

meantime, their combined total of warheads burgeoned to nearly 70 000—though many are now being dismantled.

Israel, which is an undeclared but de facto nuclear power like India and Pakistan, signed the treaty on 24 September. Still, doubts remain on how soon, if ever, the CTB will become international law. Libya and Bhutan voted against the treaty, and Iraq and North Korea, which have ambitions to develop nuclear weapons, did not take part in discussions or negotiations at the UN.

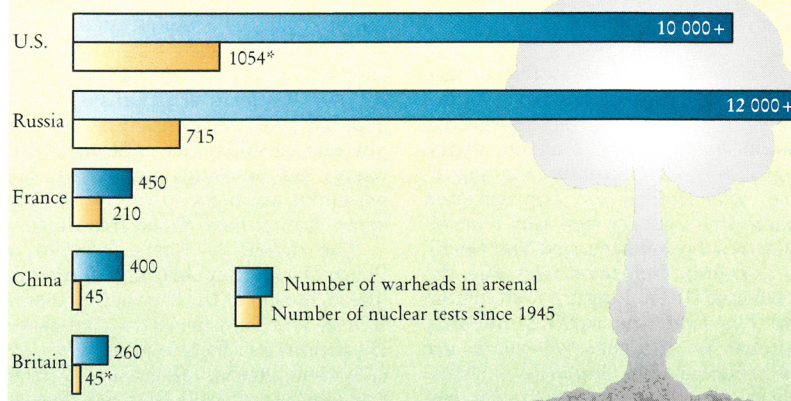
India fired only one nuclear device in 1974, according to arms control experts, and is reckoned to have a clandestine program that it doesn't want to give up until a timetable is set for totally eliminating the world's nuclear weapons, which was Nehru's original goal. Without this, India argues, the CTB is little more than a device that makes it easier for the nuclear nations to hold on to their weapons while guaranteeing that no other countries join the nuclear club. China, which continued testing throughout the negotiations and insisted that "peaceful" explosions be allowed for excavating harbors and highways or exploring for oil and minerals or even diverting asteroids on a collision course with Earth (see *PHYSICS TODAY*, June 1996, page 46), finally agreed to the treaty's provisions.

Government officials in India insist that the CTB is dangerous because it could encourage a new arms race based on scientific sophistication and nonnuclear technology out of the reach of most nations. The treaty simply rules out tests involving nuclear explosions. As such, it does not ban the kinds of inspection and modification of existing weapons or design and deployment of new weapons that are being done within the US science-based stockpile stewardship program, which will employ laser experiments at its proposed National Ignition Facility and super-computed designs and tests at its nuclear weapons laboratories to upgrade components and warheads and to gain additional fundamental understanding of nuclear explosions.

The CTB treaty will not go into effect for at least two years, and in any case not until it is signed and ratified by the 44 countries that conduct nuclear research or possess nuclear reactors. But while the treaty as it is now written would ban both full-scale and low-yield nuclear tests, including the so-called hydronuclear tests, it would not prohibit subcritical tests of nuclear weapons components, including the chemical explosives to trigger the weapons, so long as no nuclear energy is released.

In October 1995, the Energy Department announced that a series of

## The Five Declared Nuclear Weapons Nations



\*The US and Britain jointly conducted 24 underground nuclear tests at the Nevada test site.  
(Source: Natural Resources Defense Council)

subcritical experiments would be conducted underground at the Nevada Test Site to study the effects of aging plutonium and components on the safety and reliability of nuclear warheads. Besieged with objections from many countries, DOE postponed the tests at the urging of the State Department and the White House. A review of lower-yield and hydronuclear tests by the Jason panel, a group of smart and experienced scientists who mainly advise the Defense and Energy departments, concluded that such tests would not be very useful for maintaining stockpile safety and reliability. Still, DOE's nuclear weapons labs argued that subcritical tests would be necessary even after the CTB is adopted.

The issue is unresolved. In an article in the November–December issue of *The Bulletin of the Atomic Scientists*, Frank von Hippel, a nuclear weapons expert at Princeton University who recently completed two years on the staff of the White House Office of Science and Technology Policy, and Suzanna Jones, a research associate at Princeton's Center for Energy and Environmental Studies, raise objections to such tests. They call for an independent peer review "so that the technical arguments for performing the

tests can be sorted out from the political and economic arguments on which conducting the tests has been promoted." If the review panel were to find that some subcritical experiments are indispensable, write von Hippel and Jones, "the only way to assure the international community that these tests are subcritical will be through on-site monitoring. This could be accomplished by allowing an international organization to measure the intensity of neutron and gamma-ray radiation from the experiments." They calculate that the radiation released in subcritical tests should be "minuscule."

"The issues surrounding subcritical tests highlight broader questions about whether international controversy would be created by conducting exercises that resemble nuclear test preparations or involve underground detonations," von Hippel and Jones maintain. "The US is the only country to have announced plans to conduct underground subcritical tests—or underground nuclear-weapons-related tests of any type—under the nuclear test ban. Whatever example it sets in terms of underground testing and transparency, it must be prepared to expect similar behavior from other countries."

IRWIN GOODWIN

## Engineering Academy Picks Wulf to Replace Deposed President

It has been a disturbing and divisive time for the National Academy of Engineering. Last February, seven months after he was elected president of the NAE in a combative campaign against the academy's anointed candidate, Harold Liebowitz was ordered by his governing council to resign. Lie-

bowitz ignored the directive. In May, after polling the NAE's 1840 members, the council amended the bylaws with a new recall provision, enabling it to ask the members to vote on what to do about Liebowitz. By an overwhelming vote of 1179 to 179 in early June, the members chose to remove Lie-

bowitz. A few weeks later, the council appointed one of its newly elected councillors, William A. Wulf, to be the academy's interim president. Wulf, AT&T Professor of Engineering and Applied Science at the University of Virginia, took a year's leave to serve the NAE.

Wulf was clearly the center of attention at the NAE's 32nd annual meeting on 30 September. He exuded confidence and candor as he hobnobbed with members and guests at numerous receptions. But it was his inaugural address that gave members an inkling of the course he was setting: to restore order and engage more members in the organization.

Two weeks before the meeting, Wulf invited a small group of news reporters to lunch at the academy and told them his program as president is "to work out ways to get more input from the membership into the decision process of the academy." Among his first reforms: to replace a nominating committee appointed by the "inner circle" of council members with members from industry, government and academe selected by NAE's 12 sections, representing all fields of engineering. In the past, the academy's nominating system always came up with one candidate for each office, in the style of a banana republic. Wulf and the current council now intend to name a so-called blue-ribbon panel to propose at least two nominees for president, thereby ensuring a contested election. The panel also would review the criteria for electing NAE members, which has led some members to argue that some great engineers and applied scientists have been overlooked in favor of some "good old boys."

### NAE 'subservient' to NAS

Ironically, such internal reforms were also advocated by Liebowitz in the platform on which he was elected last year by a narrow margin of 697 to 660. But his campaign against the council's efforts to depose him raised other issues that rankled some members (see *PHYSICS TODAY*, April 1996, page 48). In May, Liebowitz, a former dean of engineering at George Washington University, sent each member a copy of his platform and a "Dear Colleague" letter asserting that the council was out to get him because he had proposed to put an end to the NAE's "present subservient position" in its affiliation with the National Academy of Sciences. "Because they disagree with my policies, I am incompetent," wrote Liebowitz. "Because they obstruct my platform, I am a failure."

Last March, in its communication to the members, the council had accused Liebowitz of creating "constant



WULF: Temporary or permanent?

confusion and turmoil," demoralizing the staff to the point where senior staffers threatened to resign, and ignoring the council's policy mandates. Under Liebowitz, the council lamented, the "NAE fundraising program is moribund"—a serious matter, considering the independent studies and other functions the academy would like to engage in to gain the recognition and the endowment now enjoyed by the NAS. Equally deplorable, the council stated, "the NAE is leaderless, is in peril as an organization, and needs a new president to do the job that NAE presidents are elected and well paid to do."

The council then advised members on the details of its salary negotiations with Liebowitz. Upon his election, Liebowitz had rejected a compensation package identical to that of his predecessor, Robert M. White, a former head of the National Oceanic and Atmospheric Administration, who had served two six-year terms as NAE president. White received an annual salary of \$270 000, a leased car for business and personal use, and a \$30 000 discretionary fund for expenses incurred while doing NAE business. Liebowitz, the council charged, asked for a total of \$300 000 in salary and deferred compensation, and demanded a car and driver. The council also claimed that Liebowitz wanted the NAE to purchase a \$600 000 apartment for his use in the Watergate complex where the NAS president, Bruce Alberts, now lives and where two previous NAS presidents had lived.

At his meeting with reporters, Wulf refused to discuss any negotiations over a severance settlement for Liebowitz. When the council notified Liebowitz about resigning, he had threatened legal action, but Wulf would not comment on any pending or proposed litigation. "I've been advised by the legal

beagles not to discuss that," said Wulf.

Instead, he talked about the relationship between the NAE and the NAS, a sore point in the opposition to Liebowitz by both academies. Since taking the helm at the NAE, Wulf said, his most important goal has been to regain the confidence of the members in the organization, of the Federal agencies that support studies by the National Research Council, and of the NAS in working with the NAE. Liebowitz had approached government agencies, including NASA and the Defense Department, to convince the agencies to sponsor studies performed exclusively by the NAE, in violation of a 1974 agreement between the academies to work jointly through the National Research Council.

The NAE was created in 1964 to elevate the engineering profession to the high ground of science and technology held by the NAS. After all, NAS had dozens of Nobel Prize winners on its rolls. By contrast, NAE elected many of the nation's corporate nabobs. At this year's annual meeting the engineering academy added three more notables: Bill Gates, founder and chairman of Microsoft; Paul A. Allaire, chairman and CEO of Xerox; and Gary Tooker, vice chairman and CEO of Motorola.

### Maintaining academy ties

In his talk to members and in his meeting with reporters, Wulf emphasized the importance of maintaining close ties between the academies and stated that he and Alberts often discuss plans and programs after the staff has gone home.

Wulf's long hours are often matched by those of his wife, Anita K. Jones, who occupies a commanding presence in Washington as director of research and engineering at the Defense Department. Asked why he left the University of Virginia to deal with the NAE's troubles, Wulf laughed and then said that he had been asked to do so by another councillor, Erich Bloch. Wulf had served as assistant director of the computer and information science and engineering directorate of the National Science Foundation when Bloch was the agency's director. "Anyone who's worked for Erich knows how persuasive he can be," said Wulf. Would Wulf run for the presidency of NAE? His response was an enigmatic smile.

Judging by the reception he got at the annual meeting and the reaction he received from NAS leaders, Wulf should be considered a candidate for the NAE's top job. His leadership has been hailed in NAE's time of troubles.

IRWIN GOODWIN ■