

Fusion's Spectacular Promise

Coming breakthroughs and political battles over the best energy source

The achievement of 60 million degrees Centigrade and better temperatures in the Princeton University Plasma Physics Laboratory's tokamak reactor (see *THIS WEEK*) is only the first in a series of major breakthroughs which the international fusion community confidently expects to achieve within the next 12 to 18 months. Moreover, the Princeton results have significantly improved earlier conservative projections which indicated that tokamak reactors would be both economically and technologically possible, with capital costs in the range of existing nuclear fission light water power plants.

As increasing numbers of the U.S. and international press have pointed out during the days since the Princeton results were announced, a rapid push to fulfill the spectacular promise of fusion will mean clean, cheap energy for the entire world and give the United States a global leadership role in solving the energy crisis. The *Executive Intelligence Review* is the only weekly publication which has consistently covered the fusion effort, both in its political and scientific implications. We are pleased to give our readers this week an exclusive overview of world response to the Princeton breakthrough and a picture of both sides of the raging political battle on fusion in the United States. Our report begins with highlights of a summary outline by Charles B. Stevens, Director of Fusion Engineering for the Fusion Energy Foundation, of the expected fusion research results and their impact on fusion energy development. The full report will be published in a forthcoming issue of *Fusion* magazine.

1. The Coming Breakthroughs In Fusion

Neutral Beam Heating

The most crucial technological input into the Princeton PLT success was the use of neutral beam injectors to heat the tokamak plasma to temperatures at which fusion reactions can occur. The injectors, which were constructed at Oak Ridge National Laboratory in Oak Ridge, Tenn., are the key technology responsible for the current U.S. worldwide lead in tokamak fusion research. They are also being developed at Lawrence Livermore Laboratory in California, where scientists utilizing neutral beam injection on their 2XIIB mirror machine have obtained plasmas with temperatures greater than 150 million degrees C.

New Tokamaks Now Coming on Line

The fact that the Princeton PLT tokamak works at all is, from an engineering and management perspective, a miracle. The total U.S. fusion budget at the time the PLT was conceived in 1972 was less than the Princeton Plasma Physics Laboratory budget for

1978. During the crucial, initial stages of procurement for construction of the PLT, far less than the necessary funds were committed.

The PLT was built on a crash, round-the-clock basis. Sufficient funds were eventually obtained through the efforts of Dr. Robert Hirsch, then head of the U.S. controlled fusion program. Hirsch also obtained commitments at this time for construction of two more major experiments: the General Atomic Corporation's Doublet III Tokamak and the Princeton Poloidal Divertor Experiment (PDX) Tokamak. Unlike the PLT, these devices have had the minimal funding needed from the very beginning.

The fact that the Oak Ridge Impurities Studies Experiment (ISX) tokamak was brought on line immediately following construction — and has achieved ground-breaking results — reflects the growth of the engineering and scientific competence in the U.S. fusion effort and the direct effects of substantially increased funding levels.

The Alcator C Tokamak

Because of the efforts of the current head of the Department of Energy Fusion Office, Edwin Kintner, the intermediate step in the followup to the MIT Alcator success has been skipped and a large, high magnetic field tokamak, Alcator C, will be brought on

line this fall. In 1976 the original Alcator reached the minimum confinement product needed for fusion energy production (i.e., 30 trillion nuclei-seconds per cubic centimeter), but only at a temperature of 10 million degrees C (44 million is needed to ignite the fusion reaction). This was achieved at relatively high plasma densities and opened up a whole new physical realm for tokamak research.

Alcator C will achieve a confinement product greatly in excess of that needed for fusion power plant operation. With only ohmic heating — that is, heating by simply passing current through the plasma, not using neutral beam injections — the Alcator C will probably only reach temperatures between 10 and 30 million degrees C. The addition of neutral injectors is not currently planned due to lack of funds, but the MIT fusion scientists are concentrating on an alternative method using intense microwaves.

Experiments this summer, as reported in the Fusion Energy Foundation's *Fusion* magazine, on Alcator A indicate that microwave heating will work. Since the Princeton Large Torus reached 60 million degrees C, with less than two million watts of neutral beam heating, the Alcator C could easily surpass this if large-scale microwave heating proves successful.

High Beta Experiments

Over the last six years of the U.S. fusion program, the General Atomic Corporation has made a major commitment to fusion research. The Doublet III tokamak now coming on line at General Atomic in San Diego, California, is the definitive scientific test of their design for a tokamak system. With the addition of neutral beam injectors, scheduled for next year, Doublet III will proceed well beyond what is needed for a tokamak fusion reactor. More importantly, Doublet III will demonstrate that tokamak plasmas can be efficiently confined in minimal-strength magnetic fields. This is key in bringing tokamak fusion plasmas up to the levels needed for economic power plants. That is, Doublet III could resolve the so-called beta problem. Beta is a measure of how efficient a given strength magnetic field is in confining a fusion plasma. Current experimental tokamaks operate at betas in which the magnetic field is less than one percent efficient. Five to ten percent efficiencies are needed for economic reactors, and DIII will operate in this range.

Another approach to the beta problem will also be tested in the near future with the addition of neutral

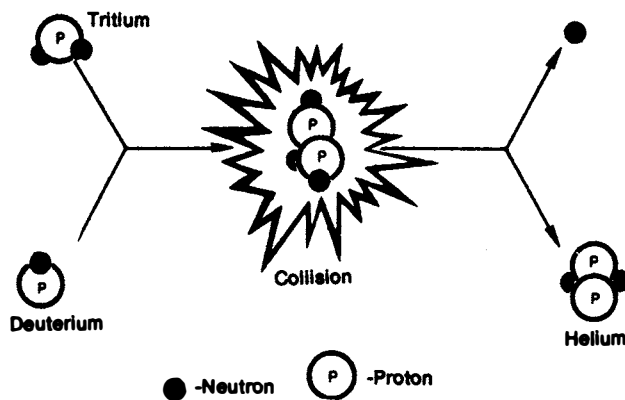
Just What Is Fusion?

Fusion, the fusing together of atomic nuclei, is the process by which all the heavier elements we know on earth were built up from simpler, lighter elements. It is the energy source that powers the sun.

Unlike nuclear fission, which splits heavier elements like uranium up into lighter ones and makes use of the energy released, fusion fuses lighter elements into heavier ones. The amount of power that can be generated from this process is mind-boggling. Fusion's basic fuels, deuterium and tritium, heavy hydrogen atoms, are found in sea water. Unlike uranium, deuterium is one of the most abundant elements known to man: there is enough in sea water to fuel fusion reactors for, literally, millions of years. A single gallon of seawater can fuel as much fusion energy as five barrels of oil can fuel conventional energy.

And fusion is clean. The special form of electromagnetic energy in the fusion-energized plasma and the wide variety of energy forms available from the fusion reaction — from charged and neutral particles to various frequencies of radiation such as X-ray and ultraviolet — will make it possible to build fusion reactors with a closed cycle of materials and energy flows that will have no waste and no radioactivity.

Equally important, fusion would permit man to redefine completely his earthly supply of raw



materials, through the use of plasma processing. This process, the fusion torch, could extract minerals that exist in minute amounts in ordinary rock and make them available for industrial purposes through the direct use of hot charged gas to separate them. It would open the possibility for a total revolution in industrial technology.

In the deuterium-tritium fusion process shown here, the deuterium nuclei (d), which consists of one neutron and one proton, fuses with a tritium nuclei which consists of one proton and two neutrons. The result is the formation of a helium nuclei with two protons and two neutrons and one free neutron. Since the total mass of the fusion reaction products, the helium nuclei and the free neutron, is less than that of the deuterium and tritium nuclei, the difference in mass becomes expressed in the velocity of the products.

beam injectors on the Oak Ridge ISX. This experiment could provide a test for the "flux-conserving" method of increasing beta efficiency. The experiment will also provide a means for beginning to corroborate the Grad-Hogan theory. The achievement of efficient high betas is key to producing the high power densities needed for low-cost reactors.

Princeton PDX

The large Poloidal Divertor (PDX) experiment at Princeton is just about to be broken in. The PDX will test an important method of cleansing fusion plasmas of impurities (elements other than the fusion reactants and the products of fusion reactions, helium). The method utilizes magnetic divertors which "scrape" impurities off the surface of the plasma.

Scientists at the General Atomic Corporation recently obtained initial experimental verification of another impurity-cleansing method using a gas blanket around the plasma. These impurity-cleansing methods will provide the means for sustaining fusion plasmas over long periods of time.

Inertial Confinement

As noted by Dr. Harold Furth, Assistant Director at the Princeton Laboratory, magnetic fusion research has been making great strides generally, not just in tokamaks. Scientists at Livermore who proved that everyone else was too pessimistic about mirror machines in 1976 will be bringing their Tandem Mirror Experiment on line this fall. This experiment could demonstrate the principles of what could be a very attractive mirror reactor configuration. The Soviets and Japanese are bringing similar experiments on line. The Soviets continue to have success with their broad-based tokamak program, and their stellerator donut-shaped magnetic bottle like the tokamak, which was designed in the U.S. but later abandoned for the tokamak — continues to demonstrate that it is as good of tokamaks of the same size.

The real breaking story is the inertial confinement fusion research effort which uses lasers, ion and electron beams to ignite fusion reactions. Researchers at the Lawrence Livermore and Los Alamos laboratories have already scored major technological breakthroughs with the breaking in of their large-scale laser systems. Sandia labs in New Mexico has also begun fusion experiments with their high-power electron beam, and Soviet laser and electron beam systems are just now being geared up. Major results should be coming from these laboratories within the next several months.

2. World Reaction to the 'Earth-Shattering News'

The press, both in America and abroad, gave prominent and generally accurate coverage to the Princeton fusion breakthrough, although some, like *Le Monde* in Paris, accompanied a wire dispatch with a lengthy attempt to play down the significance. Mexico's press gave massive coverage to the event. The British newspapers reported a similar breakthrough at Culham Laboratory in Britain, which is to be discussed at the international plasma physics and fusion research conference this week in Innsbruck, Austria.

ATLANTA JOURNAL, ATLANTA CONSTITUTION, "Atomic Breakthrough Made, Could Mean Cheap Energy," Aug. 13:

"For the first time in history, the actual conditions of fusion have been produced in a fusion reactor in scale model," said Steven Dean, director of the department's Magnetic Confinement Systems Division. "This is the biggest thing that has ever happened in fusion research," he said.

"Experiments at Princeton University that began three weeks ago and are now in progress are the most significant developments in the twenty-seven years of the fusion program," Dean said. "It has laid to rest the question of whether fusion is feasible from a scien-

The Science of The Breakthrough

The Princeton Large Torus (PLT) tokamak has attained sufficient conditions of hydrogen fuel impurity so that the main heating source, the Oak Ridge neutral beam apparatus, could be turned up in power. With the low impurity level reducing the radiative energy losses from the PLT's hydrogen plasma, 2 megawatts of the deuterium heating beam shot the plasma temperature up from the previous high of 26 million degrees Centigrade — and past the ignition temperature of 44 million degrees — to a record *60 million degrees*.

Even more important, no instabilities or excessive leakage from the plasma occurred in this high temperature "collisionless" regime, in agreement with the theoretically predicted behavior. With these results in hand, there is little doubt that the larger Tokamak Fusion Test Reactor (TFTR), now under construction, will achieve better than energy-breakeven conditions when it begins operation in the early 1980s.

Although there are about 100 tokamak fusion devices worldwide, the Princeton success is a unique U.S. result.

tific point of view. There is now a scientific basis for embarking on engineering developments of fusion reactors."

NEWARK STAR LEDGER, "Princeton Reports Breakthrough in Creating Cheap, Clean Energy," Aug. 13:

"This significant achievement establishes the foundation for fusion as an energy source," said Dr. Morris Levitt, executive director of the New York based Fusion Energy Foundation (FEF), adding "Now it's up to the United States to make the same kind of commitment to fusion as it did with the Manhattan Project."

"The breakthrough...eliminates the final scientific hurdle to the production of a pollution-free and virtually unlimited supply of power," according to FEF's director of plasma physics, Dr. Steven Bardwell. "What remains now are technological and engineering breakthroughs in order to produce a prototype fusion reactor and ultimately commercial production of electricity through fusion."

Bardwell said most scientists world-wide believed the prototype fusion reactor could be built by 1990, and commercial production of energy through fusion is possible by the turn of the century. "This undercuts solar energy and of course oil and coal because fusion

represents an unlimited efficient clean source of energy. The energy scarcity's over," said Bardwell.

LE FIGARO, Paris, Aug. 15:

The current raging battle in the United States between pro- and anti-nuclear forces was marked by a turning point at the Bonn summit meeting with the famous little phrase of President Carter, "the indispensable development of nuclear energy." It is in this political context that one must situate the earth-shattering announcement by leaders in the U.S. fusion program, undoubtedly made to influence political decisions.

WASHINGTON POST, editorial, Aug. 16:

One thing the government must now reconsider is whether the secrecy wrapped around the laser approach to fusion can be reduced. It is the lack of secrecy and the large amount of international cooperation on the (magnetic) bottle approach that have brought success to the work at Princeton. The configuration of the machines in use there is Russian in origin. Somewhere in this maze of science is a solution to the energy problem. That should encourage the government to be generous in its support of a variety of research programs aimed at the development of a source of clean and unlimited energy.

Congress: "This Committee Expects The Department of Energy to Reap the Fruits"

Congressional reaction to the Princeton results mostly consisted of pressure on the White House and Department of Energy to scuttle its energy austerity policy and use the tokamak breakthrough as an excuse to move into real research and development. Some comments from the House floor follow.

Rep. Charles Rangel (D-NY, member of Black Congressional Caucus), Aug. 16:

"Miraculously, this timetable (the 20 to 30-year one cited by the *Washington Post*—ed.) coincides with most estimates of when we'll reach the end of the world's oil supplies. The implications of this advancement are tremendous. The solution to the world's energy problem is before us. We must seize the initiative and pursue it. This breakthrough compels us to redirect our energy and funnel further funds and attention to highly promising and vitally important nuclear fusion research."

Rep. Olin Teague (D-Texas, Chairman, House Science and Technology Committee), Aug. 16:

"This nation is eager for victories on the energy front and demonstrating advanced technology to tap renewable resources is mandatory if we are to show other nations that we are serious about energy supply." (Mentions letter he and ranking minority

member Wydler wrote to energy officials in June voicing their concern about the future of the magnetic fusion program when money was redirected to solar). . . "The stakes are too high for this nation to take a timid approach to magnetic fusion. We must move aggressively on this option and this committee expects the Department of Energy to reap the fruits of this latest advancement."

Rep. Carl Pursell (R-Mich.), Aug. 17:

"Fusion is America's future energy supply. Recent developments in our national fusion research program have given this potentially vast new source of energy the widespread public attention it deserves. . . . The real question is not so much if we can do it, but when and how. . . . I suggest to my colleagues that the time is right to push ahead with an intensive national commitment to develop fusion and other alternate energy sources. . . . Our energy problems and lack of a coherent national drive to solve them are undermining the strength of the dollar, distorting our foreign trade, influencing our fusion policy, threatening both our economy and national security. Fusion power can lead the way to a secure, inexhaustible energy supply, not just for America but for all the world's people. We should pursue it with all the vigor of our successful space program.

"I would ask the membership to look carefully at HR12922 (a bill for a limited supplemental appropriation—ed.) which I've introduced as a blueprint for a space program-type effort to accelerate the development of fusion and other alternate energy sources."

LONDON TIMES, Aug. 15:

The hope has been entertained that fusion technology will come into play in time to forestall massive reliance on fast breeders. The latest developments give an ounce of encouragement to that view. But the technical problems still to be tackled are too great and the economics of fusion generators too uncertain to permit the fast breeder option to be closed now or in the near future.

LE MONDE, Paris, Aug. 15:

A good twenty years of work is still required. The statements reported by UPI should thus be seen in the light of the ferocious struggle for grant money in which the American laboratories are involved, a struggle which drives them to trumpet *urbi et orbi* the least success. Last March, the same lab at Princeton announced a temperature of 26 million degrees as "a major advance toward the use of fusion for producing electricity."

Nevertheless, the step from 26 million to 60 million degrees is noteworthy. "Breakeven" requires temperatures of 50 million to 100 million degrees, and the American test shows that these temperatures can be obtained in a Tokamak.

LA REPUBBLICA, Rome, Aug. 15:

It has laid to rest the question of the realizability of fusion from the scientific point of view. Now there is the scientific basis to develop the technology.

BALTIMORE SUN, editorial, Aug. 16:

Scientists believe judicious increases in the federal fusion budget could hasten fusion's development. Yet the Carter Administration has actually cut the modest budget. The promise is for *unlimited* energy, enough to make not only the Texaco find seem paltry but even to render the Arab petroleum reserves of minor importance. With the success of the Princeton experiment, the promise is significantly nearer fulfillment. It is time for the Administration to review its attitude toward the fusion energy budget.

LE MATIN, Paris, Aug. 16, "A Billion Dollars a Year to Succeed" by Henri Laurent:

The tokamak results from Princeton prove that thermonuclear fusion is possible....Professor Bardwell...of the American Fusion Energy Foundation, goes even further. He has explained to Matin that in his opinion, the industrial application will occur before the year 2000. This is only, according to him, a question of investment: it is necessary to devote one billion dollars a year....

The recently obtained results...confirm Steve Bardwell in his conviction that it is actually possible to go faster....

...It is all a question of political will. He insists also on the direct relation between fission and fusion, "two paths which it is preferable to consider as

complementary rather than opposed."... For example, it will be possible, according to him, to build fusion-fission hybrid breeder reactors. "The development of such a process which has the advantage of a much greater rate of breeding than the convention breeder, would be an excellent transition to fusion both in terms of technology planning and supplying energy," said Bardwell, who favors fast breeder reactors.

3. The Soviet and Japanese Joint Research Offers

Since the beginning of 1978, the United States has been made at least three official offers by the Soviet Union and Japan to engage in a cooperative fusion development effort. The Princeton breakthrough, demonstrating the near-term feasibility of commercial production of thermonuclear fusion, makes U.S. acceptance of these offers all the more urgent from the standpoint of ensuring both U.S. and global energy resources through the next century.

In April, E.P. Velikhov, Vice President of the Soviet Academy of Science and a leader of the Soviet fusion program, privately suggested to U.S. officials in Washington that the work of several nations in the fusion field be coordinated in one major international effort so that a full demonstration of fusion energy production could be realized by the 1990s. Velikhov subsequently renewed this proposal at the May meeting of the U.S.-Soviet Joint Fusion Power Coordinating Committee in Moscow; and on May 31, the Soviet newspaper *Pravda* released an official proposal to the U.N. Disarmament Conference.

The Soviet statement read in part:..."it can be said with confidence that nuclear (fission-ed.) energy...does not provide the only key to solving the energy problem...There emerge alternative approaches...The Soviet Union is prepared to cooperate on a constructive basis with other states in research on new sources and types of energy. We have recently stated our readiness to participate together with the USA, European countries, Japan and other states on a 'tokamak' international project — a thermonuclear reactor designed to produce a controlled thermonuclear reaction with an energy yield higher than the energy input..."

On May 3, in New York City, Japanese Prime Minister Takeo Fukuda added a special kick to such proposals in his remarks to the Foreign Policy Association and the Japan Society. Fukuda proposed a billion dollar Japanese investment in the U.S. fusion program and the creation of a special fund for research in the field.

Fukuda singled out fusion as a uniquely promising avenue for joint research and development:

"Fusion involves harnessing almost unlimited

energy from a manmade process which employs the same principle by which the sun creates its heat and light in nature...I should like us to take (our current efforts—ed.) a step further, pooling our human and financial resources in a joint effort to realize an ultimate dream of mankind... I wish to propose that Japan and the United States seriously study the establishment of a joint fund for the advancement of science and technology, to serve as a framework for international cooperation in these areas....”

4. How Schlesinger Is Trying To Sabotage Fusion

In response to a question from NSIPS at a special White House press conference called on Aug. 18 to announce a compromise with Congress on the natural gas portion of the Administration's energy package, Department of Energy chief James Schlesinger for the first time publicly associated himself with the grouping that is trying to downplay the Princeton fusion breakthrough. Schlesinger, forced to cover himself by characterizing the Princeton achievement as “great,” stressed to the press that they and their colleagues had “overplayed the Princeton results. They are a step toward feasibility (of commercial fusion), but they don't demonstrate feasibility.”

Schlesinger's Aug. 18 statement was a continuation of the campaign of lies and disinformation the Energy Secretary has run against the U.S. fusion program since before the significance of the Princeton breakthrough reached the U.S. press and the White House. There is no doubt, in fact, that Schlesinger and his special team at the DOE did everything in their power to block news of the Princeton breakthrough from both the general public and President Carter.

As news of the Princeton results spread like wildfire across the national press last week, Department of Energy press spokesman Jim Bishop told callers to his office that the Princeton results were not as significant as press reports indicated. Bishop's disinformation line was that the whole story had been fabricated by “a former high-ranking Energy Research and Development Administration (ERDA) official now working for big industry.” DOE Director of Press Services Al Alibrando circulated the same set of lies.

Schlesinger's office at the same time began heavily pressuring the Princeton scientists themselves, with the aim of restricting official news release of the results to a press conference scheduled at the International Atomic Energy Association meeting to be held at Innsbruck, Austria on Aug. 23.

Schlesinger knew of the Princeton results and their extraordinary significance as early as July 31. On that day, Assistant Secretary of Energy for Technology Robert Thorne directly notified Schlesinger that the results were a unique achievement for the U.S. and

unmatched by any other nation; that they were the most important results in the history of the U.S. program; and that the press conference announcing the achievement would be held at DOE headquarters in Washington on Aug. 15.

Subsequently, a joint Princeton-DOE Office of Fusion press release was modified and cleared by the DOE during the week of Aug. 7. During the same period, the DOE magnetic committee meeting in Oak Ridge, Tennessee, confirmed the extraordinary significance of the Princeton results.

By the evening of Aug. 11, Bishop had begun telling callers that the press conference was off, but after being told of this disinformation Thorne's office angrily insisted that the news conference would be delayed, but would definitely be held on Aug. 16. When the news from Princeton broke into the national press, Alibrando's office began insisting that no press conference was scheduled, and that since the story was out, “it may not be necessary.”

Lies to Carter

Schlesinger targeted Carter in particular with disinformation. John Deutch, DOE Assistant Secretary for Research, provided Dr. Frank Press, the Presidential Science Advisor, with the incompetent assessment that the Princeton results did not warrant presidential involvement in their announcement. Deutch disregarded international scientific judgment when he told a scientist over the weekend that the results “may be great for Princeton, but they don't represent a real breakthrough.” This is the same man who six months ago answered a reporter's question on fusion research with “I don't know anything about fusion. I'm a chemist.”

Deutch continued his retailing of the Schlesinger line when the DOE was forced to go public with the Princeton results and convened a press conference at their Washington, D.C. headquarters on Monday, Aug. 14. Introducing Dr. Melvin Gottlieb of Princeton, Deutch slanted his report on the results to maintain the DOE's present inadequate timetable for the U.S. fusion program and to contain the new results within that framework. The press conference had been called with only several hours notice, barely allowing Gottlieb time to arrive in Washington, and Dr. Edward Kintner, the highly respected Director of the Office of Fusion, was excluded from participating.

The main thrust of Deutch's remarks was to deny the quality of the Princeton research as a “crucial experiment” for demonstrating the instability-free scaling of the tokamak device beyond the crucial ignition threshold. Instead, Deutch advanced the position that only the actual production of breakeven would be a “breakthrough” rather than a merely “significant” result, even if no new physical principles were required beyond those now established by the Princeton results. That bogus logic justified not changing the Schlesinger fusion timetable: no fusion energy until at least 2025.

When Deutch was asked about ERDA studies demonstrating that the date for implementation of commercial fusion power reactors could be moved up to the 1990s, he denied knowledge of them.

These studies do exist. They were directed by Dr. Steven Dean, Assistant Director for Confinement Systems of the Office of Fusion, who first broke the story on the true scientific significance of the Princeton results to the national media on Aug. 12 during Schlesinger's first round of attempted sabotage.

What Schlesinger Wants

A page-one article in the *Christian Science Monitor* on the day of the press conference revealed Schlesinger's underlying motivation in keeping the Princeton results under wraps and sabotaging the U.S. fusion program. According to the *Monitor's* reporting, premature development of fusion would interfere with the Schlesinger faction's plans to impose austerity conditions on the U.S. by cutting oil imports and domestic energy consumption, in preparation for another provoked Middle East war.

There is every indication that Schlesinger is prepared to fire any and all competent scientists on his staff who stand in the way of his program of sabotage and lies, if he can get away with it politically. It is Schlesinger who must be fired, before he destroys America's capacity to enter the nuclear fusion age.

5. A Shift on the Fission Front

The fight to break the deadly stalemate in the U.S. nuclear program is most obvious in the response to the Princeton fusion breakthrough, but there are plenty of other signs. First was the favorable ruling by the U.S. Nuclear Regulatory Commission approving resumption of construction at the \$2.3 billion Seabrook, New Hampshire nuclear fission plant.

Seabrook Symbolic

Over the past year, Seabrook has become the national symbol of the attempts by an organized and well-financed antinuclear lobby to bring even conventional nuclear power construction to a grinding halt. But hopes of stopping Seabrook by endless legal challenges were finally dashed when the Environmental Protection Agency ruled that the water cooling system at the plant was satisfactory. The Nuclear Regulatory Commission followed that up with a 4-0 ruling Aug. 10 to allow construction to resume on the Seabrook site. Construction had been halted by the NRC on July 21 pending the EPA final ruling.

More than 400 of a total 1,800 workers laid off began resumption of work this week despite a feeble attempt by 17 members of the antinuclear Clamshell Alliance to chain themselves to the site.

The favorable NRC ruling has created considerable demoralization in the ranks of the antinuclear movement. A spokesman for the electric utility constructing Seabrook, Public Service of New Hampshire, commented, "We're happy; very happy," adding that the endless legal challenges by the environmentalists were nothing but "legal harassment." New Hampshire Gov. Meldrim Thomson declared that "the great majority of our citizens who do want Seabrook are tired of having a filthy, foul and un-American minority interfering with their lives." A spokesman for the antinuclear Friends of the Earth group told an interviewer following the governmental decision, "My comments are not printable . . . It is a dark day around here . . ." He added that he was certain that there was "arm twisting" from the White House on the issue.

"Indispensable Role"

On another significant front, U.S. nuclear exports are reviving, after being stalled since passage last spring of the U.S. Nuclear Nonproliferation Act. After months of negotiation, a U.S. State Department source reported this week that both the U.S. and Iran have initialed an agreement to "facilitate U.S. assistance and technological development of Iran's nuclear capacities." The State Department source stated that he expected the U.S. and Iran to sign the final agreement within the next two weeks, after which point Congress, according to the proliferation act, will have another 60 days to register its approval. The London *Financial Times* estimates that the deal will clear the way for U.S. export of nine nuclear power plants, part of Iran's long-range program to build 23,000 Megawatts of nuclear power by 1994. One estimate is that the total export benefit to U.S. industry could reach as much as \$20 billion.

The Iran agreement is being watched by several other countries considering purchase of U.S. nuclear technology to see whether Congress will stick to its stated intent of using the nonproliferation act to facilitate decision on such exports, despite the actual intent of the antinuclear lobby which drafted the original Percy-Glenn bill.

The Iran agreement is also being watched closely by the other signatories of the summit communiqué, signed in July by President Carter and the heads of state of the six other major western industrial countries, reaffirming the "indispensable role" of nuclear energy for world development.

The big loser in the fight is Energy Secretary Schlesinger. His zero-growth energy bill, already bogged down in Congress, wasn't exactly helped by last week's series of progrowth developments. Schlesinger's resignation has been rumored for weeks in Washington and the publicity (reported elsewhere in this issue) around his attempt to undermine the announcement of the Princeton fusion breakthrough may be the coup de grace.

EIR Daily Energy Intelligence Bulletin

The Daily Energy Intelligence Bulletin is produced by the same Executive Intelligence Review staff that puts together the news and analysis which has made the EIR Weekly unique in its field. The Bulletin provides the subscriber with all the latest energy news, world press briefs, short features, rumors, reports on the ecologists' latest ploys, and the energy lineup on Capitol Hill—all provided to you in short form, five days a week. With this service you will have all the world's energy news at your fingertips on a daily basis.

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THURSDAY, JANUARY 11, 1978

LEADING U.S. BUSINESS DAILY CALLS FOR CUTOFF OF NUCLEAR COOPERATION WITH INDIA

JAN. 11 - THE WALL STREET JOURNAL, A LEADING U.S. BUSINESS DAILY, RAN A MAJOR EDITORIAL TODAY CALLING ON THE CARTER ADMINISTRATION TO CUTOFF NUCLEAR COOPERATION RELATIONS WITH INDIA. IN A SCATHING DENUNCIATION OF THE CARTER VISIT TO INDIA, THE 'OPEN MIKE' INCIDENT, AND ABOVE ALL HIS COSMETIC CONCESSION THAT HE WOULD AUTHORIZE SUPPLY OF ONE SHIPMENT OF ENRICHED URANIUM TO INDIA, THE JOURNAL STATES: 'SO WHILE THERE ARE AT LEAST SOME ARGUMENTS FOR ENDING NUCLEAR COOPERATION COLDLY AND BLUNTLY AS THE CANADIANS DID AFTER THE INDIAN EXPLOSION... THE JOURNAL CONCLUDES 'IT IS EASY ENOUGH TO BELIEVE THAT MR. CARTER DOESN'T NOTICE MIKES AND IS IN ADDITION SO CONFUSED HE THINKS A LETTER WILL KEEP HIS POLICY INTACT DESPITE THE HEAVY WATER SHIPMENT. BUT ON THE OTHER HAND, PERHAPS THE INDIANS WHO WERE INTENDED TO OVERHEAR TO TELL US A LIE WAS USING THE PLOY TO MISLEAD THE AMERICAN PEOPLE...'

WHAT IS REALLY GOING ON?

WHILE THE DUST HAS NOT YET SETTLED ON THE CARTER TRIP, BRITISH PRIME MINISTER JAMES CALLAGHAN HAS ARRIVED IN INDIA TO SUPPOSEDLY EVOLVE THE COMPROMISE FORMULA TO BRING INDIA INTO AN ACCEPTABLE STATUS ON THE NON-PROLIFERATION QUESTION. WHILE THE U.S. STATE DEPARTMENT HAS SUCCEEDED WHERE CARTER HAS FAILED, AS PRESENTED BY THE LONDON TIMES: 'THE CALLAGHAN TRIP HAS OBTAINABLY TWO GOALS. ONE, IS TO ARRIVE AT A COMPROMISE AGREEMENT WITHOUT TALLY DIS- CLOSING DETAILS AT THIS TIME. TODAY'S LONDON DAILY TELEGRAPH ADDS THAT CALLAGHAN HOPES TO TAKE DESAI'S SECRET PROMISES AND CONTRACTED TO PAKISTAN WHERE HE WOULD USE THESE ASSURANCES TO PRESS THAT COUNTRY TO AGREE TO NEW RESTRICTIONS AND SAFEGUARDS ON ITS INDIAN FRENCH NUCLEAR REPROCESSING PLANT. CALLAGHAN ANNOUNCED IN PAKISTAN JAN. 11, ONE DAY AFTER THE NEW YORK TIMES ANNOUNCED THAT FRANCE HAS REQUESTED THE PAKISTANIS CONSIDER ALTERATIONS IN CURRENT CONTRACTS.

MIDWEST COLD FREEZES ONTO COAL STOCKPILES

JAN. 11 - AS THE NATIONAL STRIKE OF U.S. COAL MINER AND COAL-HANDLING MACHINERY, A SPOKESMAN FOR THE ELECTRIC UTILITY TOLD THIS NEWS SERVICE FOR THE CUSTOMERS HAVE BEEN ASKED TO VOLUNTARILY CUT INT THAT THEY REGARD THE SITUATION AS 'CRITICAL' FOR THE FACILITY IN SHIPPINGPORT, PA. HAS BEEN SHUT A DAY. HOWEVER A SECOND COLD FREEZE IS PRE- THE UTILITIES AFFECTED ALL EXPECT TO HAVE T- WEEKEND. THE ONGOING MINERWORKERS' STRIKE IN FRESH COAL TO REPLACE FROZEN COAL. ALTERNATIVE USED LAST WINTER DURING SEV- THE ONTO STATE ENERGY OFFICE DURING TV COAL DELIVERIES TO RESIDENTIAL USERS

A SPOKESMAN FOR THE U.S. DEPART- WILL DO NOTHING IN THE PRESENT ST- MAKES A STATEMENT HE ADDED THAT T- PRODUCED BY THE ONGOING STRIKE UNTIL THEN THE GOVERNMENT

CONSERVATIVE BRIT- FIRING OPPOSITION

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