

REPORT TO CONGRESS

ON

MATTERS CONTAINED IN THE HELIUM ACT

(PUBLIC LAW 86-777)

FISCAL YEAR 1995

BY

THE SECRETARY OF THE INTERIOR

JANUARY 1996

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## EXECUTIVE BRIEF

United States Bureau of Mines (Bureau) helium sales to Federal agencies and their contractors were 245 million cubic feet (MMcf) in fiscal year (FY) 1995. Revenues from helium sales, services, and other sources were \$26 million which exceeded the \$16.8 million funded cost of operations. A payment of \$10.0 million was made to the Treasury for application to the Helium Fund debt.

As of September 30, 1995, the Government had \$426.4 million in helium program assets. Current liabilities were \$2.9 million (accounts payable and customer advances), and long-term debt to the U.S. Treasury increased \$63.7 million to \$1,373.2 million, leaving a negative net worth of \$949.6 million.

At the end of FY 1995, there were 34.9 billion cubic feet (Bcf) of helium stored in the Cliffside Federal helium storage reservoir. Of this volume, 31.4 Bcf belongs to the Government and 3.5 Bcf to private industry. Estimates of helium demand made in 1992 by the helium-using Federal agencies for the period 1996-2015 totaled 9.8 Bcf. Thus the Government's current helium reserve is adequate to meet the estimated demand through this period.

Operation of the Government's helium conservation pipeline and storage system averted shortages of private helium as private companies use the Government's pipeline and storage system to store their helium. In FY 1995, the Bureau stored 1,361 MMcf and returned 813 MMcf of privately owned crude helium through the pipeline.

## 1. Nature and Scope of Report

This report complies with Section 16 of the Helium Act Amendments of 1960 (Public Law 86-777) advising Congress of the status of the Government's helium program. It contains operating, statistical, and financial information about the program for the fiscal year ending September 30, 1995.

## 2. General Status of the Government's Helium Program

The Federal Helium Program, conducted by the U.S. Bureau of Mines for the Secretary of the Interior under 50 U.S.C. 161, et seq, provides for the current and foreseeable future helium requirements of essential Government activities. The program includes the production, conservation, sale, and distribution of helium and involves the management of helium program facilities and resources to:

- a. Meet the current helium demand of all Federal agencies. This includes operation, utilization, and maintenance of helium plants and shipping containers (high-pressure cylinders, semitrailers, railway tank cars, liquid helium dewars, and liquid helium semitrailers) for the production and distribution of helium to those agencies.
- b. Provide, for the foreseeable future, helium requirements of essential Government programs. This includes operation, utilization, and maintenance of natural gas and helium storage fields and gas gathering, metering, transportation, and injection well systems for the conservation and storage of helium and helium-gas mixtures.
- c. Conduct investigations and evaluations for improving all aspects of the helium program. This includes the development of more efficient methods for producing, distributing, conserving, and storing helium, and the improvement of techniques for locating natural gasfields and evaluating their helium content for inclusion in the U.S. helium resource base.

The Bureau carries out these functions through the General Manager--Helium Field Operations (HFO), Amarillo, Texas. The Bureau owns two helium plants, the Cliffside Federal helium storage reservoir, and related pipelines in Texas, Oklahoma, and Kansas.

The emphasis of the Bureau's helium program is on production, distribution, and conservation of helium for essential Government needs. Historically, the Bureau has managed the program to provide users with assured quantities and qualities of helium. Section 6(a) of the Helium Act provides: "The Department of Defense, The Atomic Energy Commission, and other agencies of the Federal Government, to the extent that supplies are readily available, shall purchase all major requirements of helium from the Secretary (of the Interior)."

The Bureau sold 245 million cubic feet (MMcf)<sup>1</sup> in FY 1995, almost all of which was purchased by Federal agencies. Sales to these agencies are made directly from the Bureau to the various agencies or through Bureau contract distributors under contracts described in Code of Federal Regulations (30 CFR 602).

As of September 30, 1995, the Government had \$426.4 million in helium program assets. (See Table 7, page 9.) Current liabilities are \$2.9 million (accounts payable and advances) and long-term debt to the U.S. Treasury is \$1,373.2 million, leaving a negative net worth of \$949.6 million.

### 3. Reviews and Reports

#### Statutory Reassessment

In the Vice President's National Performance Review, it was determined that the Federal Government needed to re-examine its role in the Federal Helium Program. The report states that the program can be run more efficiently, reducing outlays by Federal helium customers and increasing revenue. Recommendations were made to: cancel the helium debt, reduce the selling price for Bureau helium, discontinue non-revenue producing functions, increase efficiencies of helium operations, and begin sales of crude helium as market conditions permit. Some of these recommendations, such as canceling the debt, cannot be implemented without congressional authorizations. Others, including changes which would increase the efficiency of helium operations, are being implemented.

Additionally, legislation that would significantly impact the Federal Helium Program has passed the Congress and is part of a larger bill vetoed by the President. The proposed bill would shut down refined helium sales within 18 months of becoming law and require that all real and personal property not needed by the remaining organization be disposed of within two years after closure. The bill authorizes continued operation of the storage and transmission system and details a specific plan to dispose of the helium reserve by 2015.

### 4. Conservation

As part of its responsibility in the area of conservation, the Bureau maintains the Cliffside Federal helium storage reservoir, associated pipelines, and measuring and monitoring services. In the mid-1970's, the Bureau began accepting privately owned crude helium for storage in the Cliffside reservoir under long-term contracts. Private industry currently has about a 1-year supply of helium in Government storage. In FY 1995, 17 of 20 helium storage contracts expired or were voluntarily terminated and replaced with eight new helium storage contracts. Three inactive old storage contracts

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<sup>1</sup>All volumes in this report are at 14.7 pounds per square inch absolute and 70 °F.

remain in effect. Revenue collected from storage and transmission operations is expected to increase from \$715 thousand in 1995 to \$1.766 million in 1996 due to the new storage contracts.

As of September 30, 1995, 34,919 MMcf of helium was in underground storage in the Government's Cliffside helium storage reservoir near Amarillo, Texas. Of this, 31,419 MMcf was Government-owned and 3,501 MMcf was privately owned. In addition, there was 3,785 MMcf of helium contained in producible native natural gas in the reservoir. Therefore, the Cliffside storage reservoir contains about 38,704 MMcf of helium. During the year, 1,361 MMcf was stored for private industry under storage contracts, and 813 MMcf was redelivered from storage to its owners.

The Bureau purified 248 MMcf of Grade-A helium from previously stored Bureau and privately owned crude helium in FY 1995. This production supplied 244 MMcf of Federal demand, 1 MMcf of private commercial demand, and 3 MMcf of contract purification for private industry.

## 5. Supply and Demand

Natural gas containing about 0.3 percent (3,000 ppm), or more, helium continues to be the only economical source of helium in the United States. The Bureau conducts a survey of the United States and foreign countries to identify new helium-bearing natural gas fields and to appraise and evaluate proved helium reserves and probable resources. This year, helium resources work included analyses of 49 gas samples from gas wells and pipelines and the evaluation of gas fields to determine helium content.

The Bureau estimates the measured and indicated helium resources in "helium-rich"<sup>2</sup> natural gas in the United States as of January 1, 1993<sup>3</sup>, to be 250 billion cubic feet (Bcf)<sup>4</sup>. Of this volume, about 89 Bcf is in gas found in reservoirs that are not being produced. Such helium resources are classified as "nondepleting." The 250 Bcf in the helium-rich gas plus the 36 Bcf of Government and private helium in storage (1993) provides the United States with 286 Bcf of helium resources.

The Federal Government owns approximately 175 Bcf, or 61.2 percent, of the 286 Bcf of helium-rich measured and indicated helium resources in the United States. This includes 33 Bcf in storage (1993), 4 Bcf in Cliffside Field native natural gas, and 77 and 61 Bcf in depleting and nondepleting natural gas resources on Federal lands.

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<sup>2</sup>Natural gas containing 0.30 percent or more of helium.

<sup>3</sup>Latest data available from internal report.

<sup>4</sup>Where appropriate, volumes in this report have been rounded to the nearest billion cubic feet.

In 1992, the Bureau obtained estimates of the helium needs through the year 2015 of the six major helium-using agencies (National Aeronautics and Space Administration, Department of Defense, Department of Energy, National Oceanic and Atmospheric Administration, National Institute of Standards and Technology (formerly National Bureau of Standards), and National Science Foundation). The total demand estimated for the period 1996-2015 is 9.8 Bcf. Therefore, the Government's helium supply of 31.4 Bcf in Cliffside is adequate to supply the Federal agencies' demand for this period.

The total market for U.S.-produced helium increased to 3,434 MMcf in FY 1995 compared to 3,389 MMcf in FY 1994. The Bureau supplied about 10 percent of the domestic market, and private industry supplied 90 percent. Table 1 shows the total market for U.S.-produced helium from FY 1986 through FY 1995, including exports. In 1995, private industry exported 992 MMcf of helium.

TABLE 1. - Market Demand for U.S.-Produced Helium  
(Million cubic feet)

| <u>Fiscal Year</u> | <u>Volume</u> | <u>Fiscal Year</u> | <u>Volume</u> |
|--------------------|---------------|--------------------|---------------|
| 1986               | 1,918         | 1991               | 3,123         |
| 1987               | 2,073         | 1992               | 3,314         |
| 1988               | 2,420         | 1993               | 3,313         |
| 1989               | 2,688         | 1994               | 3,389*        |
| 1990               | 2,984         | 1995               | 3,434         |

\*Data changed to reflect corrected total volume.

## 6. Production

Since 1981, all Federal helium demand has been supplied by Grade-A helium production from the Bureau's Exell Helium Plant in Texas. The Exell plant produces Grade-A helium from Bureau-owned crude helium and processes a small volume of Cliffside native gas for plant energy requirements and helium recovery. In FY 1995, process gas piping modifications to the HMA engine/compressors number 22 and 24 were completed by HFO welders. The modifications added an additional process gas cooler, oil catch pots and relocated and replaced or eliminated the compressor block valves. Previously, compressors 22 and 24 shared a common gas cooler.

The Department of Transportation approved HFO's exemption application for acoustic emission and ultra sonic testing (AE/UT) of railroad tank car pressure vessels. This exemption allows AE/UT in lieu of hydrostatic testing and increases the retest period from 5 to 10 years. Modifications were made to improve the operability of the gas purification system and a new gas-fired regeneration heater was purchased to facilitate regeneration of the drier beds for the incoming fuel gas stream. A laboratory

scale deoxo unit was tested to determine new operating parameters for the primary helium process stream. Table 2 shows Bureau production for FY 1986 through FY 1995.

TABLE 2. - U.S. Bureau of Mines Helium Production\*  
(Million cubic feet)

| <u>Fiscal Year</u> | <u>Volume</u> | <u>Fiscal Year</u> | <u>Volume</u> |
|--------------------|---------------|--------------------|---------------|
| 1986               | 383           | 1991               | 370           |
| 1987               | 281           | 1992               | 341           |
| 1988               | 327           | 1993               | 321           |
| 1989               | 352           | 1994               | 270           |
| 1990               | 401           | 1995               | 248           |

\*Grade-A production from previously purchased Bureau crude helium plus contract purification of privately owned and stored crude helium for private markets. In FY 1995, Bureau production for Federal agencies and a few private industry accounts was 245 MMcf, and contract purification was 3 MMcf.

## 7. Sales and Distribution

Sales to Federal agencies and a few private industry customers totaled 245 MMcf in FY 1995. Table 3 shows Bureau sales for FY 1986 through FY 1995. Reduced spending for defense, nuclear research, and space activities has contributed to the decrease in Federal helium sales.

Distribution of Bureau helium to the Federal market requires large numbers of Government-owned containers for shipping gaseous or liquid helium. Gaseous helium shipping containers include high-pressure cylinders, automotive semitrailers, and railway tank cars. Low-pressure liquid helium shipping containers include 100- and 500-liter dewars and bulk liquid helium semitrailers. Because these containers are used in interstate commerce, they must be maintained and tested according to Department of Transportation regulations. Tank car maintenance and hydrostatic testing are provided at the Exell Helium Plant. High-pressure cylinders used for high purity helium and special analytical purposes are maintained and hydrostatically tested at the Amarillo Helium Plant. Maintenance of gaseous semitrailers and dewars is performed at both plants. In 1995 the Bureau filled and shipped 310 railway tank cars, 1,078 automotive semitrailers, 3,074 liquid helium dewars, 11 liquid helium automotive semitrailers, and 1,728 cylinders. Sales of Grade A helium (99.995%) in small cylinders were discontinued on July 1, 1994.

TABLE 3. - Volume of U.S. Bureau of Mines Helium Sales  
(Million cubic feet)

| <u>Fiscal Year</u> | <u>To Private Industry</u> | <u>To Federal Agencies*</u> | <u>Total</u> |
|--------------------|----------------------------|-----------------------------|--------------|
| 1986               | 7                          | 362                         | 369          |
| 1987               | 2                          | 270                         | 272          |
| 1988               | 1                          | 317                         | 318          |
| 1989               | 1                          | 343                         | 344          |
| 1990               | 1                          | 392                         | 393          |
| 1991               | 1                          | 349                         | 350          |
| 1992               | 1                          | 325                         | 326          |
| 1993               | 1                          | 292                         | 293          |
| 1994               | 1                          | 248                         | 249          |
| 1995               | 1                          | 244                         | 245          |

\*Includes sales made through private Bureau helium distribution contractors under 30 CFR 602.

#### 8. Technical Studies and Evaluations

The Branch of Helium Resources completed one study as part of planned projects for evaluation of U.S. helium resources. The report was accepted for Bureau publication as Information Circular (IC) 9436, "Helium Resources of the U.S., 1993."

The Technical and Analytical Services Laboratory developed several analytical methods including one extending the analysis of mass spectral data to determine additional components including olefins, carbon monoxide, carbonyl sulfide, and carbon disulfide during FY 1995. A method was developed to analyze gas samples for carbonyl sulfide using FTIR spectroscopy. This method has part-per-million level sensitivity. A chromatographic calibration formula was developed that would accurately accommodate non-linearity with a two-point calibration. A program involving physical, chemical and mathematical methods was implemented to control product accountability for the helium process plant. Also, a variety of tests for gas treatment solutions have been devised, including chemical tests for a variety of possible anionic contaminants and a test for foam production.

#### 9. Helium Program Expenditures, Income, and Financial Condition

As of September 30, 1995, the Government had \$367.4 million invested in helium stored for future use (crude helium purchases); \$13.4 million in helium plants, gasfields, pipelines, and transportation equipment; and current assets of about \$45.6 million. Program income during FY 1995 was \$26 million. Funded costs were \$17

million. Unfunded costs totaled \$79.9 million resulting in a total cost of \$96.9 million and a net loss of \$71 million when income was deducted. Our net negative net worth is \$949.6 million in FY 1995.

During FY 1995, interest on the helium debt was \$73.6 million, and thus increased the indebtedness to the Treasury to \$1,383.2 million before adjustments and repayments. Repayment of \$10.0 million was made on the interest on the net worth debt during the year. The adjustment and repayment reduced the indebtedness to \$1,373.2 million. The entire debt to the U. S. Treasury is in formal default as of September 13, 1995. Table 4 shows the status of the indebtedness as of September 30, 1995. Table 5 outlines the helium program's cash flow during FY 1995.

TABLE 4. - Status of Indebtedness of Helium Fund, September 30, 1995

|   |                     |
|---|---------------------|
| Indebtedness to U.S. Treasury, September 30, 1994 | \$1,309,559,551     |
| Interest accrued on indebtedness during FY 1995   | <u>\$73,644,232</u> |
| Total indebtedness prior to repayments            | \$1,383,203,783     |
| Repayments to U.S. Treasury during FY 1995        | <u>\$10,000,000</u> |
| Indebtedness to U.S. Treasury, September 30, 1995 | \$1,373,203,783     |

TABLE 5. - Helium Program Cash Flow, Fiscal Year 1995

|                                 |                     |
|---------------------------------|---------------------|
| Cash on hand September 30, 1994 | \$34,564,892        |
| Cash received during 1995       | <u>\$26,040,298</u> |
| Cash available in 1995          | \$60,605,190        |
| Cash disbursements in 1995      | <u>\$26,986,168</u> |
| Cash on hand September 30, 1995 | \$33,619,022        |

Table 6 shows the total funds required and funds available in FY 1995 on an accrued expense and income basis. Table 7 summarizes the assets, liabilities, and net worth of the Helium Fund as of September 30, 1995.

TABLE 6. - Helium Fund Statement, Fiscal Year 1995

|  |                       |                  |                     |
|--|-----------------------|------------------|---------------------|
| ACCOUNTS PAYABLE, SEPTEMBER 30,<br>1994                  |                       | \$2,229,082      |                     |
| FUNDS REQUIRED, FY 1995: *                               |                       |                  |                     |
| Nonexpendable transfers                                  |                       | \$10,038,000     |                     |
| Conservation and storage of helium                       |                       | \$1,010,000      |                     |
| Production and sales of helium                           |                       | \$14,636,381     |                     |
| Administration and other expenses                        |                       | \$1,252,000      |                     |
| Capital investment                                       |                       | <u>\$114,802</u> |                     |
| <i>Subtotal</i>  |                       |                  | <u>\$29,280,265</u> |
| FUNDS AVAILABLE FROM OPERATIONS:                         |                       |                  |                     |
| Income from helium sales, services, and other<br>sources |                       |                  |                     |
| Net revenue, FY 1995                                     |                       | \$26,002,438     |                     |
| Accounts receivable, start of year                       | \$2,857,857           |                  |                     |
| Less: Accounts receivable and advances,<br>end of year   | <u>(\$2,805,776)</u>  |                  |                     |
| Net  |                       | \$52,081         |                     |
| Cash on hand, start of year                              | \$34,564,892          |                  |                     |
| Less: Cash on hand, end of year                          | <u>(\$33,619,022)</u> |                  |                     |
| Net  |                       | \$945,870        |                     |
| Advances   |                       | (\$12,981)       |                     |
| Net changes in other assets                              |                       | <u>\$64,581</u>  |                     |
| <i>Subtotal</i>  |                       |                  | <u>\$27,051,989</u> |
| ACCOUNTS PAYABLE, SEPTEMBER 30,<br>1995                  |                       |                  | <u>\$2,228,276</u>  |

\*Funds required are shown on a cash outlay basis and differ slightly from budget numbers which are based on obligations.

TABLE 7. - Helium Program Financial Condition, September 30, 1995

|                                       |                      |                                 |                        |
|---------------------------------------|----------------------|---------------------------------|------------------------|
| <b>CURRENT ASSETS:</b>                |                      | <b>LIABILITIES:</b>             |                        |
| Cash                                  | \$33,619,022         | Accounts payable                | \$2,228,276            |
| Accounts receivable                   | \$2,805,503          | Advances                        | \$636,497              |
| Advances                              | \$273                | Unfunded liability              | \$0                    |
| Inventory and work in process         | <u>\$9,223,746</u>   | Long term debt to U.S. Treasury | <u>\$1,373,203,782</u> |
| <i>Subtotal</i>                       | \$45,648,544         | <i>Subtotal</i>                 | \$1,376,068,555        |
| <b>FIXED ASSETS:</b>                  |                      | <b>NET WORTH:</b>               |                        |
| Helium in underground storage         | \$367,370,564        | Donations and transfers         | \$46,911,210           |
| Plants, property, and equipment (net) | <u>\$13,412,455</u>  | Retained earnings (deficit)     | (\$996,548,202)        |
| <i>Subtotal</i>                       | <u>\$380,783,019</u> | <i>Subtotal</i>                 | <u>(\$949,636,992)</u> |
| <b>TOTAL</b>                          | <u>\$426,431,563</u> | <b>TOTAL</b>                    | <u>\$426,431,563</u>   |