

HELIUM

By C. W. SEIBEL AND H. S. KENNEDY

SUMMARY OUTLINE

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A review of the demand and use for helium during 1935 is worthy of consideration, as it gives an idea of the future trend and possible new uses for this gas.

After extensive hearings, the Federal Aviation Commission submitted its report¹ in January 1935 that made encouraging recommendations concerning lighter-than-air craft. It advised that the Navy undertake further construction and operation of rigid airships and that the United States participate in a trans-Atlantic airship service by building an airship and leasing it to a commercial operator for such use. The Commission also recommended that the Bureau of Mines be granted authority to sell helium to commercial airship operators to encourage development of privately owned dirigibles.

The governmental demand for helium during the year was reduced by the loss of the *Macon* in February 1935. This left the United States military establishments with no rigid ships in operation, and the demand for helium was reduced to the requirements of nonrigid ships operated by the Army and Navy.

The committee of technical experts, known as the Durand Committee, appointed by the President to investigate and make recommendations pertaining to the Government's operation of airships, issued a report favorable to continued participation of the Government in airship construction and operation. Thus the future outlook is for an increased demand for helium in airship operation if new construction is authorized in accordance with the recommendations of the President's committee.

Helium produced by the Bureau of Mines was used for inflating the balloon in which the second National Geographic Society-Army Air Corps stratosphere flight was made.

Several years ago the Bureau of Mines conducted experiments in the use of helium-oxygen mixtures to mitigate caisson disease in deep-sea diving.² Recently helium mixed with oxygen has been used in the treatment of asthma and other respiratory diseases with favorable results. Persistent requests by doctors and hospitals for helium for

¹ Federal Aviation Commission, Report: January 1935; 74th Cong., 1st sess., S. Doc. 15.

² Sayers, R. R., Yant, W. P., and Hildebrand, J. H., Possibilities in the Use of Helium-Oxygen Mixtures as a Mitigation of Caisson Disease: Rept. of Investigations 2670, Bureau of Mines, 1925, 17 pp.

medical use indicate a new and growing demand that must be provided for. The Bureau has supplied about 25,000 cubic feet of helium to the United States Public Health Service, which is cooperating with certain hospitals in the medical use of helium.

Cliffside gas field.—The Government Cliffside helium reserve of 50,000 acres in Potter County, Tex., comprising a whole gas structure owned in fee, was operated during the year to supply helium-bearing natural gas to the Amarillo helium plant. The field produced 4,103,821,000 cubic feet of natural gas from May 16, 1929, to June 30, 1935, which represents only about 2 percent of the total original reserve, as indicated by the small decline in rock pressure since May 16, 1929, when the Bureau began to operate the field.

Amarillo helium plant.—The Bureau of Mines helium plant near Amarillo, Tex., operated during the year to supply all the helium used by the Army and Navy in aeronautics. The Bureau produced 10,218,480 cubic feet of helium to satisfy these requirements, which were considerably larger than those of the previous year due to the demand of the dirigible *Macon* during its active operating life. The wrecking of the *Macon* in February 1935 caused a slackening of demand, and the Amarillo plant was operated intermittently during the remainder of the year with an accompanying reduction in personnel.

From the beginning of operations in May 1929 to June 30, 1935, the plant produced 68,687,620 cubic feet of helium at an expenditure of \$796,626.16 for plant and gas-field operation, giving an all-time average gross operating cost of \$11.58 per thousand cubic feet of helium for the Amarillo plant. The sale of residue gas returned \$188,228.83 to the National Treasury over this period, making a net Government expenditure of \$607,397.33, or \$8.84 per thousand cubic feet of helium produced.

Government helium production and costs, April 1921 to June 1935

Period	Production ¹	Gross operating cost (expenditures in operation and maintenance) ²		Return from sale of residue gas	Net operating cost (gross operating cost less return from sale of residue gas) ³	
		Total	Average per M cubic feet produced		Total	Average per M cubic feet produced
Fort Worth plant:³						
Under jurisdiction of Navy Department:						
April to June 1921.....	Cubic feet 260,520	\$126,694.05	\$486.31			
July to December 1921....	1,841,000	320,859.73	174.28			
October 1922 to June 1923 ⁴	4,069,940	489,299.70	120.22			
July 1923 to June 1924.....	8,204,665	636,438.38	77.57			
July 1924 to June 1925.....	9,418,363	451,084.58	47.89			
	23,794,488	2,024,376.44	85.08			
Under jurisdiction of Bureau of Mines:						
July 1925 to June 1926....	9,355,623	318,446.40	34.04			
July 1926 to June 1927....	6,330,056	277,384.70	43.82			
July 1927 to June 1928....	6,687,834	274,210.54	41.00			
July 1928 to Jan. 10, 1929..	2,638,894	121,440.65	46.02			
	25,012,407	991,482.29	39.64			
Amarillo plant:⁵						
Under jurisdiction of Bureau of Mines:						
April to June 1929.....	844,900	27,833.16	32.94	\$2,645.32	\$25,187.84	\$29.81
July 1929 to June 1930 ⁶	9,805,600	140,146.75	14.30	30,445.43	109,701.32	11.19
July 1930 to June 1931....	11,362,730	150,190.53	13.22	32,510.24	117,680.29	10.36
July 1931 to June 1932....	15,171,680	148,545.26	9.79	40,862.43	107,682.83	7.10
July 1932 to June 1933....	14,749,960	151,165.51	10.25	37,661.70	113,503.81	7.70
July 1933 to June 1934....	6,534,270	63,528.33	9.72	17,585.94	45,942.39	7.03
July 1934 to June 1935....	10,218,480	114,216.62	11.18	26,517.77	87,698.85	8.58
	68,687,620	795,626.16	11.58	188,228.83	607,397.33	8.84

¹ Production from the Fort Worth plant represents volume of airship gas produced, which had an average helium purity of 93 to 94 percent under Navy jurisdiction and about 95 percent under Bureau of Mines jurisdiction. Production from the Amarillo plant represents actual helium in the airship gas of better than 98-percent purity produced by that plant. Therefore, the advantage of the Amarillo plant from standpoint of cost is about 5 percent greater than a direct comparison of the figures indicates.

² Gross operating costs for the Fort Worth plant represent expenditures in operating and maintaining the plant, including current expenditures for natural gas. The Government did not own the gas field that supplied the Fort Worth plant, so there was no return from sale of residue. Gross operating cost for the Amarillo plant represents expenditure in operating and maintaining both the plant and the Government-owned gas properties. This gross operating cost at Amarillo is a measure of the amount that must be available to the Bureau of Mines for current expenditure. Returns from sale of residue gas must be deposited to credit of miscellaneous receipts of the Treasury and therefore are not available for expenditure by the Bureau. As the net operating cost is computed by subtracting current returns from current expenditures, it is a measure of the net withdrawal of funds from the Treasury for operation and maintenance.

³ Costs at the Fort Worth plant are based on compilations by the Bureau of Efficiency from records of the Navy Department and the Bureau of Mines. (Report of Bureau of Efficiency in hearing on Amarillo helium plant before the Committee on Mines and Mining, House of Representatives, 71st Cong., 2d sess., p. 210.) The costs do not include depreciation or depletion, and those for period of Navy jurisdiction do not include cost of Washington administration.

⁴ Plant closed in 1922 from January to September, inclusive, because of lack of funds.

⁵ Compiled from Bureau of Mines records. The costs do not include depreciation or depletion.

⁶ Plant shut down entire months of December 1929 and February 1930 because the Navy purchased its helium elsewhere at \$34 per thousand cubic feet. Stand-by costs for these 2 months were \$19,181.14.

