

The Great Helium Bubble

by John H. Rothchild

Helium is a great gas for conventioners, children, and dental patients. It is good for numbing teeth, and in balloons it is wonderful for launching candidates and getting kids to take walks. Such practical, down-to-earth uses make helium one of the inert gases most appreciated outside the laboratories.

Very few people who buy balloons, however, realize that the U.S. government has been conserving helium, at taxpayers' expense, in an underground reservoir near Amarillo, Texas, for use after the year 2000, when present helium sources are supposed to be depleted. This began in 1960 when the Helium Activity, as the office is called, in the Department of the Interior's Bureau of Mines contracted with four companies to provide, over a 22-year period, around 62.5 billion cubic feet of crude helium for underground storage, at a total cost then estimated at \$500 million. Although what was called the "helium conservation program" was launched with some public fanfare, we have lost track of it after 10 years.

The relative obscurity of the helium stockpiling scheme means that most of us are also unaware that the program has become financially crippled and that the assumptions under which it was created are obsolete. We do not know, for instance, that financial blunders com-

mitted at the program's inception have caused it to be economically untenable and that the estimated costs of helium stockpiling have grown from the original \$500 million figure to, according to one Bureau expert, "as much as \$4 billion" over the 22-year period of the contracts. We are unaware that Bureau of Mines studies have questioned whether there is any reason at all to save helium.

Like many small, but costly, government programs, the helium conservation program is isolated from the public that is supposed to benefit from it. We are aware of it now only through the courageous efforts of a few members of the Bureau of Mines staff who were willing to analyze it critically. It was the Bureau of Mines, in fact, that made the convincing case against its own program last September before the mines and mining subcommittee of the House Interior and Insular Affairs Committee. Hollis M. Dole, an Assistant Secretary of the Department of the Interior, told the subcommittee: "In our review, I find that changes have occurred since 1960 which affect its conceptual aspects and our ability to carry out the program." Since those hearings, the results of this self-study by the Bureau have put the helium conservation program into jeopardy. The Nixon Administration has taken \$24 million of the 1971 allocation for stockpiling helium out of the budget, pending results of several further studies.

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At the same time, however, the men in the Bureau of Mines who engineered such a thorough appraisal of the program (among other programs) have been removed. The whole research office in the economic division, established to provide such analyses, has been reorganized under an assistant secretary to make sure, according to one Bureau employee, it doesn't come to the wrong conclusions anymore. And after making such a convincing case last September to Congress, the Bureau seems to have lost its resolve. Harold Lipper, then Acting Assistant Director of the Helium Activity, who presented most of the damaging testimony to the subcommittee, said last month: "We can't give any definite answers [whether the program should be saved]." "Helium conservation," he added, "is a good thing."

Since the purges in the Bureau of Mines, and the changes in attitude of men like Dole and Lipper, the helium conservation program has lost its opponents at the crucial moment when it is being reconsidered by the Nixon Administration. It is not, however, without powerful supporters. A Helium Society was formed just two months before last September's subcommittee hearings in the public relations firm of Hill and Knowlton. It is largely financed (exact figures are unavailable) by three of the four helium companies that won the government contracts after 1960. Its

membership includes Robert K. Gray, senior vice president of Hill and Knowlton and also former secretary to the Eisenhower Cabinet; ex-astronaut M. Scott Carpenter; and assorted lobbyists and scientists. Among its advisers are Fred Korth, Secretary of the Navy in that same Cabinet, and the two Congressional co-sponsors of the Helium Act amendments that established the stockpiling program, Senator Gordon Allott (R-Colo.) and former Representative Walter E. Rogers (D-Texas). The Helium Society, according to Gray, was formed to point up "the dangers of wasting the helium that's available." Such a powerful constituency may explain why helium, an obscure gas that occupies roughly 5.5 parts per million in sea level air, got the kind of protection in 1960 that other dwindling resources are now seeking. It may also help us understand why the Bureau has softened its opposition and why helium, under attack eight months ago, seems to be regaining its strength and may, indeed, climb back into the 1971 budget.

The problem with helium, as with many other obscure government operations, is that what is begun in the public name with public money quickly becomes the sole concern of vested interests—the merchants and the government contractors and the bureaus that deal in helium—that are far from the public eye. Whether the helium stockpile is con-

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tinued or abandoned may depend on whether there is public pressure over an issue that does not make headlines, and that does not compare in dollar size to the Vietnam war or the oil depletion allowance. To the taxpayer, continuing the helium program might mean, according to one expert, foregoing “a movie a month.” But, as we find out every April 15, helium-type programs add up. And an insignificant public issue like helium has significant inside support. Under attack, even helium has the power to invalidate studies, to remove researchers, to inspire businessmen, and to get a government bureau to think twice. Though there may be convincing evidence against such a program, as there is against helium, once it has been launched it is hard to bring it back under public control. A study of the forces that propel the buying of helium may help us understand how such things get out of hand.

The decision to save helium was made in 1960, even though the prospect had the uncertain aura of banking Confederate money. Nobody knew for sure when we would need stored helium, or how much, or whether its value would rise or fall. The Bureau of Mines predicted demand for helium would reach 2 billion cubic feet per year by 2000, but a study by the Stanford Research Institute commissioned by private helium companies, said it would be more like 5 to 10 billion. It might be that we stored an unnecessary resource, but, on the other hand, it might be that the stored amount, compared to great needs, would be as token as one lifeboat on the Titanic.

There were three main reasons the government decided to stockpile helium. The most important, paradoxically, was an immediate shortage. Anyone who saw Popeye and Spaceman drooping

down the avenue during a Macy’s Thanksgiving Day parade, filled with plain old air and held up with big ugly derricks, understood the persuasiveness of the problem. Helium demand had risen from 50 million cubic feet in 1948 to 360 million in 1960. The ICBM missiles were consuming voracious amounts of the gas for pressurizing, purging, and cooling their rocket fuels. The Bureau of Mines, which produced all the helium in the country at the time, was worried. A crisis atmosphere gave credence to the futurists, mostly scientists, who envisioned helium supplies depleted within 30 years, when space-age demand would be higher than ever.

Second, helium was needed in industry. Its uses extended from shielded arc welding, wind tunnel research, deep sea diving, molecular leak detection, artificial atmospheres, and lifting balloons to cryogenic (low temperature) work. There were few known substitutes for helium’s unique properties: light like hydrogen, yet not volatile; less soluble in fluids than other gases; nonflammable and nontoxic to man; and most important, fluid at near absolute zero temperatures. Helium conservation had nothing to do with the balance of nature, but it was thought to be irreplaceable in its technological uses.

Third, helium was in the national security interest. As late as 1955, its largest single use was in Navy blimps. Its military deployment classified it as a munition. (The U.S. refused to sell helium to Hitler for his Zeppelins.) Since the U.S. had a virtual world monopoly on production, helium export was closely regulated by the Secretary of State. Helium’s military record gave it a patriotic, nonpartisan profile. The 1960 act that established its conservation described its need for “the defense, security, and general welfare of the United

States.”

Helium also had the special role of protecting the original copies of the Declaration of Independence, Constitution, and Bill of Rights from oxidation in the National Archives.

Helium, then, had something for scientists, businessmen, politicians, and the military. What it lacked in popular support it made up for in influential friends. It even commanded the concern of President Eisenhower, who endorsed the conservation program in his 1959 and 1960 budget messages.

Although the helium program was sold as aid to a dwindling resource, the decision to stockpile it was budgetary, not environmental. Since helium occurs in the air, there will be helium as long as there is man. In fact, a process was known in 1959 through which unlimited supplies of helium could be extracted from the air itself. The problem was cost. To get helium from the air would run between \$1,000 and \$2,000 a thousand cubic feet. To get it from the natural gas streams in the Hugoton field, as had been the government’s practice, cost only \$10 a thousand. If enough extra helium could be saved then, at \$10, went the thinking, the day would be forestalled when the government would have to produce it for \$1,000.

Hugoton, a large area stretching across the Texas Panhandle and into the Kansas and Oklahoma plains, was then thought to be the only source of cheap helium in the world. The Bureau of Mines had been extracting helium from Hugoton since the 1920’s—by tapping into the natural gas pipelines and running the gas through pressurized cooling boxes where everything except helium, nitrogen, and a small percentage of other gases would freeze. The helium-nitrogen was then siphoned off (and later further refined through a similar process) and

the natural gas returned to the pipeline. Since private gas companies owned the natural gas in the Hugoton, the Bureau paid them for shrinkage—the reduction in gas volume as a result of helium removal.

Helium, however, was being extracted from only a small percentage of the Hugoton gas flow. Through the Bureau’s five helium plants—at Otis and Cunningham, Kansas; Exell, Texas; Shiprock, New Mexico; and the large, modern outfit at Keyes, Oklahoma—about 680 million cubic feet of helium was collected yearly. But billions of additional feet were going up the chimney in stoves and heaters all over the nation as most of the Hugoton gas passed through unprocessed. The new conservation program would expand the Bureau’s capacity, and massive volumes of helium would be stored in an underground reservoir near Cliffside, Texas, for the day when Hugoton would be depleted.

The helium conservation program looked forward, but it did not look back at its own history. Helium had always been linked to the Bureau of Mines. It was a public good, and a munition. As a natural resource worth the government’s money, it also had been controlled for the benefit of all. The Bureau of Mines possessed the only long-term experience in helium extraction. But in spite of these traditions, the 1960 Helium Act amendments stipulated that private corporations would contract with the government to produce the helium for storage.

This departure reflected the Eisenhower desire to make government more free enterprising. The idea of contracting out the helium stockpiling was just one of several measures enacted to insure that its procedures would be, according to preliminary reports on the program, “businesslike.” A report of the House

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Committee on Interior and Insular Affairs said this approach would “give reasonable opportunity for and encouragement to the growth of a privately-owned and operated helium industry and thus keep the costs of the government program to the minimum”

It soon became apparent, however, that “businesslike” extended only to the idea of the contracts, and not to the contracts themselves. They were more welfare-like. The Bureau signed with four companies: Cities Service Helix, Phillips Petroleum, Northern Helix Company, and the National Helium Corporation. Each of the contracts was good for 22 years and was not renegotiable regarding the price paid for the helium produced, even though evidence suggested that new technology would greatly reduce costs of extraction. No bids were taken on these contracts, and they included no cancellation provisions. The four contracting companies would be paid about \$12 a cubic foot. The four contracts were signed between 1961 and 1963. When they became public, the General Accounting Office charged that helium conservation was a “windfall” for the contracting companies. As time passed, the windfall grew. The companies soon learned to cut production costs from around \$9 per thousand cubic feet to about \$7, realizing a \$5 profit on every thousand cubic feet. And the contracts guaranteed them 62 billion cubic feet of production over the 22-year-period. “One company is making a 100 per cent profit,” a helium expert says. Such arrangements undoubtedly make helium seem not only important, but indispensable to the future of mankind.

The government was doing as poorly as the companies were doing well. The arrangement was that the Bureau of Mines would spend \$47.5 million a year on purchases from the four contracting

companies. Part would be paid out of current helium sales, from the Bureau’s own plants, and part from Treasury loans. At a four per cent interest rate, it was calculated that the Bureau would incur early debts, but that these would be erased through increased helium sales. The conservation program was supposed to pay out by 1985, with the 62.5 billion cubic feet free and clear in the stockpile.

But this financial maneuver depended on the stability of several very unstable variables. The first was interest rates. At four per cent, a thousand cubic feet of helium would cost, by 1985, around \$40. At 10 per cent, the same amount would cost \$200. Another factor was the Bureau’s optimistic demand curve. If the missile and space programs, which were consuming roughly 50 per cent of the yearly helium supply, reduced their demand, then Bureau sales would slacken and it would be forced to take out more Treasury loans. The program was also self-contradictory. If the Bureau sold more helium, it meant there was less to conserve, but more money to pay for conservation. If it sold less, there would be more helium to stockpile, but less money to purchase it. The government was in the absurd position of having to consume more now to be able to have more later.

Whatever amount of existentialism it took to understand this arrangement, it might have worked, provided that the government could have sold its helium at the artificially high price of \$35 per thousand cubic feet. While the Bureau had sold its helium for between \$15 and \$20 in the past, the new \$35 rate was set in 1960 to pay for the stockpile. When other government agencies bought helium, then, they were to pay not only for

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present value, but also for the costs of the Treasury loans and the stored helium. This price, crucial to financing the new program, could be maintained, however, only if the Bureau had a monopoly on helium sales. Elmer F. Bennett, Acting Secretary of the Interior, told a 1960 House hearing that “if any part of the helium market should be supplied by direct sales from private plant to consumers, the pay-out plan [for conservation] would be jeopardized accordingly.” His warning corresponded with a 1955 preliminary report which said: “It would be necessary to prohibit private production of helium if monopoly pricing were to be followed. This is so because the price would be so high as to attract private competition.”

Free enterprise, so far, was only in the business to sell helium to the government. But some members of the 1960 Congress did not believe that that plan was “businesslike” enough. Monopoly pricing, after all, discouraged competition, and Senator Robert S. Kerr of Oklahoma didn’t like to be discouraged. Through his efforts, the Kerr amendments to the helium program were enacted. The most important one, in the words of a House report, “emphasizes the need to foster individual initiative and avoid government monopoly in helium production and distribution.” Robert Kerr also liked to put his money where his mouth was. By 1961, the first private helium plant in over four decades was open for business in Navajo, Arizona. It would produce 65 million cubic feet a year, and sell in competition with Bureau plants. It was owned by Kerr-McGee Oil Industries, Inc. Senator Kerr’s example did not go unheeded. By 1968, there were seven private helium companies competing directly with the Bureau plants. These companies easily undercut the government’s \$35 price—

selling at \$20 they still made generous profits. Together, they were producing about 735 million cubic feet of helium a year, almost equalling total Bureau production. And they had captured 45 per cent of the helium market, most of the sales being to government agencies.

When those other government agencies bought the cheaper private helium, they were thereby increasing the total budget costs, since any loss in Bureau helium sales forced the helium program farther into debt. The Secretary of the Interior wrote a letter to the agencies, obligating them to buy helium from the Bureau. A court injunction, brought by the private companies, invalidated that obligation. Since most helium-using federal projects were farmed out to private industry anyway, the government couldn’t force those private contractors, in NASA for instance, to consume Bureau helium. That would, of course, jeopardize free enterprise. So the Bureau tried persuasion. “We approached the agencies,” said Lipper. “We tried the Defense Department. They wanted to cooperate. But they actually couldn’t locate their helium sources through the secondary contractors. It was like a needle in the haystack.”

The helium program was, as Senator Kerr intended it to be, enterprising. The case of Cities Service illustrates the multifaceted benefits it presented. A subsidiary of Cities Service—Cities Service Helix—was formed to provide the government with conservation helium, making a nice profit on the \$12 government buying price. Then Cities Service opened its own private helium plant, undercut the \$35 price, and gained both on conservation and current sales. Understandably, the balance sheet of helium conservation cannot support too much of such individual initiative. Finally, Cities Service contributes to the Helium Society,

to assure that such a valuable addition to man's resources won't be squandered because it is losing money for the government.

What had started out being "business-like" ended up being merely good for business and bad for the budget. By 1968, the Bureau indebtedness to the Treasury amounted to \$148 million, including \$20 million in accrued interest. That in itself was not alarming—but Bureau yearly sales had dropped from \$27.2 million in 1966 to \$18.7 million in 1968. The Bureau had, through lack of sales, accumulated one billion cubic feet of extra helium for conservation—but that amount had cost approximately \$40 million. Helium demand had also off because the Defense rockets now used solid fuel instead of helium. If NASA pulled out of liquid fuels, the entire helium market would crash. As it was, according to Lipper's presentation in the House, "the program cannot pay out at the current level of income."

Besides the dismal economics of the program, eight years had changed the status of helium as a commodity. Cheaper methods, introduced by the new private helium industry, made it possible to extract helium not only from natural gas fields containing .9 per cent helium or above—as in most of the Hugoton—but from those containing as low as .4 and perhaps even .3 per cent. At the same time, the growing air separation business (principally for oxygen and argon) meant that the costs of getting helium from the air itself might be reduced, especially if helium were extracted along with the other gases. If this process were perfected, there would be a plentiful supply of helium.

There was, also, the gas field at Tip Top, Wyoming. The natural gas at Tip Top was not of marketable quality and therefore was not going anywhere. But tests showed that it contained helium—the Bureau estimated 15 billion cubic feet, although this figure has been questioned—and was therefore a ready-made

conservation reservoir. All the Bureau had to do was leave it alone. Accepting the Bureau estimate, Tip Top was an instant five or six years of helium conservation. The Tip Top discovery, in 1961, was important beyond itself. It meant that there might be vast amounts of helium stored in the ground that had never been discovered. Helium conservation, the Bureau admitted, was undertaken before anybody had really looked for helium itself. Helium was valuable, but it had never been important enough to search for. Tip Top made people think such a search might produce rich new deposits that would make conservation absurd.

We were, then, squandering today what we were also conserving for tomorrow. We were paying for a stockpile that nobody knew would ever be necessary. And given the new developments in an eight-year span, what could be expected in the next 50? Would saving helium for the year 2000 be what saving horseshoes for 1970 would have been at the turn of the century? Wasn't there some other vanishing resource that could benefit from \$47.5 million a year?

These are some of the questions the Bureau asked itself in 1968-70. In spite of the fact that it had helped engineer the helium program, it seemed ready to scrap it now. This was, after all, the age of Robert S. McNamara's cost-budgeting studies, and key members of the Bureau were convinced that if helium couldn't be reformed, then nothing could. The Bureau of Mines had commissioned several studies that proved the point. The first, written by Lee Preston, then a professor at Berkeley, and David Brooks, then his research associate, accepted the need for the helium program but criticized the financial plan. That was in 1964. By 1969, however, Kenneth F. Anderson, special assistant to the Assistant Secretary over the Bureau, suggested the "cancellation alternative." Later that year, in testimony before the joint economic subcommittee on economy in

government, Preston reversed his earlier position. "In the light of all these developments," he said, "it is evident that the whole status of the helium program must be reconsidered." The Bureau's pursuit of its own program was so relentless that a National Academy of Sciences report that called for expansion of the helium stockpile was, after Bureau objections, later reworded to advocate merely a re-evaluation.

But helium had very different properties, depending on whether you looked at it from the Bureau of Mines, or from the Phillips Petroleum Company. The differences became clear at the subcommittee testimony last September. The first day of that two-day hearing belonged to Lipper and Dole. Drawing from the Bureau studies and work by John O'Leary, its director, David Brooks, now its chief economist, and William Vogely, they presented the program's bleak present and dim future. That day, helium demand in 2000 was seen to be no more than two billion cubic feet, new discoveries were a worry, the program was insolvent, and there was general cause for concern.

The next day, however, helium improved. W. L. Culbertson, of Phillips Petroleum, said no new helium sources had been developed in the past 10 years, that new technologies were not significant, and that demand in 2000 would reach five to 10 billion cubic feet. "Continuation of the helium conservation program," said Culbertson, "is by far the surest and most economical way to provide the helium required for the defense of the United States and the growth of its economy."

With the passing of time, the Culbertson view seems to have seeped back into the Bureau of Mines. The old pessimism is gone, and so is O'Leary, who was recently fired as director. Brooks, who has been stripped of his title and authority, still hangs around the Bureau, but his research staff now works under the Assistant Secretary. Vogely was shuffled off to the Internal Revenue Service.

The helium comeback can be felt

through Harold Lipper, the Bureau official in charge of the program. Although its future is in limbo at the moment, and Lipper is making no public conclusions about it, already it is clear that the Bureau is backing away from the anti-helium views of the former staff. When asked about helium demand in the year 2000, Lipper now cites the Stanford Research Institute figure of five billion cubic feet—before he mentions the Bureau's own figure of two billion. When confronted with his old reasons why helium should not be saved, Lipper says, "I guess we have a different attitude toward our natural resources."

At the same time, a kind of helium revival is happening down at the Helium Society. In March, at their first annual meeting, Dole, the Assistant Secretary who went to Congress with Lipper in September, is there to introduce Henry Wheeler, once a Bureau assistant director for Helium, who helped get the amendment passed in 1960. Wheeler, according to Dole, will discuss "a little publicized, but extremely important product." Wheeler's speech, a nostalgic defense of the program, along with a speech made by scientist and helium pioneer Clifford Seibel, are inserted into the *Congressional Record*.

The helium revival has a different flavor from the old 1960 helium harangues. What was originally viewed as a practical, economic program, justifying the acumen of hard-nosed enterprise, is now more like the vanishing eagle. If helium needed a Carnegie, it now could use an Audubon. The word "conservation," once a misnomer, has now become an asset to the helium program. Ecological respect, it seems, requires the Helium Society to protect this "valuable resource" from those near-sighted people who would squander it.

Such support is probably reassuring to those who thought that government and industry would be incapable of turning on to any conservation program. On the other hand, helium isn't exactly the kind of conservation most people had in mind on Earth Day. ■

The Great Wind Machine

by Bruce J. Oudes

The sight of a wheel rolling off into the desert is of distinct interest if it is one of four carrying you to Nouakchott, the capital of Mauritania.

It happened the visit was a goodwill, more correctly a misguided will, mission. The occasion, replete with rising sand-storm, provided time and conditions for a unique reassessment of the heavy cargo, principally hundreds of pounds of pamphlets explaining the American way of life, which had contributed to the breakdown.

My companion, who had been sent from Washington to see if the United States Information Agency (USIA) was hitting the "target" in West Africa, blew the sand off a brochure on the American economy, one which described the marvelous Detroit motor vehicle, and broke up laughing.

On another occasion, the scene was the Congo and my companion was an American newsmagazine correspondent. We spent a rather wry afternoon driving around the precincts of Katanga distributing a station-wagon load of American-produced "get out the vote" leaflets in Swahili in preparation for an election which, to no one's surprise, ratified Moise Tshombe as the Congo's Prime Minister.

Any officer in USIA has a store of such stories. They are rooted in the frustration of determining the message, the audience, and how the audience is supposed to react to the message. Much of the time there is a gnawing suspicion that whatever the project of the day might be, you're participating in a giant

"Why was I hauling those pamphlets across the Sahara? . . ."

charade, a hoax.

"What am I doing here?" is a question that often intrudes in the mind of the USIA officer as he goes about his appointed rounds. Why was I hauling those pamphlets across the Sahara? In time the two of us delivered our "freight"—the agency term for its message—to the American Embassy in Nouakchott, and it was duly distributed to its Mauritanian audience. Yet it is hard to imagine that any minds were altered by our pamphlets, either among the illiterate nomads who make up most of the population, or among the tiny literate ruling class, whose ears are tuned to Cairo and Paris. Certainly our message did not prevent Mauritania's rulers from breaking relations with the U.S. during the 1967 Arab-Israeli war. And why was I hustling votes for Moise Tshombe in the Congo? Tshombe won the election with American help, but not because of anything USIA did; the constituency that mattered was the white mercenaries, who voted with their guns, and the kind of U.S. help that mattered was money and arms, and planes supplied by the Central Intelligence Agency. If we won any votes in Katanga, which I doubt, they weren't counted—that's not how power is won and lost in the Congo. Thus the USIA officer's self-criticism

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