# UP IN THE AIR: THE BLM'S DISAPPEARING HELIUM PROGRAM

## OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

OF THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

Thursday, May 13, 2010

**Serial No. 111-52**

Printed for the use of the Committee on Natural Resources

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html
or
Committee address: http://resourcescommittee.house.gov

U.S. GOVERNMENT PRINTING OFFICE
56-392 PDF WASHINGTON : 2010

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# OVERSIGHT HEARING ON "UP IN THE AIR: BLM'S DISAPPEARING HELIUM PROGRAM."

**Thursday, May 13, 2010**
**U.S. House of Representatives**
**Subcommittee on Energy and Mineral Resources**
**Committee on Natural Resources**
**Washington, D.C.**

The Subcommittee met, pursuant to call, at 10:10 a.m. in Room 1324, Longworth House Office Building, Hon. Jim Costa [Chairman of the Subcommittee] presiding.

Present: Representatives Costa, Holt, Sarbanes, and Lamborn.

Mr. COSTA. The oversight hearing with the Subcommittee on Energy and Mineral Resources will now begin. The subject matter for this morning's oversight hearing is on the Bureau of Land Management's efforts with regard to the disappearing Helium Program, and we will get into that in a moment.

But before I do, let me indicate that this is the Subcommittee's first hearing since the tragic accident that took place in the Gulf of Mexico, with the loss of lives. Certainly I, and I believe members of the Subcommittee, want to extend our sympathy and concerns for the families who lost their loved ones in that tragic accident. And obviously, the impacts of that accident with regard to the environmental spill is something that we are all focused on. The Department of the Interior, I believe, has sent over 13,000 personnel, together with the Coast Guard, Homeland Security, and others who are now out on the Gulf in Louisiana and Alabama and the other states, trying to assure that we do everything that is humanly possible to stop the spill and work in conjunction with the private sector, with British Petroleum and the other parties to the impacts of this pending horrific spill that is taking place.

Chairman Rahall and I have spoken a number of times with regard to this entire incident. The full Committee will be holding hearings later this month, with Secretary Salazar reporting to the full Committee. And hopefully by that time, the leak will have been, if not completely stopped, significantly reduced; and the efforts to do the remedial applications so that we can minimize the impact to the environment will be taking place.

In June, it is the intention of the Subcommittee Chair to hold at least one hearing, if not a series of hearings, to look at the proposal that the Department of the Interior is considering with regard to dividing the responsibility of the Minerals Management Service as it relates to both the Royalty Program and the inspection of these facilities throughout the Gulf and other places offshore in American waters. We will do our due diligence.

It is also the desire of this Chairman, in working with the full Committee Chairman, to provide an opportunity for members of the full Committee and Subcommittee to actually go down and visit, and see firsthand what has taken place.

It is this Chairman's view that going down there now would not be helpful to the process. We want them to fix it, and to do all the corrective action. We can do our due diligence and the appropriate oversight once they have hopefully stopped the leak, and they begin to deal with the remedial efforts that clearly must be done.

But at this point, with all the efforts that are taking place, I think I would not want our visit to be counter-productive or get in the way of what needs to be happening right now. But we certainly want to provide that opportunity for Members at the appropriate time. And I hope that will be within the next month.

So I wanted to put that in perspective because, obviously, it is central to the focus and the jurisdiction of this Subcommittee. And while we are holding this hearing this morning, this had been scheduled a month ago, and I don't want anyone to think that simply because we are holding this hearing today, that we are not focused on what is a very, very critical issue for our country, for this Subcommittee, and for the full Committee. And I know Chairman Rahall takes the responsibility and the jurisdiction of his full Committee very, very, very seriously, and he will be obviously doing everything he can, working with all the members of the Subcommittee. He is going to be sending out a letter to the members of the Subcommittee that basically outlines a course of action for the full Committee, and what he would like us to focus on with the Subcommittee here soon.

So I just wanted to put that in perspective because this catastrophe is obviously on the news every day, and it is on the minds of many Americans who are concerned about the focus of our energy policy in this country. And it is the appropriate jurisdiction both of this Subcommittee and the full Committee, and we intend to fully discharge our responsibilities in those areas.

So with that understood, I will begin my opening statement with regard to today's subject matter at hand.

**STATEMENT OF THE HON. JIM COSTA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA**

Mr. COSTA. The Federal Helium Program is something that has existed for decades, and I think oftentimes people have an interesting sense of what the Federal Helium Program may or may not be.

Notwithstanding the challenges, many challenges that we face with energy, I think it is important to note that, while we may think of helium as something that we put in balloons or that used to have an impact on dirigibles decades ago, the helium that we are familiar with, a box on the periodic table when I was a student, I guess when many of us were students, is more than just that party balloon that we may associate with it.

Helium is a very important natural gas. It is contained in most natural gas fields in the United States, but not always in commercial quantities, as our expert witnesses will tell us.

Only some natural gas fields have high-enough concentrations of helium to make its extraction economically attractive to the private sector. Most of those fields, about two-thirds of our domestic supply of helium, reside in certain localities of our country: North Texas, Oklahoma, and Kansas. The rest is located in Wyoming and the Ranking Member's State of Colorado, as well as Utah.

Those who are not aware may be interested that the U.S. Government stores significantly what is taxpayer-owned, as well as privately owned, helium in a unique natural dome that is located just outside of Amarillo, Texas, maintained by the American taxpayer, which is, in part, why we are having this hearing today.

So here is the thing. Helium isn't just the gas used for party balloons or for deep-sea diving. Helium is, in fact, essential to a common medical diagnostic tool, which many of us are familiar with, and our families or friends have benefitted from, namely MRIs, or magnetic resonance imaging. These MRIs, of course, are a common tool that we use in medical diagnostic practices for a host of diseases and injuries that we deal with.

Helium is also essential for numerous other applications, from optical fibers to space rockets to the next generation of nuclear reactors. It is an important natural element, it is an important natural gas. And therefore, we think it is important that we have this hearing today.

Our space agency, NASA, needs helium, up to 107 million cubic feet a year, to pressurize and purge the engines of the space shuttles. The Department of Energy relies on helium in its research laboratories to operate super-conductors. In many scientific and medical uses, there is absolutely no substitute for helium because of its unique properties. It has a low boiling point, high thermal conductivity, and inertness. These are all things that if I had paid more attention to it as a student when I was learning about the table, I would know better today. But they are important factors nonetheless, and that is why we are holding this hearing.

We are fortunate that the United States has major helium resources, at least 20 percent of the identified resources worldwide. We are the number-one producer of helium. Our domestic helium assets include the Federal stockpile of helium, also known as the Federal Helium Reserve, which contains approximately 24 billion cubic feet of helium, enough helium to meet our domestic needs for years if we manage it wisely.

But there are some warnings, and that is why we want to have the panel of experts testify this morning. Future shortages of affordable helium would be an obstacle for the U.S. for advances in medicine, science, and aerospace, as well as other critical applications. Which brings us again to what we will hope to learn today.

In 1996, Congress made attempts to privatize and sell the helium resources. That circumstance has changed, as the National Academy of Sciences' report so clearly illustrates. In that National Academy of Sciences' report, it says that we should, and will, consider whether a new direction is needed for the Federal Helium Program.

The questions that I will be looking at answers for today are whether or not we should continue to sell off the Federal Helium Reserve, is that appropriate? If a stockpile should be maintained,

is that appropriate? And if, in fact, we should maintain a stockpile, what is the prudent size of that stockpile?

Also, are the prices and fees for Federal helium and storage of private helium appropriate? The price structure, some indicate, is impacted because, in fact, we have this reserve. Would it change greatly if we no longer had this reserve?

Should the government policies adequately encourage conservation of helium? Again, we have this distinguished panel of experts, including the Co-Chairs of the National Academy's most recent report of the Helium Program, former Director of the U.S. Geological Survey, Dr. Charles Groat; Dr. Robert Richardson, winner of a Nobel Prize in Physics in 1996. Congratulations, Doctor. I know all Americans are proud of that achievement, and as certainly I am.

So we look forward to the testimony. And I will defer to my colleague, the Ranking Member of the Subcommittee, the gentleman from Colorado, Mr. Doug Lamborn.

[The prepared statement of Mr. Costa follows:]

**Statement of The Honorable Jim Costa, Chairman, Subcommittee on Energy and Mineral Resources**

Before we begin, let me simply state our sympathy for the families who lost loved ones in the Gulf of Mexico disaster.

I want all of the Members of this Subcommittee and the entire Committee on Natural Resources to know that since several hours after the explosion, we—Chairman Rahall, and I, and the staff—have been monitoring the Joint Command's efforts to contain the oil flow. We pray that the worst of the environmental impacts can be averted and we have already begun our own investigation into not only the cause of this catastrophe, but also the implications it has on our Nation's energy policy.

As you all know, the Committee on Natural Resources has primary jurisdiction over offshore drilling. So, while other Committees hold hearings into the potential causes of this incident, if—I reiterate if—changes are needed in the regulatory regime which governs offshore drilling, those changes will emanate from this Committee.

Meanwhile, we should not ignore our oversight responsibilities in other areas, including today's issue—the Federal Helium Program. I would note that this hearing was scheduled before the Gulf incident occurred on April 20. Still, even without the horrific accident we still see unfolding in the Gulf, one might reasonably ask "Why Helium? Why now?"

So, let's begin with a little background on helium and its importance.

Helium, a box on the periodic table for me when I was a student, is more than just the party balloon with which we all associate it. Helium occurs as a constituent of natural gas in most natural gas fields in the United States—but not always in commercial quantities. Only some natural gas fields have high enough concentrations of helium to make its extraction economically attractive to private industry. Most of those fields—about two-thirds of our domestic supply of helium—reside in North Texas, Oklahoma, and Kansas. The rest is located in Wyoming, Colorado, and Utah.

You may be interested to know that the United States government stores significant tax payer-owned as well as privately-owned helium in a unique underground natural dome located just outside of Amarillo, Texas, maintained by the American taxpayer.

So, here's the thing——helium isn't just a gas used for party balloons and deep sea diving. In fact, helium is essential to a common medical diagnostic tool with which many of us are familiar—MRIs, or "magnetic resonance imaging." Helium is also essential to numerous other applications, from optical fibers to space rockets to next-generation nuclear reactors. Our space agency, NASA, needs helium—107 million cubic feet a year—to pressurize and purge the engines of space shuttles. The Department of Energy relies on helium in research laboratories to operate superconductors. In many scientific and medical uses, there is no substitute for helium because of its unique properties—a low boiling point, high thermal conductivity, and inertness.

We are fortunate in the United States to have major helium resources—at least 20% of the identified resources worldwide—and we are the number one producer.

Our domestic helium assets include a Federal stockpile of helium, also known as the Federal Helium Reserve, which contains approximately 24 billion cubic feet of helium—enough helium to meet our diverse domestic needs for years, if managed wisely.

At a glance, this may sound like a rosy situation. Yet a new report by the National Academies, which we will hear more about today, has assessed supply and demand for helium and the Federal helium program and finds that:

- The 1996 Helium Act's directive to sell off the Federal Helium Reserve by 2015 is detrimental to the taxpayer.
- We would be selling off a valuable natural resource commodity too quickly and too cheaply.
- And, finally, and I think most importantly, the report warns that the U.S. is at risk of becoming a net importer of helium in the next 10-15 years if we do not amend the 1996 law.

These are stark warnings. Future shortages of affordable helium would be a major obstacle in the U.S. for advances in medicine, science, aerospace and many other critical applications.

Which brings us to the purpose of and need for today's hearing.

In 1996, it made sense to Congress to privatize and sell off its helium resources. Circumstances have changed, as the National Academies report so clearly illustrates. We should and will consider whether a new direction is needed for the Federal Helium Program, and discuss such key questions as:

- Whether the continued sell off of the Federal Helium Reserve is appropriate. If a stockpile should be maintained, how do we determine a prudent size?
- Whether the prices and fees for Federal helium and storage of private helium are appropriate.
- Whether government policies adequately encourage helium conservation.

We have a distinguished panel to help us address these questions, including the co-chairs of the National Academies' most recent report on the helium program—-the former Director of the U.S. Geological Survey, Dr. Charles Groat, and Dr. Robert Richardson, winner of the Nobel Prize in Physics in 1996.

I look forward to all the witnesses' testimony, and now recognize the distinguished Ranking Member of the Subcommittee.

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## STATEMENT OF THE HON. DOUG LAMBORN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Mr. LAMBORN. Thank you, Mr. Chairman. I want to thank you for holding this hearing today, and for the witnesses for being here.

But before we start, I, too, recognize that this is the first hearing of the Energy and Minerals Subcommittee since the tragic explosion of the Deepwater Horizon rig in the Gulf of Mexico. I would like to express my sympathy, as well, and offer my condolences to the workers whose lives have been cut short and their families, whose lives will never be the same.

I also hope that the environmental and economic damages can be kept to a minimum.

The Natural Resources Committee has oversight on this offshore leasing spill, and the natural resource damages caused by it, and it is critical that we continue active engagement on this matter. I know that we have hearings planned on this disaster, and that the Committee has been actively engaged in working to address the crisis, as well as to answer the questions about what happened, and if the government has responded appropriately. This is a major concern for us as a committee and for the entire nation, and we will continue to keep the residents of the area in our thoughts.

Today's hearing is on our nation's Helium Program and the National Academy's recent report about the effects of the 1996 Helium Privatization Act. Since the Helium Program's inception in 1925, it has changed substantially. The program has served a broad range of interests over nearly a century, including providing for our na-

tion's defense, scientific research, medical needs, and aerospace technology.

The National Academy's examination of the privatization of the helium industry has generated a number of important questions. Should the U.S. finish the privatization of the helium industry, or should we revisit the privatization issue in light of changing demands for helium and the nation's growing import dependence on energy and mineral resources?

Should the Bureau of Land Management continue to maintain the long-term storage facility for crude helium? Should the reserve be completely depleted by its current schedule of 2015? And at what rate should the government continue to sell off its helium reserve?

Also, in our current economic state, it is critical to examine the projected worldwide supply and demand of helium over a long term. And after such examination, what course of action should the government take for a long-term policy?

Our Helium Program has proved to be a great asset to our defense, and to our technological development over the past century, and we must continue with its responsible management.

To close, I will have a few questions for our witnesses, and I am looking forward to hearing their testimony. Thank you, Mr. Chairman, and I yield back.

[The prepared statement of Mr. Lamborn follows:]

**Statement of The Honorable Doug Lamborn, Ranking Republican, Committee on Natural Resources**

Thank you, Mr. Chairman; I want to thank you for holding this hearing today. But before we start I would like to recognize that this as the first hearing of the energy and mineral resources subcommittee since the tragic explosion of the Deepwater Horizon in the Gulf of Mexico. I would like to express my sympathy and offer my condolences to workers whose lives have been cut short and their families whose lives will never be the same.

The Natural Resources Committee has oversight on this offshore leasing spill and the natural resource damages caused by the spill, and it's critical that we continue active engagement on this matter. I know that we have hearings planned on this disaster and that the Committee has been actively engaged and work to address the crisis as well as to answer the questions about what happened and if the government has responded appropriately. This is a major concern for us as a committee and for the entire nation and we will continue to keep the residents of the area in our thoughts.

**HEARING**

Today's hearing is on our nation's helium program and the National Academies recent report about the effects of the 1996 Helium Privatization Act. Since the helium program's inception in 1925 it has changed substantially. The program has served a broad range of interests over the including: providing for our nation's defense, scientific research, medical needs and aerospace technology. The National Academies examination of the privatization of the helium industry has generated a number of important questions:

- Should the U.S. continue to finish the privatization in the helium industry?
- Should the Bureau of Land Management continue to maintain the long-term storage facility for crude helium? Should the reserve be completely depleted by its current schedule of 2015? And at what rate should the government continue to sell off its helium reserve?
- Also, in our current economic state it is critical to question what the demand and supply of helium is worldwide over a longer term. And after such examination what course of action should the government take for a long-term policy?

Our helium program has proven to be a great asset to our defense and our technology development over the past century and we must continue with its responsible management.

**CLOSE**

I will have a couple of questions for our witnesses and I am looking forward to hearing their testimony.

Mr. Chairman I yield back.

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Mr. COSTA. Thank the gentleman from Colorado for your kind words, and we both share in the loss of lives that took place as a result of that accident, and to the families.

So we will now proceed with our witnesses. And we have four that we will hear testimony from.

I believe most of you, if not all of you, have testified before a Congressional panel. You know the rules. You have a five-minute statement to make. There are three lights there in front of you. The green light stays on for four minutes, and then the yellow light goes on on your fifth minute. And when the red light goes on, hold onto your chair. No, not really.

The Chairman tends to be fairly benign about those things, but we do want to keep it within the five minutes, please, if at all possible.

And then, when we finish with our four witnesses, we will then give the opportunity for members of the Subcommittee to ask questions.

So our first witness is Ms. Marcilynn Burke, Deputy Director of the Bureau of Land Management. She is accompanied by I believe Mr. Tim Spisak, is that right?

Ms. BURKE. Spisak.

Mr. COSTA. Spisak, OK. Deputy Assistant Director for Minerals and Realty Management for the Bureau of Land Management. Let us begin with you, and we will proceed on to our other witnesses. Welcome.

**STATEMENT OF MARCILYNN BURKE, DEPUTY DIRECTOR, BUREAU OF LAND MANAGEMENT, U.S. DEPARTMENT OF THE INTERIOR; ACCOMPANIED BY TIM SPISAK, DEPUTY ASSISTANT DIRECTOR FOR MINERALS AND REALTY MANAGEMENT, BUREAU OF LAND MANAGEMENT, U.S. DEPARTMENT OF THE INTERIOR**

Ms. BURKE. Thank you, Mr. Chairman, and good morning to the other members of the Subcommittee. I want to thank you for this opportunity to testify on the Bureau of Land Management's Helium Program.

The BLM plays a key role in the management and stewardship of the nation's helium resource. And as you said, I am joined here by Mr. Tim Spisak. And he managed the BLM's helium operations from 1997 to 2004.

I will briefly summarize my written testimony, and ask that the written testimony in its entirety be made a part of this record.

Helium is a critical non-renewable natural resource that has an increasingly important role in the scientific, medical, and engineering fields. The Federal government's interest in helium dates back to World War I and its potential to lift military reconnaissance devices high above battlefields.

Recognizing the importance of helium, the Mineral Leasing Act of 1920 reserved to the Federal government all helium produced on Federal land, a reservation that remains in effect today.

There have been three key legislative actions regarding the Helium Program. In 1925, Congress created the Federal Helium Program under the Bureau of Mines, which allowed for Federal production, storage, and refinement of helium from the Hugoton Gas Fields in Texas, Oklahoma, and Kansas.

The Helium Act of 1960 changed the program's mandate from exclusive government production of helium to conservation of the resource. This legislation granted the Bureau of Mines the authority to borrow money from the U.S. Treasury, to purchase helium from private gas producers in order to store the helium at the Bush Dome Reservoir near Amarillo, Texas.

The proceeds from the sales of helium were expected to allow the Bureau of Mines to repay the debt. Demand for helium rarely, if ever, however, met the expectations underlying the terms of the Treasury's loans to the Bureau of Mines.

When the 1995 deadline to pay off the debt arrived, the $252 million the Bureau had spent on privately produced helium had increased, with interest, to $1.3 billion. Congress then passed the Helium Privatization Act of 1996, which requires the BLM to make available for sale the vast majority of the stockpile of crude helium, with the goal of paying off the helium debt by 2015.

When Congress passed the Act, there was approximately 30.5 billion standard cubic feet of helium in storage in the Bush Dome Reservoir. The Act mandated that the BLM offer for sale all of the helium in excess of 600 million standard cubic feet of permanent reserve.

The Act requires the BLM to use the amount of the helium debt and the helium in storage as parameters for its sales of crude helium. To this end, the BLM offers for sale 2.1 billion cubic feet of crude helium each year. The Act also mandated that the Federal government stop refining helium; thus, privatizing the refining helium market.

The BLM currently operates the Federal Helium Program based in Amarillo, Texas, with the primary goal of paying off the helium debt. To this end, the BLM has paid over $750 million to the Treasury. In addition to operating a storage and pipeline system, the program operates a crude helium enrichment unit that helps draw down the helium reserve in a more uniform manner.

The program also manages helium extracted from Federal resources not connected to the Hugoton Fields, including the management of associated fees and royalty contracts.

Another major component of the Helium Program is the In-Kind Program, which supplies helium to Federal agencies such as NASA and the Department of Energy for scientific research, aerospace projects, and defense purposes.

Under the In-Kind Program, Federal agencies purchase all of their refined helium from private suppliers, who in turn are required to purchase an equivalent amount of crude helium from the Federal Helium Reserve. The National Academies of Science has completed two studies of the BLM's Helium Program, one in 2000 and another this year. The BLM is currently reviewing this

version, pre-publication version of this report, and looks forward to future discussion about its recommendations.

The BLM welcomes further discussion about the Helium Program and the BLM's role in meeting future helium needs for the country. The expansion of helium-dependent technology and declining domestic reserves means the importance of helium as a strategic resource is likely to increase. We look forward to working with this committee in order to address this important issue. Thank you.

[The prepared statement of Ms. Burke follows:]

**Statement of Marcilynn A. Burke, Deputy Director, Bureau of Land Management, U.S. Department of the Interior**

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to testify on the Bureau of Land Management's Helium Program. I am Marcilynn Burke, Deputy Director of the Bureau of Land Management. Tim Spisak, BLM's Deputy Assistant Director for Minerals and Realty Management, is accompanying me today.

**Background**

Helium is a critical non-renewable natural resource. While best known for filling celebratory balloons and adjusting the pitch of the human voice, helium also plays an important role in medical imaging, space exploration, military reconnaissance, underwater diving, and fiber optics manufacturing. According to the National Academy of Sciences (NAS), helium's best known property—being lighter than air—means "that every unit of helium that is produced and used today will eventually escape Earth's atmosphere and become one less unit available for use tomorrow." The BLM plays a key role in the careful management and stewardship of the nation's important helium resource.

The most common and economical way of capturing helium is by stripping it from natural gas during gas production. Geologic conditions in Texas, Oklahoma, and Kansas make the natural gas in these areas some of the most helium-rich in the United States, ranging from 0.5 to 1.5 percent of the gas extracted during production. After World War I, recognition of the potential for helium recovery in the Texas Panhandle, Western Oklahoma, and Kansas area (collectively, the "Hugoton" field) led to the development of the Federal helium program focused in that area. In 1929, the Bureau of Mines built the Cliffside Storage Facility near Amarillo, Texas, to store helium in a naturally occurring geologic storage field known as the Bush Dome Reservoir.

**The Federal Helium Program/Congressional Authorities**

The Federal government's interest in helium dates back to World War I and its potential to lift military reconnaissance devices high above battlefields. Recognizing this key military use for helium, the Mineral Leasing Act of 1920 reserved to the Federal government all helium produced on Federal lands—a reservation that remains in effect today. Soon after the passage of the Mineral Leasing Act, Congress recognized the need to ensure that helium would be available for defense needs, and created the Federal helium program in 1925. By 1929, the Bureau of Mines began operating helium extraction and purification plants in the Texas panhandle.

After World War II ended, Federal use of helium shifted towards space exploration, and in 1960 Congress passed the Helium Act. This Act changed the program's mandate from exclusive government production of helium to conservation of the resource by encouraging private natural gas producers to sell extracted helium to the Federal government for storage in the Bush Dome Reservoir. The Helium Act granted the Bureau of Mines the authority to borrow funds from the U.S. Treasury to purchase the helium, with the expectation that the proceeds from future sales of helium would allow the Bureau of Mines to repay the debt. This borrowing authority, established by Congress in lieu of a direct appropriation, required the Bureau of Mines to repay the loan by 1985. Subsequent legislation extended the deadline to 1995.

Demand for helium rarely, if ever, met the expectations underlying the terms of the Treasury's loan to the Bureau of Mines. When the 1995 deadline to pay off the debt arrived, the $252 million the Bureau had spent on privately-produced helium had increased to $1.3 billion (principle and interest), and the Bureau of Mines appeared to have little prospect of ever repaying the debt. In his 1995 State of the

Union address, President Bill Clinton stated that it was his Administration's goal to privatize the Federal helium program.

Congress then passed the Helium Privatization Act of 1996 (HPA), which required the BLM (which assumed jurisdiction over the program after the termination of the Bureau of Mines) to make available for sale the vast majority of the stockpile of crude helium. The mandate allowed the BLM to begin selling helium as late as 2005, in order to avoid market disruption. The BLM was to make a consistent amount of helium available every year at a price based on the amount of remaining helium debt and the amount helium in storage. When Congress passed the HPA, there was approximately 30.5 billion standard cubic feet (scf) of helium in storage in the Bush Dome Reservoir. The HPA mandated the BLM to make available for sale all of the helium in excess of a 0.6 billion scf permanent reserve.

Additionally, the HPA required the BLM to cease all helium production, refining, and marketing activities to effectively privatize the refined helium market in the United States. Finally, the Act provided for the NAS to review the impacts of the 1996 Act. The NAS published its first study in 2000, and recently released a pre-publication copy of its 2010 report.

**The BLM's Helium Operations**

The BLM currently operates the Federal Helium program with a primary goal of paying off the "helium debt." To this end, the BLM has paid over $750 million dollars to the Treasury, a substantial step towards eliminating the helium debt, which the HPA froze at approximately $1.3 billion dollars. BLM anticipates repaying the helium debt by the end of 2015. According to the HPA, once the helium debt is retired, the Helium Fund (used to fund the BLM's helium program operational expenses) would be dissolved and all future receipts would be deposited directly into the Treasury.

The BLM's current helium program, with its 55 full-time employees, operates not only the original storage and pipeline system, but also a crude helium enrichment unit, owned by private industry refiners that facilitates transmission of helium to private helium operations on the BLM's helium pipeline.

The BLM is responsible for administering helium extracted from Federal resources, including management of fees and royalty contracts. These operations are not limited to the Hugoton gas field, but also occur in fields in Colorado, Wyoming, Utah, and any other state where producers extract helium from natural gas. Additionally, the BLM is responsible for administering the sale of crude helium to private refiners. These sales make the most significant contributions toward paying off the helium debt. The agency also conducts domestic and, to a lesser extent, international helium resource evaluation and reserve tracking to determine the extent of available helium resources.

Another major part of BLM's helium program is the "In-Kind" program, which supplies helium to Federal agencies (e.g., the Department of Energy and NASA) for operations and/or research. Before the Helium Privatization Act, Congress required Federal agencies to purchase their helium supplies from the Bureau of Mines. Under the current In-Kind program, Federal agencies purchase all of their refined helium from private suppliers who, in turn, are required to purchase an equivalent amount of crude helium from the Federal helium reserve. In 2009, Federal agencies purchased just over $8 million of helium through the In-Kind program, down from $11.6 million in 2008.

Finally, the program is in the final stages of disposing of facilities no longer needed for the storage and transmission of crude helium as required by the HPA.

**The National Academy of Sciences Reports**

In 2000, the NAS published its first analysis of the impacts of the HPA. Its general finding was that the Act would not have an impact on helium users. Additionally, the NAS report concluded that because the price-setting mechanism was based on the amount of the helium debt, and not the market for helium, the government's significantly higher price would mean the helium refining industry would buy crude helium from the BLM only as a last resort for fulfilling private contracts. However, private helium refiners would still be required to purchase crude helium from the BLM under the In-Kind program.

Over the course of the last decade, however, it has become apparent that assumptions underlying the 2000 NAS Report are not accurate. First, the NAS's assumption that "[t]he price of helium [would] probably remain stable through at least 2010" has proven faulty. The market for helium has seen significant fluctuations on both the demand side—which dropped significantly in 2008 after peaking the prior year—and on the supply side, which experienced a significant decline in private supplies between 2006 and 2008. In the face of this volatility, prices for helium rose

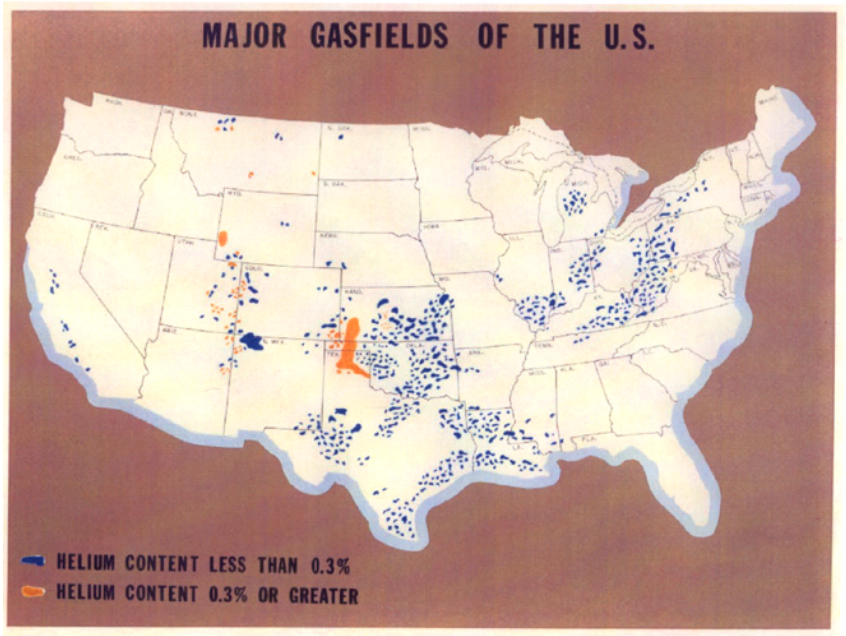
steadily over the course of the decade. By 2008, the market price for helium began to hover near the BLM's price, leading to greater withdrawals from the Federal reserve than the 2000 NAS Report anticipated.

Another market impact that the 2000 NAS Report did not address was international supply and demand for helium. According to the U.S. Department of Commerce, domestic consumption of helium decreased 2.7 percent per year from 2000-2007, while exports to the Pacific Rim grew 6.8 percent annually, exceeding the 5.1 percent growth rate in Europe. The international market also experienced supply issues because of refining capacity problems at plants in Qatar and Algeria, which would normally help supply both Europe and Asia.

In February 2010, the NAS released a prepublication copy of an updated assessment of the impact of the HPA. The BLM is currently reviewing the NAS's prepublication document, and are providing feedback. The BLM welcomed the recommendations in the 2000 NAS report, and we anticipate working closely with the authors of the 2010 report. Additionally, the BLM looks forward to working with this Committee, its counterparts, and partners in discussing NAS's recommendations related to the helium program.

**Conclusion**

The BLM welcomes further discussion about the BLM's helium program and the Bureau's role in meeting future helium needs for the country, especially for Federal agencies that depend on helium for scientific research, aerospace projects, and defense purposes. Since its discovery in the early 20th Century, helium has proven to be an increasingly important resource for scientific, medical, and engineering purposes. The expansion of helium-dependent technology and declining domestic reserves means the importance of helium as strategic resource is likely to increase. The BLM continues to serve the country by effectively managing the Federal helium reserve, and working with natural gas producers to efficiently extract helium from natural gas.

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Mr. COSTA. Thank you. And you were within the timeframe, so the Chairman appreciates that.

Our next witness is Ms. Anu Mittal, is that correct?

Ms. MITTAL. Yes.

Mr. COSTA. The Director for Natural Resources and Environment for the U.S. Government Accountability Office. So please begin your testimony.

**STATEMENT OF ANU K. MITTAL, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE**

Ms. MITTAL. Thank you, Mr. Chairman. Mr. Chairman and members of the Subcommittee, I am pleased to be here today to participate in your hearing on the Federal Helium Program.

As you know, the Federal government has played a role in the production, storage, conservation, and use of helium for over 80 years. In the early 1990s, GAO reported on various aspects of the Helium Program, and made recommendations to Interior and the Congress regarding possible changes to the program.

The passage of the Helium Privatization Act of 1996 and the construction of the Helium Enrichment Unit in 2003 have changed the program since our work in the early 1990s. My testimony will focus on these changes, and the key issues that we believe that the Congress will need to address before 2015.

I would like to first summarize some of the key effects of the 1996 Act. First, with regard to the helium debt, as you know, the 1996 Act effectively froze the debt as $1.37 billion. Because interest stopped accruing on the debt, Interior has been able to pay off a large portion of this amount, and expects to pay off the entire debt by 2015. When the debt is paid off, the Helium Fund that Interior uses to operate the program will also be terminated.

Second, the 1996 Act required Interior to offer for sale all but 600 million cubic feet of crude helium in storage by 2015. Interior, however, has not been able to sell all of the helium that it has offered for sale, and only about 68 percent of the helium offered for sale has been sold. Therefore, about 9 billion cubic feet of crude helium is expected to remain in storage in 2015.

Third, the Act required Interior to set the price for crude helium, using a formula that would cover program costs, pay off the debt, and account for inflation. As a result, the initial minimum selling price for Federal crude helium after the Act was passed was higher even than the private price for refined helium.

Over time, however, private helium prices have continued to increase, and are now almost double the Federal crude price.

Fourth, the Act established an In-Kind Program to meet Federal needs for helium. While total Federal demand for helium has fluctuated from year to year, it represents only about 10 percent of the total domestic demand. However, since 2001, the total domestic demand for helium has generally decreased, and total foreign demand, on the other hand, has consistently increased.

Finally, a key development which has addressed the helium purity concern that we reported in the early 1990s is the construction and operation of the Cliffside Helium Enrichment Unit. According to Interior officials, as we have just heard, the enrichment unit has allowed them to better manage the draw-down in purity of the helium in storage.

As you would expect, some of these changes have led to concerns about the future availability of helium for Federal and other uses.

And because the 1996 Act does not provide specific direction for the Helium Program past 2015, we have identified three key issues that the Congress will need to address within the next five years.

First, how should the helium remaining in storage after 2015 be used? In light of the changing demand for helium and the potential for future shortages, we believe that the Congress will have to decide whether the 9 billion cubic feet of crude helium expected to be in the reserve by 2015 should be sold, or should be conserved.

Second, how will the Helium Program be funded after 2015? If the helium debt is paid off in 2015 and the Helium Fund is terminated, it is not clear how the operations of the program will be paid for. Currently, the program does not receive any appropriated funds. Instead, the revenues generated by the program go into the Helium Fund, and the program has access to those funds to pay for day-to-day operations. The Congress will have to decide how the program's operations will be funded after the Helium Fund is terminated.

Finally, at what price should Interior sell the remaining crude helium in storage? Interior's price for crude helium since 1996 has been tied to the program's operating costs and debt. Once the debt is paid off, it will no longer be a factor in setting this price; and therefore, raises uncertainty about how Interior will or should set the price for remaining crude helium in storage.

The price set by Interior is important because it affects the private industry price for both crude and refined helium.

Mr. Chairman, as you can see, these uncertainties demonstrate that it is time once again for the Congress to step in and decide the future direction and operation of the Helium Program.

This concludes my prepared statement. I would be happy to respond to any questions that you have.

[The prepared statement of Ms. Mittal follows:]

**Statement of Anu K. Mittal, Director, Natural Resources and Environment, U.S. Government Accountability Office**

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to participate in this hearing to discuss the federal helium program currently managed by the Department of the Interior's (Interior) Bureau of Land Management (BLM). As you know, helium is an important nonrenewable natural resource that has a variety of uses. The federal government uses helium for, among other things, the space program, national security applications, and scientific research. For many of its uses, helium has no substitute.

During the 1960s and early 1970s, to fulfill the conservation objective of the Helium Act Amendments of 1960,[1] Interior purchased about 34 billion cubic feet of helium from private crude helium producers.[2] In the 1990s, we reported to, and testified before this Subcommittee on Interior's management of the helium program.[3] In May 1993, we testified that Interior had enough helium in storage to meet federal needs until at least 2070 and that a reassessment of the objectives of the Helium Act was needed.

Since our reports in the early 1990s, key changes have affected the federal helium program and a recent report by the National Academies' National Research Council

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[1] Pub. L. No. 86–777, 74 Stat. 918 (1960), *codified as amended at* 50 U.S.C. §§ 167–167m.

[2] "Crude helium" is a gas containing approximately 50 to 85 percent helium.

[3] GAO, *Mineral Resources: Federal Helium Purity Should Be Maintained,* GAO/RCED–92–44 (Washington, D.C.: Nov. 8, 1991); GAO, *Mineral Resources: Meeting Federal Needs for Helium,* GAO/RCED–93–1 (Washington, D.C.: Oct. 30, 1992); GAO, *Mineral Resources: Meeting Federal Needs for Helium,* GAO/T–RCED–93–44 (Washington, D.C.: May 20, 1993); GAO, *Mineral Resources: H.R. 3967 – A Bill to Change How Federal Needs For Refined Helium Are Met,* GAO/T–RCED–94–183 (Washington, D.C.: Apr. 19, 1994); and GAO, *Terminating Federal Helium Refining,* GAO/RCED–95–252R (Washington, D.C.: Aug. 28, 1995).

concluded that it is time once again to reassess the program.[4] My testimony today will (1) summarize the findings and recommendations from our work in the early 1990s, (2) highlight key changes that have occurred in the areas that we reported on in the early 1990s, and (3) describe some of the issues facing BLM's helium program in the near future.

To address these issues, we reviewed our prior reports and testimonies from the early 1990s. To identify key changes that have occurred in the areas that we reported on in the past and some of the issues facing BLM's helium program in the near future, we reviewed applicable laws and regulations, relevant studies, and data on the helium program from BLM and Interior's U.S. Geological Survey. In addition, we interviewed BLM officials associated with the helium program located at BLM's headquarters in Washington, D.C.; BLM's New Mexico State Office in Santa Fe, New Mexico;[5] and BLM's Amarillo Field Office in Amarillo, Texas. To assess the reliability of data used in this statement, we examined the data to identify obvious errors or inconsistencies, interviewed knowledgeable BLM officials, and, to the extent possible, compared the data with other sources. We determined the data to be sufficiently reliable for the purposes of presenting overall trends. Officials with BLM's helium program concurred with the new information presented in this testimony and provided technical clarifications, which we incorporated as appropriate.

We conducted this performance audit from April 2010 to May 2010 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## Background

Helium is an inert element that occurs naturally in gaseous form and has a variety of uses (see table 1).[6] Helium's many uses arise from its unique physical and chemical characteristics. For example, helium has the lowest melting and boiling point of any element and as the second lightest element, gaseous helium is much lighter than air.

**Table 1: Estimated Helium Uses in the United States, 2008**

| Category of use | Examples of applications | Amount used (million cubic feet) | Percentage |
|---|---|---|---|
| Cryogenics | Magnetic resonance imagining (MRI)<br>Fundamental science<br>Industrial cryogenic processing | 685 | 32 |
| Controlled atmospheres | Optical fiber manufacturing<br>Semi-conductor manufacturing | 382 | 18 |
| Pressure/purge | Space and defense rocket purging and pressurizing | 382 | 18 |
| Welding | Metal welding | 285 | 13 |
| Chromatography/ lifting gas/ heat transfer | Chromatography<br>Weather balloons<br>Military reconnaissance<br>Heat transfer in next-generation nuclear reactors<br>Party balloons | 270 | 13 |
| Leak detection | Leak detection | 94 | 4 |
| Breathing mixtures | Commercial diving | 50 | 2 |
| **Total** | | **2,149** | **100** |

Sources: U.S. Geological Survey's 2008 Minerals Yearbook and National Research Council.

Note: Totals may not add because of rounding.

[4] National Research Council, *Selling the Nation's Helium Reserve* (Washington, D.C.: National Academies Press, prepublication copy released on Jan. 22, 2010). Last accessed at http://www.nap.edu/catalog.php?record__id=12844 on April 20, 2010.

[5] In addition to New Mexico, BLM's New Mexico State Office also has jurisdiction over Kansas, Oklahoma, and Texas. The helium program is administered by BLM's Amarillo Field Office in Amarillo, Texas.

[6] Helium in this statement refers to helium-4, the most abundant naturally occurring helium isotope. Helium-3, which has its own supply and demand issues, is not the focus of this statement. We currently have an ongoing review looking into the implications of shortages in helium-3.

Certain natural gas fields contain a relatively large amount of naturally occurring helium, which can be recovered as a secondary product. The helium is separated from the natural gas and stored in a concentrated form that is referred to as crude helium because it has yet to go through the final refining process.

The federal government has been extensively involved in the production, storage, and use of helium since the early part of the 20th Century. The federal government and private sector cooperatively produced helium before 1925, specifically for military uses. The Helium Act of 1925,[7] as amended, assigned responsibility for producing helium for federal users to the Department of the Interior's Bureau of Mines.[8] The act provided that funds from helium sales be used to finance the program. From 1937 until 1960, the Bureau of Mines was the sole producer of helium. The 1925 act, as amended, also established a revolving fund known as the helium production fund for the program. Such revolving funds are used to finance a continuing cycle of government-owned business-type operations in which outlays generate receipts that are available for continuing operations. In the federal budget, this fund is referred to as the Helium Fund and it is used to account for the program's revenues and expenses.

The Helium Act Amendments of 1960 stipulated that the price of federal helium cover all of the helium program's costs, including interest on the program's debt. The 1960 act required the Secretary of the Interior to determine a value for net capital and retained earnings and establish this value as debt in the Helium Fund, and to add subsequent program borrowings to that debt. The program's borrowings were authorized by subsequent appropriations acts and recorded as outlays in the federal budget in the years in which they were expended. In addition, the interest was added to the debt in the Helium Fund. However, the interest is simply a paper transaction, not a government outlay. The Bureau of Mines determined that the value of the program's net capital and retained earnings was about $40 million in 1960. Subsequent borrowings from the U.S. Treasury totaling about $252 million were used to purchase helium for storage. By September 30, 1991, the debt had grown to about $1.3 billion, of which more than $1 billion consisted of interest because the interest accrued faster than the program could repay the debt.

The government's reserve of crude helium is stored in the ground in an area of a natural gas field that has a naturally occurring underground structural dome near Amarillo, Texas. The purity of the stored crude helium diminishes (degrades) over time as it mixes with the natural gas that is present in the storage area. Moreover, when extracted at an excessive rate, the degradation is accelerated because the natural gas surrounding the helium is pulled toward the extraction wells faster than the helium. This causes the helium to mix with the natural gas more rapidly. As a result, larger volumes of the mixture of natural gas and helium must be extracted to obtain the needed helium. In addition to the government's reserve of crude helium, private companies that are connected to BLM's pipeline and pay a storage fee are also able to store and retrieve their own private crude helium reserves from the same storage area.

As directed by the Congress, the National Academies' National Research Council reviewed the helium program and released a report in 2000 that evaluated changes made in the program, effects of these changes on the program, and several scenarios for managing the federal helium reserve in the future.[9] Because of subsequent changes in price and availability of helium, in 2008, the National Research Council convened a committee to determine if the current implementation of the helium program was having an adverse effect on U.S. scientific, technical, biomedical, and national security users of helium. The committee reported on these effects in early 2010 and concluded that the current implementation of the program has adversely affected critical users of helium and was not in the best interest of the U.S. taxpayers or the country.

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[7] Pub. L. No. 68–544, 43 Stat. 1110 (1925), *originally codified at* 50 U.S.C. § 161 *et seq*. These sections of the United States Code were completely amended, renumbered, revised, or repealed. The current citation is 50 U.S.C. §§ 167–167m.

[8] The Bureau of Mines was established in 1910 and abolished in 1996. The helium program was transferred to BLM.

[9] National Research Council, *The Impact of Selling the Federal Helium Reserve* (Washington, D.C.: National Academy Press, 2000).

**GAO Reported on Helium Debt, Pricing, Purity, and Alternatives for Meeting Federal Helium Needs in the Early 1990s**

Our November 1991 and October 1992 reports included findings and recommendations on the helium program's debt, the pricing of crude helium, the purity of helium in storage, and three alternatives for meeting federal needs for helium.[10]

*In 1992, GAO Recommended that Congress Cancel the Debt in the Helium Fund*

In October 1992, we reported that the Helium Fund debt had grown to about $1.3 billion, as of September 30, 1991.[11] Section 6(c) of the Helium Act Amendments of 1960 stipulated that (1) the price of federal helium should cover all of the helium program's costs, including interest on the program's debt; and (2) the debt should be repaid within 25 years, unless the Secretary of the Interior determines that the deadline should be extended by not more than 10 years. With the 10-year extension, the deadline for paying off the debt and accumulated interest was September 13, 1995. In 1992, we estimated that, in order for the Bureau of Mines to repay the debt by the 1995 deadline, it would have to charge federal agencies with major requirements for helium over $3,000 per thousand cubic feet, compared with the 1992 price of $55. These agencies, which were required under section 6(a) of the 1960 act to purchase helium from the Bureau of Mines, would have had no choice but to pay a higher price for helium. We concluded that this would have no net effect on the overall federal budget if those agencies received additional appropriations to pay for helium at a higher price because the appropriations would offset the increased revenues to the helium program.

Because conditions affecting the Bureau of Mines' helium program had changed since the Helium Act Amendments of 1960, one of the recommendations in our October 1992 report was that the Congress should consider canceling the debt in the Helium Fund. This is because we concluded at the time that it was no longer realistic to expect the agency to repay the debt by the statutory deadline of 1995, and canceling the debt would not adversely affect the federal budget as the debt consisted of outlays that had already been appropriated and interest that was a paper transaction. We reported that canceling the Helium Fund debt, however, would likely allow the Bureau of Mines to undercut private industry's refined helium prices, thus adversely affecting the private helium-refining industry.

*In 1992, GAO Found That the Federal Price for Helium Affected the Private Helium Industry and Identified Alternatives to Foster the Private Helium Industry*

The Helium Act Amendments of 1960 also were intended to foster and encourage a private helium industry. In our October 1992 report, we found that the helium price set by the Bureau of Mines had an effect on the growth of the private helium industry.[12] After the 1960 act was passed, the Bureau of Mines' refined helium price for federal users rose from $15.50 per thousand cubic feet to $35 in 1961 to cover the anticipated costs of conserving helium, which principally included purchasing helium for storage. This 126-percent increase in the federal refined helium price caused the private industry to believe that it could economically produce and sell refined helium. While private-sector prices fluctuated from a low of $21 in 1970, they gradually increased to $37.50 by 1983, which matched the Bureau of Mines' 1982 price. Over this period, the Bureau of Mines' price for helium continued to be higher than or equal to the private-sector price, and from 1983 to 1991 it appeared to act as a ceiling for private-sector prices. In 1991, the federal price increased to $55, and private-sector prices gradually increased to about $45. These price trends led us to conclude in 1992 that once a private helium refining industry had developed, it was able to successfully compete with the Bureau of Mines' program.

However, in our October 1992 report, we also noted that if the Congress decided to cancel the Helium Fund debt then this would affect how the Bureau of Mines sets its helium prices and would likely allow it to undercut private-sector prices. Therefore, we noted that if the Congress decided that fostering the private helium industry was still an objective of the Helium Program then additional actions would be needed. One alternative we identified was to require the Bureau of Mines to price its helium comparably to private-sector prices by ascertaining private-sector prices and using a comparable price or by setting a price that covered the Bureau of Mines' capital costs, operating expenses, estimated costs of a normal level of inventory, and an industry-like rate of return on its investment. A second alternative was to eliminate competition by requiring that all federal needs be met by the Bureau of Mines

[10] GAO/RCED–92–44 (helium purity); and GAO/RCED–93–1 (helium debt, pricing, and alternatives).
[11] GAO/RCED–93–1.
[12] GAO/RCED–93–1.

but prohibiting the federal helium program from selling helium to nonfederal customers.

*In 1991, GAO Made a Recommendation on the Purity of the Helium in Storage*

In our November 1991 report on helium purity, we found that the Bureau of Mines was not restricting the rate at which helium was being extracted from the helium reserve, causing the purity of the crude helium to degrade faster than would otherwise occur.[13] We noted that because of this accelerated degradation, the Bureau of Mines was incurring additional costs to extract and refine federal helium.[14] While some mixing with natural gas is inevitable, according to a study by the Bureau of Mines in 1989, the mixing should be minimized so that the crude helium's purity can be maintained at as high a level as possible in order to avoid higher future costs of extracting and refining federal helium. In our 1991 report, we reported that, according to Bureau of Mines' engineers, the accelerated degradation could be avoided by restricting total extractions to 3 million cubic feet of helium per day. At the Bureau of Mines' request, an outside petroleum engineering consulting firm reviewed the Bureau of Mines' engineering, geologic, and other studies and agreed that an extraction rate restriction of 3 million cubic feet per day was needed to protect the purity of the stored crude helium.

In 1989, the Bureau of Mines decided to restrict total daily extractions to 3 million cubic feet but later rescinded that restriction after an industry association expressed concern to the Director of the Bureau of Mines that the restriction might adversely affect private companies' ability to obtain crude helium to meet their needs. At the time of our 1991 review, the Director told us that he had not reviewed the Bureau of Mines' study when making the decision to rescind the restriction and Bureau of Mines' engineers estimated that if the helium continued to be degraded at the rate it was being degraded at that time, the Bureau of Mines would incur additional costs of as much as $23.3 million in 1991 dollars to extract and refine federal helium from the helium reserve through the year 2050.

In 1991, we recommended that the Bureau of Mines determine if setting an acceptable extraction rate was warranted and, if so, to specify that rate. In addition, we noted that if an extraction rate was specified, the Bureau of Mines should either restrict private company extractions or impose a charge on private companies that store helium in the helium reserve when their extractions exceed the established acceptable rate.

*In 1992, GAO Recommended That Congress Reassess the Objectives of the Helium Program*

In our October 1992 report, we evaluated three alternatives for meeting federal needs for helium: (1) continue the Bureau of Mines' existing program, (2) require that all federal needs be supplied by private industry, and (3) allow all federal agencies to choose to purchase helium from the Bureau of Mines or private industry.[15] These three alternatives had the potential to affect the objectives of the Helium Act Amendments of 1960, the program's debt, the federal budget, and the total cost of supplying helium to the U.S. economy differently. For example, in 1992, we reported that the growth of a private industry capable of meeting federal needs created a competitive market where the federal helium prices directly affected the private industry. In this environment, if the Bureau of Mines priced helium to repay the Helium Fund debt by 1995, it would need to charge an extremely high price, which would likely drive the Bureau of Mines out of the helium business. On the other hand, if the debt had been repaid or cancelled, the federal price likely would be lower than private prices, which could have an adverse effect on the private helium refining industry. We concluded that the choice among these and other possible alternatives was ultimately a public policy decision that should consider many issues. We recommended that the Congress reassess the act's objectives in order to decide how to meet current and foreseeable federal needs for helium.

**Two Key Developments Have Affected the Issues That GAO Reported on in the Early 1990s**

Since our reports in the early 1990s, two key developments—the Helium Privatization Act of 1996 and the construction of the Cliffside Helium Enrichment Unit in 2003—have caused considerable changes to the federal helium program. These two developments addressed or altered the areas that we had raised concerns about in the early 1990s. Specifically, the Helium Privatization Act of 1996 affected

[13] GAO/RCED–92–44.
[14] Refined helium has a varying purity of 99.99 percent to 99.9999 percent helium.
[15] GAO/RCED–93–1.

helium debt and pricing, and it reset the program's objectives. The Cliffside Helium Enrichment Unit addressed the issue of helium purity in storage.

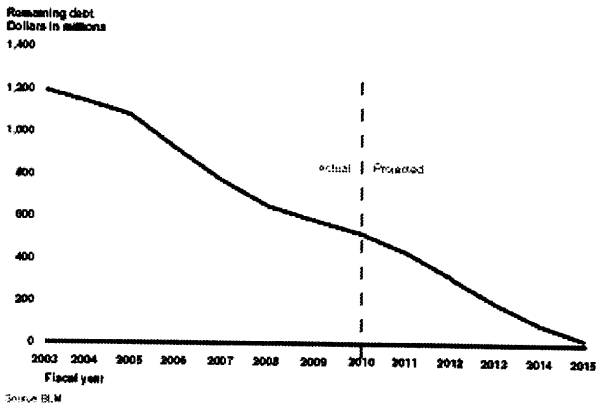
*The Helium Privatization Act of 1996 Affected the Helium Debt, Pricing, and the Program's Objectives*

After our reports in the early 1990s, the Congress passed the Helium Privatization Act of 1996, which significantly changed the objectives and functions of the Interior's helium program.[16] For example, the 1996 act made the following key changes:

- Interior was required to close all government-owned refined helium production facilities and to terminate the marketing of refined helium within 18 months of enactment (50 U.S.C. § 167b(b));
- the helium program's debt was frozen as of October 1, 1995 (50 U.S.C. § 167d(c));
- Interior was required to offer for sale all but 600 million cubic feet of the crude helium in storage on a straight-line basis—a depreciation method that spreads out the cost of an asset equally over its lifetime—by January 1, 2015 (50 U.S.C. § 167f(a)(1));
- Interior was required to set sale prices to cover the crude helium reserve's operating costs and to produce an amount sufficient to reimburse the federal government for the amounts it had expended to purchase the stored helium. The price at which Interior sells crude helium was required to be equal to or greater than a formula that incorporates the amount of debt to be repaid divided by the volume of crude helium remaining in storage, with a Consumer Price Index adjustment (50 U.S.C. §§ 167d(c), 167f(a)(3)). Furthermore, when the debt is fully paid off, the revolving Helium Fund shall be terminated (50 U.S.C. § 167d(e)(2)(B));
- Interior should maintain its role in the helium storage business (50 U.S.C. § 167b(a)); and
- established a modified "in-kind" program to meet federal needs for helium. Rather than purchasing refined helium directly from Interior, federal agencies were required to purchase their major helium requirements from persons who have entered into enforceable contracts to purchase an equivalent amount of crude helium from Interior (50 U.S.C. § 167d(a)).[17]

These changes affected the federal helium program in various ways. For example, because the 1996 act effectively froze the debt at $1.37 billion and interest no longer accrued, BLM has been able to pay off a large portion of its debt. As of the end of fiscal year 2010, BLM expects to have paid off 64 percent of the debt; it expects to pay off the entire debt around 2015 (see fig. 1).

**Figure 1: Actual and Projected Balance of the Helium Debt, Fiscal Years 2003 through 2015**

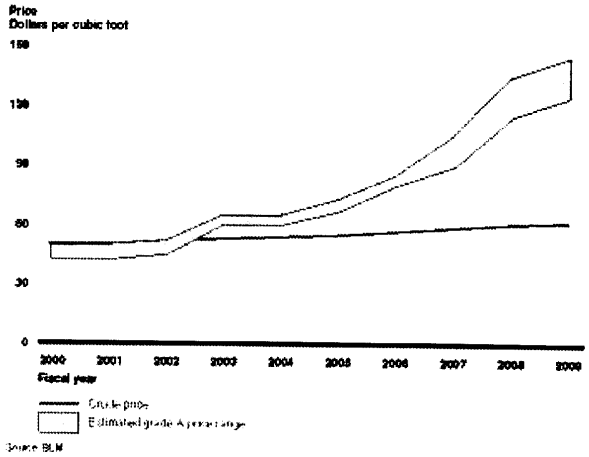



[16] Pub. L. No. 104–273, 110 Stat. 3315 (1996), *codified at* 50 U.S.C. §§ 167–167m.

[17] The term "person" means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, or state or political subdivision thereof. 50 U.S.C. § 167(2).

In addition, since the 1996 act required a specific method for pricing crude helium, the initial minimum BLM selling price for crude helium after the act was passed was almost double the price for private crude helium at that time. However, after BLM started to sell its crude helium according to the method specified in the act, the market price for crude and refined helium began to change. According to the National Research Council, the private sector began using the BLM crude price as a benchmark for establishing its price, and, as a result, privately sourced crude helium prices increased and now they meet or exceed BLM's price. Increases in the price of crude helium have also led to increases in the price of refined helium (see fig. 2). Refined helium prices have more than doubled from 2002 through 2008 pursuant to demand trends. One of the factors for recent price increases was a disruption in helium supply from plants closing because of weather-related issues. Prices increased around 2007 due to the decline in production capacity.

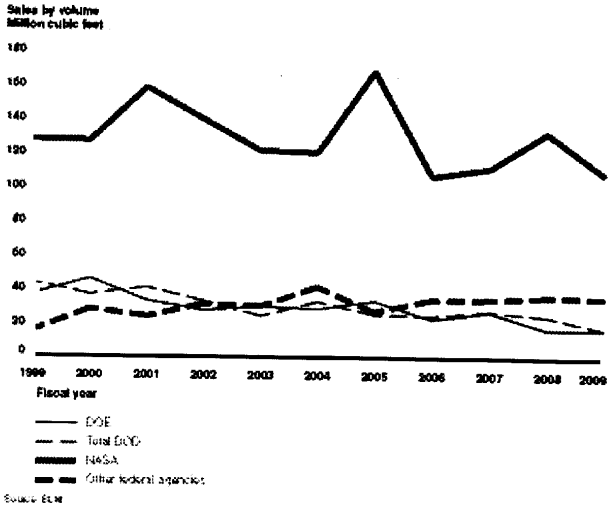
Figure 2: BLM Crude Helium Price and Grade A Price Estimates




As part of the resetting of the helium program's objectives, the 1996 act established a revised approach for meeting federal needs for helium. In 1998, BLM began engaging in in-kind sales to federal agencies. The in-kind regulations established procedures for BLM to sell crude helium to authorized helium supply companies and required federal agency buyers to purchase helium from these approved suppliers.[18] Since the in-kind program started, the sales to federal agencies have fluctuated, primarily due to the National Aeronautics and Space Administration's (NASA) unique requirement for large volumes of helium on a sporadic basis. Total federal in-kind sales for fiscal year 2009 were 175.67 million cubic feet (see fig. 3).

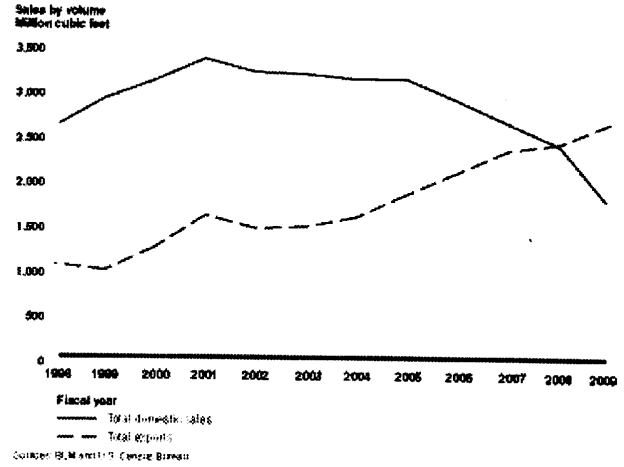
[18] 43 C.F.R. § 3195.

Figure 3: In-Kind Helium Sales by Federal Agency, Fiscal Years 1999 through 2009




Since the act was passed, demand for helium has changed over time (see fig. 4). Total domestic demand has generally decreased since 2001. The vast majority of domestic sales are made to private industries, with federal agencies making up about 10 percent of the sales. On the other hand, total foreign demand has consistently increased, and the amount of helium exported was approximately equal to the amount of helium removed from storage each year from 2000 to 2007. In 2008, the amount of helium exported exceeded the amount of helium removed from storage.

Figure 4: Domestic Sales Compared to Exports




*The Cliffside Helium Enrichment Unit Addressed the Helium Purity Issue*

The second key development, which has affected the helium purity issue that we reported on in the early 1990s, is the construction and operation of the Cliffside Helium Enrichment Unit. In response to degrading helium supplies, in 2003, Cliffside Refiners Limited Partnership—a consortium of private-sector refiners—designed and constructed an enrichment unit to produce crude helium of sufficient concentration and pressure for further refining. According to BLM officials, the total

cost of building the enrichment unit was approximately $22 million and was paid for by the Cliffside Refiners Limited Partnership. BLM, in partnership with the Cliffside Refiners Limited Partnership, operates the unit. At full capacity, the enrichment unit supplies more than 6 million cubic feet per day or 2.1 billion cubic feet per year of crude helium. The crude helium that is produced from this process is either sold or retained in storage, depending upon demand. As part of the operation, pipeline-quality residual natural gas is also made available for sale. In addition to the proceeds from the helium sales, BLM uses proceeds from the natural gas sales to fund the Cliffside helium operations and the remaining revenues are returned to the U.S. Treasury.

According to BLM officials, the enrichment unit has allowed BLM to better manage the drawdown and purity of the helium in storage because it is able to control the wells and the helium content of the feed. Without the enrichment unit, BLM would have to produce from high helium wells first to meet purity requirements and that would have a detrimental effect on the purity of later production, according to these officials.

**The Helium Program's Direction after 2015 Is Uncertain**

Changes in helium prices, production, and demand have generated concerns about the future availability of helium for the federal government and other critical purposes. The Helium Privatization Act of 1996 does not provide a specific direction for the helium program past 2015—less than 5 years away. As a result of these factors, there is uncertainty about the program's direction after 2015. Specifically:

- *How should the helium remaining in storage after 2015 be used*? The Helium Privatization Act of 1996 required BLM to offer for sale substantially all of the helium in storage by January 1, 2015. While the required amounts have been offered for sale, only 68 percent of the amounts offered for sale have actually been sold (see table 2). If the past sales trends continue, BLM will still have significantly more crude helium in storage than the 600 million cubic feet target established in the 1996 act. In addition, the demand for helium has changed over time, with foreign demand outpacing domestic demand. According to the recent report by the National Academies' National Research Council, the United States could become a net importer of helium within the next 10 to 15 years, and the principal new sources of helium will be in the Middle East and Russia. Given these circumstances, the National Academies' report recommended that the Congress may want to reevaluate how the domestic crude helium reserve is used or conserved. It is uncertain at this point how the helium in storage after 2015 will be used.

**Table 2: Actual and Projected Crude Helium Sales, 2003 through 2015**

| Amounts in millions of cubic feet | | | | |
|---|---|---|---|---|
| Fiscal year | Amount offered for sale | Amount sold | Amount not sold | Percentage sold |
| Actual sales through March 2010 | | | | |
| 2003 | 1,640 | 1,640 | 0 | 100 |
| 2004 | 2,100 | 675 | 1,425 | 32 |
| 2005 | 2,100 | 1,390 | 710 | 66 |
| 2006 | 2,100 | 1,565 | 535 | 75 |
| 2007 | 2,100 | 2,030 | 70 | 97 |
| 2008 | 2,100 | 1,638 | 462 | 78 |
| 2009 | 2,100 | 925 | 1,175 | 44 |
| 2010 (1st half of fiscal year) | 1,050 | 525 | 525 | 50 |
| **Subtotal** | **15,290** | **10,388** | **4,902** | **68** |
| Projected sales | | | | |
| 2010 (2nd half of fiscal year) | 1,050 | 480 | 570 | 46 |
| 2011 | 2,100 | 1,600 | 500 | 76 |
| 2012 | 2,100 | 1,430 | 670 | 68 |
| 2013 | 2,100 | 1,230 | 870 | 59 |
| 2014 | 2,100 | 1,230 | 870 | 59 |
| 2015 (1st quarter of fiscal year) | 460 | 271 | 189 | 59 |
| **Total** | **25,200** | **16,629** | **8,571** | **66** |

Source: BLM.

- *How will the helium program be funded after 2015*? Regardless of whether BLM is directed to continue selling off the crude helium in storage after 2015 or conserve it, there will almost certainly continue to be some form of a helium program after 2015. However, if the helium debt is paid off in 2015 as currently projected and the revolving helium fund is terminated, it is not clear how the operations of the helium program will be paid for. Currently the helium program does not receive any appropriated funds for its operations. The revenues generated by the program go into the Helium Fund and the program has access to those funds to pay for its day-to-day operations. It is uncertain at this point how the helium program's operations will be funded after 2015.
- *At what price should BLM sell its crude helium*? Since the Helium Privatization Act of 1996 was passed, BLM has set the price for federal crude helium at the minimum price required by the act. However, because federal crude helium reserves provide a major supply of crude helium, we expect BLM's prices will continue to affect private industry market prices for crude and refined helium. In addition, in recent years, the helium market has been influenced by other market forces as well as supply disruptions that have resulted in price increases. For example, in 2006, failure of a major crude helium enrichment unit process vessel led to unscheduled outages and eventually to a major plant shutdown. When BLM first set its price after the 1996 act, its price was estimated to be significantly higher than the market price, but now the reverse is true—BLM's price is estimated to be at or below the market price. On one hand, BLM could consider raising its price to ensure that the federal government is getting a fair market return on the sales of its assets. On the other hand, raising the price could potentially further erode sales. Furthermore, the 1996 act, like the Helium Act Amendments of 1960 before it, tied the price to the program's operating expenses and debt. If the debt is paid off in 2015 as projected, the debt will no longer be a factor in setting helium prices. BLM officials told us that the 1996 act sets a minimum selling price and that the Secretary of the Interior has the discretion to set a higher price. BLM is planning to reevaluate its selling price, according to agency officials. As a result, it is uncertain how BLM will price its crude helium in the future.

In conclusion, Mr. Chairman, there have been a number of changes in the market for helium since the Congress passed the Helium Privatization Act of 1996. As the end point for the actions that were required to be taken under the act come upon us in the next 5 years, the Congress may need to address some unresolved issues such as how to use the remaining helium in storage, how the helium program will operate once the Helium Fund expires in 2015, and how to set the price for the helium owned by the federal government.

Mr. Chairman, this concludes my prepared statement. I would be pleased to answer any questions that you or other Members of the Subcommittee may have at this time.

May 13, 2010

GAO Highlights

Highlights of GAO-10-700T, a testimony before the Subcommittee on Energy and Mineral Resources, Committee on Natural Resources, House of Representatives

# HELIUM PROGRAM

## Key Developments Since the Early 1990s and Future Considerations

### Why GAO Did This Study

The federal government has been extensively involved in the production, storage, and use of helium since the early part of the 20th Century. The federal helium program is currently managed by the Department of the Interior's Bureau of Land Management (BLM). During the 1960s and early 1970s, Interior purchased about 34 billion cubic feet of crude helium for conservation purposes and to meet federal helium needs, such as for the space program and scientific research. Crude helium is a gas of 50 to 85 percent helium. While some of the helium was used to meet federal needs, most of it was retained in storage. The funds used to purchase the helium became a debt owed by the program. GAO reported on the management of the helium program in the 1990s (GAO/RCED-92-44 and GAO/RCED-93-1).

Since GAO's reviews of the program in the 1990s, key changes have affected the federal helium program and a recent report by the National Academy of Sciences concluded that it is time to reassess the program. This testimony discusses (1) GAO's findings and recommendations in the early 1990s, (2) key changes that have occurred since the early 1990s, and (3) some of the issues facing the helium program in the near future.

To address these issues, GAO reviewed prior reports, applicable laws and regulations, National Academy of Sciences' reports, and BLM data. GAO is not making any new recommendations.

View GAO-10-700T or key components. For more information, contact Anu K. Mittal at (202) 512-3841 or mittala@gao.gov.

### What GAO Found

In 1991 and 1992, GAO reported on various aspects of the federal helium program including the helium debt, pricing, purity, and alternatives for meeting federal helium needs, and made recommendations to the Congress. For example, in 1992 GAO recommended that the Congress cancel the helium program's debt. As of September 1991, the debt had grown to about $1.3 billion, over $1 billion of which was interest that had accrued on the original debt principal of about $290 million. The debt was also a factor in setting the price of federal helium because the Helium Act Amendments of 1960 stipulated that the price of federal helium cover all program costs, including interest on the debt. In addition, in 1991, GAO recommended that Interior take action to preserve the purity of the helium in storage. GAO found that the unrestricted extraction of helium from the reserve was causing the purity of the crude helium to degrade faster than would otherwise occur, which in turn had increased the program's operating costs. In 1992, GAO also recommended that the Congress reassess the conservation objectives of the helium program and consider other alternatives to meet federal helium needs.

Since GAO's reports in the early 1990s, two key developments—the Helium Privatization Act of 1996 and the construction of the Cliffside Helium Enrichment Unit in 2003—have caused considerable changes to the helium program and addressed or altered GAO's prior concerns. Specifically, the 1996 act froze the program's debt and as a result over half the debt has been paid off and the remainder should be paid off by 2015. The 1996 act also required a specific method for pricing helium. This along with other changes in the supply and demand for helium, has resulted in BLM's price to be at or below the market price. Lastly, in resetting the program's objectives, the act directed Interior to stop refining helium and it established a modified in-kind approach for meeting federal helium needs. Agencies must purchase helium from refiners who then purchase an equivalent amount of crude helium from BLM. The Cliffside Helium Enrichment Unit has addressed concerns about helium purity by enriching the crude helium through extracting excess natural gas.

Changes in the helium market have generated concerns about the future availability of helium for federal and other needs. The 1996 act did not provide a specific direction for the federal helium program past 2015. Some of the uncertainties facing the program include:

- *How should the helium owned by the federal government be used?* BLM's effort to sell off the helium in storage is going slowly and will not be completed by 2015; and some believe that the United States could become a net importer of helium within the next 10 to 15 years.
- *How will the helium program be funded after 2015?* If the helium program's debt is paid off by 2015, the revolving Helium Fund that is used to pay for the program's day-to-day operations will be terminated.
- *At what price should BLM sell its helium?* In the past, the debt has been a factor in the price and the price has been above the market price. After 2015 the debt will be paid off and the current price is at or below market.



## GAO Contact and Staff Acknowledgments

For further information about this testimony, please contact Anu K. Mittal at (202) 512–3841 or mittala@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to this testimony include Jeffery D. Malcolm and Barbara Patterson, Assistant Directors; Carol Bray; Meredith Graves; and Caryn Kuebler. Also contributing to this testimony were Michele Fejfar, Jonathan Kucskar, and Jeremy Sebest.

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Mr. COSTA. Thank you very much. The five points that you referenced in your summary are areas I want to revisit when we have that time. But we have two more witnesses.

Dr. Robert Richardson, Professor and Vice Provost for Research, Emeritus and Senior Science Advisor for the President and Provost of Cornell University. And, as I noted in the opening, he was, in 1996, awarded a Nobel Prize in Physics, and we are very honored that he is here.

In addition, for members of the Subcommittee—using helium in his work, you are correct. Obviously, there is a tie here.

But for members of the Subcommittee, Dr. Charles Groat, who is also a professor and Chair in Energy and Mineral Resources for the Department of Geological Sciences at the University of Texas at Austin, and was the former Director of the U.S. Geological Survey from 1998 to 2005. The two professors have submitted their written testimony in tandem. So while they will each be making a presentation for five minutes, the written testimony, for your information, is one that they have done together. It has a wonderful title: "Up In The Air: The BLM's Disappearing Helium Program." No puns intended, I suspect.

Dr. Robert Richardson, we are very anxious to hear your testimony. Please begin.

**STATEMENT OF ROBERT C. RICHARDSON, Ph.D., VICE PROVOST FOR RESEARCH, EMERITUS AND SENIOR SCIENCE ADVISOR TO THE PRESIDENT AND PROVOST, CORNELL UNIVERSITY**

Dr. RICHARDSON. I have made a career of low-temperature research using liquid helium for 50 years. The Chairman of the Subcommittee gave an admirable summary of the uses of helium.

Mr. COSTA. Thank you very much, Doctor.

Dr. RICHARDSON. And I will confine my remarks to substitution, conservation, and recovery of helium because helium is far too precious for frivolous use.

Mr. COSTA. Thank you.

Dr. RICHARDSON. For some applications, other gases can replace helium. The main reason helium is widely used in some applications is that it is far too cheap. Other applications rely on helium's unique properties, and there are no alternative uses.

In the first category where the substitutions might exist, these include lifting. For uses requiring lifting, you can easily substitute hydrogen, if there are safety concerns. For instance, in India, hydrogen is substituted for helium for party balloons. And the quantity of hydrogen in the party balloons, it is not particularly dangerous, and it makes it more exciting for the kids.

[Laughter.]

Dr. RICHARDSON. Welding. The chemical inertness is the key for the welding. And argon can be substituted for helium, and the helium gas is slightly more expensive than argon, but not enough more expensive.

Helium, Europe mostly uses argon, but the United States uses helium. And then semi-conductor and optics manufacturing, and most of Asia uses our helium to manufacture fiber optics. Argon or hydrogen will be substituted.

The essential product is super-conducting magnets and the basic research. I will conclude.

[The joint prepared statement of Dr. Richardson and Dr. Groat follows:]

**Statement of Charles G. "Chip" Groat, Ph.D. and Robert Richardson, Ph.D., Co-Chairs, Committee on Understanding the Impact of Selling the Helium Reserve, National Research Council of the National Academies**

Good morning, Mr. Chairman and members of the Committee. My name is Charles Groat. I am Director of the Energy and Earth Resources Graduate Program and Professor in the Jackson School of Geosciences and a Professor in the LBJ School of Public Affairs at the University of Texas at Austin. My name is Robert Richardson. I am the F.R. Newman Professor of Physics at Cornell University. We are co-chairs of the National Research Council's Committee on Understanding the Impact of Selling the Helium Reserve. [1]

The study we will be discussing was commissioned by the Department of the Interior's Bureau of Land Management (BLM) and the principal task of our committee was to determine whether the sell-off of the nation's helium reserve as prescribed by law has had an adverse effect on the United States' scientific, technical, bio-

[1] The National Research Council is the operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine of the National Academies, chartered by Congress in 1863 to advise the government on matters of science and technology.

medical, and national security users of helium. Our committee concluded that the sell-off has had and will continue to have adverse effects and we developed a series of recommendations to address several outstanding issues with respect to the reserve.

To provide context for those recommendations, we will first give a brief overview of our critical helium needs, with a focus on the plight of the small research user community, and also discuss those uses where substitutes or conservation and recycling are possible. We will follow this with a discussion on helium supply issues, the federal helium reserve itself and the sale of federally owned helium. Our testimony will conclude with a discussion of our major recommendations regarding the reserve and its management in the future.

**Uses of Helium**

Ready access to affordable helium is critical to many sectors in academe, industry and government and the range of those uses is quite impressive, enabling research at the coldest of temperatures, weather monitoring, surveillance in areas of combat, and optical fiber production, among many other applications.

The diversity in uses for helium arises from its unique physical and chemical characteristics—specifically, its stable electronic configuration and low atomic mass. Among those unique characteristics are the temperatures at which helium undergoes phase transitions (liquefies and freezes). Helium has the lowest melting and boiling points of any element: It liquefies at 4.2 Kelvin and 1 atmosphere and solidifies only at extremely high pressures (25 atmospheres) and low temperatures (0.95 Kelvin). These characteristics have led to many cryogenic applications for helium; the largest single category of applications by percentage of helium consumed. These range from the efforts of individuals engaged in small-scale cryogenic research to large groups using high-energy accelerators and high-field magnets. All rely upon helium to conduct their research and because the federal government supports many of these researchers, it has a direct stake in their continued success. Cryogenic users also include segments of the medical profession, not only for biological research in devices such as superconducting quantum interference devices (SQUIDS), but also for diagnosis with tools such as magnetic resonance imaging (MRI) devices.

Helium's ability to remain liquid at extremely low temperatures also gives rise to its usage for purging and pressurizing systems and as such, helium is a critical component in our nation's space exploration and defense efforts. The National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD) use significant amounts of helium, as it is the only gas that can be used to purge and pressurize the tanks and propulsion systems for rockets fueled by liquid hydrogen and oxygen.

Other uses rely on helium's lifting capabilities. As the second lightest element, gaseous helium is much lighter than air, causing it to be quite buoyant. When combined with helium's chemical inertness—especially when compared with the highly flammable alternative, hydrogen—its buoyancy makes helium an ideal lifting gas. NASA and the Department of Energy (DOE) use helium to support weather-related missions and various research and development programs funded by these agencies, both at government facilities and at universities. DOD also must have ready access to helium to operate the balloon- and dirigible-based surveillance systems needed for national security.

Other applications draw on other characteristics of helium—its relatively high thermal conductivity, low viscosity, and high ionization potential—either alone or in combination. These applications include welding, providing controlled atmospheres for manufacturing operations, and detecting leaks in equipment providing vacuum environments to science and industry. Table 1 summarizes the principal applications of helium and the share of use in the United States.

**Small-Scale Researchers.** Among the events that triggered this study were soaring prices and limited supplies that characterized the refined helium market in the fall of both 2006 and 2007. The committee, composed of individuals from a wide range of professions—economists, business people, and scientists—noted that small-scale scientists were particularly hard hit by price shocks and interruptions in the supply of refined helium during that time. An informal poll conducted by committee members of approximately 40 research programs at universities and national laboratories that use helium indicated that shortages of liquid helium interrupted the helium supply for almost half of these programs, with some interruptions lasting for weeks at a time during the late summer and fall of both 2006 and 2007. For many of those scientists, losing access to helium, even temporarily, can have long-term negative repercussions for their research.

In general, the federal grant programs that support these researchers simply are not designed to cope with significant pricing shifts and other market volatilities experienced here. Grants typically are for a two to three year period and for a set amount that does not adjust if a principal expense of research such as helium significantly increases. Further, the relatively short duration of such grants, with no guaranty of renewal, effectively precludes these research programs from entering into long-term contracts that might at least partially reduce the risk of significant prices increases and shortages.

**Domestic vs. foreign consumption.** The balance between domestic and foreign consumption of helium has shifted significantly in the past 15 years. Until the mid-1990s, substantially all helium production took place in the United States. This factor, combined with high shipping costs and limited availabilities, meant that until recently, the amount of helium consumed abroad was fairly small. In 1990, for example, 70 percent of worldwide helium consumption was in the United States.

Since 2000, the demand for helium in the United States has remained fairly constant but has grown significantly elsewhere, reducing the U.S. share of total consumption. See Figure 1. Foreign growth has been assisted by the opening of several helium-producing facilities outside the United States that will be discussed later in this testimony, as well as by improved capabilities in the short-term storage and handling of refined helium. This period also saw a significant increase in industrial applications, principally in semiconductor and optical fiber fabrication facilities outside the United States, and the shifting of industrial facilities that use helium from the United States to foreign countries. By 2007, United States helium consumption had dropped to below 50 percent of worldwide demand. Despite a slight downturn in overall demand for helium associated with the global recession in 2008-2009, the committee believes, based on recent trends, that foreign demand should continue to increase relative to demand in the United States, such that U.S. relative consumption is expected to drop even further by 2012, to slightly more than 40 percent.

**Substitution, Conservation, Recovery.** For some applications, other gases can replace helium, but other applications rely critically on helium's unique properties and there are no alternatives. Applications in the first category, where substitutes for helium might exist, include these:

- Lifting. For these uses, where low density is the only requirement, hydrogen is sometimes substituted if safety concerns can be met.
- Welding. Here, chemical inertness is the key property. For processes such as gas tungsten arc welding—a critical process applicable to reactive metals such as stainless steel, titanium, aluminum, and others in high-value, high-reliability applications—Europe mostly uses argon, while the United States uses helium.
- Semiconductor and fiber optics manufacturing. In these applications, high thermal conductivity is the important property. Often, hydrogen may be substituted.

In the above applications, economics, market conditions, availability, safety, and legislation can influence the choice among helium and other gases.

In contrast, other applications require the unique properties of helium, typically relying on the extremely low boiling point of liquid helium to achieve a desired result. These applications include the following:

- Purging/Pressurizing. Entities such as NASA and DOD must purge and then pressurize liquid hydrogen (LH2) and liquid oxygen (LOx) rocket propulsion systems and fuel tanks that may be at liquid air temperatures or colder. Although gaseous hydrogen might have the right physical properties for use in LOx systems, its reactivity with oxygen precludes its use. Nitrogen is not desirable because nitrogen might contaminate the LOx. In LH2 environments, all gases other than helium and hydrogen would freeze, clogging fuel lines and systems and rendering the rocket engines nonfunctional.
- Superconductivity. All applications that employ superconducting magnets, including medical magnetic resonance imaging (MRI) machines, high energy accelerators and many high field magnets used in research, rely on the continued availability of helium. Current materials and technologies dictate that only helium can act as the crucial refrigerant to cool these materials below superconducting thresholds.
- Basic research. Here, no other substance can be used as a refrigerant to achieve temperatures from 4.2 K above absolute zero down to millikelvins.

**Supply of Helium**

**Sources.** Helium is the second-most-abundant element in the universe, but its diffusive properties mean that atmospheric helium leaks into space, rendering it relatively scarce on Earth. At only 5.2 parts per million (ppm) in air, it is not economically feasible to extract helium from the atmosphere using current technology. Rather, the principal source of helium is natural gas fields. Helium nuclei (or alpha par-

ticles) are produced in the radioactive decay of heavy elements such as uranium and thorium, located in Earth's crust. While most of these helium atoms find their way to the surface and escape, a small fraction are trapped by the same impermeable rock strata that trap natural gas. Such natural gas usually consists primarily of methane and secondarily of ethane, propane, butane, and other hydrocarbons and various other contaminants, including H2S, $CO_2$, and He.

There are three different situations in which helium contained in natural gas may be economically recovered:

- Helium may be extracted as a secondary product during the primary process of producing methane and natural gas liquids (NGLs) such as propane, ethane, butane, and benzene.
- For natural gas fields that have sufficient concentrations of helium and other non-fuel gases such as sulfur and $CO_2$ to economically justify their extraction, the gas in those fields may be directly processed for the non-fuel constituents.
- Helium may be extracted during the production of liquefied natural gas (LNG), which consists primarily of liquefied methane.

For the first two recovery processes, current technology requires threshold concentrations of 0.3 percent helium before separation of the helium is commercially feasible. For the third process, the helium is extracted from the tail gases, the gases that remain after the methane has been liquefied. The helium concentration in those tail gases is much higher than in the original gas, allowing the economical extraction of helium even through the original natural gas might contain as little as 0.04 percent helium.

Figure 2 shows the principal domestic sources of helium. Historically, most helium in the United States has been recovered using the first method described above, as a byproduct of producing methane and natural gas liquids. Almost all of that helium has been produced in the mid-continental region around the Hugoton Field. As is described in later testimony, this is where the federal helium reserve system is located. The Hugoton Field is mature and the production of methane, NGL and secondary products such as helium from that field is expected to significantly decline over the next several years. In the last few decades, helium has been produced in Wyoming using the second method described above, where the natural gas is directly processed for its helium and other non-fuel content. Potential helium reserves have also been explored in the Four Corners area.

Outside of the United States, only small reserves of the first two sources of helium have been exploited and for many years, the rest of the world has relied upon the United States as their principal source of helium. Recently, the development of large LNG facilities has opened up new, potential sources of helium. The principal countries in which those facilities are being developed are Algeria, Qatar, and Russia, with smaller facilities coming online in Australia. These areas are expected to become increasingly more important sources of helium as the Hugoton and adjoining fields mature. See Figure 3.

**Supply Chain.** After being refined, helium is transported to end users through a fairly complicated supply chain. In the United States, the helium typically is liquefied and delivered by refiners either to their transfill stations situated throughout the United States or to distributors of industrial gases. This transportation is handled using expensive domestic tanker trucks or bulk-liquid shipping containers standardized according to the International Organization for Standardization (ISO), each of which holds approximately 1.0 to 1.4 million cubic feet (MMcf) of helium. While some of the largest helium users contract directly with a refiner for their helium purchases and deliveries, most sales to end users are through the retail division of a refiner or a distributor. The refiners and distributors then repackage the helium, either in its liquid state into dewars—evacuated, multiwalled containers designed to hold liquid helium—of varying sizes or in its gaseous state into pressurized cylinders, tube-trailers, or other modules as needed by the end users.

**Federal Policy Regarding Helium**

Helium has long been the subject of public policy deliberation and management, largely because of its many strategic uses and its unusual source. Shortly after natural gas fields containing helium were discovered at the beginning of the last century, the U.S. government recognized helium's potential importance to the nation's interests and placed its production and availability from federally owned mineral interests under strict governmental control. In the early years, helium principally was used for its lifting capability, as a safe alternative to highly flammable hydrogen. By the mid-1920s full-scale production facilities had been built and were being operated by the federal government to support its lighter-than-air aviation programs.

In the 1960s, helium's strategic value in cold war efforts was reflected in policies that resulted in the creation of the federal helium reserve. Although much of the

infrastructure predates the cold war, the Federal Helium Reserve as a program began and currently consists of

- The Bush Dome reservoir, a naturally occurring underground structural dome in the Cliffside Field near Amarillo, Texas, where federally owned (and some privately owned) crude helium is stored;
- An extensive helium pipeline system running through Kansas, Oklahoma, and Texas (the Helium Pipeline) that connects crude helium extraction plants with each other, with helium refining facilities, and with the Bush Dome reservoir,
- Various wells, pumps and related equipment used to pressurize the Bush Dome reservoir, to place into and withdraw crude helium from it, and to operate other parts of the helium reserve.

The 1960s efforts also included inducements for private companies to develop helium extraction and refining facilities and to sell crude helium to the United States. The program was quite successful, resulting in the accumulation of approximately 35 billion cubic feet (Bcf) of helium by the mid 1970s. This amount was many times the 600 (750) million cubic feet (MMcf) of helium then being consumed domestically (globally) and so further purchases were suspended. The amount of helium maintained in the helium reserve remained fairly constant for the next 20 years.

The latest manifestation of public policy is expressed in the Helium Privatization Act of 1996 (1996 Act), which directs that substantially all of the helium accumulated as a result of those earlier policies be sold off by the year 2015, at prices sufficient to repay the federal government for its outlays associated with the helium program, plus interest.

**Context of Current Study.** The last section of the 1996 Act called for the Secretary of the Interior to commission a study from the National Academies to determine whether disposal of federally owned helium pursuant to the 1996 Act would have a substantial adverse effect on critical interests of the country. The report that followed (2000 Report) found that because the helium market had been quite stable since the 1980s and the price at which federally owned helium must be sold under the 1996 Act was significantly higher than the price at which privately owned crude helium was then being sold, the sell off of the helium would not have a substantial adverse effect on critical users. The report predicted that the price of privately owned crude would gradually rise to the price at which federally owned helium was being offered, and until it reached that level very little federally owned helium would be purchased, given the availability of cheaper sources.

While the helium market remained fairly stable for several years after issuance of the 2000 Report, that report did not accurately predict the market's response to efforts to sell-off federally owned helium. In March 2003, when BLM first offered federally owned helium for sale, the entire 1.6 Bcf offered for sale was purchased. Rather than gradually rising, the prices for privately owned crude helium rapidly rose such that by 2007, those prices were on par with and often exceeded the legislatively prescribed price for federally owned helium. Retail prices for helium commensurably rose, more than doubling between 2003 and 2008. In addition, during the summer and fall of 2006 and 2007, the helium market encountered widespread shortfalls, with some of the interruptions lasting for weeks at a time.

The amount of federally owned helium being sold is enormous: it is currently equivalent to approximately one-half of U.S. helium needs and almost one-third of global demand. One consequence is that the price of federally owned helium, which is set not by current market conditions but by the terms of the 1996 Act, dominates, if not actually controls, the price for crude helium worldwide.

**Committee Findings, Recommendations.** As mentioned at the beginning of this testimony, the principal charge of our committee was to determine whether the sell-off of the nation's helium reserve as prescribed by law has had an adverse effect on the United States' scientific, technical, biomedical, and national security users of helium. In response to this charge, the committee determined that selling off the helium reserve, as required by the 1996 Act, has adversely affected critical users of helium and is not in the best interest of U.S. taxpayers or the country. The sell-down of federally owned helium, which had originally been purchased to meet the nation's critical needs, is coming at a time when demand for helium by critical and noncritical users has been significantly increasing, especially in foreign markets. If this path continues to be followed, within the next ten to fifteen years the United States will become a net importer of helium whose principal foreign sources of helium will be in the Middle East and Russia.

In addition, the pricing mandated by the 1996 Act has triggered significant increases in the price of crude helium, accompanied by equally significant increases in the prices paid by end users. Finally, the helium withdrawal schedule mandated by the 1996 Act is not an efficient or responsible reservoir management plan. If the

reserve continues to be so managed, a national, essentially nonrenewable resource of increasing importance to research, industry, and national security will be dissipated.

The committee recommends several ways to address the outstanding issues. Several of its recommendations respond to the very large impact that selling off the reserve has had and is continuing to have on the helium market in general, including a recommendation that procedures be put in place that open the price of federally owned helium to the market.

Another of the committee's concerns is that the drawdown schedule required by the 1996 Act, which dictates that the reserve helium be sold on a straight-line basis—the same amount must be sold each year until the reserve is substantially gone—is a wasteful way to draw down a reservoir. Because it is much more costly and more likely to leave significant amounts of helium unrecoverable than alternative drawdown scenarios, the committee recommends that this portion of the 1996 Act be revisited. In addition, given recent developments in the demand for and sources of helium (the principal new sources of helium will be in the Middle East and Russia, and if the sell-down continues, the United States will become a net importer of helium in the next 10 to 15 years), the committee recommends that Congress reconsider whether selling off substantially all federally owned helium is still in the nation's best interest.

The committee also addresses the needs of small-scale, government-funded researchers who use helium, a group that has been hit particularly hard by sharp price rises and shortages that have characterized the helium market in recent times. This group was singled out mainly because such research is an important public enterprise and the funding mechanisms available to the researchers, typically grants on 3-year cycles for set amounts, do not allow them to respond to short-term fluctuations. These research programs should have some protection from the instabilities recently characterizing the helium market. Accordingly, the committee recommends that the researchers be allowed to participate in an existing program for government users of helium that would give them priority when there is a helium shortage. It also recommends that funding agencies help such researchers to acquire equipment that would reduce their net helium requirements. Implementing these recommendations would not subsidize such users nor would it require significant additional outlays: Indeed, over time, it would lead to the much more efficient use of the federal funds with which helium is purchased.

Because the helium market is rapidly changing and helium is critically important to many critical users, the committee includes recommendations that would facilitate long-range planning to meet the nation's helium needs, including the collection and dissemination of needed information and the formation of a standing committee to regularly assess whether national needs are being appropriately met. The remaining conclusions and recommendations consist of steps to help properly manage the helium reserve and protect this important national resource. The language of the committee's full recommendations is contained in the summary of the report, which is attached to this statement.

Finally, while noting that the question of how critical helium users in the United States will be assured a stable supply of helium in the future is beyond the scope of its charge, the committee points out that several important issues related to this topic remain unanswered. How will the large amounts of federally owned helium that remain after the mandated sell-off deadline in 2015 be managed after that date? Moreover, from a wider perspective, should a strategic helium reserve be maintained? These questions need to be answered in the near future, well before most federally owned helium is sold.

This concludes our testimony to the committee. Thank you for the opportunity to testify on this important topic. We would be happy to elaborate on any of our comments during the question and answer period.

ATTACHMENTS –

TABLE 1 Helium Uses in the United States

| Category | Representative Application | U.S. Share (%) |
|---|---|---|
| Cryogenics | | 28 |
| | Magnetic resonance imagining | |
| | Fundamental science | |
| | Industrial cryogenic processing | |
| Pressurize/purge | | 26 |
| | Space and defense rocket purging and pressurizing | |
| Welding | | 20 |
| Controlled Atmospheres | | 13 |
| | Optical fiber manufacturing | |
| | Semiconductor manufacturing | |
| Chromatography/ lifting gas/heat transfer | | 7 |
| | Chromatography | |
| | Weather balloons | |
| | Military reconnaissance | |
| | Heat transfer in next-generation nuclear reactors | |
| | Party balloons | |
| Leak detection | | 4 |
| Breathing mixtures | Commercial diving | 2 |

SOURCE: USGS, 2007. These data are extrapolated from data in a USGS survey conducted by BLM personnel in 2003. Current shares are not known precisely but are expected to be approximately as shown.

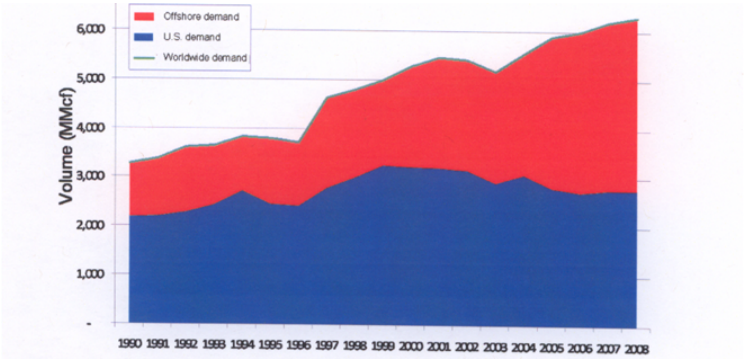


FIGURE 1. Market demand for refined helium in the United States (blue), in other countries (red), and worldwide (green line) for the years 1990 through 2008. SOURCE: U.S. Geological Survey 1990-2008 Minerals Yearbook (Helium).


Figure 2.The United States crude helium supply system. Historically, the Hugoton and surrounding fields have been the principal sources of helium. Recently, natural gas fields in Wyoming with rich helium and other non-fuel content have become an increasingly important supply of helium, while potential new fields are located in the Four Corners area. SOURCE: U.S. Geological Survey 2006 Minerals Yearbook (Helium).

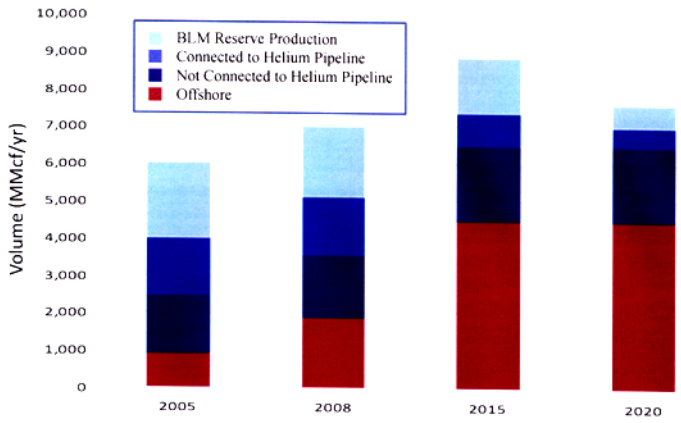


FIGURE 3. Actual (2005 and 2008) and estimated (2015 and 2020) crude helium capacities by crude helium source. Light blue represents helium available through the sell-off of the federal helium reserve; medium blue represents crude helium being produced from neighboring natural gas fields such as the Hugoton Field by those refining facilities connected to the helium pipeline; dark blue are domestic helium sources, principally in Wyoming, not connected to the helium pipeline; brown are foreign sources of helium.

**Summary from Selling the Nation's Helium Reserve**
**A Report of the National Research Council**

Ready access to affordable helium is critical to many sectors in academe, industry and government. Many scientists—from individuals engaged in small-scale cryogenic research to large groups using high-energy accelerators and high-field magnets—rely upon helium to conduct their research and because the federal government supports many of these researchers, it has a direct stake in their continued success. The medical profession also depends on helium, not only for biological research in devices such as superconducting quantum interference devices (SQUIDS), but also for diagnosis with tools such as magnetic resonance imaging (MRI) devices. Industrial applications for helium range from specialty welding to providing the environments in which semiconductor components and optical fiber are produced. Government agencies that require helium include the National Aeronautics and Space Administration (NASA) and the Department of Defense (DOD), as only helium can be used to purge and pressurize the tanks and propulsion systems for NASA and DOD's rockets fueled by liquid hydrogen and oxygen. NASA and the Department of Energy (DOE) also use helium to support weather-related missions and various research and development programs funded by these agencies, both at government facilities and at universities. Finally, DOD must have ready access to helium to operate the balloon- and dirigible-based surveillance systems needed for national security.

The Federal Helium Reserve, managed by the Bureau of Land Management (BLM) of the U.S. Department of the Interior, is the only significant long-term storage facility for crude helium in the world and currently plays a critical role in satisfying not only our nation's helium needs but also the needs of the world. The federally owned crude helium now on deposit in the Reserve was purchased by the federal government as a strategic resource during the cold war. After the cold war, Congress enacted legislation (the Helium Privatization Act of 1996 referred to hereinafter as the 1996 Act) directing that substantially all of the federally owned helium in the Reserve be sold at prices sufficient to repay the federal government's outlays for the helium and the infrastructure, plus interest. The present report, called for by BLM, examines whether BLM's selling of this helium in the manner prescribed by law is having an adverse effect on U.S. users of helium and, if so, what steps should be taken to mitigate the harm. [2]

This report assesses the current status of the supply and demand for helium as well as the operation of the federal helium program. It concludes that current efforts to comply with legislative prescriptions have had and will continue to have negative impacts on the needs of both current and future users of helium in the United States. The sell-down of federally owned helium, which had originally been purchased to meet the nation's critical needs, is coming at a time when demand for helium by critical and noncritical users has been significantly increasing, especially in foreign markets. If this path continues to be followed, within the next ten to fifteen years the United States will become a net importer of helium whose principal foreign sources of helium will be in the Middle East and Russia. In addition, the pricing mandated by the 1996 Act has triggered significant increases in the price of crude helium, accompanied by equally significant increases in the prices paid by end users. Finally, the helium withdrawal schedule mandated by the 1996 Act is not an efficient or responsible reservoir management plan. If the reserve continues to be so managed, a national, essentially nonrenewable resource of increasing importance to research, industry, and national security will be dissipated.

## FINDINGS AND RECOMMENDATIONS

### SPECIFIC RECOMMENDATIONS FOR IMMEDIATE IMPROVEMENTS

To address these issues, the committee first lays out three specific recommendations for improving the federal helium program: changing the methods for pricing the helium being sold, committing more resources to managing the physical facili-

[2] As discussed more fully in the section of Chapter 1 entitled "Review of the 2000 Report's Conclusions," the 1996 Act called for an Academy study to determine if such disposal would have a substantial adverse effect on U.S. interests. That study, The Impact of Selling the Federal Helium Reserve, published by the NRC in 2000 and referred to hereinafter as the 2000 Report, concluded that the 1996 Act would not substantially affect matters. While several of that study's findings remain valid, it did not correctly predict how the 1996 Act would impact prices or how the demand side of the helium market would grow, in part a response to the ready availability of helium arising from the sell-off of the Helium Reserve pursuant to the 1996 Act. These factors have significantly impacted the current market for helium.

ties at the Federal Helium Reserve, and providing assistance for small-scale scientists by expanding the sales program for government users to include them and promoting conservation and reuse by these users.

**Pricing Mechanism**

The 1996 Act set minimum selling prices, adjusted for inflation, for crude helium held by the BLM such that the sale of that helium at those prices would generate sufficient revenue to repay the federal government for what it originally spent to purchase the helium and to build the supporting infrastructure, plus interest. BLM has elected to sell its helium at those minimum prices. At the time of the 1996 Act, the minimum selling price was almost double the price being paid for privately owned crude helium. A market that had been stable for several decades prior to the sell-off of federally owned helium, experiencing neither drastic price increases nor shortages of supply,[3] began to change after BLM started to sell its crude helium. Almost immediately, privately sourced crude helium prices began to rise, and those prices continued to steadily increase so that they now meet or exceed BLM's price, and many of the sales contracts for private helium expressly tie future selling prices to BLM's price. Thus this legislatively set price for federally owned helium is now setting the price for crude helium, and there is no assurance that this price has any relationship to the current market value of that helium.

To the extent BLM's price is lower than the price the market would otherwise set for crude helium, this pricing mechanism could have several negative consequences: (1) it could lead to inaccurate market signals, increased consumption, and accelerated depletion of the Federal Helium Reserve; (2) it could retard efforts to conserve and develop alternative sources of crude helium, (3) it could result in transfers of taxpayer assets to private purchasers at below-market values—that is, it could amount to a taxpayer-financed subsidy for consumption of this scarce publicly owned resource; and (4) sales of federally owned crude helium could end up subsidizing exports of helium.

The managers of the Reserve should shift to a market-based pricing policy to improve the exploitation of this important national asset. The report notes that several mechanisms could be used to implement market-based pricing and thereby introduce competition, or the threat of it, to the process. However, one complicating factor is that before federally owned helium can be used, it must be refined, and the refining capacity linked to the Reserve is owned by four companies. The committee believes that market-based pricing of crude helium from the Reserve will require that purchasers other than those four companies have access to refining capacity linked to the Reserve. However, additional details on mechanisms to provide access to excess refining capacity and to attain the goal of market-based pricing of crude helium from the Reserve are beyond the committee's charge.

**Recommendation. The Bureau of Land Management (BLM) should adopt policies that open its crude helium sales to a broader array of buyers and make the process for establishing the selling price of crude helium from the Federal Helium Reserve more transparent. Such policies are likely to require that BLM negotiate with the companies owning helium refining facilities connected to the helium pipeline the conditions under which unused refining capacity at those facilities will be made available to all buyers of federally owned crude helium, thereby allowing them to process the crude helium they purchase into refined helium for commercial sale.**

**Management of the Reserve**

An additional aspect of the 1996 Act that has significant—and undesirable, in the judgment of this committee—implications for the overall management of the Helium Reserve is the Act's requirement that the sale of federally owned crude helium is to take place on a straight-line basis.[4] The mandated constant extraction rate conflicts with standard practices for the exploitation of this type of reservoir, which is that production rates vary over the economic life of a deposit, typically declining over time. Declining production rates and reservoir pressures delay encroachment

[3] 2000 Report, page 9.

[4] The law directs that crude helium from the reserve be offered for sale in such amounts as may be necessary to dispose of all helium in excess of 600,000,000 cubic feet on a straight-line basis between January 1, 2005 and January 1, 2015. Although BLM has offered helium for sale in the amounts required by the 1996 Act, not all such helium has been purchased and as a consequence significant amounts of federally owned helium will remain in the Federal Reserve after January 1, 2015. This is discussed in more detail in Chapter 5 in the section entitled "Sell-Down of Crude Helium Pursuant to 1996 Act."

of water from nearby aquifers and connected reservoirs, and promote the efficient drainage and recovery of the resource gas in place.

**Recommendation. The BLM should develop and implement a long-term plan that incorporates appropriate technology and operating practices for delivering crude helium from the Reserve in the most cost-effective manner.**

**Assistance for Small-Scale Researchers**

Among the events that triggered this study were the soaring prices and limited supplies that characterized the refined helium market in the fall of both 2006 and 2007. The committee, composed of individuals from a wide range of professions—economists, business people, and scientists—notes that small-scale scientists were particularly hard hit by price shocks and interruptions in the supply of refined helium during that time. An informal poll conducted by committee members of approximately 40 research programs at universities and national laboratories that use helium indicated that shortages of liquid helium interrupted the helium supply for almost half of these programs, with some interruptions lasting for weeks at a time during the late summer and fall of both 2006 and 2007. While anecdotal, these poll results provide clear indication that this community of users is directly impacted by general shortages of helium. For many of those scientists, losing access to helium, even temporarily, can have long-term negative repercussions for their research.

In general, the federal grant programs that support these researchers simply are not designed to cope with the pricing shifts and other market volatilities experienced here. The grants typically are for a two to three year period and for a set amount that does not adjust if a principal expense of research such as helium significantly increases. Further, the relatively short duration of such grants, with no guaranty of renewal, effectively precludes these research programs from entering into long-term contracts that might at least partially reduce the risk of significant prices increases and shortages. Further, if BLM were to implement the market-based pricing mechanism recommended in this report, the retail price for helium may commensurably increase, which will have an even greater negative impact on those helium users.

These negative impacts could, however, be mitigated at least in part through a programmatic and policy change that would allow small users being supported by government contracts and grants to participate in a program—commonly referred to as the in-kind program [5]—operated by BLM for the sale of helium to federal agencies and their contracting agents. Under that program, qualified buyers purchase their refined helium indirectly from BLM on a cost-plus basis. [6] Notably, participants in the program have priority access to helium in times of shortages. [7] The committee believes that such an expansion of the in-kind program would eliminate supply concerns and many of the price fluctuations that have negatively affected federally funded researchers during the past few years. Further, such an extension would be without significant cost to the programs supporting these researchers and, indeed, should lead to a more efficient use of the federal funds being used to purchase helium.

**Recommendation. The crude helium in-kind program and its associated customer priorities should be extended by the Bureau of Land Management, 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.**

In addition to recommending that these users be allowed to participate in the in-kind program, the committee believes that the conservation and reuse of helium by these users should be promoted by the agencies funding this research. Although adopting such a policy may be costly in the short-run, the committee judges that it would save money in the long-run and would help to reduce many of the negative effects of the price and supply disruptions referred to in the preceding discussion.

**Recommendation. Federal agencies such as the Department of Energy, the National Science Foundation, the National Aeronautics and Space Administration and the Department of Defense, which**

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[5] The in-kind program is discussed in more detail in Chapter 5 in the section entitled "In-Kind" Program of Crude Helium Distribution."

[6] As discussed more fully in the section of chapter 5 entitled "In-Kind Program of Crude Helium Distribution" the price is negotiated between the supplier and user and includes BLM's cost of crude helium plus refining and transportation costs and profits for the refiner and distributor.

[7] 50 U.S.C.A. Section 167d (a);

**support research using helium, should help researchers at U.S. universities and national laboratories acquire systems that recycle helium or reduce its consumption, including low-boil-off cryostats, modular liquefaction systems, and gaseous recovery systems.**

The committee notes that because total U.S. research applications account for only 2 to 4 percent of all usage of refined helium in the United States, the negative effects of supply and price disruptions for the U.S. research community not currently participating in the in-kind program could be addressed at relatively low cost. Moreover, in the judgment of this committee, the benefits for the nation that would accrue from minimizing these disruptions would be substantial.

GENERAL RECOMMENDATIONS FOR MEETING U.S. HELIUM NEEDS

In addition to the specific recommendations just discussed, the committee sets out more general recommendations for how to best meet the nation's current and future helium needs. These include recommendations for (1) collecting and making available the information needed to more effectively manage the Federal Helium Reserve and to formulate future helium policy, and (2) initiating strategies to develop a more comprehensive long-term program for meeting the nation's helium needs.

**Collection of Information**

One of the difficulties encountered by this committee and the previous NRC committee that issued the 2000 Report was the lack of timely and sufficient information to evaluate the supply and demand sides of the helium market, especially non-U.S. supply and demand, and the operation of the Federal Helium Reserve. Such information is needed by those who formulate and carry out U.S. policies on helium in order to make good decisions.

**Recommendation. The Bureau of Land Management (BLM) should acquire, store, and make available to any interested party the data to fill gaps in (1) the modern seismic and geophysical log data for characterization of the Bush Dome reservoir, (2) information on the helium content of gas reservoirs throughout the world, including raw data, methodology, and economic assessment that would allow the classification of reserves contained in specific fields, and (3) trends in world demand. BLM or other agencies with the necessary expertise, such as the U.S. Geological Survey, should develop a forecast over the long term (10-15 years) of all U.S. demand for helium for scientific research and for space and military purposes.**

**Recommendation. Unless expressly prohibited from doing so, Bureau of Land Management should publish its database on the helium concentrations in the more than 21,500 gas samples that have been measured throughout the world and provide its interpretations of gas sample analyses, especially those reflecting likely prospective fields for helium.**

**Long-Range Planning**

Helium is critically important to many U.S. scientific, industrial, and national defense sectors. Further, the helium market is rapidly changing, as evidenced by the unforeseen developments on both the supply side and demand side of that market since the 2000 Report was released. Finally, because the Reserve is so large, steps undertaken in connection with it can have unintended consequences, the most pertinent being the effect of the pricing mechanism adopted by BLM pursuant to the 1996 Act on worldwide prices for helium. These considerations merit the development of a more permanent and sustained plan for managing this valuable resource.

In addition, the Federal Helium Reserve is a finite resource and so at some point in the future will be depleted. However, the helium needs of users in the in-kind program will continue. The BLM and the White House Office of Science and Technology Policy (OSTP) should develop a strategy to address these important future needs.

**Recommendation. The Bureau of Land Management should promptly investigate the feasibility of extending the Helium Pipeline to other fields with deposits of commercially available helium as a way of prolonging the productive life of the Helium Reserve and the refining facilities connected to it.**

**Recommendation. The Bureau of Land Management (BLM) should form a standing committee with representation from all sectors of the helium market, including scientific and technological users, to regularly assess whether national needs are being appropriately**

**met, to assist BLM in improving its operation of the Federal Helium Reserve, and to respond to other recommendations in this report.**

**Recommendation. The Bureau of Land Management, in consultation with the Office of Science and Technology Policy and relevant congressional committees, should commission a study to determine the best method of delivering helium to the in-kind program, especially after the functional depletion of the Bush Dome reservoir, recognizing that this will not happen until well after 2015.**

**Recommendation. The congressional committee or committees responsible for the federal helium program should reevaluate the policies behind the portions of the 1996 Act that call for the sale of substantially all federally-owned helium on a straight-line basis. It or they should then decide whether the national interest would be better served by adopting a different sell-down schedule and retaining a portion of the remaining helium as a strategic reserve, making this reserve available to critical users in times of sustained shortages or pursuant to other predetermined priority needs.**

CONCLUSION

The committee notes that securing a stable and accessible helium supply in the future requires addressing several important issues that are beyond the scope of this study. For example, the legislative framework for the operation of the federal helium program is silent on the management of the Federal Helium Reserve after January 1, 2015, the mandated date for disposal of substantially all federally owned crude helium. What is to be done with the remaining federally owned crude helium? How will BLM operations beyond 2015 be financed? Should the Reserve, either as a federal or a private entity, as appropriate, continue to exist after the BLM debt to the U.S. Treasury has been retired? While the committee supports maintaining a strategic reserve, addressing these issues requires the involvement of Congress and the broader federal science policy establishment because they go well beyond the reserve management responsibilities of BLM.

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Mr. COSTA. Thank you very much, Professor. We will look forward to having an opportunity to ask you some additional questions when we get to that part of the hearing.

Our last witness, but certainly not least, as I indicated, both Professor Groat and Professor Richardson have submitted their written testimony together. Dr. Charles Groat is Professor and Chair in the Energy and Mineral Resources for the Department of Geological Sciences at the University of Texas at Austin. As I noted, Dr. Groat was also the former Director of the U.S. Geological Survey from 1998 to 2005.

Could you please present your testimony, Dr. Groat?

## STATEMENT OF CHARLES G. GROAT, Ph.D., CHAIR IN ENERGY AND MINERAL RESOURCES, DEPARTMENT OF GEOLOGICAL SCIENCES

Dr. GROAT. Thank you, Mr. Chairman. I appreciate the opportunity to summarize the results of the National Research Council study on the impacts of selling off the national helium reserve.

As the Chairman and Dr. Richardson discussed the use of helium, I will make a couple of comments about the supply situation.

In 2009, approximately 170 million cubic meters of helium were extracted from natural gas or withdrawn from the helium reserves. Approximately 78 percent of that production comes from the United States, 10 percent from Algeria, and most of the remainder from Russia, Poland, and Qatar.

The U.S. supplies all domestic demand, and approximately 80 percent of world demand. Part of the supply comes from the sale of helium from the Federal Reserve. The Helium Privatization Act of 1996 called for sales of 2.1 billion cubic feet, as noted earlier, per year in order to sell off the reserve by 2015.

In 2009, the Amarillo Field Office of BLM sold 940 million cubic feet. The Federal Reserve contains about 18 billion cubic feet, as of 2009. Given the actual rate of sales, there will be more than the mandated amount, 600 million cubic feet, as noted by other witnesses, of helium left in the reserve in 2015, which raises the question from the committee, what happens after 2015.

The principal change charged to our committee was to determine whether the sell-off of the Nation's helium reserve, as prescribed by law, has had an adverse effect on the United States' scientific, technical, biomedical, and national security users of helium.

In response to this charge, the committee determined that selling off the helium reserve in the manner prescribed by the 1996 Act has adversely affected critical users of helium, and is not in the best interest of U.S. taxpayers or the country.

The sell-down of Federally-owned helium is coming at a time when demand for helium by critical and non-critical users has been significantly increasing, especially in foreign markets. If this path continues to be followed, within the next 10 to 15 years the United States will become a net importer of helium, whose principal foreign sources will be the Middle East and Russia.

In addition, the pricing mandated by the 1996 Act has triggered significant increases in the price of crude helium. The helium withdrawal schedule mandated by the 1996 Act is not an efficient or responsible reservoir management plan.

Another of the committee's concerns is that the draw-down schedule required by the 1996 Act, which dictates that the reserve of helium be sold on a straight-line basis, the same amount must be sold each year until the reserve is substantially gone, is a wasteful way to draw down a reservoir, because it is more costly and more likely to leave significant amounts of helium unrecoverable than alternative draw-down scenarios.

The committee, therefore, recommends that a portion of the 1996 Act be revisited, that particular portion.

Furthermore, the committee recommends that the Congress reconsider whether selling off substantially all the Federally-owned helium is still in the nation's best interest.

The committee also addressed the needs of small-scale, government-funded researchers, a group that has been particularly hardhit by the sharp price rises and the shortages that have characterized the helium market in recent times. These research programs should have some protection from the instabilities recently characterizing the helium market.

Accordingly, the committee recommends that the researchers be allowed to participate in an existing In-Kind Program for government users of helium that would give them priority when there is a helium shortage, and insulation from the accompanying dramatic retail price increases.

Because the helium market is changing rapidly, and helium is critically important to many users, the committee report includes

recommendations that would facilitate long-range planning to meet the nation's helium requirements. Including the collection and dissemination of needed information, and the formation of a standing committee to regularly assess whether the national needs are being appropriately met.

Finally, while noting that the question of how critical helium users in the United States will be assured a stable supply of helium in the future was beyond the scope of its charge, the committee points out that several important issues related to this topic remain unanswered.

How will the large amount of Federally-owned helium that remained after the mandated sell-off in 2015 be managed after that date? Moreover, from a wider perspective, should the strategic helium reserve be maintained?

These questions need to be answered in the near future, well before more Federally-owned helium is sold and will require action by the Congress.

This concludes my spoken remarks.

**[The joint prepared statement of Dr. Groat and Dr. Richardson can be found on page 24.]**

Mr. COSTA. Thank you very much. A number of questions that I had have been answered as it relates to the 1996 proposal at that time by a sense of Congress to, in essence, eliminate the reserve by 2015.

Professor Groat, you clearly, I think, have given us a sense that we need to revisit that 1996 policy by the Congress at that time.

What has changed so dramatically in terms of the demand and the usage of helium that puts us on a different track? And I guess the other question, I guess, is, it seems like logically you are indicating that if we eliminate the reserve, we will go, in a short period of time, from being the net provider of helium throughout the world, to a net importer.

And I am wondering, is there not a third scenario in which, in fact, as a result of the elimination of the reserve, that it might increase domestic production for helium, and how that would take place absent the reserve.

There are two parts to that question, the demand and then the——

Dr. GROAT. Right. I think the stimulus for the price erratic, the changes in pricing were, the events had started in 2003, when you actually began selling the helium reserve off, and went on the market with helium. They sold 1.6 billion cubic feet. And as one of the testimonies pointed out earlier, the price for government helium at that time was high, and private-sector helium was low.

It didn't take very long for private-sector helium to move up above the government helium, so there was a large price increase. At the same time, there were demand increases globally and in the United States. There were some planned and unplanned maintenance issues, both at the——

Mr. COSTA. But if I am a consumer of helium, either for scientific purposes or because I manufacture MRI machines, why would I buy helium from the private sector, when it came significantly higher than the reserve?

Dr. GROAT. Well, the government was only selling its helium to refiners. So they——

Mr. COSTA. I see.

Dr. GROAT. It had to be refined first. You couldn't buy it directly from the government any more.

Mr. COSTA. OK. So then the refiners were making a good profit.

Dr. GROAT. They were doing better, yes. In fact, and that combined with the straight-line sell-off set a Federal price that remain now very low. And the refined price, retail price went up very high. Couple that with world demand increasing, particularly in Asia.

So we had the beginnings of a critical supply-and-demand situation that really affected the small researchers probably most significantly because they have fixed budgets. They can't go back for more money to buy more helium. And so they really felt the pinch, and were probably the most vocal about that.

Your question about supply is an interesting one. Are there ways to increase the supply. If you look at the total resource base of helium in the United States, it is huge. But the base that is commercially exploitable is not. And so it is a legitimate question to wonder whether, if the price continues to go up, which would force some of the substitutions Dr. Richardson talked about, some of the conservation that could take place; if that price were to go up, would that encourage others to process other helium resources for the helium?

In other words, there are helium and natural gas in the Four Corners area.

Mr. COSTA. Right. Did you look at that?

Dr. GROAT. We did not.

Mr. COSTA. You did not.

Dr. GROAT. We did not. In fact, Mr. Chairman, one of the things we pointed out that we were very emphatic about was that the availability of information about potential sources of helium, about demand for helium, about supply economic issues, is sparse. We had a great difficulty in getting original data, and that is one of the reasons we put such an emphasis on trying to gather that information in formulating long-range plans.

Mr. COSTA. Do both you and Dr. Richardson believe we ought to maintain a reserve?

Dr. RICHARDSON. Yes.

Dr. GROAT. I think the committee and Dr. Richardson and I both felt—the committee wasn't asked that question, but individuals on the committee, including both of us, feel the reserve has a legitimate and important role in the future.

Mr. COSTA. Dr. Richardson, how do you, you talked about how there are other uses. You went from party balloons to welding to other kinds of things that should not be used helium, that hydrogen and some of the other gases can be substitutes for.

But how do you, I mean, isn't that ultimately a function of price? Or is it just availability?

Dr. RICHARDSON. I think the price. And I think that helium probably has a factor of 20, too cheap.

Mr. COSTA. Too cheap, OK. I want to get back to that in a moment. But I do want to ask our lead witness if, in fact, it has been an issue that she has had with the Department, with the Secretary

or with others within the Administration, to revisit the current plan that has been moving forward as she outlined, as you outlined, Ms. Marcilynn, to basically pay off by 2015 and continue to implement this. Or is there a reconsideration taking place now within your agency and by the Department? In light of the changes that many of the witnesses have indicated in recent years.

Ms. BURKE. Yes. Mr. Chairman, the report has certainly generated quite a bit of discussion within the Bureau, and we are well aware of the supply-and-demand issues that have changed over time, making our helium less expensive relative to other sources.

But the Helium Privatization Act is very specific in its direction to the Bureau. So——

Mr. COSTA. No, I understand that. But is there any—I am just trying to get a sense. Is there any discussion taking place to reconsider that?

Ms. BURKE. Yes.

Mr. COSTA. OK. My time has expired. I will now defer to the gentleman from New Jersey. We have, I am told, votes in about 15 minutes. So what I will intend to do is give every Member here an opportunity to have five minutes for their questions. And if there is further time, we will maybe consider some others.

But when votes are called, it is the Chair's intention to shortly thereafter close the hearing.

Mr. Holt.

Mr. HOLT. Thank you, Mr. Chairman. And I thank you and the staff for assembling a good group of witnesses on what is a topic that is more important than generally recognized. And so, thank you.

As someone who actually wrote on this subject three decades ago, about why it was important for the government, why it was in the public interest to maintain helium reservoirs; and as someone who was not in Congress when the revisions were made in the mid-nineties, but who read with alarm what Congress had done; I am delighted that the Chairman is revisiting this now.

First of all, Dr. Richardson, did I understand you correctly to say that you think the, in your own opinion, that the price for helium is off by a factor of 20? Is that—all right?

Dr. RICHARDSON. Party balloons are three dollars, and I think that it would be appropriate for them to sell at $60.

Mr. HOLT. Thank you.

Dr. RICHARDSON. Because, I mean, it is not a major use, but it is symptomatic of the problem.

Mr. HOLT. Well, that raises lots of other questions. But I thought, I thought that in recent years—and I suppose this would be a question for Ms. Burke—that private, the private commercial price for helium is more or less pegged to the Federal price now. That there was not much discrepancy between. Am I misguided in this? Or maybe someone else can answer that. OK.

Mr. SPISAK. Yes. Generally, the Bureau price is, serves as a benchmark price. And a lot of contracts are tied to that. But they will add on a refining charge. And so it is always going to be above.

With some of these shortages that occurred over the last several years due to some of the supply issues, you have the market driv-

ing the price up quite a bit higher. And it doesn't always come back once it goes up.

Mr. HOLT. A question, maybe starting with Dr. Richardson and Dr. Groat, but for anyone who wants to chime in. Recognizing that predictions are difficult, especially about the future, can anybody explain why the predictions about the—historically, the predictions about the use of helium have been pretty far off? And will that help us, the lesson, can we draw lessons from that to help us understand what future need might be?

Dr. GROAT. Mr. Holt, I think part of the problem has been a benefit. It has been technology. There have been developments in technology. MRIs, for example, fiber optics, those sorts of things that put demands on helium that weren't anticipated in some of the earlier projections. And then the growth of the Asian economy that does a lot of this work has increased the volume of demand internationally.

So I think the supply, the demand situation has probably been the least accurately projected. And one of our chief concerns was that with a standing committee, we might have a chance to keep a better handle on those kinds of changes than we have been able to do in the past.

Mr. HOLT. Do we need to mandate or ask for better data about supplies? Does that require new studies, or just reporting of data?

Dr. GROAT. Speaking from the committee's opinion, I think we felt strongly that obtaining more data was important, and that the responsibility for doing that would need to be fixed with an agency or with an organization so it was clear what the responsibilities are.

The helium is, through the USGS Mineral Service, actually funded, or supported through BLM, does do routine statistical gathering of information. So there is some information. But the specificity is difficult to obtain that is needed. And also, some of the market changes are very difficult to monitor. And we would really benefit, I think, from better efforts there, and clear responsibility assignments, which aren't there now.

Mr. HOLT. Thank you. I am intrigued by your—well, my time is up.

Mr. COSTA. Go ahead.

Mr. HOLT. I am intrigued by the suggestion of the NRC panel, that helium be supplied in kind or on a subsidized basis to small researchers. It seems to me that would not be terribly expensive.

But I guess the question is, from a Congressional point of view, how would that be accomplished? This committee, obviously, would have no jurisdiction over that, I think. Do you have any advice for us on that?

Dr. GROAT. I can speak, reflect some of the committee discussions, and perhaps the others would care to speak in.

Much of the research that uses helium by the small research community is Federally funded: NSF, DOE. So they are technically Federal users of helium, but they have no mechanism for accessing it, since the money comes through a Federal agency.

So it would be contingent upon the agency doing the funding to have a program for getting at the In-Kind Program. So I am not so sure it is a question of it is illegal or immoral for that to happen.

It is a question of mechanisms or processes that would be workable to do it.

And we think access to the In-Kind Program would be a great insulator for the research community, and solve many of its problems. But how you do it is the difficult part.

Mr. HOLT. Thank you.

Mr. COSTA. You are welcome. The gentleman from Maryland is next, Mr. Sarbanes.

Mr. SARBANES. Thank you, Mr. Chairman. I am neither a physicist nor an economist, so I am kind of hanging on by my fingernails here for this conversation.

But Dr. Groat, could you just take me through again why you believe that if we don't, if we don't sort of adjust the current trend, we are going to end up being importers of helium from other places? Just take me through that one more time.

Dr. GROAT. A couple of factors. One is that there aren't new deposits being put on line in the United States right now. I shouldn't say—that is not absolutely true because there are small ones. But the major supply that we tap now is very mature. And so it is subject to decline with time.

So if we don't look at any economic incentives to develop new supplies and our existing ones decline, and we end up selling off the Federal reserve, the domestic supply base of helium is going to drop off dramatically over the next 10 to 15 years. We will still have a demand.

Now, the U.S. demand has flattened out, but the global demand, when added to, the international added to ours has gone up dramatically. And so if we are not supplying it, and if the dependency for helium for our own needs and the global needs are based on foreign sources, and those are based on LNG facilities in Algeria and Qatar and Russia; and if there is a glut of natural gas on the market and we may not see all—it is almost a perfect storm of factors that could lead to critical supply shortages for the U.S. community, and a global situation where their supply needs aren't met, as well.

So it is a number of factors working together that could cause a supply disruption in a fairly short period of time.

Mr. SARBANES. So it is not that our reserves will be disappearing; it is that our management of the economics of this will be such that we won't, we won't have the kind of access to the reserves and the production capacity and so forth that will allow us to deliver that out of our own resource, as opposed to getting it someplace else? Is that correct?

Dr. GROAT. There is some of both. Our own reserves in the U.S. are being depleted.

Mr. SARBANES. They are.

Dr. GROAT. If there were economic incentives to develop additional ones, then it would help solve that problem.

But the amount of helium out there in natural gas that is being processed for LNG, which takes a much lower concentration, and if it were all processed, and if it were turned into helium, then we would not have a numerical supply situation. It comes down, as you mentioned, to economics, and the willingness of the private sector to invest in providing that helium.

Mr. SARBANES. I think I was being misled by the fact that by 2015, we are still going to have a certain amount of helium in the reserve. Which makes one thing that we are OK in terms of supply.

But what you are saying is that eventually that is just a matter of time, if we don't address this broader issue.

Dr. GROAT. Yes, correct. The law says there will be 600 million cubic feet left. And then the sell-off rate is telling us that it won't all be gone that was intended to be gone by 2015, so we will have a significant amount of helium left in the reserve. But no responsibility for what happens after that, as BLM has pointed out. So that is the part that is hanging over us right now.

Mr. SARBANES. Thank you.

Mr. COSTA. I just want to, I have a couple other questions. I don't know if Mr. Holt does, but they really take on the questions that my colleagues just asked.

I mean, it is being depleted, in fact, because that was the public policy that was enumerated in 1996, right? That the Federal government should not be in the business of holding a helium strategic reserve.

I mean, we had, I mean, we had a strategic petroleum reserve that used to be in California as a part of our Navy strategic defense planning. It was felt that the use of helium really dated back 80 years to a policy that was no longer strategic in nature.

And so in 1996, good, bad, or indifferent—I mean, that is why we are reexamining it—the plan was to phase this out by 2015. That is what we are doing, right?

And what you are suggesting in the report is that in reflection of what has taken place between now and 1996, and what you see us going forward with, that you are saying it is in the United States' best interest in terms of our longer-term public policy that we maintain a reserve.

Dr. GROAT. Go ahead.

Dr. RICHARDSON. Yes.

Mr. COSTA. Dr. Richardson. And not only for strategic purposes and research, but also for commercial use?

Dr. RICHARDSON. Urgent commercial use, yes. You know, the next generation of nuclear power reactors will require helium.

Mr. COSTA. And that is a very important potential energy source, I believe.

Dr. RICHARDSON. Yes.

Mr. COSTA. To further the line of questioning that Congressman Sarbanes was asking, I mean, I guess the alternative is, if we eliminate this—again, you are going to have to help us a little bit, because I suffer from the same level of expertise as my colleague from Maryland on this subject matter.

Helium is produced when we are producing natural gas, right? Generally speaking, from natural gas fields? And I guess the theory might have been, in 1996, is that if we no longer have this helium reserve, that when—and of course, especially in California, but elsewhere, natural gas I refer to sometimes as the energy du jour because of its clean-burning attributes related to natural gas. And so it is an energy source with, when we have air quality issues in California, that is sought after. And there is much more demand and increased production taking place of natural gas.

Would that not indicate that as a part of that, that additional helium will be produced at the same time? Or am I missing something here?

Dr. GROAT. I think the fact that most of the helium that we have in the United States is situated in very limited geographic areas means that much of the natural gas isn't coincident with those areas. So we can increase our natural gas significantly, production significantly, without necessarily tapping natural gas that contains a lot of helium. So that is the basic problem.

But in theory, in general, if we increase natural gas production, and if it includes areas like the Four Corners area, then we would be tapping natural gas that has some helium. And if the price were high enough to encourage commercial development of that, we might actually see some incremental increases in the helium resource base.

Mr. COSTA. How would the Helium Program be funded, Ms. Mittal, after 2015, once the program's debt is paid off?

Ms. MITTAL. That is a question that we think Congress is going to have to address. Because once the Helium Fund is terminated, there is no mechanism for funding the program.

Right now what happens is, as BLM sells the helium in storage, the funds are put in the Helium Fund, and then BLM has access to those funds to operate the program. But the fund is tied to the debt. So once the debt is paid off, the Helium Fund gets terminated, and then there is no mechanism to operate the program.

So either Congress is going to have to, if one wants to continue a Helium Program, Congress will either have to appropriate funds for the program, or create some new mechanism by which the fund can continue, or some other appropriate vehicle is there for BLM to manage the operations of the program.

Mr. COSTA. So that, in part, is the discussions I guess that is taking place within the Department, and what this Subcommittee ought to be focused on as it relates to whether or not we want to continue the current policy or make changes. I mean, those are at the heart of the question, I guess.

Ms. BURKE. Yes, Mr. Chairman.

Mr. COSTA. At what price should the BLM sell its helium? In the past the debt has been a factor in price, and price has been above market price. After the 2015 debt will be paid off at current prices at or below market. And of course, Dr. Richardson has already opined as to his thoughts about the inexpensiveness of what the current price of helium is today. Yes. No, Dr. Mittal I think was, that was in part what you——

Ms. MITTAL. It was one of the issues that I identified that needs to be addressed.

You are absolutely right. Once the debt is paid off, it ceases to be a factor in the formula that BLM has been using to price helium. And so we have to consider what the policy, public policy objective of the program is.

If we want the program to be one of conservation or allowing the industry to take over more of the production of helium, then you might consider a market, a higher-than-market price for the price of the crude in storage.

If you want to make sure that the Federal government is getting its too-fair value for the helium in storage, then you might consider a market price.

If the whole objective of the program is to eliminate the reserve completely, then you might go with a price that is below market price. So again, it hinges back to what are the public-policy goals for the Helium Program going forward.

Mr. COSTA. Well, that is why we are reexamining this, and that is why your testimony is important. I mean, the policy again, as I understood it, as was noted by Congressman Holt, none of us were here when it was established. But as I, and maybe someone can correct me if I am wrong, but it was basically to get the government out of the business of a strategic helium reserve.

And what Professor Richardson and Professor Groat are telling us is you don't think that the private sector can handle whatever the needs are, whether it be for research or for medical science, or for the next production of nuclear reactors, absent a government strategic reserve? I mean, I guess that is the bottom, that is the threshold question that we need to wrestle with here. Dr. Groat, and then Dr. Richardson.

Dr. GROAT. I think——

Mr. COSTA. I mean, if we just eliminate, you know, under the theory that I guess established this program in 1996 is, is that whatever those needs are—and I think we have all substantiated that the needs are important, they are critical, and they are going to be a part of our long-term requirements for this country in the 21st century. So that, I think, is established.

The question is, I guess, is there a role for the government to continue on this? Or can the private sector handle this? Or will we just become dependent upon foreign sources, as I think someone indicated?

Dr. GROAT. I think you hit the heart of the question. And that is, why do we have reserves in the first place. And we had many reserves, strategic minerals and so forth, that helium was one of them. And then we went through a period in the nineties when we decided, as a matter of policy, to get out of the reserve business; that private sector and supply and demand will take care of the situation. It is no longer necessary or in the best interest of the United States to maintain these kind of reserves. Helium was part of that, the privatization.

Yet today the question is not so much could the private sector produce helium. I think the policy question is, and this is a personal opinion, is whether or not the government has a role in ensuring certain users are insulated because they are so critical from price and supply shocks, because it is in the best interest of the United States. Our small research community, small-user research community on the committee felt very strongly that their role was critical to the well-being of the United States in doing research. And if they are denied a supply, then it is not good for the United States. So they would argue that the reserve is important, and access to it, for them, is important.

And I am sure the MRI folks and the nuclear reactors of the future will feel that they are an important part of the United States' future. So again, back to the policy question, is the government's

role to provide this insulation through a reserve program worthy of reconsideration again. Perhaps not only for helium, but there may be some other critical things that are in the same family.

Mr. COSTA. Any other questions by my colleagues? Yes, Congressman Holt.

Mr. HOLT. Thank you, Mr. Chairman. And thank you again for that line of questioning, because I think you get at the heart of the question before us.

A couple of kind of random questions. In your paper, Dr. Groat and Dr. Richardson, and briefly in your testimony, you talk about efficiencies in the use of helium. How much is to be gained? What savings are there in efficiencies?

You talk about low-boil-off cryostats. But if you are filling dirigibles, you know, maybe the amount that is lost from cryostats isn't, or the amount that might be saved might not be so important.

So can you give me an idea of how important it might be? We just passed a week ago here in the House something called Home Star to encourage efficient use of energy. Maybe we need a Lab Star or a Dirigible Star program——

Dr. RICHARDSON. Yes.

Mr. HOLT.—or a Welstar to encourage efficient use of helium.

How significant is this?

Dr. RICHARDSON. You know, the NASA and the Department of Defense use liquid helium for purging rockets. And it would be expensive, but it would be worthwhile to recapture that helium. Because it is 25 percent of the uses, for instance.

Mr. HOLT. So could it be, for example, a condition of sale that the user have some approved recapture technology?

Dr. RICHARDSON. Well, if it is expensive enough to begin with, then the user would be naturally encouraged to recover the helium.

Dr. GROAT. That is an interesting point about some condition of sale. The committee did discuss how can you encourage conservation and more efficient use. And again, back to the small research user, they don't have the resources available to put in these recycling conservation things. And if there were some process by——

Mr. HOLT. But they are using only a few percent——

Dr. GROAT. They are not using very much, no. They are perhaps the most acutely affected, but they are not—percentage-wise, you are correct, they are not.

But the large commercial users already do. MRI industry and people like that are more cautious about recycling. But there are large segments, as Dr. Richardson pointed out, that don't or can't. And that is one step the committee felt was, could be encouraged.

Mr. HOLT. A question, actually maybe for an economist or someone else, but let me ask it of you. Why not depend on Qatar? Why do you think that a domestic supply is needed?

I mean, there are certainly many things that we are dependent on, not the latest of which is petroleum, where we have, you know, backed in or walked in or gladly embraced dependence on international suppliers.

Dr. GROAT. I think, Mr. Holt, initially the thoughts of Qatar, Algeria, and Russia being our suppliers made people nervous. But beyond that, you are correct; we still get a lot of critical minerals and

resources from countries that aren't terribly stable or friendly. So that is not a new thing.

My personal concern is not so much those countries, but it is dependence on the international LNG production as the source for that helium. If the world glut in natural gas persists, then there are going to be some LNG facilities that don't make it economically. And if the ones that produce helium are among those, we could see a decrease in an intended large source of supply.

So it is less strategic and more economic, at least that is my personal concern.

Mr. HOLT. Are there other comments on that?

[No response.]

Mr. HOLT. Thank you, Mr. Chairman.

Mr. COSTA. Thank you for your focus and interest. And now, when I see you on the Floor, I can ask you how you wrote your thesis on helium several decades ago.

Mr. HOLT. Sorry, it wasn't my thesis, but I had written on the subject decades ago.

Mr. COSTA. Well, we appreciate all the witnesses' testimony this morning. It was helpful. And we will look, as the Administration is looking, at this policy that has been in place, whether or not we need to have some mid-course corrections, as the National Academies have indicated, it seems to me. And I think it is an important issue, clearly not only strategically for the United States, but commercially as we go forward. So your testimony will be well used.

The Subcommittee on Energy and Mineral Resources hearing is now adjourned.

[Whereupon, at 11:22 a.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows:]

[A letter and attachment submitted for the record by Mark Haynes, President, Concordia Power, on Behalf of the NGNP Alliance, follows:]

May 13, 2010

The Honorable Jim Costa
Chairman
Subcommittee on Energy And Mineral Resources
Committee on Natural Resources
1324 Longworth House Office Building
Washington, D.C. 20515

Dear Chairman Costa:

Thank you for conducting your oversight hearing on "Up in the Air: The BLM's Disappearing Helium Program" today. Among other things, this hearing helps highlight the great importance of helium to our economy and the need for its careful management.

On behalf of the Next Generation Nuclear Plant Industrial Alliance, I am writing to bring to your attention the importance of helium to what may ultimately prove to be one of the most important future energy options: high temperature gas cooled reactors or HTGRs. HTGRs are quite different from the water cooled reactors that constitute the vast majority of the world's existing nuclear fleet. By utilizing helium as a coolant, along with other important design and materials differences, HTGRs exhibit unparalleled safety characteristics and are able to operate in high temperature regimes that make it possible for them to ultimately supplant fossil fuel use and substantially reduce greenhouse gas production in many industrial and transportation uses. The attached one page summary discusses these uses.

In the overall picture of current world helium production(193,000 cubic meters in 2008), HTGR use is not large. A deployment of 1,000 HTGR modules would use about 5.0% of the world's current production on an ongoing basis. It is important to assure, however, that future helium supplies and production are managed to enable a long-term supply for the HTGR nuclear energy technology.

Thank you again for your attention to this very important resource.

Sincerely,

Mark Haynes
President
Concordia Power
On Behalf of the NGNP Alliance

cc: The Honorable Douglas L. "Doug" Lamborn. Ranking Member

Attachment

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**Next Generation Nuclear Plant (NGNP)**
**and High Temperature Gas Cooled Reactor Technology:**
**Environmental and Economic Benefits**

The approximately 20% of U.S. energy consumption associated with industrial uses (primarily in the form of process heat), is almost completely derived from fossil fuels and cannot be replaced by renewable sources such as wind and solar. The ONLY option for a substantial greenhouse gas free substitute for this energy and its associated emissions, is High Temperature Gas-cooled Reactors (HTGRs).

**GREENHOUSE GAS REDUCTIONS AND INCREASED ENERGY SECURITY**

HTGRs can provide reliable, economic process heat and cogenerated electricity needed for the petrochemical, petroleum and fertilizer industries as well as for heavy oil recovery and upgrade applications that otherwise rely on burning natural gas. In these applications, a nominal 600MWt HTGR modular unit can avoid ~0.8 million metric tons of carbon dioxide annually—essential to achieving the long term U.S. environmental goals. Further, the natural gas is then available as a feedstock—important stewardship of resources.

For the end uses discussed above, a conservative estimate shows that a U.S. market for at least 200 HTGR modules could exist in the next four decades. A 200-module deployment would eliminate 160 million metric tons/year of $CO_2$ and reduce U.S. natural gas consumption by ~32% of current consumption in the industrial and commercial sectors or ~13% of total natural gas consumption in 2008 Importantly, the potential $CO_2$ and natural gas offset via an export market for HTGRs is even more significant

Beyond these applications, HTGRs can be integrated with coal conversion processes (e.g., gasification and coal-to-liquids) that can produce transportation fuels and hydrocarbon feedstock for the petrochemical industry. The use of HTGRs in this manner would result in essentially no carbon footprint for production of transportation fuels and hydrocarbon feedstocks using indigenous coal. Fifteen 100,000 barrel per day coal-to-liquids plants integrated with 480 HTGR modules could reduce U.S. oil imports by 26% of current U.S. petroleum imports

**ECONOMIC BENEFITS**

Achieving the HTGR energy supply capability described above (and assuming no export sales) would result in significant economic activity and job creation. HTGRs are designed to be constructed in plants of 4 to 8 modules. Each 4-module plant would create approximately 12,400 jobs during construction and approximately 1200 permanent jobs at the site during plant operation. Looked at another way and depending on the ultimate number of reactors built domestically, the $2 - $3 billion estimated federal investment in the NGNP Project to achieve HTGR commercialization would leverage over $2 trillion in economic activity. These figures do not assume any exports which have the potential to substantially increase these totals.

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