

lishment's choice, Cornelius Pings, president of the Association of American Universities. Pings was so confident of victory that he announced his departure from the AAU. Liebowitz, however, won by a vote of 697 to 660, and Pings canceled his resignation and stayed on at the AAU.

Almost immediately after Liebowitz took office, according to NAE and NAS sources, the councils of both academies grew worried about Liebowitz's actions. His critics contend that Liebowitz attempted to fire NAE's top management, insisted that NAE buy him a home at the Watergate complex, where NAS has a luxurious apartment for its president, and began hustling contracts from Federal agencies for independent studies by NAE, not by the research council. In some cases, some accusers contend, Liebowitz even offered NAE membership to Federal officials who would award such contracts and proposed to serve as principal investigator himself to guarantee that the outcome of the study would please the agency. "It was outrageous and damaging behavior," says an NAS councillor, "and undermines the whole process of the research council." It was a "flagrant violation" of the way the academies operate the research council, says a veteran NAE member who prefers to be anonymous.

Bruce Alberts, NAS's president, warned Liebowitz that such practices

were inimical to the style and substance of the research council. "Hal seemed not to hear my pleas," says Alberts. "He was a loose cannon on the deck of the entire academy complex. He has a strong desire to make his mark on Washington. We could admire him for that if he was not also misrepresenting us to the government and others."

On 15 February, the NAS Council passed its resolution with an accompanying understatement: "Having observed his performance over the past seven months, the NAS council noted with great concern the manner in which Dr. Liebowitz has represented the National Research Council in interactions with other organizations and sponsors, his failure to follow approved procedures of the National Research Council and his adverse impact on National Research Council staff productivity and morale." The statement goes on to say that Liebowitz is no longer authorized to conduct any business on behalf of the research council, that the NRC chairman cannot assign any duties to Liebowitz and that research council funds to support NAE are to be reduced.

The NAE council had passed a resolution last September, shortly after Liebowitz took office and tried to fire experienced staff hired by White. NAE vice president Morris Tanenbaum, former executive vice president of AT&T,

explained that the council placed some controls over Liebowitz's handling of financial and personnel matters, but, says Tanenbaum, he "paid no attention to our resolution." The day the NAS council approved its resolution of "no confidence" in Liebowitz, the NAE council met with him to discuss his performance. Tanenbaum says Liebowitz was asked to "consider" several options. While Liebowitz was not formally asked to resign, he was given the option to remove himself and avoid a public airing of dirty linen.

NAE's bylaws contain no provision for removing elected officers for malfeasance, though they allow officials to resign. The council is considering a range of options, from informing members of Liebowitz's activities as a first step in seeking his recall to amending the bylaws so that the council would have the authority to remove him. "The situation is unfortunate for all the parties involved," says Tanenbaum.

While lawyers are meeting with officials of both academies to decide on what steps to take, Liebowitz continues to "carry out the wishes of the members," he declares. "I want to interact with my council and the research council, but they appear to be divisive and to fractionate both academies." The whole matter is almost certain to go to the NAE members and, if push comes to shove, possibly to court.

IRWIN GOODWIN

Academy Proposes Standards to Make K-12 Science Accessible, Understandable and Relevant to All

After nearly five years of drafts, critiques and revisions, involving a cast of thousands of teachers, scientists and the wider public, the final version of the "National Science Education Standards" was published last December by the National Research Council, which operates under the aegis of the National Academies of Sciences and Engineering. The council's glossy 262-page report is touted as the nation's first comprehensive set of science standards for all students in kindergarten through 12th grade. The 39-member National Committee on Science Education, the group responsible for the standards, believes that their extensive adoption will eventually raise the level of scientific literacy in the US.

In a brief foreword to the document, Bruce Alberts, president of the National Academy of Sciences, and Richard Klausner, chairman of the standards committee who recently became director of the National Cancer Institute, issue a "call to action" and declare

that the proposed new standards "point toward a destination and provide a roadmap for how to get there." They identify the reasons why drawing up precollege science standards are a national necessity:

All of us have a stake, as individuals and as a society, in scientific literacy. An understanding of science makes it possible for everyone to share in the richness and excitement of comprehending the natural world. Scientific literacy enables people to use scientific principles and processes in making personal decisions and to participate in discussions of scientific issues that affect society. A sound grounding in science strengthens many of the skills that people use every day, like solving problems creatively, thinking critically, working cooperatively in teams, using technology effectively and valuing

life-long learning. And the economic productivity of our society is tightly linked to the scientific and technological skills of our work force.

More than a year ago, the research council's committee sent 40 000 copies of a draft of the standards to educators, scientists, engineers, business leaders, school board members, parents and public officials of all sorts. The committee hadn't reckoned on the range of reactions it would receive. Along with those who said the standards are just what the country needs, there were many who objected. Some argued that the standards were overly dogmatic for resourceful teachers to apply to their best and brightest pupils; others claimed that some standards appeared to have been drawn up by educators who view science as multicultural, with natural scientists offering no better understanding of the world than any other group.

"No one at the academy was happy



ALBERTS: Advancing science literacy.

with the early drafts," says Alberts. According to James Trefil, a physicist at George Mason University who sat on a panel organized by Alberts and Klausner to revise the drafts, the project "had fallen into the clutches of the postmodernist school of thought." These folks, says Trefil, see science as "a neverending change of opinions."

The final document represents what the committee claims to be wide agreement about what will provide students with a challenging and balanced blend of science. It places scientific knowledge on an equal footing with scientific understanding and in doing so reduces the traditional emphasis on memorization of facts or cramming for tests.

The document organizes the standards by function: Early sections provide standards of knowledge and ability for teachers—an especially important issue in a country where many science teachers in primary and secondary schools have little or no science education themselves. Detailed specifications are offered to local school boards for planning the professional development of their science teachers, as well as for evaluating the performance of both students and teachers. The report suggests that students should be assessed on their ability to apply science to the kind of problems they are likely to find outside the classroom. Later chapters propose what students should be expected to know and understand at various stages in their education—grades K–4, 5–8 and 9–12. For instance, the standards for the physical sciences call for students by the fourth grade to comprehend the properties of objects and materials—for example, the position and motion of objects in the sky—and to have a basic understanding of light, heat, electricity and magnetism. By the 12th grade their understanding should include the structure of atoms,

chemical reactions, the origin and evolution of the universe and the nature of scientific inquiry.

"The standards are really a consumer's guide to science education," says Alberts. "Adoption of the standards is voluntary." Observing that the political currents in the US are flowing strongly against national standards, Alberts says the academies will put most of their own effort into advancing the standards at local and state levels. He acknowledges that it will take years to assemble a critical mass in science education. On 9 January he had hoped to start a "year of dialogue" with an academy forum of teachers, scientists, students, parents and policymakers. When Washington was battered by a blizzard, the meeting was canceled.

Undeterred by the delay, Alberts is enthusiastic about promoting the standards. He has recruited Donald Kennedy, former president of Stanford University, to chair a committee that will oversee local and regional meetings and enlist working scientists to help improve science education in the schools. The academy will seek to "mobilize all the scientists and engineers in the country and prepare them to be a force for change in their communities," says Alberts. He suggests that scientists who accept his challenge should spend about four hours per week working with local schools.

In the three months since the standards report was published, the academy has distributed more than 55 000 copies. "To have a real effect, the standards project needs to be a national

movement," Alberts points out. "Our job is to keep it on track." He has already recruited business leaders and Washington lawmakers to support his campaign. Producers of school science materials are eager to join. "In the past it's been the textbook publishers and testing companies who have set the standards for the country's schools," Alberts contends. "Teachers taught from the texts and for the tests. The standards project is perturbing the commercial forces in the system."

The academy's mutipronged approach is what sets the project apart from previous efforts to promote science literacy. In 1993, when the National Governors Conference endorsed the goal of scientific literacy for all high school graduates by the year 2000, the American Association for the Advancement of Science had already issued "Science for All Americans" and followed this with "Benchmarks for Science Literacy." "Writing about school science reforms isn't enough," Alberts declares. "We need to make sure every school district in the country gets the opportunity to understand what we're trying to do and to adopt our guidelines if that's what it wants to do."

IRWIN GOODWIN

The report is available for \$23.95 (including shipping) for the first copy and 50 cents for each additional copy from the National Academy Press, 2101 Constitution Avenue NW, Washington, DC 20418; phone 800-624-6242 or 202-334-3313.

WASHINGTON INS & OUTS

Changes at OSTP, NASA, NSF and DOE; Hill Aides Become Lobbyists

One of the four associate directors at the White House Office of Science and Technology Policy has left the agency, and another has announced that he is leaving this month. Their positions, just below the level of Director John H. Gibbons, will be slow to fill this late in President Clinton's term. The first to depart was **Jane Wales**, associate director for national security and international affairs, who joined the Rockefeller Brothers Fund in New York and Washington at the end of February. **Robert T. Watson**, associate director for environment, is moving this month to the World Bank in Washington to become senior science adviser for environment. If the past is prologue for OSTP appointments, it may be five or six months before the President nominates any new top aides to Gibbons. With elections ap-

proaching in November, Federal appointments almost certainly will be held off until the next Presidential term begins next January. The case of **Ernest Moniz** is to the point: Last August the President announced his intention to nominate Moniz as OSTP's associate director for science. Moniz then went on leave from MIT, where he headed the physics department since 1991, to join OSTP as a consultant while awaiting Senate confirmation. After an agonizing period, he was confirmed just before the Senate left Washington for its Christmas recess and officially assumed his position with OSTP on 2 January.

Charles F. Kennel, an astrophysicist who served as NASA's associate administrator of the Mission to Planet Earth, is leaving in May to return to the