and electrical engineering in 1978 from MIT and a PhD in physics in 1984 from the University of California, Berkeley. As OSTP's assistant director for national security, Epstein has a full bag of policy issues relating to nuclear, chemical, and biological weapons of mass destruction, disposition of Russian excess weapons-grade plutonium, physical or computer-based attacks on critical infrastructures, counterterrorism R&D, international technology transfer, ballistic missile defense, and nonproliferation and arms control.

At the turn of the millennium, **Alex Flint**, the highly regarded chief executive of the Senate appropriations subcommittee on energy and water development and once the legislative aide to Senator Pete Domenici, the influential Republican of New Mexico, who chairs the subcommittee, joined the lobbying firm of former Senator J. Bennett Johnston, the Louisiana Democrat who had ruled the same subcommittee before his retirement in 1997. That was the year Republicans took command of the Senate and Domenici replaced Johnston as subcommittee chairman. When that happened, Flint left Domenici's staff to take the subcommittee job.

Flint succeeded W. Proctor Jones, who had been an aide in the 1960s to Senator Richard Russell, the powerful Democrat from Georgia. Jones joined the appropriations committee in 1971. Jones, like Flint after him, left the subcommittee's top job for Johnston's lobbying firm, which represents a galaxy of companies, universities, associations and organizations, including Lockheed Martin, Northrup Grumman, Battelle Memorial Institute, SBC Telecommunications, Drexel University, and Tulane University.

Flint had served in Domenici's office for eight years, the first two while attending George Washington University in the District of Columbia. The energy appropriations subcommittee is ultimately responsible for the annual budgets for the Department of Energy's nondefense programs as well as for many of the nation's waterways and harbors. In the past decade, the staff's most demanding work has centered on mitigating the damage under the budget caps. The caps were first set in place to limit discretionary spending in 1990, when Jones occupied the job, and were readjusted during Flint's first year in 1997, after President Clinton and Congress agreed to a deal to balance the budget. Jones described the work of the staff with a famous aphorism: "First, do no harm."

Two former deputy secretaries at the Energy Department have taken new posts: **Charles Curtis**, who served under two secretaries, Hazel O'Leary and Federico Peña, has been appointed executive vice president and CEO of the United Nations Foundation, which was established in 1998 to administer broadcasting executive Ted Turner's gift of $1 billion to support UN causes related to child health, human rights, and environmental problems. Former Colorado Senator Tim Wirth is the organization's president. When Curtis left DOE in 1997, he joined the Washington law firm of Hogan & Hartson as director of its energy group.

Another former DOE deputy secretary, **Elizabeth (Betsy) Moler**, has joined Unicom Corp, a Chicago-based electric utility (once known as Commonwealth Edison, the nation's largest operator of nuclear power plants), which is merging with a Pennsylvania company, PECO Energy. Moler, who succeeded Curtis, served in 1997–98. She was a partner in the Washington law office of Vinson & Elkins before she was appointed as Unicom's senior vice president for federal government affairs. She was chair of the Federal Energy Regulatory Commission from 1993–97, before joining DOE.

IRWIN GOODWIN

WASHINGTON BRIEFINGS

One Too Many Mishaps on Voyages to Mars The loss of two successive US spacecraft on their approach to Mars in the last four months is regrettable, embarrassing, and costly, but unless an investigation finds that the failures were caused by NASA's planning or engineering, there are unlikely to be serious repercussions on Capitol Hill. The Red Planet has often eluded Earth's intrepid space explorers. Of 25 previous US and Russian attempts to land robot spacecraft on Mars since 1962, 11 have ended in disaster.

"Heads will roll" if NASA blundered again, said Representative Dana Rohrabacher, the California Republican who heads the House Science Committee's space subcommittee. But Rohrabacher and many of his colleagues in Congress understand the enormous risks of space exploration, and that is exactly why Congress forced NASA to launch "faster, smaller, cheaper" missions—though strict adherence to that mantra may be a fundamental cause of the recent failures. "It's difficult to blame anyone or anything until we know what went wrong," said Rohrabacher. "Failure of two missions is lamentable, but at least it's not a $1 billion project."

It was the disappearance of the $1 billion Mars Observer as it neared the Martian surface in 1993 that led Congress to demand that NASA pursue a management philosophy that sought to lower the price tags of planetary exploration and to launch the missions more quickly. In the wake of the Observer debacle, NASA attempted to balance an ambitious program against declining annual budgets and waning political support. Loss of the $165 million Mars Polar Lander and its $29.2 million probes in early December was "a crushing blow," said Edward Weiler, NASA's head of space sciences. It followed by three months the failure of the $125 million Mars Climate Orbiter, which veered off course and into oblivion because of a navigation error caused by a mixup in using English measurement units (by the contractor, Lockheed Martin Astronautics) and metric units (by NASA's Jet Propulsion Laboratory). In all, the agency's entire $356.8 million program of Mars exploration last year came to a wretched end.

Weiler and the agency's administrator, Dan Goldin, promised a thorough examination of the Polar Lander's failure and its implications, as well as NASA's space-on-a-shoestring approach. "Clearly, something is wrong, and we have to understand it," declared Goldin in a teleconference with news reporters. "It is conceivable that we will completely change our approach. . . . Everything is on the table." This month, NASA officials are expected to decide whether to proceed with plans to launch other spacecraft to Mars in 2001. At least three major Mars missions are on the drawing boards for later in the decade. All could be drastically revised and delayed. While NASA and JPL are assembling formal investigations, the 106th Congress, returning for its second session on 24 January, is almost certain to convene hearings on the failures.

NIF Faulted for Cost and Schedule Overruns A panel of physicists that advises the University of California on the

laboratories it operates for the Department of Energy (DOE) found fault with the management of the National Ignition Facility (NIF), which is being built at Lawrence Livermore National Laboratory. The panel, led by Steven E. Koonin, vice president, provost, and professor of theoretical physics at Caltech, concluded that "the project is now facing potentially serious cost and schedule overruns because of management deficiencies at the laboratory, the university, and the DOE."

NIF, a 192-beam laser that is designed to trigger tiny nuclear explosions by inertial fusion, would be the crown jewel in the stockpile stewardship program. It was originally planned for completion in 2003. But that timetable has been immersed in controversy and doubt since Energy Secretary Bill Richardson revealed last September that the project is over budget and behind schedule. Richardson then ordered an investigation of NIF and withheld $2 million of the University of California's fee for operating Lawrence Livermore. On top of that, NIF's principal manager, Michael Campbell, had announced a week before that he was stepping down as associate director for laser programs. After someone at the lab had blown a whistle on Campbell's academic credentials, Campbell confessed that he had failed to inform lab officials that he lacked a PhD. Though he had completed his course work toward a doctorate in physics at Princeton University, he admitted that he never wrote a dissertation.

While the baseline cost of NIF is $1.2 billion, it now faces a cost increase of around $350 million and a delay of about 18 months, according to DOE sources. Without acknowledging specific overruns, the Koonin committee concluded that the project's "main problems have been a failure to fully appreciate the complexity of the NIF system, some relatively fundamental project management issues, and a contingency inadequate for a project of this complexity and technical challenge."

The committee's report went on to elaborate on its findings: "The extraordinary complexity of the NIF project is far beyond that previously attempted by the laser directorate. It requires extensive systems integration, design management, inventory tracking, and project planning and performance measurements capabilities beyond those that were available within the laboratory. The project and laser directorate management structures and culture were not conducive to identifying or understanding these deficiencies. Those weaknesses were further exacerbated by weaknesses in the DOE project management system, and by lack of effective project review by the university. Combined, these management failures are the real root cause. . . ."

The committee noted that many of NIF's problems were first identified early in 1999 during an initial review initiated by Campbell and that the review had revealed that the original plan, "which relied extensively on laboratory management and manpower, would be unlikely to succeed in assembling and integrating the highly complex infrastructure within the planned cost and schedule." Then Campbell and other NIF managers developed a new approach that relied for the most part on industrial project management, manufacturing, and assembly expertise.

These changes were praised by the Koonin panel. "The project has already successfully solved a number of very difficult technical issues, including the large optical switch and the ability to grow large frequency conversions crystals very rapidly. The project also successfully demonstrated the engineering feasibility of the high efficiency amplifiers, deformable mirrors, and electrical power systems." Still, technological problems remain: One is large-scale production of laser glass that meets the difficult specification and cost goals, and another is the operational lifetime of the final optics. Even so, the committee believes the lab can handle the remaining technical matters. "The laboratory has an excellent track record for resolving technical issues of this sort," the report stated. Moreover, it calls for the adoption of the committee's recommendations for improved management—and for Livermore's director, Bruce Tartar, to devote greater attention to the project, accept the project as his own, and demand adequate funds for it. The committee expressed its confidence that the lab can then successfully complete and operate NIF.

Notwithstanding the Koonin panel's review, NIF is undergoing a separate examination by Congress's Government Accounting Office, which had been requested by House Science Committee chairman F. James Sensenbrenner Jr, a Wisconsin Republican, and the senior Democrat, Ralph Hall of Texas. When the GAO report is finished, the House committee will conduct a hearing of its own.

Disappointing Report Card on K–12 Education More than 15 years after a disturbing report gave public education a very low grade, a sobering update released on 1 December concluded that US schools had not improved measurably and that education continued to be troubled because of misguided policies. Though students had improved their scores in math and reading since the findings of "A Nation at Risk" had distressed parents and politicians (see PHYSICS TODAY, June 1983, page 44), they are still falling short of the goals put forth then, as well as any of the eight educational goals for the year 2000 that were set a decade ago by President Bush and the governors of all 50 states.

Insufficient and inadequate data gathered from across the country kept the National Education Goals Panel from saying exactly how far the nation is from meeting the goals. "Have we achieved all we set out to do? No," Education Secretary Richard Riley said when the report was released. "Are we moving in the right direction? Absolutely." Riley, who was South Carolina's governor when the initiative began in 1990, said, "The goals we have set are like the North Star. They give us a sense of direction, and they challenge us to keep moving forward."

But in the case of two goals, teacher quality and school safety, the panel reported that the nation had actually gone backward. The percentage of teachers holding a college degree in the main subject they teach has dropped from 66% to 63%, and there is a significant increase in student use of illicit narcotics, from 24% to 37% in the 10th grade.

The nation has fallen far short of the goals for increasing high school graduation rates, improving teacher training, and increasing parental involvement in education. It also has come nowhere near getting all students to demonstrate competency in core subjects. And while 12 states have reduced their high school dropout rates, 11 states have increased those rates.

The panel also reported some good news: 15 states perform at world-class levels in 8th grade science, so that out of 41 nations, only Singapore could be expected to outperform science students in those states; 37 states increased the percentage of diplomas earned by underrepresented minority students in math and science, and 51 states or territories increased the percentage of diplomas achieved by female students in math and science. Only two states, Minnesota and neighboring Wisconsin, ranked at the top consistently in 4th grade math, 8th grade math, and 8th grade science.

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