Using the new risk factor boosts the extra cancer deaths in the European U.S.S.R. from 10,000 to 12,000. In global terms, it boosts the extra in cancer deaths from 14,000 to 39,000. The epidemic will be invisible, however, for it will be lost in a sea of 630 million cancer deaths. Furthermore, Goldman points out, the data do not rule out the possibility that the cancer increase will be zero.

One critical comment comes from the staff of the Nuclear Regulatory Commission, which was responsible for estimating global cesium pollution in the U.S. interagency report. Harold Denton, director of the office of nuclear reactor regulation, wrote on 14 April that the new DOE report is "substantially different from" earlier ones and could "create more confusion" if published as it stands. Denton recommended that it be withheld for a peer review lasting "at least 60 days."

Goldman is impatient to have the study see daylight, however, and he says that government officials including Denton have had months to study and criticize the findings. So far, he claims, they have not raised any substantive objections.

Another recent development annoys Goldman. Robert Gale, the U.S. bone marrow specialist who treated victims of the reactor accident last year, has been quoting data from this new report in TV appearances before its release and without naming DOE as a source. Goldman wishes Gale would share the limelight, and grumbles that he "got a lot of exposure at Chernobyl—but not from radiation."

Gale, who has said the accident will cause between 2,500 and 75,000 new cancers, claims that his estimate rests on a "review of several sources," including the DOE report and unpublished data in the hands of Soviet scientists. However, he adds, "If I had to pick one study as the best researched," it would be DOE's.

Both Gale and Goldman say that a unique opportunity to test the estimated radiation doses and cancer risks will present itself in the next year. It is important, they say, to set up a system to monitor the health of the evacuees from Chernobyl. The records from Hiroshima and Nagasaki show that exposure to a well-defined amount of radiation leads within 48 months to an increase in specific types of leukemia and chromosome abnormalities. In the U.S.S.R., a careful reading of the early leukemias will tell a great deal about what is likely to happen over the next 50 years. According to Gale, the Soviets have begun to organize a monitoring program that will include U.S. participants. The details have not been worked out. ■ ELIOT MARSHALL

Soviets Disinvited to Join Drilling Program

An invitation to join the international Ocean Drilling Program has been withdrawn because of objections by DOD

In December 1985, the Reagan Administration appeared ready to reestablish an important scientific link with the Soviet Union. Erich Bloch, the director of the National Science Foundation, wrote to the head of the Academy of Sciences of the U.S.S.R. to ask whether the Soviet Union would care to join the Ocean Drilling Program (ODP), a major international research effort to probe the geology of the earth's oceanic crust.

The Soviet academy had participated in the previous Deep Sea Drilling Program, but was frozen out when political relations between Washington and Moscow chilled in the early 1980s. The Soviets were evidently eager to get back in. The invitation to join the ODP was accepted last October, and a formal agreement was quickly drawn up.

On 29 April, however, Bloch was forced to notify the Soviets that the agreement could not be signed and that the invitation has been withdrawn. In a cable to Gury Marchuk, the new president of the Soviet academy, Bloch said: "I regret to inform you that we will not be able to conclude the agreement on cooperation in the Ocean Drilling Program." No reason was given. The cable stated only that "The Administration has determined that we should not go forward with this program at the present time."

Bloch was placed in the embarrassing position of withdrawing an accepted invitation because officials in the Department of Defense opposed it late in the game and mashalled heavy forces to shoot the agreement down.

The Ocean Drilling Program is a multinational endeavor involving the United States, France, West Germany, Canada, Japan, the United Kingdom, and several smaller European countries that participate through the European Science Foundation. The United States provides about $20 million a year through NSF and the other members each pay annual dues of $2.5 million. The program is headquartered at Texas A&M University and it is centered around a sophisticated drilling vessel, the JOIDES *Resolution*.

Bloch was given a green light to open discussions with the Soviet academy after an interagency committee reviewed the idea and raised no objections. Soviet member-

JOIDES *Resolution*

The Defense Department objects to Soviet participation in the ODP because the drill ship is equipped with advanced technologies, but the Administration refuses to say what it is specifically concerned about. Others say there is nothing on the ship the Soviets do not already have.

ship in ODP was also unanimously approved by a committee representing all the oceanographic institutions that participate in the program.

When the Soviets signalled their acceptance, William Graham, who had then just been appointed President Reagan's science adviser, asked NSF to put the agreement through another interagency review. No serious objections were raised until early February. The day before U.S. officials were to depart for Moscow to sign an agreement, the National Security Council put the matter on hold for further review.

It did so after Defense Department officials claimed that the Soviets could gain access to sensitive technology aboard the drilling vessel. The objections came from the office of Stephen Bryen, who heads export control policy in the Pentagon. Bryen is said to have enlisted the support of then Secretary of the Navy John Lehman and Defense Secretary Caspar Weinberger. The security council upheld the Defense Department's objections even though the Departments of Commerce and State are said to have supported going ahead with the agreement. Bloch was told to withdraw the invitation.

Administration spokesmen will say only that technology transfer problems were a concern, but they decline to discuss specifics. Others say that questions were raised about the dynamic positioning system, which enables the drill ship to maintain a precise location, a technique for reentering a borehole, and the onboard computers. However, only seven technologies on the vessel even require export licenses, and according to several experts, the Soviets already have more advanced systems than those on the JOIDES *Resolution*. "There's nothing on that ship the Russians don't have," says Douglas Caldwell, chairman on the executive committee that represents the member institutions. Philip Rabinowitz, who heads the ODP at Texas A&M, says most of the equipment on the ship is widely available. "I'm sure they have access to anything we are using," he says.

NSF officials also note that Soviet participation in the program might have helped ease potential objections to drilling in politically sensitive areas. "The Soviets would have brought a lot to the table and we turned them down," laments one official.

The withdrawal of the invitation is the second episode in a month in which the Administration has blocked a scientific program with the Soviet Union because of objections raised principally by Bryen. In March, the National Security Council disapproved an NSF grant to the International Institute for Applied Systems Analysis (*Science*, 1 May, p. 514). ■ COLIN NORMAN

Female Math Anxiety on the Wane

But data from standardized achievement tests in math and science still show male superiority, particularly among the highest scorers

At the recent annual meeting of the American Educational Research Association, no fewer than 25 sessions dealt with male-female differences in achievement and interest in mathematics and science.

The topic is undeniably provocative. On the one hand, it appears that "math anxiety," the much touted explanation for girls' lower achievement in the 1970s, is no longer much in evidence. But despite this, boys are doing significantly better than girls in the upper reaches of scores from standardized tests in math, science, and even history.

Julian Stanley. *Director of Johns Hopkins Study of Mathematically Precocious Youth.*

The apparent decline of math anxiety was documented in a presentation by Frank Besag of the University of Wisconsin (Milwaukee), who surveyed the school records of 7500 students from grades 9 through 11 and gave them the MARS test on math anxiety and a test measuring their self-esteem. He and Maureen Wahl found few sex differences on course participation, grades, or dropout rates, and found no differences between boys and girls on math anxiety or self-esteem. "It would certainly seem to me that some of it [math anxiety] has been overcome," said Besag.

The impression given from several of the sessions was that if math anxiety still exists for girls, it kicks in relatively late, since they have better grades than boys do on all subjects through elementary school. The problem is that the sexes begin to diverge in science and math interest and achievement in high school, and the divergence becomes more pronounced in higher education.

Much of this disparity has to do with divergent interests. Linda K. Zimmerer and Susan M. Bennett of the California Assessment Program reported that a survey of high school students throughout the state showed that "boys have more positive attitudes toward science," even though girls got better grades. Boys spent more time than girls studying 9 of the 12 topics surveyed. On achievement tests, boys scored significantly higher in 25 of 33 categories. Girls did better on two: laboratory safety and observation (telescopes and microscopes were their favorite instruments). Girls did better on reading, memory, and comprehension, and boys on science vocabulary. Girls were good at inferring; boys at predicting. The researchers concluded that the differences were "a reflection of more than simply classroom instruction."

This seemed to be borne out in observations by Sharon Rallis of Rhode Island College who said the "differential course work hypothesis may be inadequate to explain differences in achievement and career choice" between males and females.

Rallis and her colleagues selected two groups from 2200 Rhode Island 12th graders: those who were "academically prepared" for science careers, with course work including calculus and physics, and those expressing an intent to have a science career. The "most striking revelation" was the small number of prepared girls who indicated a career interest in engineering, science, or technology—11 of 59, compared with 47 of the 74 "prepared" males.

Why the difference? Rallis said teachers and counselors insisted there were no relevant differences between males and females