Delaware Democrat on the Foreign Relations Committee, joined Republicans like Hagel and former Secretary of State Henry Kissinger in arguing that the decision be left for the next president. Building a missile defense against North Korea at the cost of a new nuclear arms race with Russia makes little sense, Biden cautioned.

Until now, DOD had projected the cost of building and operating a single site of 100 interceptors at $25.6 billion through 2015. A new estimate by the nonpartisan Congressional Budget Office raises the projection of the first phase by nearly $4 billion to $29.5 billion. But when the CBO includes the cost of upgrading the first site and building and running a second site, the price would rise to $48.8 billion. Add another $10.6 billion to build and operate 24 low-orbit infrared satellites that would be able to discriminate between incoming warheads and decoys intended to confuse the system, and the total cost would be $59.4 billion, according to CBO.

If Clinton approves of NMD this fall, the first stage could be completed by 2005. It would include an X-band radar perched on the remote, windswept island of Shemya at the outer edge of the Aleutian chain to provide precise target tracking information for an interceptor, to help distinguish warheads from decoys, and to perform the kill assessment. At first, NMD would have 20 interceptors in underground silos at Fort Greely and Clear Air Station in Alaska. The plan also includes space-based sensors, five land-based upgraded early warning radars on the US perimeter, and a battle management center in Colorado. By the end of 2007, NMD would have 100 interceptors.

Sometime between 2010 and 2012, the second-phase architecture would be in place with another interceptor site, four more X-band radars, and a new constellation of space-based sensors to counter "a few tens of warheads with complex penetration aids" that might be launched aggressively by a renegade country or terrorist group or accidently from a nuclear power.

As Clinton and Putin prepared for a summit conference in Moscow on 4 June, the *Bulletin of the Atomic Scientists* obtained a draft US document proposing to amend the 1972 ABM treaty so that Russia would allow the NMD system to be deployed. In exchange, the details reveal, the US is prepared to negotiate a critical change in nuclear strategy. Russia would maintain its entire nuclear force under START II of about 3000 missiles on constant alert (to permit launch on warning) as a way of reducing Moscow's anxiety over weakening the nation's deterrent after NMD begins operating. The US system is designed to counter no more than a tiny fraction of Russia's force and, therefore, is incapable of threatening Russia's capability to survive a first strike and to respond with its arsenal.

"Deployment of NMD will make the US less secure, not more secure," said Kurt Gottfried of Cornell University and a member of the UCS–MIT study. If the US is telling Russia that retaining a large arsenal for the indefinite future is its hedge against NMD, then Washington cannot credibly argue that it is also taking steps toward the elimination of nuclear weapons."

IRWIN GOODWIN

As Term Nears End, Clinton Names Dresselhaus to Strengthen Support for DOE Science Research

At the dawn of his presidency in 1801, Thomas Jefferson wrote: "There is nothing I am so anxious about as good nominations, conscious that the merit as well as the reputation of an administration depends as much on that as on its measures." Jefferson's standards were attained many times over the centuries and once again were met on 13 April when President Clinton nominated Mildred S. Dresselhaus, a prominent solid-state physicist at MIT, to serve as the next director of the Department of Energy's Office of Science.

The choice pleased but puzzled many scientists. Why would Dresselhaus, one of MIT's 12 active Institute Professors, agree to take a position in an administration that is in its last year? Even if Dresselhaus's nomination is quickly confirmed by the Senate, her appointment would run only seven months at most before she has to resign, no matter who became the next US president. By tradition, every government executive appointed by the president and confirmed by the Senate is required to submit a letter of resignation before any new administration takes office. Of course, it's possible that if Vice President Al Gore is elected president, Dresselhaus may be asked to stay on, but it's highly unlikely that she would stay on if the White House changed political parties.

The last director of the science research office to test the tradition was President Bush's appointee, William Happer, the Princeton University physicist who held on for a few months into the Clinton administration before being sacked for daring to question Gore's position on the potentially harmful effects of ozone depletion and greenhouse gases on the Earth's environment and human health (see PHYSICS TODAY, June 1993, page 89).

DRESSELHAUS: Science and music have been good to her.

Happer was replaced by Martha Krebs, who held a PhD in theoretical physics, but had worked mainly in political or administrative positions connected with DOE. She had been staff director of the House subcommittee on energy development and applications and, then, associate director for planning and development at Lawrence Berkeley Laboratory, the first woman to hold such a high position in the DOE laboratory system (see PHYSICS TODAY, November 1999, page 53).

In November, a month before Krebs left, Energy Secretary Bill Richardson asked Dresselhaus to have breakfast with him in Boston. "I had no idea what he wanted to talk about," she recalled. "I thought it might be related to an article I just published in the journal *Science* on carbon nanotubes. But that didn't seem right." During breakfast, he told her she had been recommended for the DOE job by sev-

eral people in Washington. He had discussed her qualifications with Neal Lane, the president's science adviser, and Ernest Moniz, the department's undersecretary, who had observed Dresselhaus with awe during his 25 years as an MIT physics professor and director of the university's Bates Lab. Richardson told her that he and the president were eager to bring more practicing scientists, especially ones esteemed by their peers, into high government position.

Though he couldn't offer her the job on the spot, he was confident, Richardson said, that the post could be hers if she wanted it. "Science has been so good to me," Dresselhaus remembered thinking, "that maybe this is the time in my life when I could best serve science by serving the country. It was something I knew I shouldn't pass up." Dresselhaus's career in science reaches back to 1958, when she received a PhD from the University of Chicago's illustrious physics department. After a two-year stint as a National Science Foundation postdoc at Cornell University, she joined MIT, first at Lincoln Laboratory and later with joint appointments in the department of electrical engineering and the department of physics.

At 69, Dresselhaus has many distinctions: Abby Rockefeller Mauze Chair in MIT's department of electrical engineering and computer science (1973–1986), director of the university's Center for Materials Science and Engineering (1977–1983), winner of the National Medal of Science from President Bush in 1990, president of the American Physical Society in 1984, president of the American Association for the Advancement of Science (1997–1998), treasurer of the National Academy of Sciences (1992–1996). She also is a trustee of Caltech, a member of the board of Israel's Weizmann Institute, and one of the overseers at Harvard University—all positions she will have to give up if she joins DOE.

Her current research has led her to unlocking the mysteries of carbon, studying the structure of carbon fibers, and exploring the properties of fullerenes, carbon nanotubes, bismuth nanotubes, and low-dimensional thermoelectric materials. She also is "working like mad," she says, to complete a book about carbon nanotubes before accepting the DOE post.

"Millie's interests are unbounded, and her energy and enthusiasm unbridled" says DOE's Moniz. "I expect her to benefit the department in many ways. She knows how our labs work, and I expect her to provide direction to their programs. And I'm confident she can have a significant impact in shaping the department's 2002 budget if she's confirmed before Congress's August recess. She could also have a significant role in the transition period to the next administration."

Though Moniz cannot give Dresselhaus a guarantee that she will be reappointed at DOE if Gore is elected president, there is also some chance she could stay on if George W. Bush were elected. "Millie's appointment is clearly not politically charged. The decision to nominate her was based solely on her record in science."

"Millie is not a little old lady," says a friend who didn't want to be named. "She's so dedicated, she often sends e-mail at 3 or 4 in the morning, and expects an answer in an hour or two. Her neurons seem to be working overtime. She could have been a concert violinist, and she still plays extremely well. She inspired her four children to play musical instruments."

Dresselhaus may need her musical talent if she's confirmed. At DOE, nondefense science has often been second fiddle to defense programs even though the cold war ended a decade ago.

IRWIN GOODWIN

Clinton Nominates General John Gordon to Lead New NNSA

President Clinton's nomination on 3 May of Air Force General John A. Gordon as undersecretary of the new National Nuclear Security Administration (NNSA) in the Department of Energy was greeted with praise on Capitol Hill. Gordon, 53, is currently the deputy director of central intelligence at the CIA. He has held the second highest job at the agency since 1997. His background includes a stint as a research physicist working on Air Force weapons systems at DOE's Sandia National Laboratories in New Mexico.

He entered the Air Force in 1968 through the Reserve Officer Training Corps program at the University of Missouri in Columbia, where he earned a BS in physics. He received an MS from the Naval Postgraduate School in Monterey, California, and got an MBA degree from New Mexico Highlands University in Las Vegas. In an eclectic career, Gordon was a long-range planner at the Strategic Air Command, commanded a strategic ICBM wing, worked at the State Department in politico-military affairs, and served on the staff of the White House's National Security Council in defense and arms control issues, including the oversight of START II negotiations with Russia.

"Gordon has experience, credibility, and commitment," said Arizona Republican Senator Jon Kyl, one of the principal architects of last year's legislation (PL 106-65) that renovated DOE's weapons programs into NNSA, a semiautonomous agency within the department, headed by its own undersecretary. Another Republican who led the House in establishing NNSA, William M. (Mac) Thornberry of Texas, said Gordon's nomination "fills the bill better than we could have expected. He's exactly the kind of person to put some sense and stability into the organization, and give us some confidence that it will function well."

Two months before Clinton's announcement, Energy Secretary Bill Richardson had told the House Armed Services Committee that Gordon was reluctant to take the assignment in the final year of Clinton's administration without an assurance of job security if a Republican were elected to the White House. In an effort to provide a remedy for the problem raised by Gordon, Senator Pete V. Domenici, a New Mexico Republican, introduced a bill (S. 2179) later that day to provide a three-year term for the head of NNSA.

The new agency, which was formally established on 1 March, is responsible for nuclear weapons development, nonproliferation activities, and management and disposal of fissionable material. Richardson objected to the legislation allowing the NNSA undersecretary to bypass the DOE secretary and report directly to the president.

Richardson has demanded that Congress amend the legislation to clarify the secretary's authority over the agency. But most Republicans and a few Democrats in Congress remain unwilling to do Richardson's bidding. One reason for their reluctance: Richardson had angered many lawmakers last January when he sent Congress his plan for creating NNSA, which allowed him to appoint some DOE officials to also occupy positions within the new agency—an approach known as "dual-hatting" (See PHYSICS TODAY, February 2000, page 45). Richardson has since defended his position, explaining that no more than 18 of NNSA's 2000 bureaucrats would have dual posts at DOE, mainly to cut down the number of senior officials and to make sure the new agency functioned effectively within the whole department. **IRWIN GOODWIN** ■