THE ENERGY MESS

The Energy Department could spend up to $150 billion before it finishes tackling the environmental damage wreaked by its weapons plants.

BY DANIEL CHARLES

Poisonous chemicals used to manufacture nuclear weapons have been contaminating groundwater and soil around the Energy Department's Rocky Flats Plant in Coloroado, top photo. At the Hanford Reservation in Washington state, underground steel tanks have been leaking highly radioactive waste. The million-gallon tanks in the bottom photo were built in 1973.

GOLDEN, COLO.—The Coors brewery, this small town's most famous business, advertises its beer as "brewed with pure Rocky Mountain spring water." But a few miles to the north, the water is not so pure, thanks to Golden's other major industrial resident—the Rocky Flats Plant, where Rockwell International Corp. builds nuclear weapons for Department of Energy.

At areas of the plant where chemicals were dumped during the 35 years since Rocky Flats began operating, the groundwater is poisoned with chemicals like tetrachloroethylene and carbon tetrachloride. These substances are believed to cause cancer. Trapped above a layer of bedrock 20 feet below the surface, the contaminated water is seeping slowly downhill toward a creek that flows into Stanley Lake, from which several Denver suburbs draw their water.

At another part of the plant, acres of soil are contaminated with minute particles of radioactive plutonium. Small quantities of plutonium, blown by the wind and washed downhill by rainfall, have lodged in sediment at the bottom of the creek and Stanley Lake.

Kirk McKinley, a 38-year-old Idaho native, has the job of cleaning up Rocky Flats.

Daniel Charles is a freelance writer in Washington.

McKinley spent 13 years developing techniques of waste management at DoE's Idaho National Engineering Laboratory, until Rockwell hired him last year.

Cleaning up waste at the plant, says McKinley, will require nothing more novel than time and lots of money. "It's pump and treat, hog and haul," he says. Hundreds of wells (176 have already been dug) will pinpoint how far the contaminated groundwater has spread. Underground dams, extending down to the bedrock, will stop it from spreading any further. Drains in the dams will collect the water, which then will be cleansed with ultraviolet light.

In areas where plutonium has contaminated the soil most seriously, says McKinley, the top two feet of soil will simply be dug up and shipped to DoE's waste site in Nevada as low-level radioactive waste. With less serious contamination, new plastic cement may be poured into the soil, turning it into a rubbery material that locks the radioactive particles in place.

It will cost from $344 million to $400 million to clean it all up, says McKinley, and the job should be done in 15 or 16 years. "We're going to clean it up to green pastures," he says. "A dairy farmer will be able to come out here and let his cows graze."

Rocky Flats, however, is just the tip of an iceberg. DoE has only begun calculating the eventual cost of cleaning up the waste at some 20 sites across the nation where materials for nuclear weapons are made. But it's already clear that the sum is staggering.

Rockwell International hired former Energy Department employee Kirk McKinley last year to head the Rocky Flats cleanup.

DoE says that between $48 billion to $86 billion will be required for cleanup during the next 20 years, and additional tens of billions will be needed after that. That figure rivals the cost of cleaning up all privately owned hazardous waste sites in the nation that are covered by the Superfund law, according to the Environmental Protection Agency (EPA). It also is more than the nation spent on the Apollo program that sent men to the moon.

The lion's share of the total cost will be spent at DoE's most contaminated site, the Hanford Reservation in southeast Washington state. For most of the 1950s and 1960s, Hanford was the heart of the nation's production complex for nuclear materials.

Millions of gallons of highly radioactive waste from nine nuclear reactors, and from large plants that separated plutonium chemically from irradiated reactor fuel, were pumped into steel tanks. Many of the tanks later leaked; others are so fragile that an attempt to empty them could cause them to spill their contents.

Additional billions of gallons of dangerous waste were dumped directly into the ground, on the theory that the toxic substances would be so diluted by the time they seeped into the public water supply that they would pose no danger. Groundwater 200 feet below the surface at Hanford now contains more than 400 times EPA's limit some radioactive materials in drinking water.

The cleanup of Hanford's environmental disaster could take from $30 billion to $45

Building a New Weapons Complex

Matters could hardly be worse for the industrial facilities that produce the nation's nuclear weapons. As the price tag for cleaning up their deadly hazardous waste continues to mount, many of them are wearing out, and are considered increasingly unsafe. The Department of Energy would like to replace or renovate the entire network of facilities, at a cost of $52 billion over the next 20 years.

At the top of the DoE wish list are two new nuclear reactors, costing a total of $7.9 billion, to produce plutonium and tritium for nuclear weapons. Current reactors are shut down for safety reasons. One, at Savannah River in South Carolina, may start up again later this year, but only after DoE has supervised comprehensive checks of the reactor, established safer operating procedures, and retrained its workers.

But critics say much of the expense is unneeded. According to several environmental and arms control groups, plenty of plutonium is available. Statements by some government officials seem to confirm their view. Former Secretary of Energy John Herrington once said that the United States was "awash in plutonium." Harold Agnew, former director of Los Alamos National Laboratory, said in an interview that "we've got it coming out our ears." And Energy Secretary James Watkins says the nation does have a 10-year supply on hand.

Watkins, while acknowledging that the nation has a healthy supply of plutonium, said in an interview with *Government Executive* that new facilities likely will be needed to upgrade the supply for use in weapons.

In the meantime, DoE needs tritium. It decays rapidly, so continued production is needed unless arms control negotiations bring about a significant cutback in the nuclear stockpile. In any case, says Dan Reicher of the Natural Resources Defense Council, one reactor, not two, would suffice.

DoE's track record in managing major projects may be its own worst enemy when it comes to getting money from Congress. One of the most recent additions to the production complex was Building 371 at the Rocky Flats facility in Colorado, finished in 1981 at a cost of $215 million. Unfortunately, the equipment was so poorly designed and constructed that it has never been used at more than 10 percent capacity, and DoE now proposes to rebuild it, for an additional $400 million.

DoE's enthusiasm for modernization is fueling charges that it would prefer to turn its back on the task of restoring the environment. A plan submitted to Congress in December "places modernization on a faster track than environmental cleanup," says the GAO's J. Dexter Peach, assistant comptroller general. "By 2010, the nation would have a revitalized weapons complex. However, environmental problems would still be with us."

billion—far more than DoE and its predecessor agencies ever spent operating the facilities at Hanford in the first place.

These cost estimates may even undershoot the mark, says Dan Reicher of the Natural Resources Defense Council, an environmental advocacy group. EPA, according to Reicher, was forced to double its estimate of how much it would cost to clean up an average hazardous waste site during the last four years, and a similar fate may await DoE's calculations. In addition, says Dexter Peach of the General Accounting Office (GAO), "we are not sure that all the problems have surfaced." The Savannah River Plant, in South Carolina, "may be a sleeper," says EPA's Nat Miullo, who monitors cleanup efforts at Rocky Flats. Additional research may discover more problems.

Yet research also can be part of the solution, says Adm. James Watkins, the new Secretary of Energy. In a late April interview with *Government Executive*, he asserted that new, high-technology means of both preventing and cleaning up waste from DoE facilities could cut the department's waste-related spending considerably below the worst-case estimates. *(See page 28.)*

Environmental Triage

On March 23, Watkins sent a letter to Congress announcing that he had ordered DoE to prepare a "Five Year Cleanup Plan." The same day, he called a group of top DoE administrators together on the seventh floor of the agency's Washington headquarters and asked them to get to work preparing it.

At the meeting, Watkins introduced his new special assistant for defense waste management, Leo Duffy. Duffy, like Watkins, had worked on the Navy's nuclear reactor program, which is generally given high marks for avoiding the safety and environmental controversies now dogging DoE. By August, said Watkins, the agency should have in hand a detailed plan for solving its most serious environmental problems, together with estimates of how much they will cost to clean up.

But settling on a cleanup plan that doesn't bust the budget will be a challenge. "DoE only has so much money," says R.P. (Pat) Whitfield, in charge of DoE's environmental restoration efforts. "How clean is clean enough? That's part of what we're trying to figure out." He adds, "There's probably not enough money in the world" to restore all of DoE's sites to a pristine state.

Some portions of Hanford and Savannah River, according to the GAO, may be "irreversibly contaminated." Rather than pour billions of dollars into an effort to clean them up, DoE officials plan to apply a kind of environmental triage, and focus cleanup efforts

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INTERVIEW

'Thirty-Five Years of Neglect'

The new Energy Secretary talks about the problems he inherited and what he intends to do about them.

It's possible that no member of the new Cabinet has stepped into the center of more debate and contention than Adm. James Watkins, Secretary of Energy. But in an April interview with Government Executive *editor Timothy B. Clark, Watkins portrayed himself as a fashioner of consensus—someone who will strike fair compromises between advocates for the environment, nuclear power, energy conservation and oil drilling in the Arctic.*

It was Watkins' first interview with the national press, and he took the opportunity to denounce the decision by New York's state government to shut down the Shoreham nuclear power plant. He would "do everything in his power," he said, to keep the plant from being dismantled.

Watkins, 62, spent 37 years in the Navy, 27 of them as a nuclear-trained officer. He retired in 1986 as Chief of Naval Operations. In 1987, as chairman of the Presidential Commission on AIDS, he earned praise for rescuing the panel from the internal bickering in which it had become entangled.

While discussing the problems of the Energy Department, Watkins drew frequently on his experiences with both the Navy and the Commission on AIDS. The Navy's strict philosophy of nuclear safety, he said, must become the model for the Energy Department's nuclear complex, just as it has for the commercial nuclear power industry. The AIDS commission, said Watkins, showed that consensus is possible, even when issues are bitterly contested.

Watkins called the need for a national energy strategy, and for better math, science and engineering education, the nation's two most central challenges. At the Energy Department, he said he has inherited "a mess" that resulted from 35 years of neglect.

PHOTOS BY BRUCE REEDY

Q *Do you think conservation should be emphasized more than it has been during the last eight years?*

A Every time that oil import question comes up, I have to get into the broader strategy. You cannot solve the problem with oil import fees or gasoline taxes, because of the inequities that that imposes on the nation as a whole. We have to aggressively approach alternate sources of energy.

Conservation is one source. Conservation is a product; it takes technology and investment. Clearly it is a critical component of the total energy strategy. We're aggressively going after clean coal technology, addressing energy efficiency as well as the acid rain issue. With new coal plants, at the turn of the century we're going to see a marked decline in the total tonnage of pollutants that these things put in the atmosphere. At the same time, we'll increase their energy efficiency by 30 to 50 percent.

Q *What about nuclear energy?*

A We're going to speed up the licensing process for nuclear power plants. We think that if we can license these plants in six years, we can make one major contribution to nuclear power as one of the key elements of the national energy strategy.

We certainly can't have the kind of stupid situation that we have in New York, where we have a brand-new, freshly licensed nuclear power plant called Shoreham, and then have it shut down by silliness and a lack of understanding of what the world is all about. I'll do everything in my power to prevent that plant from being dismantled. To me it's irresponsible.

Q *When was the last time the country had an integrated national strategy for energy?*

A It never had one. If you want a hundred volumes of policies, I'll give them to you. Everybody has a policy. And nobody pays any attention to any of them. There hasn't been a good solid outline in which all of these energy needs are displayed so that people can say, "Hey, I see where we're going now in conservation, renewables, clean coal, oil and gas, nuclear, global warming, acid rain and toxics."

I'm taking policies and putting them into an integrated strategy. It's not just thoughts and good ideas. That's what the books are filled with. I'm saying, "Here's the schedule. Here's the five-year modernization plan. Here's the five-year waste plan. Here's what we're going to do year by year."

I'm a strategy-builder. I came out of the military, and you find that if you don't have a strategy, you don't have any tactical plan. This energy business—and I include waste management in that—has been terribly neglected.

That's why I took the job. I think it's exciting. The mess I've inherited is not due to any one person. Thirty-five years of neglect on the defense production side has given rise to a lack of confidence on the part of the American people that we can manage technology. We ought to be able to demonstrate that we can manage technology.

For example, the Arctic National Wildlife Reserve—a tremendous potential source of remaining oil for this country, but shattered by the events at Valdez. My feeling is, that will pass in time, but we have to be very sensitive in the near term.

Q *What you are describing sounds like a very ambitious effort.*

A Yes, and it is going to take several years. It will probably take us across the country in hearings. It will include federal, state and local government, industry, and concerned environmentalist groups. As we decontrol natural gas and see movement on the clean air bill this year, the momentum now is in favor of compromise, streamlining, and eliminating the barriers, most of which are self-imposed.

By 1991, I hope to have a draft national strategy on energy. You can't satisfy everybody. But you can make everyone feel that they've had to give up a little bit for the betterment of the whole.

Q *You mentioned the problems that beset the department's nuclear facilities. Does your Navy training provide some lessons in how to solve them?*

A Absolutely. In 1962, I was on a sea trial with [Adm. Hyman] Rickover, and he called me into his office and said, "Watkins, I'm telling you right now, there's going to be a serious nuclear accident in this country within 20 years." Seventeen years later, we had Three Mile Island.

Inculcated in us was the belief that the environment was important, and that operation of that plant in keeping with environmental control standards was the name of the game. We took that seriously when the private sector said it was too expensive. Commercial nuclear power paid the price of that in spades, and the nation has been the negative beneficiary with this fright of nuclear power. This feeling that somehow we have lost our technological prowess and we can't manage technology anymore—I'm trying to help turn that around.

The private nuclear power plants that are shut down are shut down for good reason. It was the Three Mile Island mentality. But major changes were put in place, and with a cultural change, they cleaned house.

That has happened in [commercial] nuclear power. It did not happen in my defense complex. They are using procedures that adopted in the 1950s and never came into the modern world. Not one lesson out of Three Mile Island was learned in the defense complex regarding reactor operations.

Q *Does the department face a brain drain or difficulty in recruiting?*

A Yes. Are there enough top-notch civil servants? No. Can I recruit them into the high skill areas? No. Did the lack of a pay raise hurt us? Absolutely. I've tried to get five assistant secretaries for defense programs—my number one assistant secretary—and I can't get them. They can't afford it. They want to work for the government, but they don't have the dough.

Q *Are you losing career people?*

A Sure. We can't beat them over the head all their lives and then expect them to be motivated. I'm going to try to get 20 or 30 people at Savannah River to be DoE technical oversight people, to see that the Westinghouse contractor carries out his contract. Where do I get them? I don't know.

Q *That pushes you back to relying on outside contractors.*

A Right. And then who's the oversight for the contractors? How do I know that they're performing well? I'm revamping my entire contracting procedures. I don't think they provide enough incentive—in other words, carrot—and not enough control—that is, stick. I'm going to expand both carrot and stick so I have management flexibility, and I'm going to have a whole new review of how we write our contracts. I've terminated all contracts being signed by anybody if they're worth over $25 million.

Q *You've talked about the importance of education. Will you try to make that part of your job?*

A We're going to get very much involved in public/private ventures with our labs. At Fermi Lab, I want to get youngsters down from Chicago schools, the underclass, the ones who are dropping out, 10 to 15 year olds, to try to inspire them in math, science and engineering. The country is woefully short in this area. We're 14th in the world in our computational skills and understanding of science, and we're supposed to be the leaders in the world and internationally competitive. My God, how do you run a nation that's all technology?

I'm going after the youngsters to inspire them, and getting our labs and facilities involved, so that they're the inspirational mentors for these kids. Bring these kids into our labs, give them summer internships and motivate them and say, "You can understand this, you've got to understand it." □

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on sites where a smaller effort can do more good.

The alternative to complete cleanup is "long-term institutional control," a bureaucratic euphemism for fencing off an area and declaring it off-limits to the public, perhaps for centuries. Colorado Gov. Roy Romer calls such areas "national sacrifice zones."

Mentioning sacrifice zones to Miullo is like waving a red flag in front of an ill-tempered bull. "It irks me," says Miullo. "I belong to a generation of environmental people who cannot accept that we don't have the money to clean this up." Rocky Flats, according to Miullo and McKinley, can clearly be cleaned up without spending exorbitant amounts of money. "Hanford? It's a big site, and it's expensive, but I don't think we can afford not to clean it up," says Miullo. "I'll use every tool that I have available in my arsenal of environmental enforcement to push to make it happen."

So far, DoE has concentrated on tasks that cost relatively small sums, such as eliminating unsafe waste disposal practices that still exist, and bringing its plants into compliance with standards set by the Resource Conservation and Recovery Act. Of the $9.3 billion that the department will spend in fiscal 1990 to operate its weapons production complex, $400 million will be for cleaning up waste sites. That may be small change compared to the total problem, but it is more than double what the department is spending in the current fiscal year.

Behind Closed Doors

DoE and its predecessor, the Atomic Energy Commission, didn't necessarily operate their plants more irresponsibly than private companies: Dumping and burying waste "was status quo in industrial America," says Miullo. But DoE's production complex is uniquely hazardous—"one of the more potentially dangerous industrial operations in the world," according to the GAO.

Despite the hazards, DoE's nuclear facilities were not subject to any legal environmental regulation until 1984. "They were an independent agency that had no oversight, not from the Occupational Safety and Health Administration, not from the EPA, not from state health departments, not from any organization," says Miullo. "They operated under this shroud of national security."

In 1981, when Miullo was beginning to survey disposal of hazardous waste in the Denver area, Rocky Flats officials agreed to let him visit the plant. "We had half an afternoon to be whisked through," recalls Miullo. "I came back to the office, and we discussed the issue with our management. We didn't think we had authority" to enforce regulations at the plant.

In 1984, a federal court decided that EPA had jurisdiction over hazardous wastes generated at DoE's plants. Since then, political pressure, court cases and unilateral concessions by DoE have combined to gradually push back the shroud of secrecy that surrounded nuclear weapons plants. Major DoE facilities have begun negotiations with the EPA and state authorities to establish schedules for bringing each plant into compliance with environmental standards.

Fred Dowsett, of the Colorado Department of Health, is one of the state regulators

Scramble for Toxic Waste Experts

Kirk McKinley, director of the environmental cleanup program at the Energy Department's Rocky Flats Plant, says he gets job offers on a weekly basis. "It's almost unbelievable," says McKinley, who is an employee of Rockwell International Corp., the contractor that operates Rocky Flats for the department.

Nat Miullo, who works in the Denver office of the Environmental Protection Agency, has one assistant assigned to help him monitor Rocky Flats. Private contractors, having given up their attempts to hire Miullo, are trying to lure the assistant away with the promise of higher salaries.

Cleaning up the environment is a booming industry. Ten years ago, the government had a list of about 100 hazardous waste sites that needed "remedial action." Now, the list has reached 1,200, with no end in sight. The estimated cost of cleaning up these sites also is rising.

The result is growing competition for talented people trained in toxic waste cleanup. It is a competition that the government often loses.

Marcia Williams is one the government lost. In 1988, she quit her job as director of EPA's Office of Solid Waste Management, and became a vice president of Browning-Ferris Industries, an environmental consulting firm. "The field is building at such a rate that they're looking for staff from almost anywhere," says Williams. "Obviously, the government, whether it's the federal or state level, is a key source."

EPA statistics show that about 10 percent of its work force responsible for solid waste and emergency response left the agency last year, which "isn't that bad," according to EPA spokesman Dave Ryan. But Williams says turnover was a serious problem when she worked at the agency. One reason, she says, was salary: Employees could sometimes boost their pay by 40 percent by moving to private industry.

For lawyers in EPA's enforcement division, the pay discrepancy is even higher, says Gene Lucero, who was EPA's director of hazardous waste enforcement until 1988, when he joined a private law firm. "You were dealing with people on the other side who were earning two to five times as much," he adds. EPA lost 30 percent of the lawyers in its waste enforcement division last year.

But money is only one factor, according to Williams and Lucero. Some senior people, in particular, leave out of "pure frustration," says Williams. "The resources, money and staff just aren't there to do it right."

Private companies look to EPA employees for their knowledge of environmental law and regulation, not for their technical expertise or management skills, according to Williams. Former EPA employees "help you on the compliance side," she says.

Legal talent from EPA is particularly valuable because prospective attorneys can't learn environmental law in school, says Lucero. "This is not a traditional area, with established case law. It turns on understanding how the government works," he explains. "And frankly, the only way to learn that effectively is to work in the government."

But according to Lucero, the pool of available lawyers at EPA has dried up. "The people there who are good have made it clear that they have no intention to leave, and the ones who are interested in leaving are probably not the people that you're after," he says. Starting salaries at private firms, which may be twice what EPA offers, hinder the agency from replenishing its pool of talent, he adds.

Williams, however, still looks to her old employer when recruiting new talent for her firm. "I would see EPA as a recruiting ground," she says.

responsible for Rocky Flats. "It became obvious to us very early on that they did not have a good handle on what was going on at their own facility," said Dowsett. "Our compliance was non-existent," admits McKinley. Close attention was paid to the handling of radioactive waste, says McKinley, but toxic chemicals were often ignored.

Now, McKinley has many eyes peering over his shoulder. Every two weeks or so, Colorado's Health Department—which once threatened to shut the plant down unless DoE accepted state regulations covering mixed radioactive and chemical waste—sends officials to visit the plant. The EPA has put Rocky Flats on its list of the most dangerous hazardous waste sites in the country, and keeps abreast of developments. "I've never seen a site that's this heavily monitored," says Miullo.

Progress has been made, at Rocky Flats and elsewhere. Contaminated sites have been identified, and the process of turning liquid waste and radioactive sludge into solid blocks that are more easily handled has begun at several sites. At Rocky Flats, the plant's operators have cut back on the use of hazardous chemicals by at least a third, according to Miullo.

But the process has not been easy. "DoE just wasn't used to this," says Miullo. Because of security concerns, EPA has agreed to give Rockwell 72 hours notice before any inspections. "I don't do any gate-crashing at this facility, because I don't want an M-16 shoved in my throat," says Miullo, "but we are not very comfortable, not being able to make surprise inspections."

Facing the Public

Publicity surrounding the environmental problems at Rocky Flats has forced officials from DoE and its contractors into an even more unfamiliar arena: detailing their operations to an increasingly skeptical public.

"We used to do a lot more hiding," says Ed Heintz, a public relations official for Rockwell. "It's easy to put the veil up and say, 'That's classified.'"

In part, local citizens groups have forced DoE to drop its veil of secrecy. At Hanford, Rocky Flats and Savannah River, activists have become more sophisticated in their understanding of the environmental risks of nuclear weapons plants.

An Environmental Monitoring Council for Rocky Flats has been established, with representatives from Rockwell and the public. Rockwell and DoE representatives hold public meetings every month to discuss safety and environmental issues. But local critics of the plant remain deeply distrustful of Rockwell, saying the company still refuses to respond constructively to public concerns.

Rockwell has refused, for example, to release information on the health record of its work force. DoE, after promising Gov. Romer early this year that it would fund independent studies of the plant's potential impact on public health, has reneged on those promises, charge local activists. According to Kenneth Lichtenstein, a Denver physician, Rockwell employees who volunteer to serve on committees of the Monitoring Council regard their participation more as a public relations chore than an opportunity to contribute substantively.

BRUCE REEDY

Leo Duffy will apply the expertise he gained working for the Navy to Energy's defense waste program.

DoE: Department of Environment?

Miullo doesn't doubt the good intentions of DoE and its contractors. "Rockwell is eager to get going. DoE wants to clean up. Everybody is eager move forward," he says.

The sticking point of current negotiations over cleaning up DoE facilities remains uncertainty over the budget. Tom Looby, director for Health and Environmental Protection for the Colorado Health Department, says that Rockwell and DoE are holding out for a more lenient timetable for cleanup, fearing that they won't have the money to carry out a more ambitious schedule.

Looby, however, isn't willing to wait around for budget realities. "We're going to demand that they do everything they can to comply with the state's laws," he says. "They need to do a better job of identifying what the most expeditious schedules are, irrespective of the budget, so that we can work together with Congress to get the appropriations."

According to a memo Watkins sent to his department heads on March 15, top priority will go to efforts aimed at abolishing waste disposal practices that violate state and federal laws. Equal urgency, according to the memo, will be assigned to cleaning up sites "where there are known releases with the potential to affect the public."

But public safety, says John Ahearne, a former chairman of the Nuclear Regulatory Commission, "is not the same thing as neatness." Ahearne chairs an independent commission on safety at DoE facilities.

A cleanup effort aimed at turning every site back into its original pristine state—what Ahearne would call neatness—would turn into a black hole for scarce funds, fear DoE officials. They want to concentrate on a few sites that present clear and immediate dangers. "The clean-up business has generated an industry that is very good at spending huge amounts of money to deal with trivial risk," says James Martin, a professor of environmental and industrial health at the University of Michigan. "There's no sense spending infinite amounts of money to change very small risk."

Environmental advocates like Dan Reicher argue that tight budgets cannot become an excuse to continue violating environmental laws, especially since DoE plans to build several costly new nuclear facilities at the same time.

Pleading poverty, DoE has negotiated agreements with EPA that "sanction foot-dragging in carrying out critical cleanup activities," says Reicher. According to Reicher, DoE persists in concentrating on ambitious modernization projects like building two new reactors to produce plutonium and tritium, while cleanup efforts make do with "budget leftovers."

In the *Government Executive* interview, Watkins said some of the cleanup cost estimates were "far too high for a variety of reasons." More recent projections "are coming in at one-twentieth" of the earlier estimates, he added. And he identified new cleanup technologies as a key means of reducing budgetary costs.

Watkins points to super-hot incinerators, operating at 17,000 degrees Fahrenheit, that break down hazardous organic compounds into elemental components of carbon, hydrogen, and oxygen. A prototype is now operating at a DoE facility in Butte, Mont. At the Savannah River plant, scientists are investigating the usefulness of tiny microbes that feed on contaminated hydrocarbons, breaking down the compounds within their cells.

According to Watkins, his agency's current environmental problems may even give it a new and valuable mission. At DoE's network of national laboratories, additional money is flowing to projects that may find other technical solutions to the problem of neutralizing waste. "It is my hope that the DoE will become the world leader in the important area of environmental technology, and a valuable global resource for environmental restoration," Watkins said. □