## **HELIUM**

(Data in million cubic meters of contained helium gas<sup>1</sup> unless otherwise noted)

Domestic Production and Use: The estimated value of Grade-A helium (99.997% or better) extracted domestically during 2010 by private industry was about \$730 million. Nine plants (five in Kansas and four in Texas) extracted helium from natural gas and produced only a crude helium product that varied from 50% to 99% helium. Ten plants (four in Kansas, and one each in Colorado, New Mexico, Oklahoma, Texas, Utah, and Wyoming) extracted helium from natural gas and produced an intermediate process stream of crude helium (about 70% helium and 30% nitrogen) and continued processing the stream to produce a Grade-A helium product. Of these 10 plants, 6 (4 in Kansas, 1 in Oklahoma, and 1 in Texas) accepted a crude helium product from other producers and the Bureau of Land Management (BLM) pipeline and purified it to a Grade-A helium product. Estimated 2010 domestic consumption of 54 million cubic meters (1.9 billion cubic feet) was used for cryogenic applications, 32%; for pressurizing and purging, 18%; for welding cover gas, 13%; for controlled atmospheres, 18%; leak detection, 4%; breathing mixtures, 2%; and other, 13%.

Salient Statistics—United States:	<u>2006</u>	2007	<u>2008</u>	2009	2010 <sup>e</sup>
Helium extracted from natural gas <sup>2</sup>	79	77	80	<del></del>	77
Withdrawn from storage <sup>3</sup>	58	61	50	40	48
Grade-A helium sales	137	138	130	118	125
Imports for consumption	_	_		_	
Exports <sup>4</sup>	62	64	70	71	71
Consumption, apparent <sup>4</sup>	75	74	60	47	54
Net import reliance <sup>5</sup> as a percentage					
of apparent consumption	E	Е	Е	Е	Е

Price: The Government price for crude helium was \$2.33 per cubic meter (\$64.75 per thousand cubic feet) in fiscal year (FY) 2010. The price for the Government-owned helium is mandated by the Helium Privatization Act of 1996 (Public Law 104-273). The estimated price range for private industry's Grade-A gaseous helium was about \$5.05 to \$5.77 per cubic meter (\$140 to \$160 per thousand cubic feet), with some producers posting surcharges to this price.

**Recycling:** In the United States, helium used in large-volume applications is seldom recycled. Some low-volume or liquid boiloff recovery systems are used. In Western Europe and Japan, helium recycling is practiced when economically feasible.

## Import Sources (2006-09): None.

Tariff: Item	Number	Normal Trade Relations
		<u>12-31-10</u>
Helium	2804.29.0010	3.7% ad val.

<u>Depletion Allowance</u>: Allowances are applicable to natural gas from which helium is extracted, but no allowance is granted directly to helium.

Government Stockpile: Under Public Law 104-273, the BLM manages the Federal Helium Program, which includes all operations of the Cliffside Field helium storage reservoir, in Potter County, TX, and the Government's crude helium pipeline system. The BLM no longer supplies Federal agencies with Grade-A helium. Private firms that sell Grade-A helium to Federal agencies are required to purchase a like amount of (in-kind) crude helium from the BLM. The Helium Privatization Act of 1996 mandated that all Federal Conservation helium stored in Bush Dome at the Cliffside Field be offered for sale, except 16.6 million cubic meters (600 million cubic feet).

In FY 2010, privately owned companies purchased about 4.8 million cubic meters (172 million cubic feet) of in-kind crude helium. In addition to this, privately owned companies also purchased 59.2 million cubic meters (2,130 million cubic feet) of open market sales helium. During FY 2010, the BLM's Amarillo Field Office, Helium Operations (AMFO), accepted about 13.3 million cubic meters (479 million cubic feet) of private helium for storage and redelivered nearly 60.5 million cubic meters (2,180 million cubic feet). As of September 30, 2010, about 12.9 million cubic meters (466 million cubic feet) of privately owned helium remained in storage at Cliffside Field.

Stockpile Status—9-30-10°				
	Uncommitted	Authorized	Disposal plan	Disposals
Material	inventory	for disposal	FY 2010	FY 2010
Helium	467.4	467.4	63.8	64.0

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Events, Trends, and Issues: During 2010, some helium suppliers announced price increases of 5% to 10% in response to continued increased raw material, energy, and distribution costs. The price of pure helium is expected to continue to increase as production costs, including the price of crude helium, increase. The BLM raised the FY 2011 price of open-market crude helium to \$2.70 per cubic meter (\$75.00 per million cubic feet) based on recommendations from a report from the National Research Council of the National Academies. During 2010, helium consumption increased by about 15% compared with that of 2009. During FY 2010, the AMFO conducted four open market helium offerings, selling a total of 59.2 million cubic meters (2,133 million cubic feet). The Skikda, Algeria, helium plant continued to experience operational problems, and the plant in Arzew, Algeria, experienced production problems related to the liquefied natural gas trains. The Qatar helium plant experienced no major operational problems and maintained the same rates of production as in 2008 and 2009. A new helium plant in Australia started up in March. Worldwide, eight new helium plant projects were scheduled for startup between 2011 and 2017. Two projects were scheduled for startup in the United States during 2011–14 near Riley Ridge, WY, and St. Johns, AZ. The other plants were planned for Algeria, China, India, Indonesia, Qatar, and Russia.

<u>World Production and Reserves</u>: Reserves data were revised based on estimated production for 2009 and new information available from the Government of Poland.

	Production		Reserves <sup>8</sup>
	2009	<u>2010<sup>e</sup></u>	
United States (extracted from natural gas)	<del></del>	<del></del>	4,000
United States (from Cliffside Field)	40	48	( <sup>9</sup> )
Algeria	20	18	1,800
Canada	NA	NA	NA
China	NA	NA	NA
Poland	3.3	2.6	33
Qatar	NA	NA	NA
Russia	5.3	5.5	1,700
Other countries	NA	<u>NA</u>	NA
World total (rounded)	<del>147</del>	<del>150</del>	NA

<u>World Resources</u>: As of December 31, 2006, the total helium reserves and resources of the United States were estimated to be 20.6 billion cubic meters (744 billion cubic feet). This includes 4.25 billion cubic meters (153.2 billion cubic feet) of measured reserves, 5.33 billion cubic meters (192.2 billion cubic feet) of probable resources, 5.93 billion cubic meters (213.8 billion cubic feet) of possible resources, and 5.11 billion cubic meters (184.4 billion cubic feet) of speculative resources. Included in the measured reserves are 0.67 billion cubic meters (24.2 billion cubic feet) of helium stored in the Cliffside Field Government Reserve, and 0.065 billion cubic meters (2.3 billion cubic feet) of helium contained in Cliffside Field native gas. The Hugoton (Kansas, Oklahoma, and Texas), Panhandle West, Panoma, Riley Ridge, and Cliffside Fields are the depleting fields from which most U.S.-produced helium is extracted. These fields contain an estimated 3.9 billion cubic meters (140 billion cubic feet) of helium.

Helium resources of the world, exclusive of the United States, were estimated to be about 31.3 billion cubic meters (1.13 trillion cubic feet). The locations and volumes of the major deposits, in billion cubic meters, are Qatar, 10.1; Algeria, 8.2; Russia, 6.8; Canada, 2.0; and China, 1.1. As of December 31, 2010, AMFO had analyzed about 22,000 gas samples from 26 countries and the United States, in a program to identify world helium resources.

<u>Substitutes</u>: There is no substitute for helium in cryogenic applications if temperatures below –429° F are required. Argon can be substituted for helium in welding, and hydrogen can be substituted for helium in some lighter-than-air applications in which the flammable nature of hydrogen is not objectionable. Hydrogen is also being investigated as a substitute for helium in deep-sea diving applications below 1,000 feet.

<sup>&</sup>lt;sup>e</sup>Estimated. E Net exporter. NA Not available. — Zero.

<sup>&</sup>lt;sup>1</sup>Measured at 101.325 kilopascals absolute (14.696 psia) and 15° C; 27.737 cubic meters of helium = 1 Mcf of helium at 70° F and 14.7 psia.

<sup>&</sup>lt;sup>2</sup>Helium from both Grade-A and crude helium.

<sup>&</sup>lt;sup>3</sup>Extracted from natural gas in prior years.

<sup>4</sup>Grade-A helium.

<sup>&</sup>lt;sup>5</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>&</sup>lt;sup>6</sup>See Appendix B for definitions.

<sup>&</sup>lt;sup>7</sup>Team Leader, Resources and Evaluation Group, Bureau of Land Management, Amarillo Field Office, Helium Operations, Amarillo, TX.

<sup>&</sup>lt;sup>8</sup>See Appendix C for resource/reserve definitions and information concerning data sources.

<sup>&</sup>lt;sup>9</sup>Included in United States (extracted from natural gas) reserves.