

COVER STORY

Who Has the Bomb

The threat is spreading, and the phantom proliferators lead the way

It is called a research center, but the Pakistan Institute of Nuclear Research looks more like a fortress. Layers of barbed wire surround the sprawling complex in the dusty hills at Kahuta, 20 miles southeast of Pakistan's capital, Islamabad. Much of the facility is buried beneath the earth, a precaution against accident—or perhaps surprise attack. Paratroopers guard the installation, and tanks block all routes into Kahuta. Crotale surface-to-air missiles and anti-aircraft guns bristle toward the skies, through which Pakistani air force planes fly round-the-clock patrols. Unauthorized entry to Kahuta is impossible, sightseeing in the vicinity ill advised.

Precise information about what goes on inside Kahuta is virtually unobtainable; the site is one of Pakistan's most closely held defense secrets. Nonetheless, over the past decade the world has been catching occasional, disturbing glimpses of clandestine dealings and espionage coups that have left trails of suspicion leading inexorably back to Kahuta. All those James Bond operations have conveyed the same unsettling message: even though the government of President Mohammed Zia ul-Haq firmly denies it, Pakistan appears to be developing the capacity to build an atom bomb.

But Kahuta is just one outcropping of a far bigger nightmare: nuclear proliferation, the spread of atomic weaponry, has entered a new and ever more ominous phase. As the 40th anniversary of the A-bomb explosion over Hiroshima approaches, the world has special reason to view what is happening with trepidation, at the very least. On the Asian subcontinent, in the Middle East, in southern Africa and, to a lesser degree, in South America, a number of countries have acquired or are in the process of acquiring the capacity to build atomic weapons. At the same time, the fragile international system of self-restraint that the world has built around its most deadly Pandora's box of technology, a system that has worked surprisingly well so far, is under growing strain. Says a senior official of the Vienna-based International Atomic Energy Agency: "Proliferation has already happened. The main problem of the late 1980s is not so much preventing the spread of nuclear weapons, but making it survivable."

Among the signs that illustrate proliferation's disquieting reach:

► In Moscow on an official visit last week, Indian Prime Minister Rajiv Gandhi charged that Pakistan's development of an atom bomb was "very close" to fruition. Earlier this month, the Indian leader had affirmed that such an achievement by his country's chief regional rival "will completely change the present military balance on the subcontinent. At no cost will we allow our integrity and security to be compromised." In 1974, India shocked the world with a "peaceful" underground nuclear explosion in the Rajasthan Desert; Gandhi's pronouncements hold out the threat that India might resume testing, perhaps even begin to build and stockpile nuclear arms.

► In Los Angeles, a federal grand jury has indicted a U.S. citizen for exporting to Israel 810 high-speed precision switches known as Krytrons, in contravention of U.S. export laws. It is an open secret that Israel has its own atomic weapons program; Krytrons can be used as part of the trigger mechanism for nuclear arms. But Israel offered to return many of the switches, and the U.S. State Department accepted Jerusalem's explanation that it did not intend to use the devices in its atomic weapons program. Still, the incident demonstrates the ease with which highly sensitive technology necessary for nuclear-arms manufacture can, and does, escape control.

► In Washington next month, two House Foreign Affairs subcommittees will hold joint hearings on the global spread of plutonium, the highly toxic atomic explosive. An estimated 55 tons of separated plutonium exists in the West, a stockpile that is growing by five to six tons a year. Among the issues likely to be discussed by legislators at the hearings is the potential that plutonium traffic offers to nuclear terrorism.

► In Geneva in September, delegates from about 85 countries will meet to review progress under the 1968 United Nations-sponsored Nuclear Nonproliferation Treaty. The treaty is the most important accomplishment of the worldwide antiproliferation effort, but it expires in 1995 and there is no guarantee that it will be renewed. The atmosphere at the review session could be tense. Third World countries are expected to criticize the superpowers for failing to work to-

ward nuclear disarmament, a promise embedded in the treaty. To some of the more militant Third World countries, that failure smacks of hypocrisy. The biggest fear is that one of the restive nations might withdraw from the treaty at the September session; if that happened, it would mean a calamitous setback, the first explicit unraveling of the world's major nonproliferation accord.

► In Washington and elsewhere, nonproliferation experts are concerned over an erosion of confidence in the inspection apparatus of the International Atomic Energy Agency; the system is designed to monitor adherence to nonproliferation standards. The concern focuses on the "safeguards" sponsored by the I.A.E.A. to detect the diversion of peaceful atomic technology to bomb-making purposes. Some experts fear that the safeguard scheme is inadequate to the task at hand, while others are worried that the lack of confidence can itself lead to further weakening of an inspection system that in large measure functions on a basis of trust.

Proliferation invokes atavistic fears and uncertainties because it involves arcane and highly sophisticated technologies: breeder reactors, plutonium reprocessing plants, uranium-enrichment facilities.* Says Leonard Weiss, an expert on the U.S. Senate staff: "Proliferation is a set of symptoms with a number of causes. It is both a political and technical problem. Therefore no single cure, or set of cures, will work."

What experts agree on is the problem's perniciousness. "I used to think that

*Uranium 235 (U-235) and plutonium 239 (Pu-239) are the radioactive elements used in atom bombs. Uranium enrichment is the process by which the concentration of U-235 in natural uranium is increased, eventually to weapons-grade material. From 33 to 55 lbs. of U-235 at roughly 93% purity can be used in a Hiroshima-size bomb. Reprocessing is the chemical procedure for extracting Pu-239 from the spent uranium fuel of nuclear reactors, where the plutonium is produced as a waste product. A breeder reactor uses plutonium as fuel rather than uranium: by atomic fission, additional uranium placed in the breeder is converted into more plutonium than was consumed in the original reaction.

Continued

of earthly problems," says Roger Mo-lander, a nuclear expert formerly with the U.S. National Security Council, who now heads the Washington-based Roosevelt Center for American Policy Studies. "But that was before I understood nuclear proliferation. It makes the superpower arms race look like a comparatively minor league problem." Says Charles Ebinger of Georgetown University's Center for Strategic and International Studies: "It's probably the most pessimistic issue I've ever dealt with. Nobody seems to come up with any solutions, myself included."

The spread of nuclear technology over the past four decades is both an impressive and a daunting achievement. Five countries formally possess nuclear weapons (the U.S., the Soviet Union, Britain, France and China); India's 1974 test explosion shows that it has at least mastered the capacity to build them. All told, about 345 commercial nuclear power reactors are in operation in 26 countries, and some 52 nations have nuclear research facilities. At least eleven nations possess facilities for the reprocessing of nuclear fuels, all yielding varying amounts of plutonium. Large enrichment facilities to turn uranium into nuclear fuel, or bomb-grade material, exist in the U.S., the Soviet Union, the Netherlands, France and China. Commercial reprocessing plants to extract plutonium from used reactor fuel are located or planned in France, Britain, West Germany, Japan, India and the Soviet Union. Programs involving breeder reactors are under way in the Soviet Union, India, France, West Germany and Japan. (In 1983, the U.S. canceled its \$4 billion Clinch River breeder facility, located at Oak Ridge, Tenn., because of long construction delays, steep cost increases and a

declining need for additional nuclear power installations.)

The rate of proliferation could grow rapidly worse. Small, easily concealed new technologies for producing nuclear explosives are becoming available in world markets. Among them: high-speed centrifuges and still experimental laser systems for enriched-uranium production. Such systems could be engineered to produce the explosives needed to build the Bomb. Says Paul Leventhal, president of the Nuclear Control Institute, a Washington-based think tank: "History demonstrates that in the nuclear field, any technology ultimately is exported—and Third World countries will get it."

Despite the overall pessimism that the proliferation issue inspires, there are some grounds for guarded hope. Since World War II, no atomic weapon has been used in warfare; nor have nations rushed to develop nuclear weapons in the numbers that were predicted even 20 years ago. In the early 1960s, it was feared that within a decade ten or more countries might have produced atomic arsenals. In the eleven years since India's nuclear test, no additional country, as far as can be confirmed, has succeeded in following suit.

dy, the Reagan Administration's ambassador-at-large for nonproliferation issues, provides grounds for both "cautious optimism and vigilance." Says he: "The situation ought not to give us a sense of great comfort for the future. But thus far [the nonproliferation system] has worked pretty well. Extraordinary vigilance and extraordinary effort just might give us another 20 years of the same."

Kennedy hastens to add that "there are countries that have gone forward in ways that we don't like. We're very concerned." Indeed, a new generation of nuclear powers, and would-be powers, is maturing. Known among experts as the

"phantom proliferators," these countries are contributing the most significant uncertainties about the future of nonproliferation. The phantoms are India, Pakistan, Israel, South Africa and, to a lesser degree, Argentina and Brazil.

All of them have mastered, or are well on their way to mastering, the skills to produce atomic explosives. Unlike such nations as West Germany and Japan, which have also conquered the technology, the phantoms have declined to forswear the right to build atomic weapons by signing the nonproliferation treaty. As a result, some of their most sensitive nuclear activities are taking place outside the scope of International Atomic Energy Agency inspection.

Some of the phantoms are widely assumed to have atom bombs already or to be close to that goal. The major example of that ambiguous status known as having "a bomb in the basement" is Israel. The Israelis probably developed an atomic weapon as early as 1968, in all likelihood using reprocessed plutonium from their top-secret, French-built research reactor at Dimona, in the Negev desert. By 1973, Israel was believed to possess at least 13 nuclear weapons.

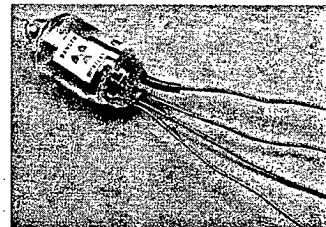
This month the well-regarded *Aerospace Daily*, a Washington-based industry newsletter, added new allegations about the Israeli nuclear arsenal. The *Daily* claimed that Israel has an unspecified number of nuclear-tipped, mobile Jericho II intermediate-range ballistic missiles based in the Negev desert and on the Golan Heights. The *Daily* also said that Israel possesses nuclear artillery shells. If true, that would mean Israel's atomic capability has been drastically underestimated. Jerusalem had no comment on the newsletter's claims.

Another candidate for bomb-in-the-basement status, South Afri-

ca, announced in 1970 that it had developed a new process for uranium enrichment. Since then the government in Pretoria has fiercely protected its putative breakthrough from virtually all curious foreign eyes. In 1977 the Soviet Union, apparently acting on evidence received from one of its spy satellites, notified the U.S. of an installation in South Africa's Kalahari Desert that resembled a nuclear test site under construction. Washington used one of its own satellites to inspect further. Four months later, under pressure from the U.S., South Africa stopped work on the site. In September 1979, a U.S. satellite detected an intense burst of light, similar to the flash created by a small nuclear explosion, over the South Atlantic. A special White House panel of investigators discounted the possibility of an atomic blast, but the U.S. intelligence community has never been totally convinced.

The history of Pakistan's nuclear effort shows the bedeviling complexity of proliferation and the difficulties involved in containing it. Pakistan's nuclear program got under way in 1955. Over the next nine years, 37 Pakistani scientists were trained at atomic facilities in the U.S., and in 1965 Pakistan began operating its first nuclear reactor, a small research installation supplied by the U.S., under international inspection safeguards. In 1976 the Kahuta center was established.

The chief architect of the Kahuta program was Zulfikar Ali Bhutto, the populist politician who became President in 1971 and was overthrown by Zia in 1977. (In 1978 the popular Bhutto was hanged by the Zia government for allegedly conspiring to have a political opponent killed.) Bhutto was obsessed by India's nuclear progress. In 1965 he had declared, "If India builds the Bomb, we will eat grass or leaves, even go hungry. But we will get one of our own."



Sensitive object: a Krytron

In 1972, following Pakistan's defeat in the third India-Pakistan war, Bhutto made his move. Less than two months after becoming President, he convened a secret conference of Pakistani scientists and bureaucrats in the city of Multan. There, he

launched Project 706, Pakistan's equivalent of the U.S.'s Manhattan Project.

The program developed rapidly along several fronts, some evidently peaceful in intent, others less so. By 1973 the country possessed a Canadian-built commercial nuclear reactor fueled by natural uranium. At about the same time, Bhutto entered negotiations with France for a commercial-scale plutonium-reprocessing plant. It would be capable of extracting from spent fuel more than 300 lbs. of plutonium annually, enough for as many as 30 atom bombs and far more than necessary for Pakistan's peaceful nuclear program.

The agreement with France was signed in 1976. About two years later, under pressure from Washington that was in turn inspired by growing congressional

concern, the French decided to stop work on the reprocessing project. By that time, however, Pakistan had reportedly obtained blueprints covering up to 95% of the project, and some French firms apparently continued to give quiet assistance to the effort until the end of 1979. Pakistan has continued to work on the plant, but no completion date can be predicted.

During the reprocessing tussle, Pakistan pulled off its most audacious espionage coup. It came to light after a quiet scientist, Abdul Qadeer Khan, resigned in March 1976 from his post as a metallurgist at the Physical Dynamics Research Laboratory, known as F.D.O., in Amsterdam. The firm was involved in research and development at one of Western Europe's most advanced atomic installations, the URENCO uranium-enrichment facility at Almelo, also in the Netherlands. The plant is today one of Western Europe's major sources of low-enriched uranium for nuclear reactors. High-speed gas centrifuges like those at URENCO—thousands of devices lined up in rows like washing machines in a laundromat—can also be used to produce the highly enriched ura-

nium needed for atomic weapons.

During his three-year stint at F.D.O., Khan had copied the plans of the centrifuge process and sent them back to Pakistan. He had revealed to his countrymen the names of more than 100 European, Canadian and U.S. firms that could provide the necessary equipment for a plant. Using a network of phony businesses as cover, Pakistan began to acquire and transfer to Islamabad technology from Western Europe and North America. Items in the covert pipeline ranged from special steel tubing to precision measuring equipment to specialized electronics. In 1978, some 400 tons of uranium oxide, the basic feedstock in producing enriched uranium, was secretly obtained from Niger, with the connivance of Libya.

Pakistan reportedly received hundreds of millions of dollars for Project 706 from Libya's Colonel Muammar Gaddafi, who in return was permitted to send his scientists to study Pakistan's enrichment advances. Nominally, the Libyan payments were made in return for Pakistani military assistance. Then, in 1977, after Zia came to power, Libya's connection with Project 706 was cut. Zia disliked and distrusted Gaddafi, and turned instead to Saudi Arabia for financial assistance. Saudi Arabia's payments were officially rendered in return for Pakistani military help.

Assembling the centrifuge equipment took years. Khan quietly resurfaced as head of the Kahuta operation in 1976. In November 1984, a Dutch court sentenced him in absentia to four years in prison for espionage, but the sentence was subsequently annulled on a legal technicality.

A further example of Khan's activities came to light last year in Canada, during the trial of three Pakistani-born naturalized Canadians on charges that they had tried to circumvent local export controls. Two officials of the Pakistan Atomic Energy Commission allegedly asked the trio in July 1980 to buy various components for a device that can be used to spin high-speed centrifuges. The equipment is manufactured by General Electric Co. at a plant in Hudson Falls, N.Y., and at U.S. factories of Westinghouse Electric Corp., RCA Corp. and Motorola Inc. The three Canadians made ten shipments to Pakistan. They were arrested while attempting to ship the eleventh. The trio later denied that they knew the ultimate purpose of the exports. One of them said that the equipment was for use in a textile plant and a food-processing factory. In the end, two of the men paid fines of \$3,000 each on a minor charge: failing to obtain an export permit.

Khan oversaw construction of a facility at Kahuta that is capable, according to some estimates, of producing more than 30 lbs. of weapons-grade uranium annually. In February 1984, he announced that Pakistan had mastered the uranium-enrichment process, and later boasted that there is "nothing that stands in our way technically to stop us from enriching to 90% weapons-grade uranium." But he has repeatedly stressed that "Pakistan is not at all interested in nuclear weapons." The fact is that Pakistan has built an enrichment plant without an evident use—except making bombs.

There have been indications that Pakistan is at work on the task of actually assembling an explosive device. In April 1984, after six months of surveillance, U.S. Customs agents in Houston detained Nazir Ahmed Vaid, a Pakistani businessman. In a case similar to this month's Los Angeles indictment involving Israel, Vaid was charged with attempting to ship to Pakistan 50 Krytrons labeled "bulb/switches." In September he was given a suspended sentence of two years and five years' probation. He was then deported to Pakistan. Only later did prosecutors learn that documents that had been in their possession for months linked Vaid to the Pakistani nuclear program.

The progress of Project 706 has drawn attention to the gaps that have all along

existed on the nonproliferation front. One of the major problems has been lack of effective agreement among suppliers about what technologies are safe to export, and under what circumstances. Following India's 1974 test blast, the U.S. and six other countries agreed on the need for tight export controls on sensitive nuclear equipment. High on the "trigger list" was plutonium-reprocessing and uranium-enrichment technology. The supplier group has since expanded to 21 countries.

Updating the list to keep pace with new technology has proved to be a disconcertingly slow process, however. It was not until last year that the trigger list was expanded to include the equipment used in the centrifuge process. Long before then, Pakistan had acquired the technology, albeit illegally.

Throughout the last few years of the Pakistani saga, the Reagan Administration has been severely criticized in Congress for giving military assistance to the Zia government without extracting further concrete assurances about Pakistan's nuclear program. The official U.S. position remains that Pakistan does not have atomic weapons and has not assembled

Continued

the nuclear explosives to make them. But a top U.S. official says that the Administration remains "concerned" about Pakistan's efforts to obtain weapons technology. Washington discounts Indian suspicions of Pakistan's nuclear intentions as part of the long-standing rivalry between those two countries. Says a State Department official: "If you just listen to the Indians, you'd come away with the impression that Pakistan has had the bomb for some years." He notes that the U.S. "would not sit idly by" if Pakistan attained the ability to test a bomb, but does not specify what Washington's actions would be. Nonetheless, says Proliferation Expert Weiss, "we're addressing Pakistan's real security needs, but we didn't

extract a high enough price for it. Zia is acting as if he's got us over a barrel. We're acting as if we agree with that assessment."

The trouble with Weiss's complaint lies in the assumption that only the U.S. can solve what is a global problem. Says David Fischer, a former assistant director-general of the I.A.E.A.: "The U.S. can no longer legislate the world nuclear industry. That may mean more nonnuclear diplomacy rather than nuclear denial."

Well before the incoming Reaganauts decried the U.S. Nuclear Nonproliferation Act, West European critics maintained that the law constituted a sledgehammer approach. They resented U.S. efforts to force them down the same road. As Bertrand Goldschmidt, a French physicist and former chairman of the I.A.E.A., puts it, "Applying nonproliferation measures is a delicate matter. It's like using drugs in medicine. If you are too strict, you can push countries into autarky."

What solutions are available? An emerging school of thought views the open acknowledgment of new nuclear arsenals as not such a bad development, especially in the case of Israel. Officially,

Jerusalem's long-standing position is that it will not be the first country in the Middle East to introduce nuclear weapons to the area. Shai Feldman, an expert on strategy at Tel Aviv University, argues differently. He contends that "you can only have a credible nuclear deterrent if the other side believes you have the capability and the will to employ nuclear weapons under certain circumstances. And the only way to have a credible doctrine is to have the public behind you." Accordingly, Feldman feels, Israel should "develop the means and then openly proclaim its willingness to use nuclear weapons."

If the challenge of proliferation is grim, the situation could be much worse. Playing for time in the effort to curb further growth of the nuclear nemesis has never been time wasted. But the harsh fact cannot be brushed aside: proliferation is not an arcane and unpleasant prospect to be avoided but a reality that must be confronted. The world's spreading nuclear capability is far more dangerous than it used to be. Full recognition of that state of affairs is necessary if mankind is ever to quiet its nuclear fears.

—By George Russell.

Reported by Jay Branegan/Washington and Dean Brelis/Islamabad, with other bureaus

~~UNCLASSIFIED~~