

Russia Banks on Importing Nuclear Waste

Russia will be piling up both imported nuclear waste and cash, if three bills President Vladimir Putin signed in July translate into a burgeoning business. The money would be split between the Russian treasury and Minatom, the country's financially strapped nuclear ministry. The waste—about 20 000 tons of radioactive spent fuel from Western Europe and Asia—would be sent to facilities at Mayak and Krasnoyarsk in Siberia for storage and reprocessing.

Many Russians are unhappy about the prospect of their country being turned into the world's waste dump. Despite a skeptical public, Minatom claims that the profits will be used to help clean up decades of nuclear contamination from its civil and weapons programs. The plan also faces opposition from Russia's neighbors and the US.

Four hundred million cubic meters of radioactive waste is already stored in Mayak and Krasnoyarsk, according to a 1998 report to the Russian Duma, and some of that waste is leaking into the local environment. More is stored at Russia's nuclear power stations and at military installations, but the country has yet to develop a long-term plan or geological storage facility to deal with the problem (see PHYSICS TODAY, April 1996, page 40).

The concern with this latest plan is that the foreign waste won't be handled properly. The Mayak reprocessing plant—Russia's only facility capable of reprocessing the foreign spent fuel—can no longer vitrify high-level nuclear waste due to budget cuts, and only \$5 million of the hundreds of millions of dollars needed has been put aside in the plan to upgrade it. Transporting the waste to Russia poses another problem. Minatom has only one train that can carry nuclear waste, and the decline in rail maintenance heightens the risk of a transport accident.

"It's not clear that they will clean up the already-existing mess with some of the profits of this venture," says Allison Macfarlane from MIT's security studies program, "and I wouldn't like to see richer countries essentially dumping their waste on Russia." The plan also has outspoken critics in Europe. Jürgen Trittin, Germany's environment minister, told the German media that the proposal is "an irresponsible game with the health and safety of people in Russia," and promised to block Germany's nuclear industry from shipping its

Domestic and international opposition may scuttle the survival strategy of Russia's nuclear industry.

waste to Russia.

The new bills reverse existing environmental law and a 1995 governmental decree, both of which prohibited the storage of foreign nuclear and radioactive waste in Russia. Public opinion polls in the country show that 90% of the population is against the Minatom scheme, and more than two million Russian citizens signed petitions to block the proposal. However, a judge threw out enough signatures to make the petition nonbinding. Members of the Russian Academy of Sciences sent an open letter to Putin



VLADIMIR SLIVYAK & ALISA NIKULINA/ECODEFENSE

ANTINUCLEAR ACTIVISTS in Moscow protest waste imports

and Duma members before the bills were signed and ratified, urging the legislators and the president to oppose the plan and to find alternative solutions for the existing pollution problems. "In case of massive [nuclear waste] introduction, the inevitable side effects would endanger the life of Russia's residents for hundreds of years," they wrote. To try and appease the plan's critics and make the scheme more accountable to the public, Putin proposed that Nobel Prize winner Zhores Alferov chair a committee to monitor and approve the waste imports. The committee "isn't just an attempt to placate the public using my name," Alferov said in a

press statement. But Vladimir Sliviyak, cochairman of the Russian environmental group Ecodefense, disagrees, saying Alferov's expertise is in condensed matter physics, not nuclear physics.

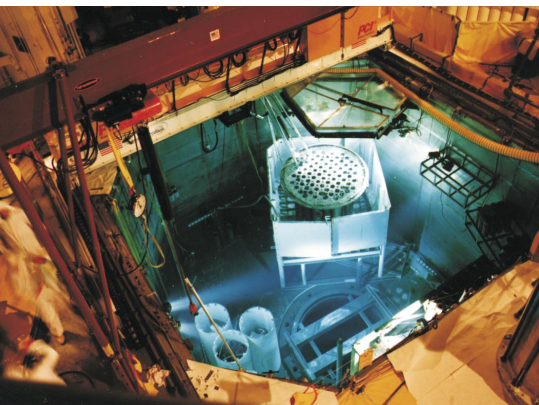
This is not the first time that Russia has imported radioactive waste, nor the first time a country has considered waste shipments for money. Until the 1990s, Finland and some Eastern bloc countries shipped their spent fuel to Russia; North Korea tried to import Taiwanese waste for cash in 1996. On that occasion the plan failed after South Korea complained to Taiwan about the risks involved. Now, Minatom hopes to raise \$21 billion from countries such as Germany, China, Spain, Taiwan, South Korea, Switzerland, and Japan, none of which have long-term arrangements to deal with their spent fuel. Once in Russia, the waste would be kept in "temporary" storage for at least 10 years and then reprocessed into MOX fuel, a uranium and plutonium mixture that can be burned in nuclear power plants. The by-products would be vitrified and stored in Russia indefinitely.

Whither the money?

In addition to concern about environmental safety, analysts also wonder where the money would go. Minatom's bookkeeping is hard to interpret, since part of the agency's budget is classified as secret. And instead of civilian programs such as clean-up work, Yevgeny Adamov, the former head of Minatom who was sacked in March amid allegations of corruption, told the Russian press that the money could go toward accelerating military programs.

Minatom is already taking flak over some of its current international deals because of its lax financial controls. According to its annual report for 2000, Minatom earned \$2.3 billion from exports—mostly from selling 500 tons of highly enriched uranium to the US as part of a joint nuclear disarmament program. The agency's other deals are collaborative projects with China, Iran, India, Bulgaria, Slovakia, and the Czech Republic to build, reconstruct, and upgrade nuclear power plants. But this work is guaranteed by loans from Russia that are never repaid or are paid in the form of barter, such as mass consumption goods that Minatom has difficulty in reselling.

Minatom's pet project has an obvious flaw, however. "Minatom gave a



CAN MINATOM turn a profit by storing spent fuel rods?

list of potential customers to the Duma," says Thomas Cochran from the Natural Resources Defense Council in Washington, DC, "and if you look at these customers, most of their fuel is of US origin, so that fuel can't be moved without US consent." In fact, more than 90% of the spent fuel that Minatom has identified would need that consent. To get it, Russia would need to introduce tighter security, establish better controls over the distribution of funds, and sign a peaceful nuclear cooperation agreement with the US, none of which is likely. The main US concern centers around reprocessing the waste into MOX fuel, a known proliferation hazard, says a

spokesman from the US State Department. "I don't support the Minatom proposal," adds Cochran, "and I don't think it's feasible."

Another waste solution

"There are always alternatives to importing waste to Russia," says John Ahearne, an expert on nuclear waste management at Duke University in Durham, North Carolina. "You could continue to store spent fuel at the reactor sites, as is happening in the US. Japan has been examining the possibility of constructing a repository, and the Pangea group [a cooperative venture involving several Asian companies] has been trying to develop a site in Australia. However, I'm not sure whether any of these are any farther along than that in Russia." In fact, apart from the Waste Isolation Pilot Plant in New Mexico, only Finland is close to developing a repository, according to a US National Academy of Science report that came out in June.

Given the objections to Minatom's plan, a variation on it put forth by the international US-led group called the Nonproliferation Trust International may have a better chance of implementation. The NPTI proposal stipulates that the waste be sent to Russia, but that the spent fuel be stored, not reprocessed. Most of the money would go toward building a geological repository, cleaning up the environment,

providing alternative jobs for nuclear workers, and supporting the groups hardest hit by Russia's change to a market economy—pensioners and orphans. The strict controls on finance and the involvement of highly experienced groups such as Sandia National Laboratories, Duke Engineering Services, and the Society for Nuclear-Container Ltd make it likely that the US would go along with the NPTI proposal. "It will take a few years before spent fuel can move under the NPTI proposal," says Cochran, one of the promoters of the scheme, "but there are no showstoppers as there are under the Minatom proposal." In fact, he says, NPTI could sign a deal with a representative of the Russian government within the next few months.

"The principle behind sending the spent fuel to Russia to get money for cleanup is good," agrees Ahearne. "The Russians can handle the fuel, as they have some highly competent people."

But the Russian public opposes the NPTI plan almost as much as Minatom's proposal, according to Sliviyak. And scientists in the US also have reservations. "A permanent repository would be very difficult for the Russians, seeing how they've made no progress on this for their own waste at all," says Macfarlane. **PAUL GUINNESSY**

New NIH Institute Seeks to Serve Physicists and Engineers in Medicine

Medical physicists and bioengineers aim to gain visibility, funding, and clout with the creation of the National Institute of Biomedical Imaging and Bioengineering (NIBIB), which became the latest addition to the National Institutes of Health family when it was signed into law in the waning hours of the Clinton presidency.

NIBIB was born of frustration: "People who work in engineering and imaging have major difficulties selling their projects to NIH," says Ferenc Jolesz. He should know. As head of magnetic resonance imaging and image-guided therapy programs at Harvard Medical School's Brigham and Women's Hospital, Jolesz oversees about 100 researchers and an annual budget of \$10 million. "We have physicians, engineers, mathematicians, physicists, computer scientists. Our projects can be good for many things—the brain, the heart, the lungs. It's very difficult to fit into the culture of NIH, which is driv-

Now that medical imagers and bioengineers have succeeded in getting their own NIH institute, they have to fill its coffers and define its role both at NIH and in the wider scientific community.

en by organ- or disease-oriented research. You have to fake it and say you are doing something for a specific disorder."

"Say you are developing a new detector material that may be used for imaging the breast or the leg bone. Because it's a detector, it may not be disease specific," adds Maryellen Giger, head of graduate programs in medical physics at the University of Chicago. "One needs funding to get a system up to the point where its uses can be determined. That's a role the new institute might fill."

It boils down to gaining recognition for bioengineering and imaging science

as fundamental disciplines in their own right, says William Hendee, vice president of the Medical College of Wisconsin in Milwaukee. "They are not just tools. They need their own identity and funding authority within NIH."

Lobbying for NIBIB

As an independent institute, NIBIB will be funded directly through Congressional appropriations. It will be NIH's clearinghouse for nationwide research grants involving development of imaging techniques for detection and diagnosis of disease; molecular imaging; image-guided surgical, chemical, and radiation therapies; and image interpretation. On the bioengineering side, it will encompass molecular diagnostics, genomics, proteomics, and development of robotic body parts, among other things.

NIBIB's leaders will be able to tag grant money for specific fields. Possible hot areas, says acting director