pressurizing and purging agent for liquid-fueled rockets.

The demand for helium for conventional uses is growing slowly, but a much greater demand for helium could arise from new technologies to produce and distribute energy. Without helium, the production of virtually infinite amounts of energy from thermonuclear fusion and the transmission of large amounts of electricity by superconducting power lines, and conversion of coal to electricity in magnetohydrodynamic plants are thought to be unlikely or impossible. New materials could possibly be found for superconductors without helium, but all practical systems now require it. Gas-cooled breeder reactors, alternatives to the current U.S. design for a breeder, would also require huge volumes of helium.

But these technologies are still embryonic, and they are not expected to become practical until the next century. Right now, helium is abundant and the helium conservation program is expensive. So the Administration has apparently taken the position that fiscal economy in the short run is more important than conservation of helium for the future, when the country may need it most.

Helium is found in the atmosphere, but it occurs mainly in natural gas. The concentration in most gas reservoirs is so low that recovery has never been economically justified, but several fields of natural gas in Kansas, Oklahoma, and Texas are extremely rich in helium. Because of their unusual geological characteristics, these fields may contain natural gas with as much as 2 percent helium, and together they comprise the world's largest known reserve. But like most other sources of natural gas in the United States, the fields near the Oklahoma Panhandle have been thoroughly developed by private companies and are being rapidly depleted. As far as the gas companies are concerned, helium is a harmless impurity, which escapes into the air with the products of combustion when natural gas is burned. As a result, the helium

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Weinberg Leaves Oak Ridge Lab

Alvin M. Weinberg, one of the nuclear establishment's preeminent visionaries, has retired as director of the Oak Ridge National Laboratory, a job he has held since 1955. Weinberg, who is 58, plans now to start a small think-tank for energy issues at Oak Ridge, Tennessee.

His departure from ORNL was disclosed in a brief announcement released on 18 December by the Union Carbide Corporation, which runs the facility under contract to the Atomic Energy Commission. The announcement offered no explanation for Weinberg's leaving, and he was not immediately available for comment.

In 18 years as ORNL's director, Weinberg led the laboratory out from under its military shroud and into a new role as a center for biological, environmental, and peaceful energy research. He himself emerged as an important conceptualizer of new reactor types, a commentator on science-government relations, and an enthusiastic—sometimes controversial—advocate of a nuclear powered future. In recent years, Weinberg is said to have chafed at AEC's tighter reins on the national laboratories and to have clashed on a number of issues with some members of the AEC and the Joint Committee on Atomic Energy in Congress. Among the sorest points reportedly has been the AEC's reluctance to fund the development of gas-cooled and molten-salt breeder reactors, as insurance against major problems that might crop up in the all-out effort to build a commercial liquid-metal fast breeder reactor. Weinberg has also questioned the adequacy of experimental evidence underlying official assurances of reactor safety, and nuclear critics have put his misgivings to good use.

Early last year, rumors circulated around Capitol Hill that Union Carbide, whose lucrative operating contract was coming up for renewal, had begun to view Weinberg as a liability and was trying to ease him out. Friends on the Joint Committee interceded, and Union Carbide apparently had second thoughts; last February, Weinberg took an extended leave of absence, reportedly on the understanding that he could resume the directorship if he wanted it. Indications are that he did not.

The new Institute of Energy Analysis promises to give Weinberg the chance to devote more time to the problems of "trans-science" as he calls them—issues such as nuclear safety that meld social and political decisions with scientific judgment. According to a prospectus prepared by Weinberg, the institute will function as a "super-think-tank" for systems analysis, serving as a rallying point for the work of more specialized groups and as an "honest broker" of advice to the government.

Plans contemplate a staff of about ten and initial support from the AEC. Officially the institute will be an arm of the Oak Ridge Associated Universities, a nonprofit organization of 42 schools in the South which are linked to the national laboratory.

The laboratory's new director as of 1 January is Herman Postma, a plasma physicist who, like Weinberg, has spent virtually his entire career at Oak Ridge. Postma has been director of the laboratory's thermonuclear division since 1967.—R.G.

EPA Severs Ties with Industry Research Group

In what can best be described as a friendly parting of the ways, the Environmental Protection Agency (EPA) has decided to cut its ties with the Coordinating Research Council–Air Pollution Research Advisory Committee, known as CRC-APRAC, an air pollution research organization funded mainly by the oil and auto industries. EPA's participation in the group has been criticized by Senator Edmund S. Muskie (D–Me.) and by some public interest groups as posing a conflict of interest for EPA, since the joint research is intended as input to federal pollution standards which it is EPA's job to set (*Science*, 24 August 1973).

In disclosing the decision, Senator Muskie praised EPA Administrator Russell E. Train. But officials at CRC-APRAC said the decision to sever ties had come to them as a "surprise" since they believe the CRC-EPA relationship to be exemplary among industry-government

will run out when the natural gas does, probably between 1985 and 1995.

The Department of the Interior set up the helium conservation program in 1961 after Congress had passed the 1960 Helium Act Amendments. Under the program, Interior signed 22-year contracts with private companies to extract the gas from the Hugoton and Panhandle natural gas fields at a fixed price. The companies simply separated the helium from natural gas as it flowed out of wells, then pumped the helium via pipeline to the Cliffside Field, a partially depleted natural gas cavity near Amarillo, Texas (see map). Because the Congress set an annual ceiling of $47.5 million for helium extraction and storage, only about half the helium from the Panhandle area was being recovered by the conservation program. Nevertheless, by 1972, 35 billion cubic feet of helium had been laid away—60 years' supply at the present rate of national consumption.

The government is also in the business of selling helium, and the income from helium sales was supposed to pay for the conservation program. At first, funds were borrowed from the Treasury to cover program costs, but within 35 years the program was supposed to pay for itself. Government sales declined sharply in the mid-1960's, however, as the space program was cut back and private companies entered the domestic helium market in competition with the government. Instead of paying its own way, it appeared in 1969 that the helium conservation program would eventually owe the Treasury $1.5 billion for loans and interest. Furthermore, many critics, including the General Accounting Office, pointed out that the contractors earned enormous profits. *Time* characterized the helium program in 1971 as "The Great Balloondoggle," and a writer for *The New Republic* observed that, in view of the overwhelming surplus, "Favoring helium conservation had the uncertain aura of stashing Confederate money." Practically all observers, except perhaps the contractors, agreed that the Inte-

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cooperative research. The group supervises about 30 technical studies in atmospheric chemistry, health effects of pollutants, and engineering problems at think-tanks and universities around the country. The operation has been supervised by a hierarchy of committees on which EPA representatives sit, but they are outnumbered by those from auto and truck companies, oil companies, and think-tanks. Industry has paid three-fourths of the bill; EPA has paid the balance.

Muskie and the public interest groups, such as the Nader offshoot, Public Interest Campaign, have said that aspects of the research sponsored by CRC-APRAC has been biased in favor of industry. In his letter announcing the decision, however, Train said past CRC-APRAC work was objective. But he said that "not only the fact of objectivity but the appearance of objectivity must be considered when it comes to evaluating continued EPA participation in this activity." The EPA would stop sitting on the committees and funding projects no later than 31 August 1974, Train said. Current plans include EPA's taking sole responsibility after that time for ongoing projects.

Muskie also released an internal EPA memorandum supporting his contention that industry spokesmen view CRC-APRAC projects as devices for hindering pollution regulations set by EPA. The memo related that a representative of Cummins Engineering Co.—one of the nation's two principal manufacturers of diesel engines—had told an EPA official last June that one CRC-APRAC project "was the most 'effective coup that the industry has pulled off on EPA' as it commits EPA to a long, complicated project which is bound to result in additional delays which could postpone instituting controls for heavy duty engines for many years."

—D.S.

Noncooperation with Russia: One Man's How-To

The recent disillusionment with détente and consequent strain on Soviet-American scientific ties has led to a lot of talk—but few known instances—of noncooperation with scientists in the Soviet Union. But Marc H. Richman, professor of engineering at Brown University, has devised what he thinks is a novel protest tactic for helping Russian scientists who have tried unsuccessfully to emigrate to Israel and for simultaneously maintaining contact with Russian colleagues.

Not long ago, Richman received a request from E. M. Nadgornyi of the Institute for Solid State Physics of the Soviet Academy of Sciences for some specialized information on computer simulation techniques, to which Richman had alluded in his technical publications. Richman, who has never been to the Soviet Union, says that generally he responds to such requests from Russian scientists with a friendly letter and the desired information.

However, this time, he replied to Nadgornyi saying that while he favored collaboration between scientists of "all countries . . . I cannot condone the official attitudes of the Soviet government in respect to such noted scientists as Professors [Alexander] Lerner, [Benjamin] Levich, and [Andrei D.] Sakharov." Therefore, Richman explained to Nadgornyi, he was sending the requested information to Alexander Lerner, a noted scientist who applied to emigrate from Russia in June of 1971, and who, like Nadgornyi, lives in Moscow. Nadgornyi, therefore, could pick up the information which includes, among other things, a number of computer programs, from Lerner. Richman says he sent letters and the information by registered mail since, in his experience, this kind usually gets through.

Activists in the cases of Jewish rights and civil liberties of Soviet citizens, asked about Richman's protest, replied that they viewed it as a useful technique. One scientist said that encouraging this kind of contact between Nadgornyi and Lerner could, in turn, ecourage solidarity among scientists there. Another scientist, who has been to Russia several times, praised the technique because it was "polite" to all concerned. As for Richman, he says he has reason to believe his letters have been received in Russia and that other scientists have been following his example, including some who say that they normally "tear up" such information requests from Russians.

—D.S.