

which created Henry Kissinger from a wretched and obscure Pfc. jeep driver back at the close of the last World War. He is merely a hired gun, whose loyalty to his master continues for just as long as his master is able to provide hired assassins and kindred types with wealth and prestige for services rendered.

Into fresh air

Contrary to Henry Kissinger, the United States is not objectively doomed to decay and expire. The purpose and direction which Benjamin Franklin and his co-sponsors embedded in the original federal Constitution and the design of Alexander Hamilton's American System is fully as viable, and more urgently needed in the world today, than nearly two hundred years ago.

The United States was created by an international conspiracy, one which linked the heirs of the English Commonwealth Party, of Jean-Baptiste Colbert, and of Gottfried Wilhelm Leibniz into a combined force committed to bringing about a new republic, dedicated to scientific and technological progress, and to the development and realization of the creative powers of the individual. The European supporters of this conspiracy made establishment of the United States a strategic possibility, but not as an act of charity toward the oppressed people of a British colony. They did so to create a republic whose example and development would foster the extension of the same ordering of nations into Europe, and into the world more generally.

This crisis-weary, hungry, frightened world today urgently needs the establishment of a new, gold-reserve-based world monetary order, to replace the shambles of the bankrupt Bretton Woods System. That new world monetary order must be premised on the principles of the American System, as those principles were articulated by the first George Washington administration.

It is our proper purpose, and self-interest, to rededicate ourselves to those principles of the American System, and not only to contribute to creating a world monetary order modeled on that American System, but to foster by that means the development of stable, durable sovereign national republics, enjoying scientific progress, technological progress, and the development of the individual, as our forefathers secured that heritage for their posterity—if the posterity did not waste it.

That is the historical purpose and hope for security of the United States, a purpose more viable today than ever before.

If we seem to be in a process of decay, especially since the time of Henry Kissinger first moved into the White House, this decadence, economic rot, and moral rot are not intrinsic to the American System. The rot is the consequence of submitting our national institutions to manipulation by such alien "Typhoid Marys" of immorality and decadence as Henry Kissinger.

Science & Technology

Teller, Bethe call for fusion hybrid

by Vin Berg

Dr. Edward Teller and Dr. Hans Bethe, two world-famous American physicists, now say that fusion-fission hybrid reactors can and should be developed by the United States within 10 years. The specialized system has long been under discussion among nuclear scientists, and it is now clear that the hybrid should be "elevated to the dignity of a project," according to Dr. Teller.

Speaking in separate interviews and speeches over the past two weeks, both men asserted that no significant technical obstacles exist to the hybrid system. Such a reactor would combine elements of existing nuclear technology with emerging fusion energy systems.

If accomplished, the hybrid would provide abundant fuel for existing nuclear reactors, and scientists will have gained engineering experience that could prove invaluable in the development of pure fusion systems during the decade of the 1990s.

Technical and political aspects

The two scientists called for the hybrid's development a few days after the enactment of Cong. Mike McCormack's Magnetic Fusion Energy Act of 1980, which commits the United States to develop a commercially viable pure fusion reactor by the year 2000. Fusion is the power source of the sun, in which the nuclei of atoms fuse under conditions of very high temperature and density, producing new elements and giving off enormous amounts of energy. In pure fusion systems now under development, the fuel would come from ordinary water and other common elements like lithium.

Although Teller and Bethe were extremely optimistic about the fusion-fission hybrid from a scientific and technical standpoint, Dr. Teller bluntly qualified his remarks from a political standpoint: if the Carter administration is returned to office this November, he stated, the hybrid will probably never be developed.

The urgent need for such a technology results from the limited magnitude of world uranium resources. Light water reactors of the type that make up the

nuclear power industry in the United States depend on a rare isotope of uranium, U-235, which could be exhausted by the turn of the century. In fact, such fuel supplies could run out even sooner, if nuclear power is applied at the rate energy needs require.

Scientists have long known of two solutions to the U-235 problem. One is the fast breeder reactor, a more advanced form of nuclear fission reactor, with the special advantage that it not only generates electricity like existing light water reactors, but would actually create or "breed" more new fissionable material than it burns up in the course of its operation. In this way, the breeder reactor "recycles" and extends the lifetime of uranium-based nuclear fuel.

Such breeder reactors are under intensive development in many nations, led by France and including the Soviet Union and Great Britain. But since April 1977, all development of the fast breeder in the United States has been halted by order of President Carter.

The hybrid

A second solution to the shortage of uranium is the fusion-fission hybrid system, of the sort Teller and Bethe have now called for. Such hybrid systems could produce electricity or serve simply as "fuel factories."

In the "fuel factory" concept, the fusion-fission hybrid would utilize fusion reactions between isotopes of hydrogen to generate nuclear fuel for fission reactors. Although hybrid reactors that would generate electricity are also on the drawing boards, Bethe and Teller argue that the surest near-term goal should be the development of a "fuel factory" hybrid.

"The fusion-fission hybrid has been discussed in the last couple of years with increasing frequency, but it has not yet been elevated to the dignity of a project," Dr. Teller told an interviewer from *Aviation Week* magazine, which published his remarks in its Oct. 13 edition. "It could be realized in 10 years in an economical fashion, using elements which are practically in hand today.

"The hybrid will not produce sizable amounts of electrical power," he continued, "but instead will produce fuel for certain types of nuclear reactors that in turn generate power."

Dr. Hans Bethe, speaking at a colloquium of scientists from Sandia National Laboratories in New Mexico, stated that the fusion-fission hybrid could provide enough new fuel for nuclear fission reactors to ensure energy for hundreds of years to come.

Developing a fusion-fission hybrid reactor to generate electricity directly could pose problems, Bethe indicated, but far fewer problems are present if the system is restricted to only one function, breeding fuel for fission reactors. "Any electricity generated by the hybrid itself

would be a secondary consideration."

The "fuel factory" he describes involves surrounding a fusion reactor with "blankets" of uranium-238 or thorium-232, both common isotopes, but useless as fuel. Their interaction with the high-energy neutrons generated by fusion reactions, however, would produce fissionable byproducts, either U-233, a uranium isotope that does not occur naturally, or plutonium-239, to fuel conventional reactors.

The engineering for such a hybrid would be "relatively simple," Bethe added. If it were coupled with the best in advanced reactor technology, like high temperature gas-cooled reactors or heavy water reactors like those now in use in Canada, electricity could be produced for as little as 2 cents per kilowatt-hour. Electricity produced from oil as fuel at present costs 6 cents per kilowatt-hour just for the fuel.

A step toward fusion

Dr. Teller reiterated his call for quick development of a fusion-fission hybrid in an interview last week with the Swedish magazine *Energi*, published by the FKU (the Association for Nuclear Energy and Development), a frequent collaborator with the U.S. Fusion Energy Foundation. He emphasized that such a project would not only mean a near-term solution to energy shortages, but significantly contribute to the realization of pure fusion power.

"Fusion energy is the most exciting possibility," he stated, "and \$20 billion for 20 years is approximately the amount that is needed to make it practical." The drafters of the McCormack fusion bill, signed into law Oct. 7, gave those figures as a reasonable estimate of the time and cost required.

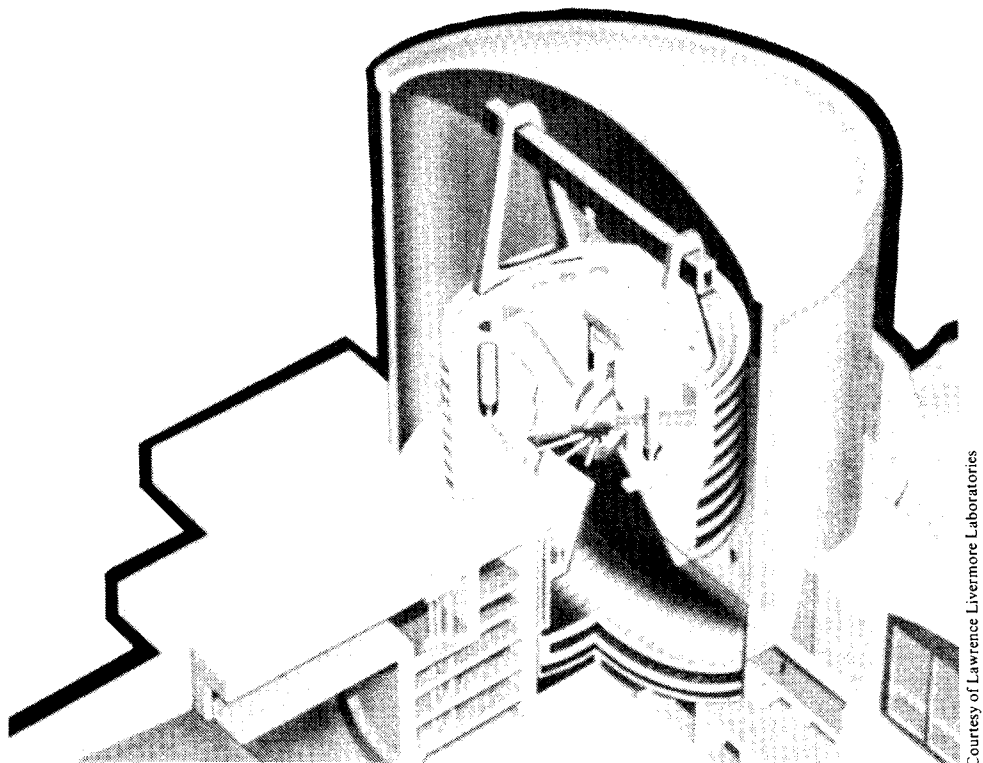
"I have said from 1950 onward," Teller continued, "that we can have fusion by the year 2000. And I still say that. The McCormack bill may make it possible; \$20 billion over 20 years is enough. . . ."

"But we already have a plan which I think we can complete in 10 years and which is much more certain of being accomplished, and that is the fusion-fission hybrid.

"You start inside a long pipe with fusion, surround it with uranium . . . you get more energy and more neutrons. Slow down the neutrons. Altogether you'll probably get no net energy, just enough to keep the machine running and very little extra. But you can make fuel for reactors, fission reactors, cheaply, and enough for the whole world for thousands of years."

That, he emphasized, is only one reason for developing the hybrid.

"At the same time, if we build these hybrids, we will run into some of the engineering problems for the pure fusion reactor, and we can learn whether and how we



Courtesy of Lawrence Livermore Laboratories

This fusion-fission hybrid reactor design incorporates the experimentally successful 'baseball' magnet.

can make cheap fusion reactors. So, the hybrid has a double purpose. It is a source of fuel for fission reactors, and it is practice, experience, for fusion reactors: practice in building economical reactors which does not need more government money to feed it."

The Carter problem

Teller, however, plainly feared that President Carter would treat such a project in the same way he has treated the fast breeder program, no matter what the scientific merits of the proposal. "There has been a lot of discussion," he stated, "but the nuclear engineer in the White House does not want to hear of anything in which the word 'fission' occurs. Perhaps in a few weeks, we can begin these plants, if we have a new President. Otherwise, I hope the Swedes, or the Japanese, or someone else will do it."

International cooperation

Teller's Swedish interviewer asked him about the feasibility of cooperation between the United States and the Soviet Union. "You know," he replied, "the fusion project, when it was first introduced, was secret. I argued and I fought for seven years to make it open. . . . Since that time, there has been worldwide cooperation on fusion, and the cooperation is honest.

"When the Soviets and we are working together on space," he continued, "I don't believe that the Soviets tell us everything they know. You find out whether they

tell you everything from internal consistency. In the fusion field, however, we have real cooperation, good cooperation. What the Soviets say is true. Much of what the Soviets say is also new. And there is cooperation with Germany. We are talking with the Japanese. Of course, we are talking with the British and the French. There is worldwide cooperation and that is as it should be."

The military question

In his earlier *Aviation Week* interview, Teller situated his call for development of fusion and a fusion-fission hybrid in the context of the decline in U.S. military capabilities. "People talk about an arms race, and I think that designation is mistaken," he said. "An arms race means that we try to build more and more of the same. The Soviet Union has won the arms race. They are ahead of us quantitatively. . . . The Soviet Union is probably ahead of us qualitatively as well as quantitatively. This is hard to believe because it is obviously not true in their civilian economy."

Teller described fusion research as the cutting edge of a program to reverse America's strategic inferiority. The United States, he said, needs "research and more research. The one thing which one cannot confidently describe is the detailed goals of that research. Even to find the right goals requires a lot of ingenuity."

One goal, he indicated, was clear and easy to specify: the fusion-fission hybrid "fuel factory."