Soviet Nuclear Testing: The Republics Say No

Protesters in Kazakhstan and Boris Yeltsin's government in the Russian republic are giving weapons testers a hard time

THE SOVIET UNION'S NUCLEAR WEAPONS testing program appears to be in deep trouble—a victim not of technical problems or international political pressure but of ethnic tensions and constituent Soviet republics asserting their will. A powerful protest campaign in Kazakhstan has made it difficult, if not impossible, to continue testing at the Soviet Union's primary test site there. And the Russian republic has put the central government on notice that it will oppose further use of the only alternative site, which is on Novaya Zemlya, an island in the high Arctic that is part of the Russian Federation.

Only one test has been conducted in the Soviet Union this year, compared with eight in the United States. And a series of 18 blasts planned for the Kazakhstan site in 1989 was quietly halted in October of that year after only seven had taken place.

Physicist Frank von Hippel of Princeton University, a prime mover in nongovernmental arms control initiatives by U.S. and Soviet scientists and a frequent visitor to the U.S.S.R., says, "I think the case for making tests is very much an uphill battle for the Soviet military. It's unlikely they will prevail. Either there will be a complete moratorium or, for each test proposed, the military will have to convince the political authorities that their reasons for testing are compelling enough to justify the political risk of provoking the public. That will be a difficult one to make." If the Soviets should declare a moratorium, the U.S. government will come under greatly increased political pressure, both domestically and internationally, to enter serious negotiations for a comprehensive test ban.

Soviet weapons testers got a strong taste of the political difficulties facing them after conducting a test on 24 October—the first test in a year. According to Deputy Foreign Minister Viktor Karpov, the blast (equivalent to between 20 and 150 kilotons of TNT) was set off at the Novaya Zemlya site in order for the U.S.S.R. to keep pace with other nuclear powers. The nuclear charge, he said, had been in place for nearly a year and "all the deadlines for safe storage had run out." But the Supreme Soviet of the Russian Federation was not sympathetic. On 1 November, it denounced the blast as an "intolerable" violation of the republic's sovereignty. Last May, just before his election as president of the federation, Boris Yeltsin proposed environmental legislation that called for (among other things) eliminating "testing grounds for nuclear and biological weapons" on Russian territory.

The test also brought the central government a rebuke from the head of its own environmental agency. In a statement to the Russian Federation Supreme Soviet, Nikolay Vorontsov, chairman of the U.S.S.R. State Committee for Environmental Protection, called the test "yet another blow by the military-industrial complex against our President Gorbachev"—alluding to pressures from the military and nuclear weapons laboratories to continue Soviet testing. Vorontsov urged the Russian Federation to lodge a protest and noted that the test had been conducted without the consent of either the federation or the Arkhangelsk Oblast, the local jurisdiction affected.

These protests are tame, however, compared to the efforts that have been mounted

Robert del Tredici

Protest leader. *Olzhas Suleimenov at a demonstration in May against testing.*

to stop all testing at the Kazakhstan test site near the town of Semipalatinsk. The first Soviet nuclear device was detonated there in August 1949, and of the more than 500 Soviet weapons tests conducted since, most have been carried out at the Semipalatinsk site. Indeed, an ambitious program of testing was to continue there at least through the early 1990s—until opposition sprang up early last year.

The leader behind the opposition is Olzhas Suleimenov, a Kazakh poet, writer, politician, and masterful organizer. Two accidental ventings of radioactivity during shots at the Semipalatinsk site in early 1989 sparked the initial protest, which Suleimenov launched while running (successfully as it turned out) for the Congress of People's Deputies of the U.S.S.R. On Kazakh television, he called for a mass meeting at the Writers' Union Hall in Kazakhstan's capital city of Alma-Ata; it drew an overflow crowd of 5000.

Suleimenov, a stirring, gravel-voiced orator about 50 years of age, has since mobilized Kazakhstan's most politically powerful organizations against testing. These include the republic's Supreme Soviet and Communist Party (which remains strongly entrenched), plus the Kazakh Writers' Union and the locally powerful coal miners' strike committee at Karaganda. As a result, the Kazakhstan republic's declaration of sovereignty, which in theory puts its laws above the laws of the U.S.S.R., bans nuclear testing and testing of all other weapons of mass destruction on Kazakh territory. The declaration was adopted on 26 October.

The protest movement, which Suleimenov named the Nevada-Semipalatinsk movement after the U.S. and Soviet test sites, has apparently tapped a wellspring of resentment in the region over a testing program that has been conducted in secret (until glasnost) and with disregard for a traumatized population. The blasts—especially the atmospheric tests done above ground from the late 1940s through the early 1960s—have blighted the landscape. And some of the early tests are thought to have exposed the local population to high levels of fallout.

The "Nevada movement," as it is usually called, appears to have broad grass-roots support. It extends well beyond Suleimenov's fellow ethnic Kazakhs—an assertive minor-

ity that holds more than its share of official posts in the Kazakh Communist Party and in the republic's ministries. Since February 1989, large demonstrations have taken place in a half-dozen cities and towns, including Karaganda and Semipalatinsk, communities in which Russians and other non-Kazakh elements predominate.

In response to the growing opposition to testing in Kazakhstan, the central government in Moscow announced earlier this year that it was considering closing the Semipalatinsk site—but with no sense of urgency. A Soviet defense ministry spokesman, Colonel General Vladimir Gerasimov, told a committee of the U.S.S.R. Supreme Soviet in March that all testing was to be moved to Novaya Zemlya, but not until 1993, after 27 more tests at the Kazakhstan site. Although President Gorbachev told a questioner in the Supreme Soviet back in June that the Semipalatinsk site could not yet be closed, a Western diplomat in Moscow who has been following the issue closely said in an interview: "The political reality is that there aren't going to be any more tests at the Semipalatinsk site."

Further testing there could only be fitful, beset by political turmoil and attended by the risk of exacerbating incipient separatist tendencies among the republics of Central Asia. Kazakhstan together with the neighboring Uzbek, Kirgiz, Tadzhik, and Turkmen republics make up a predominantly Moslem region of nearly 50 million people. Since last summer these five republics have begun to cooperate on problems of common concern, such as restoration of the Aral Sea, a resource that has been disastrously mis-

National Science, Technology Medalists Named

President Bush this week named 20 scientists to receive the 1990 National Medal of Science, and ten technologists and one company to receive the 1990 National Medal of Technology. The following are the recipients and their citations:

National Medal of Science

■ ***Behavioral/Social Sciences:***
Leonid Hurwicz, for his pioneering work on the theory of modern decentralized allocation mechanisms. **Patrick Suppes,** for his broad efforts to deepen the theoretical and empirical understanding of four major areas: the measurement of subjective probability and utility in uncertain situations, the development and testing of general learning theory, the semantics and syntax of natural language, and the use of interactive computer programs for instruction.

■ ***Biological Sciences:***
Baruj Benacerraf, for his fundamental contributions to the understanding of the immune system, including much of the work that forms the basis of transplantation immunology and regulatory function in the immune system. **Herbert W. Boyer,** for his contributions to the basic research and development of recombinant DNA technology. This seminal breakthrough has opened new vistas in experimental biology, and it has led directly to the development of the biotechnology industry. **Daniel E. Koshland, Jr.,** for profoundly influencing the understanding of how proteins function through his induced-fit model of enzyme action. His incisive analysis of bacterial chemotaxis has led to a deeper understanding of the molecular basis of memory and adaptation. **Edward B. Lewis,** for his demonstration and exploration of the genetic control of the development of the body segments by homeotic genes. **David G. Nathan,** for his contributions to the understanding of the pathophysiology, diagnosis, and treatment of thalassemia; for his contributions to the understanding of disorders of red cell permeability; for his contributions to the understanding of the regulation of erythropoiesis; and for his contributions to the training of a generation of hematologists and oncologists. **E. Donnall Thomas,** for his pioneering work in the science and application of transplantation biology to successful bone marrow transplantation in man for the treatment of cancer and related conditions.

■ ***Chemistry:***
Elkan R. Blout, for his pioneering studies of protein conformation and devotion to the scientific enterprise of this nation. **Karl Folkers,** for his discoveries and leadership in combining basic chemical research and clinical medicine to achieve new treatments of diseases that have enhanced the quality of life and extended survival rates for countless people. **John D. Roberts,** for his pioneering studies in nuclear magnetic resonance spectroscopy and reaction mechanisms in organic chemistry.

■ ***Mathematics:***
George F. Carrier, for his achievement and leadership in the mathematical modeling of significant problems of engineering science and geophysics, and their solution by the application of innovative and powerful analytical techniques. **Stephen C. Kleene,** for his leadership in the theory of recursion and effective computability and for developing it into a deep and broad field of mathematical research. **John McCarthy,** for his fundamental contribution to computer science and artificial intelligence, including the development of the LISP programming language, the mathematical theory of computation, the concept and development of time-sharing, the application of mathematical logic to computer programs that use commonsense knowledge and reasoning, and the naming and thus definition of the field of artificial intelligence itself.

■ ***Engineering:***
Mildred S. Dresselhaus, for her studies of the electronic properties of metals and semimetals, and for her service to the nation in establishing a prominent place for women in physics and engineering. **Nick Holonyak, Jr.,** for his contributions as one of the nation's most prolific inventors in the area of semiconductor materials and devices, and for his role as research mentor while working at the forefront of solid-state science and technology.

■ ***Physical Sciences:***
Allan M. Cormack, for his scientific work, including the development of computer assisted tomography; and as a scholar and teacher, especially of undergraduates. **Edwin M. McMillan,** for his scientific achievements including the identification of the first transuranic element (neptunium) and the invention of the phase stability principle incorporated in the synchrotron. **Robert V. Pound,** for his pioneering experiments in nuclear magnetic resonance, including the study of the quadrupole interactions and negative spin temperatures, and for the demonstration of the gravitational shift of gamma-ray photons. **Roger R. D. Revelle,** for his pioneering work in the areas of carbon dioxide and climate modification, oceanographic exploration presaging plate tectonics, and the biological effects of radiation in the marine environment, and studies of human population growth and global food supplies.

National Medal of Technology

John V. Atanasoff, for inventing the electronic digital computer. **Marvin Camras,** for developing and commercializing magnetic recording. **Donald N. Frey,** for a wide range of commercial applications of new technologies and research on technology commercialization. **Fred W. Garry,** for the design, manufacture, and commercialization of high performance jet engines. **Wilson Greatbatch,** for the invention, development, and introduction into clinical use of the implantable cardiac pacemaker. **Jack St. Clair Kilby,** for inventing and contributing to commercialization of the integrated circuit and the silicon thermal print head. **John S. Mayo,** for providing a technological foundation for information age communications and overseeing conversion of the national switchboard to digital-based technology. **Gordon E. Moore,** for leadership in the microelectronics innovations of large-scale integrated memories and microprocessors. **David B. Pall,** for patenting and commercializing more than 100 filtration and fluid clarification products. **Chauncey Starr,** for innovations in energy production, risk assessment, technology transfer, and organization of research consortia. **The Du Pont Co.,** for development and commercialization of high performance, manmade polymers.

managed. There has even been talk of these republics joining in an economic federation of "Turkestan," which would reach from the Caspian Sea to Mongolia.

With such possibilities in the wind the government will not want to alienate Suleimenov, who as a member of the U.S.S.R. Supreme Soviet has developed ties to Gorbachev and Foreign Minister Eduard Shevardnadze. He could be politically valuable to the present government as it seeks to negotiate with the 15 constituent republics a "union treaty" that would keep the Soviet Union from falling apart.

If testing is finished in Kazakhstan, there will be no place to test on the scale contemplated by the military—and indeed probably no place left to test at all. As the reaction to last month's test at Novaya Zemlya indicates, it would be politically difficult to shift the test program there. This Arctic island is a poor place to test in any case. Although atmospheric testing was carried on intensively there in the late 1950s and early '60s, Novaya Zemlya has been used on the average only about once a year since testing went underground following the Limited Test Ban Treaty of 1963. The constraints are severe: Arctic cold, frozen rock, high winds, difficult access, and—today—defiant visits by Greenpeace activists and protests by the U.S.S.R.'s Nordic neighbors.

International pressure on both the United States and the Soviet Union to stop testing is expected to come next January at a conference to be held at the United Nations to consider converting the partial test ban treaty of 1963 to a complete ban.

Mexico and five other nonnuclear weapons nations—Peru, Venezuela, Indonesia, Sri Lanka, and Yugoslavia—were the prime movers behind the calling of the conference. When the United Nations adopted a resolution last year recommending the conference, 127 nations voted for it, 22 abstained, and only two voted against it—the United States and Britain. But as original parties to the treaty, these two countries can block any amendment.

There thus seems every possibility that if there should be a new Soviet testing moratorium and the White House hangs tough, the U.S. test program will be politically besieged, both domestically and internationally. Part and parcel with the political resurgence of the Soviet constituent republics, Suleimenov and his Nevada movement have set in motion a political dynamic that makes for the best chance yet for a comprehensive test ban treaty. ■ LUTHER J. CARTER

Luther Carter, an independent Washington writer, is writing a book on "civilizing the atom" under a MacArthur grant.

Orphan Drug Compromise Bush-Whacked

For 3 years biotechnology firms, pharmaceutical companies, politicians, and consumer groups had been pitted against one another in what often appeared to be a no-win battle to amend the Orphan Drug Act. The stakes were enormous: hundreds of millions of dollars in profits on some orphan drugs, and the fate of victims of rare diseases who have relied on the act's incentives for the development of drugs that might otherwise be too unprofitable. Not surprisingly, everyone had a different idea of just what was fair. But then Congress, in one bold stroke, satisfied all camps. It unanimously approved a compromise last month that was so artful even the biotech lobbyists agreed not to fight it. But all the effort may have been for naught: Last week President Bush refused to sign the measure.

Waxman is so vexed he is threatening to introduce stricter legislation next year.

The vetoed measure—H.R. 4638—closes loopholes in the Orphan Drug Act, passed in 1983 to encourage development of drugs for diseases that afflict 200,000 patients or fewer. The act's chief incentive was to give the first firm to develop an orphan drug a 7-year monopoly. The measure worked better than expected, leading to the development of more than 400 drugs, 49 of which have been approved—a remarkable increase over the 1970s, when only 40 drugs were developed for rare diseases.

But a few companies took advantage of the loopholes to edge out their competitors for drugs that turned out to have a much larger market than predicted when they won orphan status. Take human growth hormone and three drugs used to treat AIDS—AZT, erythropoietin, and aerosol pentamidine. Their inventors gained a monopoly on these expensive medications and reaped hundreds of millions of dollars as the market for each grew to more than 200,000.

This summer Representative Henry A. Waxman (D–CA) hammered out a compromise that would have changed that. It would have allowed more than one company to market an orphan drug if the competitors could prove they had begun development and clinical trials of the drug within 6 months to a year after the first company began its work. It would also have revoked a drug's orphan status if the patient population exceeded 200,000.

Although biotech lobbyists weren't thrilled with the amendments, they were better than earlier proposals, which would have revoked a drug's orphan status once it earned $100 million. Congress also placated the industry by stipulating that the changes would apply only to new drugs and not to existing orphans.

So when word began spreading around Washington last week that Bush planned a pocket veto, lobbyists and congressional aides tied up each other's phone lines spinning hypotheses to explain the White House's eleventh-hour thumbs-down. It took the White House Council on Competitiveness to come up with an official line: Bush opposes the bill because by allowing more than one company to market a drug, it would "endanger the success of the program." He also thinks revoking a drug's orphan status once the market grows beyond 200,000 patients would "send a troublesome signal" to firms that had made significant investments on the assumption that they could have the market to themselves for 7 years.

But this explanation didn't squelch rumors that there was yet another reason for the veto. Some insiders say Health and Human Services Secretary Louis W. Sullivan sought the veto because the bill included a provision calling for an advisory committee to examine the effects of the Orphan Drug Act and government policy on drug development for rare diseases. (Sullivan did ask Congress in a June letter not to alter the act.)

Whatever the reason for the veto, reaction to it has been harsh. "The totally infuriating thing is that we finally got consensus," one congressional source told *Science*. "We got this bill through the House and Senate unanimously, and all the while the Administration was not saying a word. And now it's vetoed because someone in the White House thinks he knows what's best for the industry." Capitol Hill staffers were especially irked by the fact that the veto came after Congress had adjourned. Waxman is reportedly so vexed he's threatening to reintroduce a stricter bill next year, which includes a $100-million cap on profits that any single orphan drug can earn. And that's got the biotech and drug industry lobbyists quaking. "We'd hate to see a return to an earlier version," says Lisa Raines, a lobbyist for the Industrial Biotechnology Association.

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