

30 nations produce from 6000 to 7000 tons of spent fuel, which contains something like 60 to 70 tons of plutonium. While plutonium produced in reactors is far less weapons grade than the pits piling up in Russia and the US, it still represents a substantial proliferation danger. The risk of proliferation increases if the plutonium is separated from the spent fuel by chemical reprocessing. The resulting plutonium could be used for nuclear weapons, and, not being very radioactive itself, it is more susceptible to theft.

But while the US sees surplus plutonium as a dangerous liability, Russia, along with Britain, France and Japan, view it as a potentially valuable energy source (see *PHYSICSTODAY*, January, page 56). After all, 1 ton of plutonium can generate 1000 megawatts of electricity for about 1 year. Russia, which has a larger inventory of surplus plutonium than does the US, objects to any option that "throws away" the energy contained in plutonium and therefore favors the

reactor fuel route over vitrification.

An independent commission of US and Russian physicists established early last year at the suggestion of Russian President Boris Yeltsin concluded that global security would be best served if both nations work in tandem on this problem. That means both should pursue the two methods of vitrification and MOX fuel use. In a letter to President Clinton on 3 December, a prominent group of nuclear scientists contended that if the US followed only the option calling for vitrification and burial, Russia might not get rid of any of its plutonium and store it instead in usable form. Given Russia's precarious control over the plutonium extracted from its dismantled warheads, this would be a scenario the US would find dangerous.

For her part, O'Leary was enthusiastic about the dual-track plan at her briefing on 9 December. "Four years ago, when I arrived at the Department of Energy, we were floundering in a

sea of plutonium," she said. "Now, for the first time in history, we will be destroying instead of creating weapons-grade plutonium." She said she considered the effort "the capstone" of her tenure at DOE and a huge leap forward toward eliminating the risk of nuclear engagement.

A DOE official estimated that it will cost \$2 billion over 20 years to dispose of the plutonium in reactors. By comparison, vitrifying the plutonium in glass or ceramic and placing it in an underground repository would cost \$1.8 billion. A combination of the two technologies, which the US may need to adopt, is likely to amount to a total of \$2.3 billion over 25 to 30 years. The reason the US may wind up disposing of plutonium with both technologies, says the official, is that about one-third of the excess plutonium is already in a form of mixed waste, which may be difficult or even impossible to adapt for use as a reactor fuel.

IRWIN GOODWIN

Clinton's Cabinet Changes for Science Agencies Raise Questions on Reforming Energy and Defense

As is often the custom with political appointments, expediency triumphed over experience as President Clinton announced the new cabinet members who will head major science and technology departments in his second term. Just hours before his announcement on 20 December, Clinton decided to nominate Transportation Secretary Federico F. Peña to head the Department of Energy. Many, including Peña himself, had expected Clinton to name Elizabeth Moler, who directs the Federal Energy Regulatory Commission and was formerly chief counsel to the Senate Committee on Energy and Natural Resources. The selection of Peña also disappointed supporters of Chang-Lin Tien, a mechanical engineer who is chancellor of the University of California, Berkeley. Tien, who was supported by California Democrats in Congress, may have had a chance for the position until a report in *The Washington Post* linked him to an Indonesian businessman who had contributed to Clinton's reelection campaign.

Some of Clinton's other choices to sit at his cabinet table also have little or no background in their new positions. William M. Daley, a lawyer and younger brother of Chicago Mayor Richard Daley, was designated commerce secretary, and William Cohen, the Maine Republican who retired after two terms in the Senate, was nominated for defense secretary. Daley had

been considered for the Transportation Department in Clinton's first term and made it amply clear he wanted Transportation this time. But his brother's plan for another airport south of Chicago would have raised cries of conflict of interest if Bill Daley had been nominated for Transportation. Known as an independent thinker on most subjects, Cohen is the first Republican picked for a senior Democratic cabinet seat since Robert McNamara became defense secretary in 1961. Cohen, a pragmatic politician as well as a published poet and novelist, will be central to Clinton's efforts to devise a bipartisan approach to military reform and retrenchment—though defense doves point out that Cohen has opposed only one major weapons system, the B-2 bomber, and has supported three new fighter aircraft, the Navy's CVN-76 nuclear aircraft carrier and the Ballistic Missile Defense Organization, the scaled-down Star Wars project.

But it is Clinton's choice of Peña that is most puzzling. If he is confirmed by the Senate, Peña will be the first energy secretary in recent years with no substantial experience in the field. Hazel R. O'Leary, who retired from the post on 20 January, the date of Clinton's inauguration, was an energy consultant and an executive of an electric utility company. Peña, who has a law degree from the University of Texas, was a civil rights lawyer, a

Colorado legislator and Denver's mayor before coming to Washington to be secretary of transportation.

The initial reaction to Peña's selection at DOE, on Capitol Hill and in industry was one of bewilderment. One industry executive who has dealt with DOE for a dozen years said Peña could have a rough time being confirmed. "He has almost no background in the department's four 'business lines'—science and technology, nuclear weapons, environmental cleanup and energy resources," said the executive. What's more, he said, "Peña's appointment may mark the beginning of the end for DOE as a cabinet department. If Congress is intent on eliminating or dismantling DOE, Peña is not the one to lead the defense."

Ironically, just a day before Peña's nomination, Senator Frank Murkowski, the Alaska Republican who chairs the Energy and Natural Resources Committee, which oversees the confirmation of an energy secretary, observed in a statement that the new secretary "will face challenges greater than most of his or her predecessors. In addition to revamping the nuclear waste program and dealing with this nation's dangerous dependence on foreign oil, that person faces calls from Congress and the public to shut down the department. He or she will also have to stand up for civilian control of our nuclear weapons programs."



PEÑA: Beginning of the end?

Murkowski then warned that the job demands someone "with the proper professional background and a stiff backbone."

Peña's connection with energy issues is apparently limited to his concerns as Denver's mayor with cleaning up DOE's Rocky Flats nuclear weapons facility and the Army's Rocky Mountain Arsenal. He encouraged R&D to advance renewable energy and alternative fuels as ways of reducing pollution in Denver. At Transportation, Noah Rifkin, who served as Peña's science adviser, characterized him as a "workaholic" who expects "hard work and dedication" from those around him. Rifkin said Peña believes in R&D "as a means to an end. His vision is that research and technology help drive an engine for creating jobs, improving our business competitiveness and solving social problems."

Confirmed in January 1993 as transportation secretary, Peña presided over a department responsible for the nation's highways, air traffic, railroads and Coast Guard, with more than 107 000 employees and an annual budget of \$36 billion, which is about twice the size of DOE's. Like DOE, the department has disparate missions and consists of several components that were cobbled together. A Congressional staffer noted that Peña was "a fairly effective leader who maintained a low profile." But the press often portrayed him as a captive of his department's bureaucracy and various constituency groups. He was harshly criticized, recalled the Congressional staff member, for making slow progress in handling airline disasters and in restructuring the Federal Aviation Administration, the department's largest entity. Peña upset the White House last summer when he publicly avowed

the safety of ValuJet Airlines after one of its planes had plunged into the Florida Everglades. Apparently with this episode in mind, he announced after the November election that he would leave the Administration and posted a "for sale" sign in front of his house in suburban Alexandria, Virginia.

As Peña awaits his confirmation hearing, he is being briefed by senior DOE staff on an extensive list of issues, embracing nuclear weapons, nuclear waste, environmental pollution, research laboratories and collaboration with CERN on the Large Hadron Collider (see page 58). As energy secretary, Peña will soon learn that the department often comes in conflict with the Interior Department, the Defense Department and the Environmental Protection Agency. That is one reason why previous DOE leaders, particularly James Schlesinger, Donald Hodel and John Herrington, have urged Congress to break up the department and turn over some of its missions to other agencies.

Senator Pete Domenici, the New

Mexico Republican whose support will be critical to Peña's confirmation, has conceived a plan that includes redesigning DOE so that nuclear weapons and energy research would continue to operate under a civilian agency similar to the old Atomic Energy Commission or its successor, the Energy Research and Development Administration. Domenici, who chairs the Senate's Budget Committee and appropriations subcommittee on energy, expressed his dissatisfaction with DOE in a report that accompanied the 1997 funding for the department. "The department's administration has become too cumbersome" and has lost its focus, the report says. The resulting higher costs and lower output "will seriously jeopardize the future of the department." Domenici didn't push his plan during the past two years, while freshman House members were trying to jettison the \$16.5 billion department. But he anticipates returning to it if and when Peña moves into DOE's Forrestal Building.

IRWIN GOODWIN

Washington Ins & Outs

Changes at DOE, FAA and Congress

After an extensive search over the past year, Martha Krebs, director of the Department of Energy's Office of Energy Research, selected **S. Peter Rosen**, dean of science and professor of physics at the University of Texas at Arlington, as her associate director of high energy and nuclear physics. He succeeds **Wilmot N. (Bill) Hess**, who served in that job from 1987 until his retirement last February. John O'Fallon, the deputy associate director, had been acting head of the program.

Krebs's letter in December announcing Rosen's appointment observed that Rosen has spent nearly 40 years in physics research and is a "respected scholar with an international reputation."

Born in London, England, Rosen received his BA in mathematics in 1954 from Merton College of the University of Oxford, and his PhD in physics three years later from the Clarendon Laboratory at Oxford. He was a postdoc at Washington University in St. Louis from 1957 to 1959, then joined the Midwest Universities Research Association (MURA), the organization that fought tirelessly against formidable political forces for a particle accelerator in the region. After a year as a NATO Fellow at the Clarendon Lab in 1961-62, Rosen returned to the US to teach theoretical physics at Purdue Univer-

sity. Purdue granted him leave from 1975 to 1977 to work as a senior theoretical physicist at the Energy Research and Development Administration, the short-lived agency that served as a transition from the Atomic Energy Commission to the Department of Energy. The university gave him leave once again from 1981 to 1983 to serve as a physics program officer at the National Science Foundation. In 1983 Rosen joined the research staff at Los Alamos National Laboratory, and in 1990 he became a physics professor at the University of Texas at Arlington, which drew him into another particle physics battle, this time for the Superconducting Super Collider, which was to be built under grasslands around Waxahachie, Texas.

On 15 December **John M. Deutch** left President Clinton's cabinet as director of the Central Intelligence Agency to return to MIT as an institute professor. Deutch, who had been undersecretary and then deputy secretary at the Pentagon under William Perry, was considered on the inside track for Defense Secretary. But after Clinton's reelection, the President nominated his national security adviser, Anthony Lake, for the CIA post, leaving Deutch out in the cold. The White House viewed Deutch as a con-