III. Denial Policies

Denial Policies at the Level of States

The likelihood that U.S. military force will have a rather limited role in forestalling nuclear proliferation means that most of the weight of the anti-proliferation effort will have to be carried by diplomacy with the essential backing of credible military strength. The United States has relied heavily on policies designed to prevent or inhibit potential proliferants from acquiring the necessary technology, weapons-usable materials, and equipment, including dual-use equipment. U.S. diplomacy has also been devoted to creating international organizations and rules to support a denial policy. Those organizations and rules are not only still needed but should be strengthened. Loosening restrictions on transfer of engineering information, nuclear materials, or equipment, beyond those transfers mandated under a rigorous inspection regime for signatory nations under Article IV of the NPT, would weaken the norms that discourage proliferation, as well as accelerate the spread of nuclear weapons capabilities. These restrictions are especially critical in blocking access by terrorist groups to nuclear materials, but they must be supplemented by the use of force, when required, and supported by economic measures that encourage compliance by governments and industries.

The challenge to prevent nations, as opposed to terrorist or sub-state organizations, from acquiring nuclear weapons has become very difficult. Nations might have access to uranium deposits in their territory and to the assets and technical base to produce weapons indigenously. Efforts already have been made by some countries to import specialized components for a centrifuge system that would be capable of producing enough highly enriched uranium to develop a few bombs over a multimonth period. This is a significant undertaking, and to keep track of it requires good intelligence on construction activity together with cooperative information sources on commercial activity. The same applies to other possible uranium-enrichment technologies. Underground production facilities present a verification challenge, for which a combination of surveillance by technical means and signal intercepts, together with human sources, would have to be employed. Recent experience with the uranium program initiated by North Korea shows the importance of gaining information on efforts to import the needed technology. The bottom line in this case is this: one cannot count on a lack of technical information preventing would-be proliferators from developing nuclear weapons. Denying proliferators access to special nuclear materials is the best line of defense.

Greater care also needs to be taken with export controls. Under the Non-Proliferation Treaty, nuclear weapon states were encouraged to provide the non-nuclear states assistance that they needed to reap the peaceful benefits and uses of nuclear energy. That was the basic deal that caused non–nuclear weapon states to accept the limitations of the treaty. The sovereign rights of buyers or sellers of exports relevant to nuclear facilities were limited by an understanding among supplier countries that, in effect, prohibited the transfer of technology specifically applicable for fabricating a nuclear weapon. But dual-use technology always presented a difficult problem.

It is now up to the nuclear suppliers to agree to and police even stronger restrictions on the sale or transfer of items that could be used for weapons production by non-nuclear countries. For example, gas centrifuges have become a very important part of the nuclear programs of Iran and North Korea, and were alleged to be important in the U.S. National Intelligence Estimate (October 2002) in Saddam Hussein's program prior to the Gulf war in 1991. Any component that could be useful in building these uranium-enrichment machines is capable of contributing to nuclear proliferation and is closely monitored by intelligence agencies. Governments must do a better job than they have of controlling the export of this and other equipment applicable for developing nuclear weapons. Unless these types of transactions can be stopped, the whole non-proliferation effort will be seriously undermined. There is a downside in facing this problem, which is that restrictions on sales of equipment that could be useful for building nuclear weapons can be applied too broadly and, in the process, cause harm by inhibiting useful scientific cooperation. The answer lies in complete transparency concerning transfers of even remotely sensitive equipment, and the scientific community should insist on this.

Denial policies can, at best, only slow down nuclear weapons proliferation. The technology of manufacturing nuclear weapons is widely available throughout the world. Second- and third-tier nations can be sources of equipment. The deal struck by Pakistan and North Korea is an excellent example of this: Pakistan reportedly provided assistance to North Korea in building a gas centrifuge plant to enrich uranium, and, in exchange, North Korea provided ballistic missile assistance to Pakistan. Soon, if things go badly, there may be as many nuclear weapon states outside as inside the NPT regime. It is still not so easy for some countries to acquire uranium ore, but that, too, is not an insuperable obstacle for nations determined to acquire it, and several non–nuclear weapon states have uranium located within their territories.

The Problem of Monitoring Nuclear Proliferation Activities

In today's world the monitoring of nuclear proliferation and nuclear weapons–related activities is extremely demanding. The evidence for this has become clear over the past decade from the activities and disclosures about the programs in Iraq and North Korea. That experience also emphasizes the importance of being able to detect efforts to acquire nuclear weapons at early stages. This presents a challenge to intelligence efforts as a whole rather than to technical intelligence alone. Intelligence acquired by national technical means plays an important supporting role but it alone cannot do the job without an effective human intelligence capability and on-site challenge inspection authority.

The model of monitoring nuclear activities of the Soviet Union during the Cold War is not appropriate for the task of detecting efforts by proliferants who want to acquire nuclear technology. In the case of the Soviet Union the nuclear problem was defined in terms of finding and monitoring large plutonium production facilities, and detecting the deployment of large nuclear forces, a relatively straightforward task for U.S. "national technical means"—that is, satellites viewing the earth from orbits circling several hundred kilometers above it. With their broad repertoire of electro-optical, infrared, and radar sensors they can track the construction of new large facilities, the levels of activity at known facilities, and also the deployment levels of strategic nuclear forces. The task now is to detect relatively small nuclear production activities in a number of countries that are potential proliferators. However, to go beyond indications that arouse suspicions and in fact confirm that serious covert efforts toward a nuclear capability are being attempted, authority to make on-site challenge inspections will be very valuable, if not necessary.

It is clear that the intelligence problems facing the United States today are more demanding than those during the Cold War. U.S. intelligence agencies, working together with other nations' agencies as appropriate, must now worry not just about one superpower and its large and readily located nuclear installations. They also have to gather actionable intelligence on plans, intentions, and programs by organizations in many geographical areas that could pose serious threats to the U.S. homeland, to other states, and to U.S. interests abroad. Increasingly, governments and terrorist groups are acquiring technologies, home-grown as well as imported, that can be readily hidden, require only modest investment, and pose dangerous threats. There is no question that good intelligence, starting with good human intelligence, good analysis, and reliance on the best science and technology available, is a key component to U.S. security. “Exquisite” intelligence, in the words of the Bush administration’s 2002 Nuclear Posture Review, on any adversaries’ plans and intentions, as well as their capabilities, is indeed an important goal. This emphasizes the point that just collecting information is not enough. The full value added comes in being able to interpret information about what other governments and terrorist groups are doing, applying first-rate technical expertise, based on openly available as well as on covert information. Good information is a sine qua non, but interpretation and understanding are increasingly becoming the coin of the realm for intelligence. To achieve it will require highly capable and trained people knowledgeable in the languages and habits of many diverse cultures. This must be a priority commitment of the U.S. intelligence community.

The intelligence challenge to discover that a nation has initiated a serious effort to build a nuclear weapon is illustrated by the following example. Assume the would-be proliferator has access to adequate uranium deposits in its territory, as well as the technical base and assets to produce nuclear weapons indigenously. A particular technology of concern for proliferators seeking to acquire nuclear weapons is the gas centrifuge to produce highly enriched uranium (HEU). As already noted, several nations have made serious efforts to import specialized components for centrifuge systems that might be capable of producing enough highly enriched uranium to develop a few bombs over a multi-month period. To get a rough idea of the size of such an enterprise consider the requirements to build a gun-type fission bomb relying on the simplest technology. Such a weapon can be developed and deployed without nuclear explosive testing. It is fueled by HEU, which is produced by separating the isotope U^{235} from natural uranium, 100 kilograms of which contain just 0.7 kilograms of U^{235}. The standard measure of energy for enriching the U^{235} content of a sample of natural uranium with gas centrifuge systems is the separative work unit, or SWU. In order to enrich a sufficient quantity of natural uranium to provide the fuel for one gun-type uranium bomb requires roughly 14,000 SWUs. With currently available technology each gas centrifuge is capable of about 4 SWUs each year. To produce just one primitive HEU weapon in a year would therefore require perhaps 3,500 centrifuge machines, depending on their efficiency.

Such technology for gas centrifuge machines is the result of many years of effort and billions of dollars of investment. Special materials are needed for the very rapidly spinning centrifuge columns. This means that a substantial investment must be made in the capital plant, but the overall energy requirements are low compared with other technologies for enriching natural uranium to bomb fuel. More advanced versions of gas centrifuge machines are now able to operate at a level of up to, perhaps, 40 SWUs per year per machine. With this newer technology no more than 350 machines could provide fuel for one primitive HEU bomb per year. The large halls at the uranium enrichment facility recently observed at Natanz in Iran are estimated, by David Albright and Carey Hinderstein of the Institute for Science and International Security, to be capable of holding over 50,000 centrifuges that would have a capacity to fuel a dozen or more uranium bombs per year.

In spite of all that is now known and is widely available in the public domain about nuclear technology, building up a functioning nuclear weapons program is not a trivial task. It still requires substantial efforts involving large numbers of trained people, particularly with specialized engineering and scientific skills, in dealing, for example, with maraging steel needed for high-speed centrifuges, as well as steady multiyear funding to build and operate such a plant. Nevertheless, if a proliferating country wished to conceal a gas centrifuge plant capable of enriching uranium to fuel several weapons per year, the required facility could be contained on a factory floor space of modest size. It would require less than a megawatt of electric power input and could be readily hidden underground. This emphasizes the importance of monitoring from the very beginning of the construction, together with insisting on authority for on-site challenge inspections once a suspicious activity has been identified. This will almost certainly require on-site inspection measures as provided for in the Additional Protocol that the IAEA is trying to negotiate with its member states. But stronger enforcement measures will be required to back up the Protocol. It is a good step forward, but as suggested elsewhere in this book, it does not deal with the case where a nation refuses to admit or give access to inspectors nor are there any clear downsides to simply refusing to accept the Protocol.

If a country with the technology at the level of North Korea or Iraq were to choose to go the more difficult route of producing weapons grade plutonium for an implosion weapon, it would have to construct a power reactor and plutonium separation plant. These would be difficult to construct covertly. Furthermore, in order to extract plutonium by reprocessing of their radiated reactor fuel, the proliferator would have to conceal any evidence indicative of reprocessing, for example, the radioactive isotope krypton 85, which is an unambiguous signature of this process. However, to be useful as an indicator of such an activity, the signal of krypton 85 must be obtained by air samples very close to a suspect facility since it must exceed the background signal from the global atmospheric burden of krypton 85.

These observations give a picture of the scale of effort and difficulty involved in detecting and/or hiding nuclear production activities.

The Role of Ballistic Missile Defense

The current administration has emphasized the need for deploying a missile defense system to protect the U.S. homeland from the threat of limited attacks by nuclear-armed ballistic missiles that may be launched by a hostile proliferant power. This led the United States to take a long-debated, controversial decision to withdraw from the 1972 Anti-Ballistic Missile (ABM) Treaty.

The rationale stated in the Bush administration's 2002 "Nuclear Posture Review" was that

> the demonstration of a range of technologies and systems for missile defense can have a dissuasive effect on potential adversaries. The problem of countering missile defenses, especially defensive systems with multiple layers, presents a potential adversary with the prospect of a difficult, time-consuming and expensive undertaking.

The thrust of this statement is that the administration views ballistic missile defenses as one element, and an important one, of an anti-proliferation policy.

Prior to President Bush's decision to withdraw from the ABM Treaty effective in 2002, in order to move ahead with plans for a limited national missile defense, it had been recognized that some of the restrictions of the Treaty had become dated in the post–Cold War world. These included restrictions that severely limited testing of new concepts and possibilities for such a system. During the dangerous years of U.S.-Soviet confrontation, those restrictions were believed to be appropriate on technical as well as strategic grounds in terms of their stabilizing value. Although good reasons remain to be skeptical of the ultimate potential of ballistic missile defenses against advanced ballistic missile threats, in view of technical limitations, there are now valid reasons to study and learn what might feasibly be done to protect the United States and allies against more primitive threats, or from entities against which deterrence alone may be inadequate.

The capabilities of ballistic missile defenses utilizing current or foreseeable technologies against long-range ballistic missile threats that employ countermeasures are very limited. How effective such technologies will prove to be in dissuading adversaries like North Korea and Iran from developing and deploying long-range ballistic missiles armed with nuclear, or biological and chemical, warheads, remains to be seen. At the moment there is no evidence that the U.S. ballistic missile defense program is having an impact on North Korea's program to develop nuclear weapons. There is no doubt, however, about the impact of a North Korean nuclear weapons arsenal on a friendly state like Japan. A Japanese nuclear weapons program would ultimately be the response. Preventing such an outcome is a most important goal for U.S. anti-proliferation policy; this would signal a breakdown of the non-proliferation regime.

Whatever level of success may actually be achieved by a limited ballistic missile defense against a relatively primitive attack, there are other means for delivering nuclear destruction against which such a defense is useless. These means include transport by sea aboard commercial ships or aboard large cargo vessels within a standard shipping container, perhaps hidden in the large worldwide drug traffic. Relatively short-range cruise missiles, or more primitive drones launched from the decks of commercial ships, are also a possibility as are commercial aircraft. None of these threat options is a sure thing for a world at alert status, but they cannot be dismissed as not credible.

A fact sheet on "National Policy on Ballistic Missile Defense" issued by the White House on May 20, 2003, proposes a broader international role for missile defense:

> Because the threats of the 21st century also endanger our friends and allies around the world, it is essential that we work together to defend against these threats. Missile defense cooperation will be a feature of U.S. relations with close, long-standing allies, and an important means to build new relationships with new friends like Russia.

Success in building cooperation in ballistic missile defense could encourage cooperation among nations in their common effort to extend and strengthen the nuclear non-proliferation regime. This argues in favor of U.S. efforts to seek broad international cooperation rather than proceeding unilaterally in deploying such systems. Moreover, a program to deploy weapons in space as part of a missile defense system would be challenging a broad international consensus against putting weapons in space. Such a development is one of the possibilities discussed in the White House fact sheet on ballistic missile defense, which calls for development of space-based interceptors for boost-phase and mid-course missile defense systems. This proposal raises the issue of whether such a development would be in the U.S. interest, given this country's heavy reliance on space-based sensors for intelligence as well as for navigational purposes. The importance of retaining the current condition of space as a (relatively) safe harbor for U.S. satellite systems should be weighed very carefully before the United States adds space as a new dimension for military competition. The lure of space dominance may seem attractive today in view of U.S. technical prowess, but history has shown that such technical edges cannot be relied on for long.