DEPARTMENT OF ENERGY

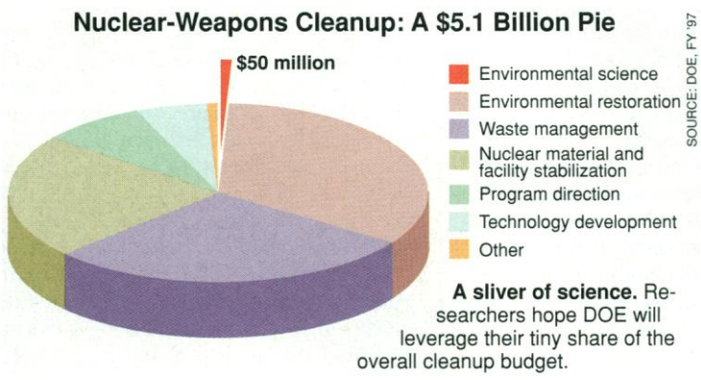
Researchers Vie for Role in Nuclear-Waste Cleanup

RICHLAND, WASHINGTON—Scientists designed the U.S. nuclear arsenal, but they have had little to do with cleaning up the toxic brews left behind at former weapons facilities like the Hanford site here. A Department of Energy (DOE) grants program begun in 1995 was supposed to rectify that situation by enticing researchers to lend a hand, but now that effort is flagging. A report this week from the National Research Council (NRC) criticizes how the grants program is being run, and later this month DOE officials, under pressure to act from states and environmentalists critical of the cleanup, will unveil a 10-year plan that some researchers say leaves little room for science.

Congress ordered DOE to set up the $50-million-a-year science program in 1995 to find cheaper and safer ways to handle waste at sites like Hanford after lawmakers complained that the Office of Environmental Management (OEM) favored near-term technology efforts over longer term research. "They're engineers—they like to build things," says one congressional staffer. The hope was that by adding basic research to the mixture, DOE could lower costs and reduce the uncertainty in an effort that could total $220 billion over 70 years. Last August, DOE awarded $47 million to 138 peer-reviewed research projects (*Science*, 30 August 1996, p. 1165). The new program accounts for only 1% of the $5 billion a year allocated to cleanup (see chart), and DOE has requested just $42 million for 1998.

But limited funding is not the problem. DOE officials involved in the cleanup say they cannot wait for basic research to mature, and they are not alone in questioning the program's impact. The NRC report, from a panel headed by physicist John Ahearne of Duke University, says the program must be revamped if it is to produce the long-range solutions needed to clean up the thousands of leaking storage tanks, tons of radioactive scraps, and the contaminated ground water that are the legacy of a half-century of the Cold War. DOE should "examine the [program's] entire review process," the panel says, to make it less closed and more credible. While the first round of awards appears meritorious, the panel said it was not able to compare them with unsuccessful proposals nor determine how they were selected. The report says the program lacks clear objectives and needs a program director as well as an outside review of its quality. DOE, it adds, also should do a better job explaining the eventual utility of the research.

Scientists at the Pacific Northwest National Laboratory (PNNL), located just south of Hanford, say they are already working hard to convince engineers that the research can be valuable. PNNL recently opened a $225 million environmental and molecular lab largely to help Hanford find lower cost solutions to its cleanup problem, and in the first round of awards its researchers won about 20% of the available lab funds.



A sliver of science. Researchers hope DOE will leverage their tiny share of the overall cleanup budget.

Roy Gephart, a senior PNNL manager who specializes in waste cleanup, says scientists can help by understanding the way contaminants are moving beneath the surface, analyzing the contents of Hanford's storage tanks, and gathering data on the risks to workers and nearby populations. Over the years, the addition of a host of chemicals in many old tanks to stabilize wastes instead has created a dangerous brew of vapors, liquids, and solids. Understanding the complex interactions among the various chemical compounds is critical for safety purposes, PNNL researchers say.

Research also could lay the foundation for less costly technologies, including the use of plants to extract contaminants from the soil. All of these could mean big savings. Gephart notes that one big problem PNNL scientists hope to tackle is whether it makes sense to remove waste so that it can be vitrified, or combined with glass to seal in contaminants. "Instead of making 30,000 glass logs at $1 million a shot," he says, it might prove far cheaper and safer to treat the waste where it is stored.

DOE officials agree that such studies eventually could have an impact—but not soon enough. "Science can help with the long-term issues of wastes that must be isolated for thousands of years," says OEM director Alvin Alm. But he adds that he cannot put cleanup on hold while waiting for research to bear fruit. Alm is now putting the finishing touches to a plan that aims to clean up most of the nuclear mess by 2006.

DOE is being pushed by states and environmental groups, who are threatening lawsuits if the department does not move quickly. In this charged environment, research is viewed by some as a potential excuse for further delay. "You can study this forever, but let's get on with it," says Marilyn Reeves, who chairs the Hanford Advisory Board that represents local and environmental interests. "We of course want science to be used, but we also want [DOE's] obligation carried out."

PNNL officials sympathize with their impatience. "The states are screaming" for cleanup, says Thom Dunning, director of the new laboratory. "That's not very conducive to a good attitude toward basic research." But Dunning says it is just a matter of time before the cleanup community realizes the value of science. "We may not seem important now, but once something goes wrong in the [Hanford] tanks, they'll want all the research they can get."

Gephart and other scientists worry that Alm's plan ignores many of the possible solutions science could offer. But no matter how aggressive DOE is in cleaning up, there will be plenty of waste left over after 2006—particularly at the most polluted sites such as Hanford. "We're going to make significant progress, but it's going to take a little bit longer than Al Alm thinks," concedes Carol Henry, OEM science and risk policy director. In fact, last week Alm told a congressional panel that the Hanford cleanup could extend to 2050.

Ahearne agrees that research can play a role, even with a 10-year strategy that many see as putting science on the back burner. "I don't think the plan eliminates the need for science," he says, noting that the toughest issues—what to do with high-level waste and contaminated ground water—will be around long enough for basic research to make a difference. But just doing the research will not be enough, according to PNNL researchers, DOE officials, and the NRC report. The challenge for scientists will be to convince the engineering and environmental communities that the basic research gamble has the potential for a big payoff.

–Andrew Lawler