

The Helium Market

DEMANDS FLOATS HIGHER AS SUPPLIES SINK

By Maura D. Garvey

Photo courtesy of ASPIRE, University of Utah

Helium is a product whose market has continued to undergo rapid change from both a demand and supply perspective. In 2006 we have seen helium becoming tight in the worldwide market, and the Linde buyout of BOC will bring changes in player market shares. Helium came under scrutiny by the Federal Trade Commission (FTC) and the European Commission (EC) during the evaluation of Linde's proposed buyout of BOC. The deal has been approved, but Linde was required to spin out and find a single qualified buyer of the following helium contracts; Exxon Mobil in the US worth 337 million cubic feet/year (mmcf/yr), 90 mmcf/yr from Polish Oil and Gas Company in Poland, and 60 mmcf/yr from Cryor in Russia. Taiyo Nippon Sanso (TNS) was selected by Linde as the proposed buyer and the helium operations will be managed by TNS's US operations, Matheson Trigas. This deal was completed on September 15, 2006. TNS also purchases helium in Japan through the Union Helium Group, so total TNS helium supply is 525 mmcf/yr.

Unrelated events worldwide caused a temporary helium shortage. The pipeline managed by the US Bureau of Land Management (BLM) experienced pressure problems which made it difficult for companies hooked into the line to draw helium. In Algeria, the Skikda plant has faced a lengthy shutdown for safety reasons, and two US helium plants will be shut down for scheduled maintenance for several months. Also, the two new sources of supply in Algeria and Qatar are behind schedule. Helium will remain tight until most of these issues are resolved later this year.

Our last helium market update emphasized that increasing worldwide demand for helium needed to be addressed with supply alternatives (CGI, July 2004). At that time, helium demand outside the US was experiencing rapid growth, with developing countries driving the need for helium. The supply side outlook was very optimistic. This feature examines the increasing demand for helium worldwide and its affects on future supply plans.

HELIUM MARKETS

Helium has an enormous range of applications and is used for both its very cold properties in its liquid state as well as for its inertness, high-heat conductivity and light-weight properties in its gaseous state. A new application on the scene is the US government's Airborne Laser (ABL) program with expected aircraft installation in

2007. The ABL will locate and track missiles in the boost phase of their flight, then accurately point and fire a high-energy laser, destroying enemy missiles near their launch areas. The ABL will use the Chemical Oxygen Iodine Laser (COIL) which creates a lasing medium using several gases including helium. The United States also has a high-altitude airship program and in 2003, the US Missile Defense Agency commissioned Lockheed Martin to design a prototype airship capable of carrying a 4,000-pound payload.

The filling of heavy lift balloons and party balloons is a steady market for helium, particularly in the US, Europe and Japan. But helium balloon suppliers are feeling the pinch in supply. News of leaks in the supply chain made it into the mainstream media with an August 31st article in *The Plain Dealer* ("Global Helium Shortage Leads to Sinking Feeling"). That paper reported that "a chain of six stores in Greater Cleveland, posted signs on its front doors to inform customers that it will not rent out helium tanks, possibly through November." NPR radio picked up the news in September reporting that shortages of helium may even threaten supply to America's favorite lifting balloons in The Macy's Day Parade.

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WORLD HELIUM RESERVES AND CRUDE AND PRODUCTION

According to data published in the United States Geological Survey (USGS) *Mineral Commodity Summaries* (US data originates from the US BLM helium group) the United States represents 21 percent of the world's known helium reserves, it produces 77 percent of the world's helium and is the single largest consumer of helium.

Helium produced in Algeria, Poland and Russia is sold almost exclusively into European markets, and helium produced in Qatar is sold exclusively into Asian markets. These countries combined own 79 percent of the worldwide helium reserves yet produce only 23 percent of the world's helium.

According to the USGS, world production of helium grew about 3.1 percent between 2004 and 2005 with helium demand continuing to grow a rate of about 3.7 percent per year. However, US helium production from natural gas dipped during the same period. Potential for shortages of helium in the US remain as demand continues to outpace supply and the US experiences continued depletion of its gas fields like the Hugoton.

US CONTAINED HELIUM PRODUCTION (mmscf)					
Year	Extracted/ Nat Gas	Withdrawn/ Storage (Net)	Volume Consumed	Volume Exported	Volume Sold
2000	3,533	1,031	3,202	1,362	4,564
2001	3,137	1,619	3,136	1,620	4,755
2002	3,153	1,431	3,100	1,484	4,584
2003	3,137	1,265	2,844	1,558	4,402
2004	3,101	1,586	2,992	1,695	4,687
2005*	3,028	1,803	2,850	1,981	4,831
* Estimated					

Figure 1

Source: USGS Mineral Commodity Summaries, January 2006

To meet demand, production from the US Cliffside reserve was increased. Under the terms of US Helium Privatization Act of 1996, the BLM must offer for sale, a portion of the conservation helium stored underground at the Cliffside Field in Texas. The first of 12 annual sales, known as “Open Market Sales”, was held in March of 2003 and these helium sales are currently helping to offset the US demand/supply imbalance. Depletion of US gas fields together with shortfalls in helium production from Algeria and Qatar make supply of helium around worldwide, as well as in the US, very tight today.

US SUPPLY AND DEMAND

The US government’s extensive helium pipeline system consists of the storage reservoir in the Bush Dome, Cliffside Field, in Texas and a 425-mile pipeline system originating at Cliffside and ending near Bushton, KS. The pipeline connects nine privately owned crude helium plants and six privately owned helium purification/liquefaction plants to the Cliffside Gas Field. (For more on US Helium Program a detailed schematic of the BLM System see page 22, “Helium from the Bureau of Land Management” by J. Benjamin Reinohl and Willard D. Moyer of RMW Solutions, LLC.) The Cliffside Fields currently contain about 25.5 billion cubic feet (Bcf) of helium (fiscal year 2005). As of December 2005, there was 24.8 Bcf in storage and about 1.1 Bcf stored for private industry.

Figure 1 tracks the source and volumes of helium sold in the US since 2000. Helium volumes extracted from natural gas remained relatively constant from 2001. It is estimated that less helium was extracted from natural gas in 2005 than the prior four years. This is a reflection of the continued depletion of the larger natural gas fields in the Hugoton and Panhandle of Texas. Net withdrawn from storage and refined has grown steadily since 2004 to meet demand that began steadily increasing after the worldwide economic slowdown. Total volume sold increased by three percent in 2005.

According to the US Department of Commerce, domestic consumption of helium continued to fall between 2000 and 2005 at an average of 2.3 percent per year. Exports have been increasing at an average rate of 7.5 percent per year over the same five year period, reflecting demand increases in emerging economies where helium is not produced. Exports increased by 16.9 percent in 2005. That same year US consumption decreased 4.7 percent. The total amount of US helium sold advanced at a rate of 1.1 percent per year between 2000 and 2005.

PRICE

Figure 2 shows the average price of crude helium sold through Open Market Sales by the BLM. Prices of government crude helium have risen an average of three percent per fiscal year since 2003. The increase over the last two fiscal years averaged 3.8 percent which was greater than the prior two years which averaged a 1.9 percent increase in price. Price increases by major helium producers have been more dramatic, however. According to the USGS (*Mineral Commodity Summaries*, January 2004), at the end of FY 2003 major helium producers announced helium price increases that averaged 10 to 12 percent to increased production, feedstock and distribution costs. (See Industry News, page 3 for latest helium price increase announcements.)

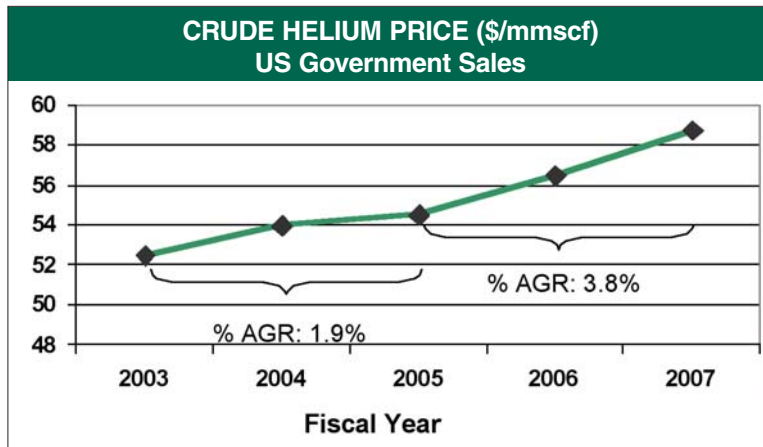


Figure 2

Source: US BLM

Figure 3 describes BLM’s Open Market Sales of helium in 2005. The Helium Privatization Act capped the volume of helium available for sale at 2,100,000 mmscf. (Note: Some in the industry speculate that this cap could be higher.) Three Open Market Sales took place in April, September, and October of 2005 and yielded a total sale of 1,675,000 mmscf. Volumes were allocated by bidder. Air Products, the largest supplier of helium in the US, and BOC Gases have purchased over seventy percent of the helium sold through Open Market Sales to date.

According to Jim West of Nishi Corporation, “as helium pricing continues to escalate, so does interest in recovery and more efficient liquid handling systems. Most of the MRI manufacturers are not only offering magnets that don’t require liquid re-filling, they are also installing refrigerators and liquefiers at their factories which

will cut their liquid helium consumption dramatically. Users who manufacture products blanketed by helium have been for some time re-using helium by removing impurities and recycling the clean helium. Some are beginning to even purify the small quantities of heavily contaminated vent streams. That has been the history of helium use — a new use begins with the consumption of helium which ultimately diminishes significantly as the technology matures and that helium use declines. Fortunately for helium producers, new applications continue to pop up. One only has to

review the development and decline of helium for space launches, diving, MRI’s, and fiber-optics. The good news for the producers is that helium use goes hand-in-hand with the development of third world economies. Since these consumptions are farther from the sources, the cost will continue to drive more demand for recovery and efficient systems.”

Type of Sale	Bidder	2005 Total	Total To Date
Allocated Sale	DEFS	- 0	151,200
	BOC	365,000	1,899,000
	Air Products	660,000	1,500,400
	Praxair	570,000	730,000
	Nathaniel	40,000	40,000
Total		1,635,000	4,320,600
Non-allocated Sale	Air Liquide	- 0	50,000
	AGA/Linde	40,000	110,000
Total		40,000	160,000

Figure 3

Source: USGS *Mineral Commodity Summaries*, January 2006

BOC & THE FUTURE OF HELIUM

In June, BOC, the UK's biggest provider of helium joined forces with the University of Cambridge to sponsor a three year research project into the helium market. The Helium Resources Project, funded jointly by BOC and UKAEA's Fusion Engineering Outreach program at Judge Business School, University of Cambridge, aims to determine the long-term availability and demands for helium.

Worldwide demand for helium is growing dramatically as high-tech industries develop new applications dependent on helium. Experts predict that global consumption of about 75 tons per day may only be possible for a few decades.

Richard Clarke of the UKAEA said: "Because helium is inextricably tied with natural gas reserves it seems inevitable that the world will run low of this rare gas, it is just a matter of when this will happen. The purpose of this project is to help us understand if and how the use of our helium resources can be sustained so that present consumption does not leave us short in the future. While of significance to a range of industries the findings will have particular relevance to fusion energy research where liquid helium is used extensively. As progress is made towards a working reactor, decisions will have to be made about what role helium will have in fusion power stations."

"Doing the work now to anticipate what will be needed in ten to twenty years is crucial. Already we have technological solutions on the horizon that could potentially reduce fusion's dependence on helium. We need a basis for deciding a program to put resources into these, so that new technologies are developed and accepted."

Nick Ward, BOC Business Manager helium and special products said, "While BOC is constantly working with our customers to understand and predict their future needs, strategic planning for helium dependent industries requires a broader understanding of this resource, the relevant technology being developed around it and the full dynamics of the helium market."

Dr William Nuttall, who supervises the project, said: "Looking further ahead helium is likely to play a special role in future energy and transport systems: for instance as a heat transfer medium in many types of power station, as a cryogen associated with the hydrogen economy, or as a lift gas for more sustainable modes of air transport."

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DEMAND

Over the past ten years, US and non-US regional growth in helium demand has shifted. From 1996 to 1999, demand for helium was rapid worldwide. Between 2000 and 2003, growth outside the US remained relatively strong but within the US negative demand growth went hand in hand with a struggling economy. Positive US growth in demand in '04 was flattened by negative growth in '05. Elsewhere, regions such as the Middle East and the Pacific Rim contributed to strong demand growth at almost 10 percent per year. This growth was driven by emerging economies.

FUTURE SUPPLY

Today, helium supplies are being boosted around the world to meet projected future demand growth. In North America, Exxon plans to expand capacity to 1,750 mmscf/yr by 2008. Ridgeway may put in 50 mmscf/yr of new nameplate gaseous helium capacity, together with CO₂ capacity, in St. John, Arizona, within two to three years with further volume possibly added after 2010.

Offshore supply plans include Algeria where Skikda #1 could be coming on-stream as early as 2006, with the potential for 550 mmscf/yr of capacity by 2009. A third Algerian source could be on-stream in 2009 with 550 mmscf/yr of capacity. Qatar, which came on-stream in 2005, should be fully loaded to its 550 mmscf/yr capacity by 2009. A second plant at Qatar is under consideration. Australia could come on-stream in mid 2008 with a capacity of 150 mmscf/yr. An additional 150 mmscf/yr by 2011 in Australia is also possible. Lastly, there is a planned expansion at Cryor in Russia of at least 200 mmscf/yr scheduled for 2008.

CONCLUSIONS

In 2006 we have seen helium supply become very tight in the US and worldwide market. The forced spin out of 487 mmscf/yr of helium by the newly formed Linde Group will bring Taiyo Nippon Sanso and Matheson Tri-Gas into the helium business more prominently. The BLM pipeline pressure problems, forced shut down of the Skikda plant for safety, the shut down of two US helium plants for scheduled maintenance, and the new supply sources behind schedule in Algeria and Qatar have caused a temporary helium shortage that will remain until these issues are resolved late this year.

Current supply and future supply sources planned in the US and offshore will allow worldwide demand to be met through at least 2015, but not without significant dependency on the US BLM reserves through Open Market Sales.

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