

space launch capability are neither adequate nor sufficiently rapid."

Fink's letter resulted from the council's annual summer meeting on 4 and 5 August. Breaking with its practice in previous meetings, which had concentrated on projects under consideration for the following fiscal year, the council this year focused on the overall state of the nation's space program. Fink, a Washington-based consultant and a former general manager of General Electric's space division, points to a number of factors that left the members deeply troubled:

■ "The Nation has no long-range goals established to serve in a policy context as the framework for specific programs and missions." Currently, Fink adds, the council is putting together a task force to study two recent proposals for such goals: the report of the National Commission on Space (*Science*, 13 June, p. 1339), and the study of future directions being conducted by the National Research Council's Space Science Board.

■ "The Nation has allowed its space technology base to erode, leaving it with little technological capability to move out in new directions should the need arise." NASA's present space technology program is essentially a Band-Aid effort, one council member later told *Science*. It is focused on fixing problems on the shuttle as they arise, instead of looking toward long-term innovation.

■ The decision to replace the Challenger has been "inordinately delayed." (Fink's letter was dated 1 day before President Reagan in fact gave the go-ahead.)

■ Even with a commitment to a new orbiter, "there is the likelihood that funds will be severely limited, leading to stretch-out, inadequate spares, no excess capacity, and thus a repeat of a lengthy downtime should new problems arise."

■ "There is no rational plan to make available expendable launch vehicles (ELV's) required for certain solar system exploration missions and to provide the mixed fleet necessary to avoid reliance on a single system. The prospects for purchasing the ELV service from the commercial sector have not been realistically assessed, and we found no plans for budgeting for ELV requirements whatever the source."

In summary, says Fink, unless actions are taken very soon to address these concerns, "the U.S. civil space program will continue to erode, to the Nation's great detriment."

Turning to more specific issues, he says, the council urges the earliest possible launch of the Hubble Space Telescope, and strongly supports a proposed initiative to reinvigorate the agency's program of space technology development. The council also urges that NASA continue or initiate development of several major science missions that are al-



ready well advanced: the TOPEX ocean-sensing satellite, the U.S. portion of the International Solar-Terrestrial Physics program, the Global Geospace Science project, the Comet Rendezvous/Asteroid Flyby mission, and the Advanced X-ray Astrophysics Facility. Given the uncertainty about launch availability, however, the council saw little point in considering any additional science missions for at least another fiscal year.

As for the space station project, says Fink, the council found it premature to comment. Not only is there a real possibility that the station will be scaled down and delayed beyond its scheduled 1994 launch date because of tight budgets—"our general feeling is that NASA has about \$1 to \$2 billion more program on its plate than it has money for," one participant later told *Science*—but the program itself is in disarray. Following the Challenger commission's recommendations on management (*Science*, 1 August, p. 512), Fletcher recently attempted to streamline the space station program by centralizing authority at headquarters and transferring some of the development work away from the Johnson Space Center in Houston; he was immediately bombarded with protests from the Texas congressional delegation, which feared a loss of jobs in the Houston area. Almost simultaneously, members of the astronaut corps questioned whether the station as currently designed could actually be built by people wearing space suits. On 31 July, Fletcher accordingly put the program on hold for 90 days pending a high-level review.

"Thus," says Fink, "we are not able to make constructive recommendations on the program and are left with considerable unease." ■ M. MITCHELL WALDROP

Soviet Union Suspends Plans to Divert Four Rivers

After a long and vigorous campaign of protest by leading members of the Russian scientific community, the Soviet government has agreed to suspend work on two ambitious schemes to divert the water of four rivers that currently flow toward the Arctic Ocean. The water would have been used to irrigate large agricultural areas in the south of the country.

Both schemes originated under Leonid Brezhnev 20 years ago. One would have involved diverting the Onega and Pechora rivers in western U.S.S.R. to flow southwards into the Volga, ultimately helping to top up the level of the Caspian Sea.

This project was strongly criticized at last December's meeting of the Soviet Writers Congress by intellectuals and scientists on the grounds that its construction would destroy vast areas of the heartland of "old Russia." A senior member of the Soviet Academy of Sciences wrote in the journal *Sovetskaya Rossiya* at the time that if the project were carried through, 368 historic monuments would become submerged.

It was also pointed out that, in contrast to prevailing concerns at the time the project was first proposed in the mid-1960's, the level of the Caspian Sea has begun to rise again, increasing by more than 1 meter since 1978.

The second scheme would have been even more ambitious, since it would involve reversing the flow of two of the largest rivers in central Russia—the Ob and the Irtysh—using a 1400-mile canal to deposit water from the rivers into the Kazakhstan region between the Caspian Sea and Mongolia.

Although work on this project has already commenced, the scientific community has been voicing increasing fear about its unknown impact on the environment. In particular, there has been concern about the impact on the global climate of shifting large amounts of water from the far north to the middle of central Asia, particularly since large stretches of the two rivers are frozen for much of the year.

A statement issued by the political bureau of the Communist Party in Moscow on 15 August said it had been decided to halt work on the project "in view of the need for more study of the ecological and economic aspects." It said that the decision had been made after close investigation of these problems by various research institutes—but admitted that the suspension of the projects had also been "advocated by wide bodies of public opinion." ■ DAVID DICKSON