

## HELIUM

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

**Domestic Production and Use:** During 1996, the estimated value of Grade-A (99.995% or better) helium extracted at the U.S. Bureau of Land Management's Exell Helium Plant was \$11.8 million; the estimated value of Grade-A helium extracted by private industry was about \$182.7 million. The total sales value for domestic consumption and exports was \$194.5 million. Twelve private industry plants and one Government facility extracted helium from natural gas: five of the privately owned plants were in Kansas, three in Texas, two in Colorado, and one each in Utah and Wyoming. An additional six private industry plants refined helium directly from the Government's crude helium pipeline: four of the plants were in Kansas, one in Oklahoma, and one in Texas. The estimated 1996 domestic consumption of 67.1 million cubic meters (2.4 billion cubic feet) was used for cryogenic applications, 24%; for welding cover gas, 20%; for pressurizing and purging, 19%; for controlled atmospheres, 11%; and other, 18%.

<b>Salient Statistics—United States:</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996<sup>e</sup></b>
Helium extracted from natural gas <sup>2</sup>	92.0	99.3	112.0	101.0	103.2
Withdrawn from storage <sup>3</sup>	2.4	(3.8)	(11.6)	(5.2)	(10.1)
Grade-A helium sales	94.4	95.6	100.4	96.1	98.1
Imports for consumption	—	—	—	—	—
Exports <sup>4</sup>	30.7	28.0	25.0	27.7	26.3
Consumption, apparent <sup>4</sup>	63.7	67.5	75.4	68.1	67.1
Employment, plant <sup>e</sup> , number	600	600	615	635	631
Net import reliance <sup>5</sup> as a percent of apparent consumption	E	E	E	E	E

**Price:** The price of Grade-A gaseous helium was \$1.983 per cubic meter (\$55 per thousand cubic feet) f.o.b. Helium Operations facilities in 1996. The Federal Government's price for bulk liquid helium was \$2.524 per cubic meter measured as gas (\$70 per thousand cubic feet), with additional charges for container services and rent. Private industry's price for gaseous helium was about \$1.802 per cubic meter (\$50 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 (1992-96):** None.

<b>Tariff: Item</b>	<b>Number</b>	<b>Most favored nation (MFN) 12/31/96</b>	<b>Non-MFN<sup>6</sup> 12/31/96</b>
Helium	2804.29.0010	3.7% ad val.	25.0% ad val.

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

**Government Stockpile:** The Federal Helium Reserve is an operation run pursuant to Public Law 86-777. During 1996, Helium Operations accepted over 37 million cubic meters (1,333 million cubic feet) of private helium for storage and redelivered nearly 22 million cubic meters (792 million cubic feet) for a net increase in privately owned storage of more than 15 million cubic meters (541 million cubic feet). On September 30, 1996, 971 million cubic meters (35 billion cubic feet) of helium was in storage, of which 111 million cubic meters (4.0 billion cubic feet) was owned by private firms.

**Events, Trends, and Issues:** Several events occurred during 1996. A crude helium plant near Dumas, TX, ended production in December 1995. A crude helium plant near Baker, OK, began production in 1996. Responsibility for and operation of the Department of the Interior's Helium Operations was transferred from the U.S. Bureau of Mines to the U.S. Bureau of Land Management. In addition, the U.S. Bureau of Mines was closed on March 30, 1996, and the President signed the Helium Privatization Act of 1996. The Act will end production and sale of refined helium by Helium Operations for Federal agencies use. Other parts of the Helium Program, such as operation of the helium storage system for both Government and private organizations and collection of helium royalties and fees, will continue.

It is estimated that in 1997 domestic production of helium will be over 101 million cubic meters (3.6 billion cubic feet) and that U.S. apparent consumption will be more than 72 million cubic meters (2.6 billion cubic feet). Exports from the United States are expected to decline because of planned production increases of an Algerian helium plant.

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### World Production, Reserves, and Reserve Base:

	Production		Reserves <sup>8</sup>	Reserve base <sup>8</sup>
	1995	1996 <sup>e</sup>		
United States	101.0	103.2	8,200	<sup>9</sup> 13,000
Algeria	3.8	3.8	NA	2,100
Canada	NA	NA	NA	2,100
China	NA	NA	NA	1,100
Netherlands	NA	NA	NA	720
Poland	1.4	1.4	NA	830
Former Soviet Union <sup>10</sup>	4.2	4.2	4.2	9,200
Other countries	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>2,100</u>
World total (rounded)	111	112	NA	31,000

**World Resources:** The identified helium resources of the United States were estimated to be about 13 billion cubic meters (470 billion cubic feet) as of January 1, 1995. This includes 1.0 billion cubic meters (34 billion cubic feet) of helium stored in the Cliffside Field, 6.7 billion cubic meters (240 billion cubic feet) of helium in helium-rich natural gas (0.30% helium or more), and 5.2 billion cubic meters (190 billion cubic feet) in helium-lean natural gas (less than 0.30% helium). The Hugoton and Riley Ridge Fields are currently depleting gasfields and contain an estimated 4.4 billion cubic meters (160 billion cubic feet) of helium. The remaining 2.4 billion cubic meters (86 billion cubic feet) of helium-rich gas resources is nondepleting. Riley Ridge contains 3.4 billion cubic meters (120 billion cubic feet) of helium of which 2.0 billion cubic meters (71 billion cubic feet) is now included in the depleting classification because this gas is now being produced. Future supplies will probably come from known helium-rich natural gas with little fuel value and helium-lean resources. The identified helium-lean resources of 5.4 billion cubic meters (195 billion cubic feet) include 1.3 billion cubic meters (46 billion cubic feet) of measured and 3.9 billion cubic meters (140 billion cubic feet) of indicated helium resources. No resource studies have been performed since this report was last published; estimated production was subtracted from previous resource values where applicable.

Helium resources of the world exclusive of the United States were estimated to be 18.0 billion cubic meters (650 billion cubic feet). The locations and volumes of the principal deposits, in billion cubic meters, are the former Soviet Union, 9.2; Algeria, 2.1; Canada, 2.1; China, 1.1; Poland, 0.8; and the Netherlands, 0.7. As of January 1, 1996, Helium Operations had analyzed nearly 21,000 gas samples from 26 countries and the United States in a program to identify world helium resources.

**Substitutes:** There is no substance that can be substituted for helium 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 flammability 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>e</sup>Estimated. E Net exporter. NA Not available.

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

<sup>2</sup>Helium content of both Grade-A and crude helium (consisting of approximately 70% helium and 30% nitrogen).

<sup>3</sup>Extracted from natural gas in prior years (injected in parentheses).

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

<sup>5</sup>Defined as imports - exports + adjustments for Government and industry stock changes.

<sup>6</sup>See Appendix B.

<sup>7</sup>The author is an industrial engineer with the Bureau of Land Management, Helium Operations, in Amarillo, TX.

<sup>8</sup>See Appendix C for definitions.

<sup>9</sup>All domestic measured and indicated helium resources in the United States.

<sup>10</sup>As constituted before Dec. 1991.