

WASHINGTON REPORTS

DOE Seeks to Convert Russia's Nuclear Cities into Commercial Centers to Prevent Loose Nukes

In the 1997 film *The Peacemaker*, a government scientist, played by Nicole Kidman, learns that a Russian nuclear warhead has been stolen by terrorists, tracks it down on the streets of Manhattan and defuses it with an ordinary pocketknife. The Hollywood endgame brought smiles to the faces of scientists and officials at a government agency that Congress has threatened with destruction: the Department of Energy. Kidman's heroine, the movie revealed, had acquired her considerable skill in disarming nuclear weapons at DOE's Lawrence Livermore National Laboratory.

Stopping the proliferation of nuclear weapons and the materials needed to create such devices has become one of the highest priorities in the Clinton Administration's national security policy—and it is “the side of DOE I want to strengthen the most,” says Energy Secretary Bill Richardson.

Last September, during a meeting of the International Atomic Energy Agency general conference in Vienna, Richardson signed an agreement with Russian Atomic Energy Minister Yevgeniy Adamov to collaborate in attracting commercial enterprises to Russia's ten closed “nuclear cities.” They housed the weapons design laboratories, the production plants for highly-enriched uranium and plutonium, and the warhead assembly facilities. Built by the Soviet Union between the late 1940s and the 1960s, the nuclear weapons complex was larger than its US counterpart. Even today, of the roughly 730 000 inhabitants of the closed cities, about 130 000 work in the nuclear facilities.

The Vienna agreement provides for a Nuclear Cities Initiative (NCI), a joint effort to downsize Russia's nuclear weapons complex. The facilities could still produce nuclear arms as they did during the cold war if political and economic events were to require them. Equally important, the transformation of the nuclear facilities into commercial industries would promote political and economic stability and divert the expertise of nuclear sci-

tists and engineers into productive new enterprises.

The collapse of the Soviet Union led the G-7 nations to take some actions to prevent the country's unemployed and underemployed nuclear experts, including many of the best and brightest scientists, mathematicians and engineers, into the arms of wanna-be nuclear states such as Iran, Iraq and North Korea. To try to prevent this from happening, the US, European Union and Japan established the International Science and Technology Center in Moscow in 1992 to underwrite

2000 budget, which President Clinton will send to Congress early next month.

Few other US programs are involved in defense conversion activities. For instance, the Pentagon created the Defense Enterprise Fund (now called the Global Partners Venture) to try to turn military facilities into commercial businesses. Since 1994, the program has received a total of \$71 million in Nunn-Lugar funds (named after two senators, Sam Nunn, who formerly represented Georgia, and Richard Lugar of Indiana, joint originators of the legislation). This operation has faltered for lack of US business partners willing to accept the risk of such ventures.

The NCI program is expected to run for at least ten years, during which both countries hope to attract hundreds of millions more dollars in Western investment for all ten closed cities, beginning this year with three—Arzamas-16, now known as Sarov, Chelyabinsk-70, or Snezhinsk, and Krasnoyarsk-26, or Zheleznogorsk.

But critics worry that the proposed funds are too little to make much difference. And with Russia's economy imploding, the entire nuclear weapons complex is showing signs of distress and decline. Throughout the cold war, residents of the

closed cities received the best of everything the Kremlin could provide. But conditions have changed drastically since the end of the Soviet empire. This is sometimes symbolized by the death of Vladimir Nechai, a respected theoretical physicist who directed Chelyabinsk-70, one of Russia's two nuclear weapons design centers, the other being Arzamas-16. In late 1996, despondent over his inability to pay his staff for five months, he killed himself (PHYSICS TODAY, January 1997, page 55). On a visit to Washington shortly thereafter, Nechai's successor, Yevgeniy Avrorin, told of scientists who raised cabbages, potatoes and other vegetables on their small plot to make ends meet.

In recent months, power shortages threatened to shut off security systems intended to safeguard stores of bomb-grade materials. Nuclear scientists and others working in the complex have



BY LICKORICH FOR THE ATLANTA CONSTITUTION

civilian research by scientists who formerly worked on nuclear weapons. Currently, the center spends about \$10 million annually and supports about 1000 scientists, primarily at Arzamas-16 and Chelyabinsk-70. In 1994, DOE set up the Initiatives for Proliferation Prevention, a program that recruits experts at its national labs, mostly from Pacific Northwest, Los Alamos and Oak Ridge, to facilitate joint ventures between US companies and nuclear centers in the former Soviet Union. This year's budget for the program amounts to only \$15 million. The money will not be used for scientist-to-scientist research collaborations, or for dismantling nuclear warheads or converting highly-enriched uranium into a low-enriched form unsuitable for weapons. Now that the program has been transformed into NCI, DOE proposes to ask for \$30 million in the fiscal



RUSSIA'S CLOSED NUCLEAR CITIES and their former names and post office box numbers.

taken to the streets to demand back pay that the government hasn't provided for months. Russian newspapers have reported that guards at nuclear laboratories have left their posts to find food and have admitted strangers in exchange for a pack of cigarettes or a bottle of vodka.

In November, after visiting some of Russia's nuclear centers, Senator Lugar called on DOE to request more funds in fiscal 2000 to expand NCI. "We cannot allow our great success in dismantling weapons and securing materials to be negated by the possible flight of weapons scientists to rogue regimes

and terrorist organizations," Lugar said upon his return to Washington.

The US will lay out more than \$450 million this year, mostly in Nunn-Lugar money to disarm Russia's nuclear weapons system. The Washington-based Federation of American Scientists has held several workshops since 1995 to help Russia's three "plutonium cities" (Chelyabinsk-65, Tomsk-7 and Krasnoyarsk-26) to find economic alternatives for separating weapons-usable plutonium into reactor fuel. The European Union, for its part, spent \$104 million last year on nuclear safety in the former Soviet Union, including two new

centers to train 1000 monitors to keep tabs on Russia's nuclear material.

Meanwhile, tons of highly enriched uranium and plutonium at Russia's nuclear weapons laboratories, research centers and scientific institutes are now considered more vulnerable to theft and diversion because of the country's economic and political disintegration. The situation was worsened by the devaluation of Russia's ruble on 17 August, which effectively diminished the already meager salaries of scientists, technicians and security guards at nuclear sites and further drained domestic funds available for protecting nuclear materials.

"The Russian economy is the world's greatest proliferation threat today," says William C. Potter, director of the Center for Nonproliferation Studies at the Monterey Institute of International Studies in California. Making NCI work will require sustained investment by both the US and Russia, says Matthew Bunn of Harvard's Belfer Center for Science and International Affairs. "Nothing else the United States can do to prevent nuclear proliferation will be enough if the essential ingredient of nuclear bombs—the experience needed to make them—become available on the world's nuclear black market," he says.

IRWIN GOODWIN

Richter's Impending Retirement as SLAC's Director Deepens Concerns about Changing the Guard at DOE Labs

The national laboratories operated by the Atomic Energy Commission and later the Department of Energy (DOE) have been lucky to be run by a resourceful bunch of physicists. From Robert Oppenheimer at Los Alamos and Herb York at Lawrence Livermore to Wolfgang Panofsky at the Stanford Linear Accelerator Center (SLAC) and Robert Wilson at Fermilab, a generation of physicists who had participated in the Manhattan Project pointed the direction and set the standard for the new labs. In the past three years, their successors have been exiting to make way for a new generation of lab directors, who, many hope, will have the vision and vigor needed at a time when political support of DOE and its facilities are far from assured.

The changing of the guard is symbolized by the announcement on 23 November that Burton Richter intends to retire next August as director of SLAC. "Burt's a class act, and he will be hard to follow," says Martha Krebs,

who heads DOE's Office of Science.

Now 67, Richter, SLAC's director for the past 14 years, will leave a vacancy that requires a charismatic successor. Richter is unyielding on his departure. "This is the right time to step aside and give a younger generation the chance to do some new things," says Richter. "Periodically, a research lab needs fresh minds."

After receiving his PhD from MIT, Richter came to Stanford University as a postdoctoral student in 1956 to work at the 1 GeV linac. He shared the 1976 Nobel Prize for Physics with Samuel C. C. Ting of MIT for their independent and simultaneous discovery of a massive particle with a lifetime 10 000 times longer than might be expected. Richter's discovery had been made with a new kind of collider, the Stanford positron-electron accelerating ring, or SPEAR, which his group had built. He called the particle " ψ " because it was the only Greek letter that hadn't already been assigned to an elementary

particle. Ting named it "J." They agreed to the label of J/ψ , for the first particle to contain a charm quark. A decade after the discovery, Panofsky retired as SLAC's director and Richter took over.

Stories that Richter is being forced out or is angry at DOE for not including his concept of the Next Linear Collider in its budget for fiscal 2000 are dismissed by Krebs as "just plain wrong." For his part, Richter denies that his decision resulted from any disagreements with DOE officials. He says he had been thinking about retirement for a few years, and late this summer he informed Gerhard Casper, Stanford's president, of his intention to step down. They agreed that no announcement would be made until DOE renewed Stanford's contract to operate SLAC, and when that took place last month, Richter issued his statement.

To be sure, Richter is not known for silently suffering rebuffs by DOE officials. When jobs or facilities are at