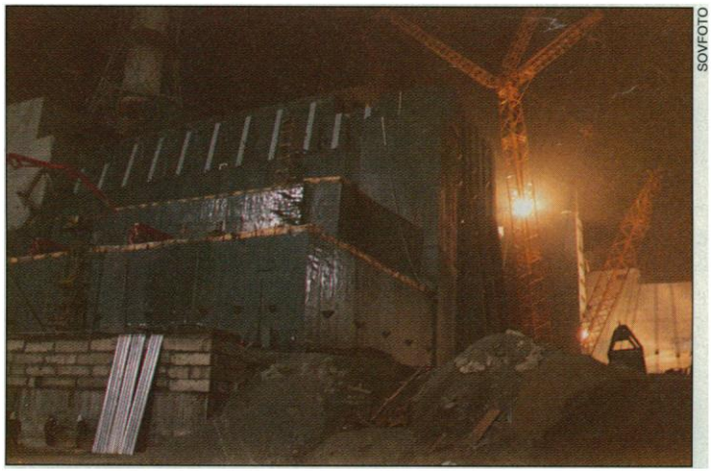
edited by RICHARD STONE

West May Help Re-entomb Chernobyl

Over the past 4 years, environmentalists in Ukraine have doubted the safety of the sarcophagus, a massive concrete structure built over the remains of the melted Unit 4 reactor at the Chernobyl nuclear power plant near Kiev, in Ukraine. Now, after waffling for months over whether to reinforce or replace the sarcophagus, Ukrainian government officials are turning to the international community for help: In December, they plan to send a team of scientists to Washington, D.C., to solicit design proposals from Western firms.



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House of cards? Ukraine wants to rebuild Chernobyl's sarcophagus.

Soviet engineers hastily built the 300,000-ton sarcophagus (*Ukritiye*) several months after the Unit 4 reactor melted down in April 1986. While widely considered an engineering feat, the structure has come in for criticism because much of its weight is supported by the deteriorating remains of the original reactor. Many scientists fear that parts of the sarcophagus might collapse and kick up a cloud of radioactive dust at least as large as the cloud that escaped from the burning reactor during meltdown. Another troubling scenario envisions the 2000-ton reactor lid, now perched precariously near the structure's roof, tumbling into the reactor chamber. (The lid blew off during the explosion and landed on the edge above the chamber.) If the lid were to fall, it, too, would kick up dust that could escape through existing holes in the sarcophagus that are big enough to allow birds in to roost. "If nothing's done, something's going to go in the next 5 years," says a U.S. State Department official.

For years, the consensus was that the longer the engineers delayed repairs on the sarcophagus, one Ukrainian scientist told *Science*, the more the remaining radioactive fuel would decay and "the easier it would be to do something." But last July, the Ministry of Ukraine for Chernobyl Affairs (Minchernobyl) decided to delay no further and announced an "international competition" to transform the structure into "an ecologically safe system."

At first Western firms showed little interest, says the State Department official, because of the "ludicrous" sum of money—$20,000—that Minchernobyl was offering for what it would judge as the best design. More firms have begun to express interest, however, ever since the Ukrainian government signed a contract in August with Los Alamos Technical Associates, a U.S. environmental technology firm, to coordinate the Chernobyl cleanup and negotiate a more reasonable contract for repairs to the sarcophagus.

Academic Freedom in New Lab Contracts

Thousands of scientists and engineers who staff the national labs can breathe a bit easier now, as the University of California (UC) prepares to renew its role as research manager for the U.S. Department of Energy for another 5 years. Their relief stems in part from the knowledge that they'll be guaranteed their traditional academic privileges. This week, UC officials expect to sign three contracts that—for the first time—will put in writing a commitment to preserve intellectual and scientific freedoms for employees of the Lawrence Berkeley, Lawrence Livermore, and Los Alamos National Laboratories.

The contracts, which are scheduled to come before the UC Board of Regents for approval on 20 November, also call for the creation of a new 27-member group to advise the UC president, called the Council on the National Laboratories. Its first chairman will be the well-known arms control expert and physicist Sidney Drell, deputy director of the Stanford Linear Accelerator Center. Other members will be drawn from university faculties, federal research labs, and industry.

But the pledge of free communication will be balanced with a stepped-up commitment on the part of UC to oversee researchers' activities: The contracts enable the government to hold lab employees accountable for the substance and quality of their work. This will be done through a new lab management staff at UC headquarters in Oakland, California, headed by physicist Robert Kuckuck. Both UC and federal officials have praised the agreements, which lab staffers say will serve as a model for other government-financed research centers.

Fermilab Scientists Zero in on the Top Quark

Particle physicists have hunted down and detected a zoo of quarks, the smallest elements of matter, quizzically named "up," "down," "strange," "charm," and "bottom." Now, they may soon add another trophy to their shelf: the long-sought top quark. Last week, the rumor mill forced physicists at Fermilab near Chicago to come clean with the news that they have detected a signal that looks like the signature of the elusive particle.

For about a decade physicists have attempted to coax enough energy out of their particle accelerators to find the top quark, one of only two predicted particles that hasn't yet been detected. (The other is the Higgs boson.) While earthly matter ordinarily is composed of up and down quarks, high-energy interactions tend to spin off the strange, charm, bottom, and also (in theory) the top quark.

Evidence of a top quark—such as decay products, including a muon and an electron—came from the Tevatron, a gargantuan particle smasher at Fermilab. "This brought us a surge of optimism," says John Huth, a Fermilab physicist. A colleague announced the result at the American Physical Society's Particles and Fields conference in Chicago last week.

But researchers at Fermilab stopped short of declaring that they had discovered a top quark because they aren't absolutely sure the signal came from this particle, says physicist Melvin Shochet, co-leader of the research team at Fermilab's Collider Detector Facility. Other processes can forge the top quark's signature too, he says.

So if the physicists are unsure, why did they reveal their findings? One researcher on the Fermilab team told *Science* that they had indeed hoped to keep the quark signal to themselves. But someone in the collaboration bragged about the find to rival scientists at another Fermilab detector, and the gossip spread so fast they were forced to go public.