FORMER SOVIET UNION

A Scramble for Data on Arctic Radioactive Dumping

On 15 August, a Russian research vessel, the *Viktor Buynitskiy*, will leave the Norwegian port of Kirkenes packed to the gunwales with surveying equipment and scientists. Its mission, which is being financed by the Norwegian and Russian governments, will be to check out one of the more alarming environmental horror stories that have drifted out of the former Soviet Union since its collapse last fall: a claim that the Arctic is being polluted by tons of radioactive waste spilled or dumped by the Soviet military.

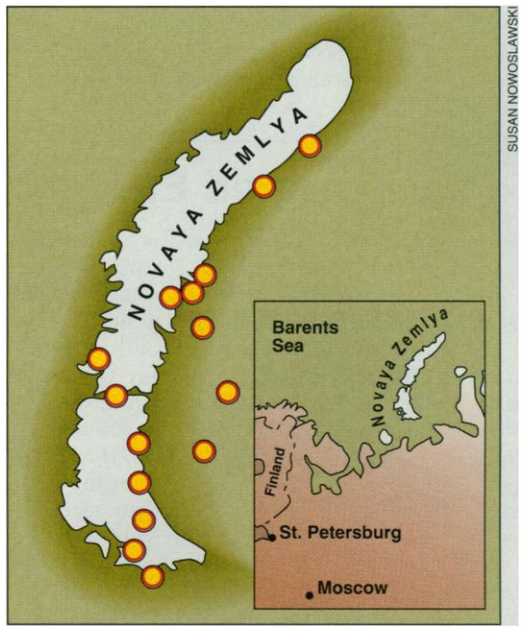
This news made the rounds of the science and environment policy circuit in Washington, D.C., recently, ringing alarms at the National Science Foundation (NSF), which manages the Interagency Arctic Research Policy Committee, and the Environmental Protection Agency (EPA). Since May, U.S. officials have been scurrying around, searching for information to confirm or disprove the reports about Russian radiation. A major U.S. research effort this year seems unlikely, however. Monitoring in the North Atlantic over the past decade has showed no major contamination coming out of Arctic waters, and the scarcity of data and funds has added to the agency chiefs' reluctance to jump in. U.S. scientists have therefore been trying to elbow their way onto the *Viktor Buynitskiy*, so far with no success.

The basic concern, as described in briefings to U.S. science officials earlier this year by physicist Grigory Barenboim of Moscow's Physics and Technics Institute, is as follows: Arctic waters—and, potentially, fisheries near Norway and Alaska—are in danger of being contaminated by radioactive isotopes leaking from two major sources. One is the area around Novaya Zemlya, an archipelago where the Soviets conducted bomb tests, scuttled submarines, and disposed of waste canisters. The other is freshwater runoff into the Arctic Ocean—including the Ob and Yenisey Rivers—carrying isotopes from weapons plants, waste ponds, and accident sites in Siberia.

As Barenboim made the rounds in Washington, additional information about ocean dumping around Novaya Zemlya trickled out, much of it from the environmental group Greenpeace. Its network of activists has interviewed many Russian and U.S. military officials and put together summaries that are now quoted even by government officials.

Greenpeace staffer Joshua Handler estimates that the Soviets have scuttled nuclear reactors from 12 submarines and three icebreakers off the coast of Novaya Zemlya. Eight of the reactors contained hot fuel when they went down, according to Handler. In addition, he says, the Soviets sank an entire submarine—a prototype model identified as K-27, powered by a liquid metal cooled reactor—on the eastern coast of Novaya Zemlya after an accident in May 1968. And in a more recent, widely publicized incident, a "Kosmolets" nuclear submarine sank off Norway in 1989 after catching fire, taking to the bottom two nuclear-tipped torpedoes and 42 seamen.

As for the claims about ground- and freshwater contamination in Russia, these have been gaining credibility ever since 1976, when



SUSAN NOWOSLAWSKI

Hot spots. Circles mark areas in the archipelago of Novaya Zemlya where the Soviet military conducted nuclear tests, dumped thousands of canisters of radioactive waste, and scuttled nuclear icebreakers and submarines.

the émigré biochemist Zhores Medvedev revealed that a nuclear waste dump had exploded in the Ural Mountains in 1957. Many Western scientists are now investigating the consequences of this accident and two other big contamination incidents associated with a weapons complex known as Mayak. For example, Marvin Goldman, a health effects researcher at the University of California, Davis, is studying cancer rates in the area in collaboration with Russian medics. A Russian colleague told him one can detect radionuclides leaking from the Mayak complex along the entire length of the Techa and Ob Rivers, all the way to the delta of the Ob where it runs into the Arctic. But Goldman says he has no idea whether the contamination at the river's mouth is significant. No one else seems to know either.

Some, like demographer Murray Feshbach of Georgetown University—coauthor of *Ecocide in the USSR*—say the risks of contamination of Arctic waters from the dumping and freshwater runoff are serious. But Russian officials have dismissed the hazards as minimal. And that's the question the *Viktor Buynitskiy* will try to settle. Its crew should be able to detect traces of leakage, if any, by taking samples of water, sediment, and sea life. They will also deploy a small submersible with a video camera to assess the condition of the submarine hulls and canisters.

While the NSF and EPA view the potential environmental threat as serious, they have adopted a "prudent and cautious approach" to funding new research, says Noel Broadbent of the NSF's polar programs. The NSF is concerned that Russian scientists may be spicing up their reports to win attention and financial support—Barenboim, for example, was offering to rent a research ship to U.S. scientists. Many Russians, Broadbent notes, are worried about survival and may be following "their own agenda," independent of Moscow.

That leaves U.S. researchers eager to take part in the Norwegian-Russian effort. Rex Brown, a sociologist at the George Mason University in Virginia, who has a grant from NSF to investigate the Arctic contamination, says he tried to get on the Norwegian boat and was politely turned down. As *Science* went to press, EPA was pleading with the trip organizers to allow just one American to take the place of a Russian scientist.

Some research managers say they are hoping the U.S. Navy will fill the gap by sending a ship to the Arctic. But Leonard Johnson of the Office of Naval Research (ONR) says it's probably too late in the year to organize a trip. ONR is "trying to get our act together" and prepare for a careful survey, he says. "We don't want to just dash up there and take a lot of water samples" that might have no practical use.

Still, the first stages of a U.S. research effort are emerging. Under pressure from Alaska's Senator Frank Murkowski (R), the Coast Guard recently promised to take some scientists on a cruise in Alaskan waters this summer. And the State Department has proposed making Arctic pollution a major topic of study at the new, U.S.-funded International Science and Technology Center based in Moscow. Murkowski himself has scheduled a hearing on this topic—complete with

Russian and CIA officials—for 15 August in Fairbanks, Alaska.

Others have already climbed aboard the Arctic bandwagon. For example, Charles Hollister, senior scientist and vice president at the Woods Hole Oceanographic Institution, brought together U.S., Russian, and Canadian scientists in a planning session in July. Their aim is to organize a meeting of all the major research groups testing the Arctic waters next June to discuss existing data and lay out a strategy for additional research. This may be more fruitful, says Hollister, than the approach that some Europeans have taken—"throwing rocks at the Russians" for their misdeeds.

Hugh Livingston, a Woods Hole researcher who has been using traces of radioactivity to follow ocean currents for more than a decade, has begun drawing up a list of Russians to invite. He will go to St. Petersburg in September to meet Russians who have been investigating the Kosmolets accident and hopes scientists who may have monitored radiation near Soviet military installations—those who have never before been allowed to attend scientific meetings in the West—will now be willing to open up.

A radioactive irony. Livingston would like to compare his own results with measurements made closer to the source of contamination. He says he and colleagues in Scandinavia have seen no significant contamination coming from the Russian Arctic toward Europe. What they have observed, ironically, is British radioactive pollution moving toward Russia. Most of Livingston's work has focused on a plume of radioactive isotopes spilled into the ocean from Britain's Sellafield nuclear fuel processing plant. It winds up around Britain, past Norway, and into the Barents Sea. It also makes its way westward across the Atlantic into the deep waters off the United States. Livingston says he and the Danes have also noticed a few anomalous high readings of tritium and strontium-90, along with an occasional, rare "spike" of cobalt-60. Previously, these oddities have been written off as fallout from bomb tests. Now, Livingston says, it's just possible they could have come from waste dumps and submarine reactors in the Arctic.

The levels of radioactivity flowing from Britain are low, Livingston hastens to add, less than 30 Becquerels per cubic meter—far below anyone's level of concern. But there is an irony in the fact that Sellafield's plume appears far larger than Novaya Zemlya's, if all those reactors have actually been dumped there. It just goes to show, says Hollister—an expert on techniques for burying nuclear waste under the seabed—that deepsea burial may be a good idea. That's not exactly the message Greenpeace hoped to send when it publicized the Soviet dumping.

–Eliot Marshall

PEER REVIEW

An NSF Survey Rattles Some Nerves

If you're one of the 978 scientists who served on a peer review panel for the National Science Foundation (NSF) in 1991, you may recently have received a questionnaire about the proposals you read, inquiring just how friendly you were with the authors. It's part of a broad, new investigation of peer review being run for Congress by the General Accounting Office (GAO). And some of the people who were asked to participate—like Eugene Davidson, chairman of biochemistry and molecular biology at the Georgetown University Medical Center in Washington, D.C.—are uneasy about how Congress might use the results.

"Science is not football." Eugene Davidson.

Davidson worries that GAO doesn't understand how agencies like NSF review proposals. As a result, he frets, they've produced a survey that could easily be misinterpreted to give science a black eye. He fears the responses may be cited as proof that an "old boy network" runs the system, as some politicians claim. (For an in-depth discussion of other conflicts of interest in science, see page 616.)

Last month, Davidson sent a letter of protest to Senator John Glenn (D–OH), chairman of the committee on governmental affairs, which requested the GAO inquiry. The questionnaire, Davidson wrote, is "seriously flawed," reflecting "considerable ignorance on the part of GAO regarding the operation of the peer-review system." In a warning that sounds like a preemptive strike at GAO's credibility, Davidson warned that "any conclusions arising from the use of information" in the survey "are likely to be incorrect." The peer-review mechanism at NSF, he noted, is "not perfect" but should be carefully treated because it "enjoys the respect of the scientific community."

Glenn hasn't responded, but one of his staffers admits that there's been "some misplaced nervousness" about the GAO survey, based on an irrational fear that Congress is out to create "another David Baltimore [case]." In fact, "there's no hidden agenda," says Glenn staffer David Plocher, who is watching over the project temporarily. The GAO inquiry is merely a follow-on to an earlier audit of reviewing practices at NSF and several other agencies, he says. (The original audit grew out of an infamous case at NSF involving the anthropologist Jon Kalb, who lost a grant, possibly because peer reviewers were influenced by malicious rumors spread by his competitors.) Glenn's staffer says: "We have every confidence in GAO's ability" to do the work fairly. "We understand how the system works," adds Patrick Grasso, the GAO official responsible for the project.

Still, the wording of the GAO's questions makes Davidson skeptical. For example, he told *Science* that he was put off by GAO's apparent assumption that every member of a panel reads all the proposals submitted to it. In fact, the work is divided up so that members only see proposals that fall within their area of expertise. (Davidson had not read either of the two proposals GAO asked him about.) And he saw a similar naivete in a question asking respondents to rank a colleague's reputation, offering the choices: "Top five nationally," "Not in the top five but probably in the top 20," and "Not in the top 20 nationally." Davidson's tart reply: "Science is not football. We do not conduct a weekly survey to identify the top 20 in our business."

The query that really set Davidson back, however, reads: "Before your review of this proposal, were you and the principal investigator sufficiently acquainted that if you passed each other on the street, you would be expected to stop and chat for at least a few minutes?" Davidson responds that most people in the same field get to know each other, but "I can easily foresee a positive answer...being used as evidence of an old boy network"—which would not be fair. To avoid bias in the questionnaire, says Davidson, "you really need [help from] someone with inside knowledge of the field" being surveyed.

Grasso concedes that "sometimes the files we relied on for the survey didn't reflect every detail" accurately. But he says the survey was vetted by an expert committee before it was sent out. And he thinks Davidson's anxieties are unwarranted. GAO has received only a few critical responses from the 300 inquiries it sent out, Grasso says, though he is not ready to discuss statistics at this point. The final report, which will examine peer review practices at NSF, the National Endowment for the Humanities, and the National Institutes of Health, probably won't be published until early 1993.

In any case, such worries are to be expected, says Dan Rodriguez, the GAO staffer who is running the project: "These are hard questions to ask, and people don't want to answer them." But he promises: "We are going to be very, very careful about interpreting" the answers, erring "on the side of conservatism in every instance."

–Eliot Marshall