White House Spotlights New Superconductors

Reagan preaches on the virtues of pursuing high-temperature materials; unveils program to assist American industry

NEVER before has the federal government made such an effort to spur industrial development of an emerging technology at such an early stage. An estimated 1500 government, university, and industry researchers, company executives, venture capitalists, and government policy-makers assembled in Washington on 28 to 29 July for a conference on new high-temperature superconducting materials. The event is just part of a larger federal drive to ensure that American industry leads the world in the development and application of these superconductors.

The conference was designed as a forum to enhance interaction among industry, university researchers, and federal laboratories. Greater cooperation among these three sectors is essential, according to the meeting's sponsors—the White House Office of Science and Technology Policy (OSTP), the Departments of Energy (DOE), Commerce, and Defense (DOD), the National Science Foundation (NSF), and the National Academy of Sciences. "We need to do a better job of cooperating within the existing economic and government framework to share financial risks and increase the chances that we will be the first to come up with the better product," says Clayton Yeutter, trade representative for the United States.

Similar sentiments have been voiced by members of Congress, such as Representative Don Ritter (R–PA). He has warned that Japan and other countries will cash in on the technology before American companies can effectively transform research results into competitive products. That fear is not unwarranted, says William H. Graham, director of OSTP. "You in industry are going to have to start ahead, and stay ahead of tough foreign competition," Graham warned conference attendees.

Some drama was injected into the conference by the appearance of President Reagan and key cabinet members. Citing the need to "bridge the gap from the laboratory to the marketplace," Reagan put forth an 11-point "superconductivity initiative" to help the process along.

The plan proposes legislation to ease antitrust laws that inhibit companies from collaborating in the development and operation of new production facilities; to strengthen patent protection over inventions and manufacturing processes; and to amend the Freedom of Information Act to permit federal agencies to withhold scientific and technical information that would undermine American economic competitiveness. Recent Administration efforts to amend the act have failed.

The President's initiative also includes a series of administrative actions. A White House advisory council on superconductivity, including representatives from academe and industry, will be used to shape the U.S. research strategy. Specific superconductivity research missions for DOE laboratories and the National Bureau of Standards (NBS) also are designated. Furthermore, DOD is called on to spend $150 million over 3 years to support high-temperature superconductivity research related to military needs. At present, DOD, DOE, Commerce, NASA, and NSF are thought to be spending $33 million in fiscal year 1987 on high-temperature superconductor research.

The White House initiative contains little new and is largely a compilation of activities already under way within the government. Included in the package, for example, is the President's 10 April executive order to government agencies to expand technology transfer activities with industry. Hence, the proposal is likely to fall short of what some members of Congress think is necessary. Bills have been introduced in the House and Senate to expand federal support for basic research for developing systems and manufacturing processes:

- Senator Pete Domenici (R–NM) has introduced legislation (S. 1480) that calls for greater industry access to federal laboratory facilities and technology, particularly as it applies to high-temperature superconductors. It would allow laboratories to accept up to $10 million for participating in a given cooperative superconductor research program. Federal involvement in the development of semiconductor manufacturing technologies also would grow if the bill is enacted.
- The National Superconductivity and Competitiveness Act of 1987 has been introduced by Representative Dave McCurdy (D–OK), chairman of the science subcommittee on transportation, aviation, and materials. His bill (H.R. 3048) calls for spending $100 million a year for 5 years on superconductor research, beginning in fiscal year 1989.
- Representative Ritter is sponsoring the National Superconductor Manufacturing and Processing Technology Act of 1987 (H.R. 3024). It would designate the De-

AP/Wide World Photos

Tutorial. *Science advisor William Graham (left) explains to President Reagan how some rare-earth ceramics become superductors. Alan Schriesheim, director of Argonne National Laboratory, pours liquid nitrogen on a superconductor to energize a light.*

fense Advanced Research Projects Agency (DARPA) as the lead federal agency in the area of superconductivity. The proposal would provide $80 million to DARPA, DOE, NSF, and NBS to conduct research related to manufacturing and processing technologies for superconductors.

The challenge that high-temperature superconductors present for American science and industry is formidable. "Japan is well prepared for exploiting this discovery and the field is well suited to Japanese talents and strengths," says Roland Schmitt, chief scientist at General Electric and chairman of NSF's National Science Board.

Schmitt, however, says that reports that foreign competitors are pulling out in front of the United States appear premature. While "the Japanese scientific community has made significant important contributions to this area," he contends, no new massive government R&D program has been undertaken.

"The fact is that the United States and Japan are reacting in the same way to this," says Schmitt, who was in Japan in March and April. In the university and government sectors, R&D work in high-temperature superconductors has been expanded through the use of discretionary funds and the redirection of research budgets.

Indeed, DOE officials say one important purpose of the conference was to emphasize to American executives and researchers that this race is still worth running. No country has a lock on this technology yet and it may take years to produce useful products.

Although no one country has a commanding lead in high-temperature superconductivity, OSTP's Graham felt compelled to deny embassy science attachés and foreign industrialists (*Science*, 31 July, p. 477) access to the conference. The decision drew some criticism. "We will be the ultimate losers" if such collaboration and cooperation are discouraged, noted Martin Blume, deputy director of Brookhaven National Laboratory (BNL).

A Japanese research team is working with scientists from the Massachusetts Institute of Technology at BNL now to analyze the structure of a lanthanum copper oxide ceramic. Nippon Telephone and Telegraph has provided the crystals that are critical to this research, which will benefit both countries.

Herman Postma, director of Oak Ridge National Laboratory, thought closing the meeting could produce a backlash in Japan the next time a delegation from the United States wants to visit scientists there working in the field. "None of the stuff going on at this meeting could be described as proprietary," said Postma. ■ **MARK CRAWFORD**

Nuclear Test Watchers Feel Political Heat

On 15 July the Soviet military shut down all three seismic monitoring stations run by the NRDC; the project resumes under new rules in August

ONE year after U.S. "citizen diplomats" signed a remarkable pact with the Soviet Union to monitor nuclear bomb tests, they are running into some of the obstacles that regular diplomats encounter—political flak from the Pentagon and harassment by the Soviet military. But they have devised some technical solutions that they hope will get them around the roadblocks.

The trouble began in February, according to Thomas Cochran, senior scientist for the Natural Resources Defense Council (NRDC), the environmental group that launched the monitoring program in May 1986.

The Soviet government had refused to accept some restrictive visa conditions set by the U.S. State Department for traveling Soviet scientists. As a result, in February the scientists were not allowed to visit seismic stations built by the NRDC in Nevada near the U.S. nuclear test site.

The Soviets had already allowed the NRDC to set up three primitive (surface seismometer) stations in the Soviet Union around their test site at Semipalatinsk. The main station is in Karkaralinsk, with secondary posts in Bayanaul and Karasu. In February, the Americans installed sophisticated, down-hole monitors but, because of shifting Soviet procedures, have had trouble getting a steady flow of data.

In return for allowing construction of these stations, the Soviets asked the NRDC to set up three similar posts in Nevada and California. The stations have been built and 4 months' worth of surface seismometer data have been collected. The Soviets have not been able to visit the stations in the United States, nor have they received data of the more discriminating down-hole variety. In this sense, argues Charles Archambeau, a University of Colorado seismologist who serves as the NRDC's adviser, the Soviets have lived up to their promises "better than we have." He feels an obligation to get the sophisticated "phase two" data to the Soviets as soon as possible.

Meanwhile, Soviet military officials have moved with growing aggressiveness to restrict the NRDC's access to posts near their own test site. Originally, the NRDC hoped to keep the seismic monitors running continuously. But when the Soviets resumed testing in February after an 18-month moratorium, they said the equipment would have to be shut off during tests. They also insisted on doing the shutdown themselves. A protocol was written out and signed, but "never followed," according to Cochran.

An officer from the Soviet test site flies out in a helicopter to close all three sites. The Americans stand back while he disables the equipment and seals off the buildings. "It's hard to know whether it's intentional or accidental," says Cochran, "but we've never been able to make arrangements to train this guy." As a result, the shutdown is often "too thorough." One scientist mentioned an incident in which equipment leads were quietly yanked, causing "a lot of trouble."

Jonathan Berger, a seismologist from the University of California at San Diego, operating manager of the program, says, "we are on line less and less time" because of the frequency of bomb tests. The Soviets have set off eight military and three "peaceful nuclear" explosions this year, while the United States has set off ten blasts.

Because of the tests, the NRDC was able to run its monitors for only 13 days in June. They have been shut off since 4 July. All three stations are equipped with sophisticated down-hole sensors, but they have never been run simultaneously. The most remote station (Karasu) has been out since 27 May.

Cochran remains hopeful, however, that the technical harassment and distrust can be beaten back. On 25 June, the NRDC negotiated a new agreement with the Soviets. The terms, Cochran says, should end most of the technical problems by January. What happens between now and then will be critical.

According to the agreement, the three original stations will be closed and the equipment removed to a distance of 1000 kilometers. Two new stations will be added to the network, bringing the total to five. So far, only one new site has been chosen, near