

## 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 greater) extracted during 2018 by private industry was about \$682 million. Fourteen plants (one in Arizona, two in Colorado, five in Kansas, one in Oklahoma, four in Texas, and one in Utah) extracted helium from natural gas and produced crude helium that ranged from 50% to 99% helium. One plant in Colorado and another in Wyoming extracted helium from natural gas and produced Grade-A helium. Three plants in Kansas and one in Oklahoma accepted crude helium from other producers and the Bureau of Land Management (BLM) pipeline and purified it to Grade-A helium. In 2018, estimated domestic consumption of Grade-A helium was 39 million cubic meters (1.4 billion cubic feet), and it was used for magnetic resonance imaging, 30%; lifting gas, 17%; analytical and laboratory applications, 14%; welding, 9%; engineering and scientific applications, 6%; leak detection and semiconductor manufacturing, 5% each; and various other minor applications, 14%.

<b>Salient Statistics—United States:</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018<sup>e</sup></b>
Helium extracted from natural gas <sup>2</sup>	75	71	66	63	64
Withdrawn from storage <sup>3</sup>	27	20	23	28	26
Grade-A helium sales	102	91	89	91	90
Imports for consumption	7	16	24	21	22
Exports	67	65	61	69	73
Consumption, apparent <sup>4</sup>	42	42	52	43	39
Net import reliance <sup>5</sup> as a percentage of apparent consumption	E	E	E	E	E

In fiscal year (FY) 2018, the price for crude helium to Government users was \$3.10 per cubic meter (\$86.00 per thousand cubic feet) and to nongovernment users was \$4.29 per cubic meter (\$119.00 per thousand cubic feet). The price for the Government-owned helium is mandated by the Helium Stewardship Act of 2013 (Public Law 113–40) and determined through public auctions and industry surveys. The estimated price for private industry's Grade-A helium was about \$7.57 per cubic meter (\$210 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 boil-off recovery systems are used. In the rest of the world, helium recycling is practiced more often.

**Import Sources (2014–17):** Qatar, 79%; and other, 21%.

<b>Tariff: Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–18</b>
Helium	2804.29.0010	3.7% 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:** Under the Helium Stewardship Act of 2013, 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. 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 law mandated that the BLM annually sell at auction Federal Conservation helium stored in Bush Dome at the Cliffside Field. The amounts sold are approximately equal to the amount that the Federal helium system can produce each year. The BLM will dispose of all helium-related assets when the remaining conservation helium falls below 83.2 million cubic meters or no later than 2021. In FY 2018, privately owned companies purchased about 4.4 million cubic meters (158 million cubic feet) of in-kind crude helium. Privately owned companies also purchased 8.3 million cubic meters (300 million cubic feet) of open market sales helium. During FY 2018, the BLM's Amarillo Field Office, Helium Operations, accepted about 3.3 million cubic meters (119 million cubic feet) of private helium for storage and redelivered nearly 30.5 million cubic meters (1.1 billion cubic feet). As of September 30, 2018, about 85.9 million cubic meters (3.1 billion cubic feet) of privately owned helium remained in storage at Cliffside Field.

### Stockpile Status—9–30–18<sup>6</sup>

<b>Material</b>	<b>Inventory</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2018</b>	<b>Disposals FY 2018</b>
Helium	83.1	74.8	8.3	8.3

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**Events, Trends, and Issues:** In 2018, the BLM continued implementation of the Helium Stewardship Act of 2013 by conducting its fifth and final auction of helium from Federal helium storage at the Cliffside Field near Amarillo. In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals (83 FR 23295), including helium. This list was developed to serve as an initial focus, pursuant to Executive Order 13817, “A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals” (82 FR 60835). By the end of the decade, international helium extraction facilities are likely to become the main source of supply for world helium users.

### **World Production and Reserves:**<sup>8</sup>

	Production		Reserves <sup>9</sup>
	<u>2017</u>	<u>2018<sup>e</sup></u>	
United States (extracted from natural gas)	63	64	3,900
United States (from Cliffside Field)	28	26	(10)
Algeria	14	14	1,800
Australia	4	4	NA
Canada	<1	<1	NA
China	NA	NA	NA
Poland	2	2	25
Qatar	45	45	NA
Russia	<u>3</u>	<u>3</u>	<u>1,700</u>
World total (rounded)	160	160	NA

**World Resources:** Section 16 of Public Law 113-40 requires the U.S. Geological Survey (USGS) to complete a national helium gas assessment. The USGS and the BLM have been coordinating efforts to complete this assessment. Completion of data integration, geologic review, data analysis, and probabilistic modeling for the resource assessment is expected in 2019. The USGS expects results to be published in 2020. The BLM plans to update its report of Helium Resources of the United States by midyear 2019. Until then, the following estimates are still the best available.

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 billion cubic feet) of measured reserves, 5.33 billion cubic meters (192 billion cubic feet) of probable resources, 5.93 billion cubic meters (214 billion cubic feet) of possible resources, and 5.11 billion cubic meters (184 billion cubic feet) of speculative resources. Included in the measured reserves are 670 million cubic meters (24.2 billion cubic feet) of helium stored in the Cliffside Field Government Reserve, and 65 million 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 in Wyoming, and Cliffside Fields are the depleting fields from which most U.S.-produced helium is extracted. These fields contained 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, 2018, the BLM had analyzed about 22,300 gas samples from 26 countries and the United States, in a program to identify world helium resources.

**Substitutes:** 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>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 = 1,000 cubic feet of helium at 70 °F and 14.7 psia.

<sup>2</sup>Both Grade-A and crude helium.

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

<sup>4</sup>Grade-A helium. Defined as Grade-A helium sales + imports – exports.

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

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

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<sup>8</sup>Production and reserves outside of the United States are estimated.

<sup>9</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>10</sup>Included in United States (extracted from natural gas) reserves.