

Proliferation Challenges in Perspective

Joseph F. Pilat

A New Look at an Old Problem

Are we entering a world in which there will be “bombs for all”? If soundings of the media and the academic and policy communities are to be believed, we are indeed entering a brave new world of nuclear proliferation. In the view of the *Economist*:

Fears of a nuclear Armageddon have dominated the past half-century. Unhappily, despite the end of the Cold War and the cascade of weapons cuts announced by America and Russia, the fears are still there. Twenty years ago, when efforts began to ban new bomb-builders, pessimists predicted that by now there would be 20 or 30 thrusting new nuclear powers (besides the famous five: America, Russia, Britain, France and China.) They were wrong. Twenty months from now, however, their gloomy prediction could start to come true. The spread of the bomb poses the biggest threat to the fragile new world order. Coping with it will take cash, cooperation and strong nerves. It is barely do-able, and time is short.*

The issue of nonproliferation is by no means new. For decades the threat of proliferation has been recognized as a fundamental challenge

*“Bombs for All?” *The Economist*, March 14, 1992, 15.

to regional and international security, and for over forty years the United States has been committed to the nonproliferation of nuclear weapons as a fundamental national-security and foreign-policy objective. However, the post-Gulf War revelations of the advances achieved in the Iraqi nuclear-weapon program as well as questions about the inheritance of the former Soviet Union’s nuclear expertise, personnel, and materials have recently highlighted the threat of spreading nuclear capabilities.

Before developments in Iraq and the former Soviet Union galvanized concern about nuclear proliferation, a growing recent interest in nonproliferation was being fed by fears of chemical and biological weapons as well as missile proliferation. It had generally been assumed that a mature, functioning nuclear-nonproliferation regime had succeeded reasonably well in stemming proliferation—with the exception of a few rogue states that refused to accede to the Treaty on the Nonproliferation of Nuclear Weapons (NPT) and to adopt comprehensive International Atomic Energy Agency (IAEA) safeguards. The NPT and the IAEA safeguards are the centerpieces of the international nonproliferation regime. The NPT was concluded in 1968 and came into force in 1970. The large number of signatories to the NPT (over 150) make it the most widely adhered to arms-control treaty in history. The objectives of the NPT are to prevent the spread of

nuclear weapons to states that do not already possess them; to ensure the fullest cooperation in the peaceful uses of nuclear energy in a manner consistent with the objective of nonproliferation; and to encourage arms-control efforts in both the nuclear and non-nuclear arenas. International safeguards, as set forth in agreements negotiated with the IAEA by NPT parties, are applied to all source or special fissionable materials with the aim of preventing the diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.

In recent years we have seen an interest in the development of chemical and biological weapons, particularly among nations the United States views as potential adversaries. Perhaps because our worst fears were never realized, chemical-weapons capabilities do not appear as threatening as they did prior to the Gulf War. Biological weapons, although a frightening prospect, are difficult to weaponize and employ effectively. With the new variables they bring to the equation, however, chemical and biological weapon programs complicate the nuclear-proliferation issue, as does the proliferation of delivery systems and other advanced conventional capabilities. The linkages among the types of proliferation are an obstacle in dealing with proliferation in the Middle East and other conflict-prone regions, and the mix of these capabilities is making proliferation where it

is occurring more militarily significant as weapons of mass destruction are mated to delivery and support systems.

In contrast to perceived wisdom, however, the problem of the proliferation of weapons of mass destruction is not spiralling out of control, and the issue is unlikely to be as central to U.S. policy as during the period immediately after the Second World War. The stakes were higher then—the United States was the only nation with a demonstrated nuclear capability and the Soviet Union and other great powers were still only potential proliferators. Once Britain, France, China, and, in particular, the Soviet Union joined the U.S. as nuclear powers, the immediate focus shifted from potential proliferation to potential confrontation, and the arms race and the Cold War gained the spotlight.

For the foreseeable future at least, the threat of a nuclear confrontation will not approach that posed by the Soviet Union during the Cold War. With the decline of the Soviet threat, however, the global situation has become far less stable, and nonproliferation is likely to have a higher priority than in the last twenty-five years. Although we may be surprised in the future about one or another country's interests or achievements in developing nuclear-weapons technology, currently only a few countries that have an undisputed capability and a limited number of countries that have programs or display an interest. Of these states, those whose possession of nuclear weapons would be most destabilizing and most threatening to U.S. interests are not on the verge of developing nuclear weapons—either because their indigenous capabilities are virtually nonexistent, for

example Libya, or because because of international pressures or actions, as in the case of Iraq.

Developments in the former Soviet Union, however, could fundamentally change the present calculus. In addition, China's willingness to export advanced military capabilities has been a serious irritant in the past, but the disintegration of China, a possibility when the old leadership changes, could result in problems similar to those now possible in the region of the former Soviet Union. In this context, persistent public reports of Iran's acquisition of former Soviet weapons and China's willingness to assist proliferators are disturbing.

The Fall of the Soviet Union Gives Rise to New Threats

The recent collapse of the Soviet Union represents an emerging challenge having the potential to undermine the nonproliferation regime more severely than any that has commanded attention in the last four decades. High-level attention is of course being given to issues directly surrounding nuclear inheritance in the old Soviet Union. Nuclear weapons, nuclear scientists, engineers and technicians, and other nuclear capabilities may flow out of Russia, Ukraine, Belarus, and Kazakhstan and be "imported" to other countries. Further unrest in the former Soviet Union, including the possible disintegration of Russia, may result in nuclear theft or sabotage, and terrorism or the deliberate use of a nuclear weapon by one of the post-Soviet states or elements within them cannot be ruled out.

There are limits to U.S. influence, but such actions as the recent nu-

clear-arms-control initiatives by former President Bush, diplomatic moves to dissuade the non-Russian successor-states from retaining nuclear forces, and the establishment of centers in Russia and the Ukraine to staunch the emigration of former Soviet nuclear specialists share these objectives.

Although nuclear inheritance of former Soviet weapons appears to be the most immediate and striking problem posed by the end of the Cold War and the collapse of the Soviet Union, it is perhaps not the most important. The international nuclear-nonproliferation regime as it exists was based on, or reflected in, a number of fundamental assumptions: stable but confrontational East-West relations; U.S.-Soviet cooperation in an area of mutual interest; and dominant U.S. and Soviet influence in international fora and in international relations including Soviet ability to control exports and proliferation behavior within its sphere of influence. All of these assumptions are now in question.

One positive effect of the end of the Cold War has been a greater prospect for dealing with problem countries whose past efforts to obtain nuclear weapons exploited Cold War diplomacy. Nonetheless, the potential negative consequences of proliferation arising from the demise of the Soviet Union could far outweigh this benefit. The successor states to the Soviet Union appear unable to play the old Soviet role in promoting nuclear nonproliferation.

The old Soviet export-control structure has broken down, and it is by no means clear how a system based on a totalitarian regime will be replaced in a situation approaching anarchy. Clearly, the old order cannot be restored, and a new export-control regime will have to mir-

ror those in the West and have all their weaknesses but perhaps not all their strengths. Shadowy private organizations in the former Soviet Union with power, money, and influence have the view that everything is for sale and that the most salable items are those that are militarily sensitive. The migration of Soviet nuclear specialists may not be resolvable, despite current efforts.

But these are only aspects of a much broader problem. Nuclear capabilities exist outside of Russia, in the Caucasian and Central Asian republics, and could find their way to the Middle East and South Asia, or result in new nuclear states in the former Soviet Union, for example, in Armenia. Russia itself could disintegrate, with perhaps tragic consequences. And China could pose the same set of problems in coming years, when the leadership changes. However apocalyptic these problems may appear, it is important to realize that they are now largely prospective—they may never be fully realized. In Russia, at least, there is a strong awareness of the scope of the problem and a sound recognition of mutual interests and the need for cooperation.

These dangers are serious, but, again, they remain largely prospective. If these dangers are not realized, the near-term proliferation threat will largely be limited to those developing countries that have been of concern over the last ten to twenty years, particularly countries in the Middle East, South Asia, and North-east Asia. Currently, the list seems to be declining rather than growing due to positive developments in areas such as Latin America and Africa. A number of states on these continents, including Argentina, Brazil, and South Africa, are now disavowing nu-

clear-weapons interests or programs. In the longer term, developments in the international-security environment and in the international arms and high-technology markets could lead to either an expansion or contraction of the level of threat we face today. Trends are moving in both directions at present.

The Nonproliferation Regime under Attack

The new challenges to the international nuclear nonproliferation regime made evident by post-Soviet nuclear developments, along with those in Iraq, have led to a growing concern among many observers that the regime will be ineffective in the face of emerging, dynamic complications. Critics have argued that Iraq has demonstrated that the NPT and IAEA safeguards have been proven ineffective, that export controls have failed, and that Iraq's example will lead other states to proliferate. Indeed, one critic argues:

The allied raids on Iraq's nuclear facilities and infrastructure not only set back the Iraqi program but destroyed once and for all the fiction created in the public mind over many years by artful propaganda and obscuration that the safeguards regime and current international export controls provide an effective barrier to proliferation. It is to be regretted that this message about the regime's weakness, delivered by the Israelis in 1981, was buried at that time by an avalanche of criticism of Israel by the nations now in the

Desert Storm coalition. The NPT regime itself provides no early red flag indicating that one of its members has begun marching down the road toward weapon production, even if no treaty violations have yet occurred.*

It is argued that the present nonproliferation regime is too narrowly focused and thus not responsive to states that are proceeding with dedicated nuclear weapons programs; that undeclared programs are not covered by current verification mechanisms; and that when such programs are based upon a sophisticated, indigenous defense industrial base and on both legal and illegal imports of dual-use items, they are not susceptible to even vastly strengthened export controls. It is also argued that the regime, which was designed during the Cold War and reflects the mutual interests and influence of the United States and the former Soviet Union, is ill-equipped to deal with problems of the post-Cold War period including those arising from the breakup of the Soviet Union.

While these assertions cannot be dismissed, they appear somewhat exaggerated, and the reports of the death of the nonproliferation regime are premature. It is clear that the regime is challenged, and in the next several years we shall see whether it meets its challenges. In this period we will see whether the extraordinary nonproliferation measures being taken in Iraq will continue—whether the international community continues sanctions and long-term monitoring of Iraq's military-industrial infrastructure, or whether it will allow Iraq to resume its weapon programs, which will surely occur once UN activity ceases. This will determine what lessons will be drawn by potential proliferators

*Leonard Weiss, Tighten up on nuclear cheaters, *The Bulletin of the Atomic Scientists* 47 (May 1991) 11-12.

from Iraq's behavior and its consequences in the next year or two—that is, whether proliferators will believe the consequences of their activities will be acceptable or unacceptable if they are caught.

In addition, North Korea's withdrawal from the NPT could have disastrous consequences for the treaty. If the North Koreans decide to remain within the treaty, the administration of IAEA safeguards will be difficult. In any case, the IAEA will be administering safeguards under difficult circumstances in South Africa. If the safeguards are not seen as credible and effective, the IAEA and the NPT will be severely damaged, reinforcing the negative impact of the Iraqi case. There will be uncertainties about stocks of weapon-usable materials and, perhaps, weapons in South Africa. It will be critical to monitor whether safeguards are effectively administered in South Africa by the IAEA and to pay close attention to the international response to any problems that might arise.

Finally, the behavior of Israel, India, and Pakistan, as well as other countries demonstrating proliferation potential will be critical in this period. Will these states continue to pursue their nuclear programs quietly, or for one reason or another, will their programs become overt?

These are the most pressing of the challenges now facing the international community. The NPT is up for extension in 1995, and all these issues could have an influence on the outcome. Other problems with adverse implications for the regime and the extension of the NPT may also arise, including nuclear-weapon tests by proliferators; overt weapons declarations by non-nuclear NPT states; further safeguards violations;

nuclear theft, sabotage, or terrorism; and differences over implementation of the Nonproliferation Treaty, particularly its provisions regarding arms control (Article VI).

U.S. Nonproliferation Policy

In the face of new threats and a changing global environment, the first response of the United States will be a renewed commitment to strengthening existing nonproliferation mechanisms. The U.S. will continue to rely on both multilateral and unilateral approaches, using political incentives, technological constraints, bilateral export controls, and multilateral treaties. The indefinite extension of the NPT and strengthening the IAEA-administered system of safeguards against diversion of nuclear material from civil to military uses will receive strong U.S. support, as will the implementation of the Treaty of Tlatelolco, intended to create a nuclear-weapon-free zone in Latin America.

U.S. nonproliferation policy will also be pursued through diplomatic efforts. These include: consultation and cooperation among the major nuclear suppliers aimed at the implementation of export controls, upgrading the existing lists of controlled items that trigger IAEA safeguards and encouraging new nuclear suppliers to accept responsible nuclear-export policies. In addition, the U.S. will maintain—or more often attempt to begin—a dialogue on nuclear issues with non-NPT states through which we can express our concerns and encourage broader application of IAEA safeguards. The US has already begun and will continue to

work to build a nonproliferation consensus, particularly during and after international crises that throw a spotlight on proliferation issues.

The United States has been and will remain committed to reducing motivations for acquiring nuclear explosives. To this end, the U.S. will continue to seek to improve regional and global stability, to strengthen alliance systems, and to promote the legitimate security interests of states through economic and security assistance in some cases and by other means. Of course, each of these objectives has other defense and diplomatic rationales, which at times work at cross-purposes with nonproliferation.

Export controls will remain an essential element of U.S. nonproliferation policy. U.S. nuclear export controls are designed to prevent the spread of nuclear weapons as well as to facilitate cooperation with other nations in peaceful uses of nuclear energy, such as electricity generation, agricultural research, and medical applications. It is a longstanding policy objective of the U.S.—the legacy of Atoms for Peace in the 1950s—to pursue peaceful nuclear cooperation while avoiding the dangers to international peace and security arising from nuclear-weapon proliferation.

A similar approach is being pursued in the areas of chemical weapons, biological weapons, and missiles.

A New Approach

It is essential to continue ongoing efforts to strengthen existing U.S. nonproliferation measures across the board, ranging from diplomacy and intelligence to export-control arrangements and treaties. Howev-

New Technologies in Support of Nonproliferation

For many years Los Alamos National Laboratory has had an active arms-control program with two main goals: to provide technology for verifying compliance with arms-control treaties, generally bilateral, and to support international activities in nuclear-materials control. But the world of the 1990s demands a considerable broadening of this charter. Technologies are needed for the deterrence and detection of worldwide tendencies toward the proliferation of weapons of mass destruction.

Initially viewed as a component of the Laboratory's Arms Control and Intelligence programs, nonproliferation support has recently emerged as a major new Laboratory initiative under the auspices of the Department of Energy's Office of Arms Control and Nonproliferation. A vastly increased role is anticipated for Los Alamos in activities relating both to monitoring and preventing proliferation, primarily of nuclear weapons but also of other weapons of mass destruction and their means of delivery. This role will utilize the Laboratory's expertise in space-based monitoring of weapons programs and in materials control and accounting as well as its premier capability in the nuclear-weapons program.

The historical bases for such Laboratory activities are the existing programs to analyze weapons programs overseas and to provide assessments of their motivations and their technical capabilities. Los Alamos has also contributed to national and international efforts to safeguard special nuclear materials such as plutonium and enriched uranium. All International Atomic Energy Agency inspectors have been trained at Los Alamos, and the equipment used by IAEA inspectors to monitor activities of nuclear facilities has largely been developed here and at Sandia National Laboratory. To assist in limiting the spread of technologies used to produce nuclear weapons, Los Alamos and other laboratories have provided technical expertise for national and international export controls, including technical advice on revising or updating international lists of controlled items for the Zangger Committee, the Nuclear Suppliers' Group, and other multilateral bodies.

The first major arms-control activity at Los Alamos was the design and preparation of the Vela satellite in 1960, which was used to detect atmospheric nuclear-weapons tests. To verify compli-

ance with the Limited Test Ban Treaty (1963), Los Alamos collaborated with Sandia to provide spaceborne instrumentation for detecting nuclear tests either in the atmosphere or in outer space. These activities illustrate the Laboratory's characteristic role of utilizing the most advanced technologies on short notice in the space environment and adapting them to a variety of launch vehicles. Today such capabilities transfer directly into nonproliferation-related functions such as the detection of x-ray, gamma-ray, radio-frequency, neutron, and charged-particle radiations from nuclear detonations. In support of programs such as the detection of directed-energy weapons tests, they also supply data on natural and artificial space radiation. In 1993 the ALEXIS satellite is scheduled for launch into orbit to provide improved determination of the low-energy x-ray environment in space.

The Department of Energy's Accident Response Group (ARG) and Nuclear Emergency Search Team (NEST) are kept in readiness to respond in the event of a nuclear threat or nuclear weapon accident. Los Alamos provides both technical experts and equipment to these groups. This operational-readiness

capability proved important in preparing DOE inspectors (from Los Alamos and other laboratories) who supported the IAEA and UN Special Commission inspections in Iraq. Maintenance of these emergency-response assets and capabilities will become increasingly important.

To meet emerging threats of proliferation, the laboratories are responding with vigorous R&D programs across the board. Ongoing safeguards R&D programs are devoted to developing various radiation detection and measurement devices, engineering new hardware and software to do the necessary measurements, and designing complete safeguards systems integrated with physical protection and process operations. Current and future safeguards technologies and techniques will enable us to begin to properly address the new problems of nuclear weapons and special nuclear materials raised by the collapse of the Soviet Union and the ongoing radical reductions in nuclear arms. Topics of concern include commodity export, technical-data transfer, consulting, and guidance on foreign visits.

Recent R&D activity in export control at the Laboratory has focused on developing a Proliferation Information Network, an on-line interactive database system to centralize proliferation data and provide analysis tools. Although the network is currently providing export-license information for government agencies and the national laboratories, there is a real possibility to expand the scope of the data in the system. Integration of these data into actionable intelligence poses challenging problems

in data transfer, display, and administration. R&D programs in this area are focusing not only on technical solutions such as improved data links, pattern recognition, and anomaly detection but also on the administrative challenges of the compartmentalization of information for security reasons.

Monitoring activities include satellite systems for wide-area detection of suspicious activities. For some years the Laboratory has been involved in projects to analyze observables resulting from hydrodynamic shock propagation and from surface ground motion near an underground nuclear test. These programs have recently become parts of an Integrated Geophysics Program to investigate the entire range of phenomena by means of which an underground explosion couples its energy into detectable signals such as seismic or acoustic waves. Historically, the major goal has been to verify nuclear-test-ban treaties. However, applications of most interest in the future may be the detection and identification of covert nuclear-weapons tests by new nuclear-weapon states who may or may not be signatories to the Nuclear Nonproliferation Treaty. Longer-range goals could include the use of combined seismic and acoustic data to estimate yields of any detected tests.

Additional monitoring activities involve high-resolution instruments that remotely detect effluents in chemical plumes, local sensors to monitor activities in production facilities, and portable systems that detect the presence of weapons or special materials. Because of its extensive experience in developing and fielding nuclear

sensors, the Laboratory can make significant contributions to this important area of arms control. Non-destructive testing expertise and facilities at the Laboratory continue to play an important role in the development of on-site inspection tools that may include, among others, radiation detection, radiography, or acoustic resonance. One of the promising technologies in this arena is LIDAR (light detection and ranging). The DOE weapons laboratories can assist the military with analyses of military vulnerabilities and response options and help define and develop future technologies based on current NEST capabilities.

Emerging proliferation threats require active programs to develop the knowledge, technologies, and capabilities to prevent the spread and use of nuclear weapons and other weapons of mass destruction. Nonproliferation and arms control are expected to be among the most rapidly growing Los Alamos programs through the 1990s and into the next century. The Laboratory has demonstrated for more than thirty years an ability to use its expertise in nuclear weapons and related technologies to address and solve challenging problems in these important fields. As requirements become more clear in the world that emerges from the incredible changes of the last several years, we anticipate that the Laboratory's special capabilities for fast response to critical technical problems will continue to play a major role in ensuring U.S. national security. □

er, in the current political climate those traditional responses are no longer wholly adequate. New approaches, from regional arms control to military options, are being considered. The United States is undertaking unilateral actions including further limitations on nuclear testing and a cutoff in U.S. fissile-materials production. A nuclear no-first-use policy may also be considered. Such actions on the part of the U.S. are designed to set an example, and these "arms control" approaches to nonproliferation have primarily been put forward in the context of strengthening the NPT. Whatever their security rationale, however, such trade-offs are unlikely to affect the behavior of proliferants or to have a decisive impact on the future of the NPT. Nonetheless, there is a widespread belief that they will.

Other responses, some of which are already being pursued and all of which have advocates within the U.S., could become important for nonproliferation in the 1990s and into the twenty-first century:

- building on the UN role in Iraq to ensure future UN action in the event of proliferation activities and to improve safeguards by utilizing UN inspection precedents;
- developing some type of embargo or sanction regimes to address noncompliant behavior of proliferators, perhaps on the basis of UN activity in Iraq;
- promoting new regional treaties, confidence-building measures, and monitoring and compliance arrangements to complement the global system in regions with particularly vexing proliferation problems;

- developing ballistic-missile defenses and a wide range of potential capabilities including accident response;
- and moving to a policy of managing proliferation with political, diplomatic, economic, and other instruments in cases where prevention fails.

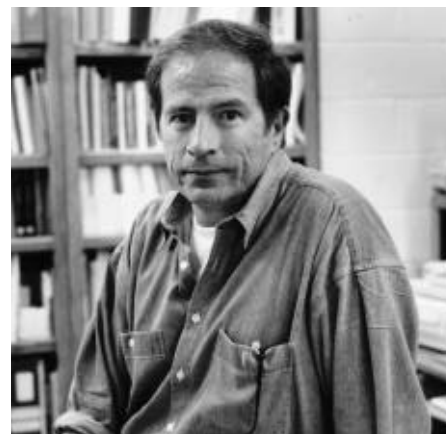
The U.S. will also explore the difficult, but perhaps necessary, avenue of unilateral or internationally sponsored military action against proliferators.

Such measures, if realized, could augment but not replace the old approaches. More radical measures are unlikely to be seriously posed and considered unless there were some extraordinary event, such as a failure to extend the NPT in 1995. Even now the revival of the Baruch Plan, which called for strict international control over all nuclear activities, the conclusion of some overarching nonproliferation treaty, and other grandiose concepts are being put forward. Although in the minority, some see a regime of sanctions sponsored by the UN Security Council as an attractive alternative to the NPT/IAEA system. The appearance of such a variety of alternatives indicates that the problems and loopholes in the old regime are increasingly being recognized. Whatever else might be proposed or adopted, the U.S. will continue to seek to strengthen traditional elements of U.S. nonproliferation policy.

As new approaches to new proliferation threats are considered, it is important to recognize there is now no consensus on a major restructuring of the regime. However, the strong domestic and international support for strengthening the regime

provides opportunities for the Laboratory to help to address emerging proliferation challenges. Los Alamos, along with the other DOE weapons laboratories, has long been involved in U.S. and international nonproliferation efforts. The laboratories' nuclear-weapon expertise provides unique capabilities for assessing foreign programs and intentions; for developing technology to detect, monitor, and respond to proliferation; and for operational support in national and international emergencies. (See "New Technologies in Support of Nonproliferation.")

There are no "silver bullets" to use in response to proliferation. However, technologies have in the past and can in the future enhance nonproliferation efforts. There is a strong requirement for action, a requirement demanding patience and vigilance over the long term. ■



Joseph F. Pilat, a member of the staff of the Laboratory's Center for National Security Studies, is spending 1993 at Cornell University as a Visiting Associate Professor in the Department of Government and a Visiting Scholar in the Peace Studies Program. He has participated in reviews of the NPT and was involved in the Open Skies negotiations. Pilat was a Senior Research Associate at the Congressional Research Service and has taught at Georgetown University, where he was a Philip E. Mosely Fellow at the Center for Strategic and International Studies. He has written widely on defense and national security issues.