



Nonproliferation

Background Information

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INTRODUCTION

In the twentieth century, mankind made amazing strides in nuclear science and technology. Those advances have provided enormous benefits. Controlled nuclear fission provides reliable large-scale energy production around the world (currently 20% of electrical generation in the United States and 16% globally), and radioisotopes are indispensable for various basic research techniques, industrial processes, and many medical procedures.¹ In contrast, nuclear weapons of enormous destructive power have been developed and pose a threat to international security. Since the first and only use of nuclear weapons in 1945, the United States and many other countries have striven to limit the spread of such weapons, with the ultimate goal of their elimination.²⁻⁴ The goal of nuclear nonproliferation, as embodied in the Treaty on the Nonproliferation of Nuclear Weapons (NPT), has been widely accepted in the international community and continues to be a cornerstone of international security. However, the threat of nuclear proliferation has evolved with the changing state of international affairs.^{5,6}

An effective nonproliferation policy must deal with the following broad-based threats:

- diversion of fissile material from the nuclear fuel cycle;
- theft of fissile material by subnational or terrorist groups;
- clandestine operation of a fissile material production facility.

Proliferation of nuclear weapons can occur through sovereign states, with a recent notable example being North Korea. Proliferation to subnational groups must also be prevented; this is primarily a concern with respect to theft of a nuclear weapon or the fissionable material from which a weapon can be fashioned. Effectively dealing with these threats requires the active leadership and involvement of the United States. This will require a flexible U.S. approach in dealing with diverse situations and possible new threats, and with the emergence and application of new technologies.

Historically, nations have only utilized unsafeguarded research reactors, special-purpose reactors, or isotope separation facilities to produce the quantities of the high-quality plutonium and highly enriched uranium desired for nuclear weapons.²⁻⁴ Other materials and technology used in the civil sector can potentially be utilized to make nuclear weapons.⁷⁻¹¹ Accordingly, there is widespread agreement that if the world is to realize the many benefits of nuclear power in the future, it is imperative that this peaceful nuclear technology continue to be applied in such a way that it does not contribute to the spread of nuclear weapons and that the public has confidence that the diversion of civil nuclear materials into weapons programs will not take



place. This is one of the prime objectives of the global nonproliferation regime, which the United States has played a key role in promoting.

NONPROLIFERATION POSITION POINTS

American Nuclear Society Position Statement 55, “Nonproliferation,” reflects the views, knowledge, experience, and insights of numerous members of the nuclear science professional community in the United States. The key position points and recommendations are the following:

1. **Nuclear science and technology can be applied for peaceful purposes in a manner that fully supports and is compatible with achieving nonproliferation goals**, as embodied in the NPT. To prevent proliferation, sovereign states should adhere to the NPT and its safeguards system, including the Additional Protocol, and adopt effective export controls.¹² Incentives to acquire nuclear weapons must also be addressed through foreign policies that discourage clandestine nuclear weapons programs in all nations. The ANS endorses the steps to strengthen the NPT contained in UN Security Council Resolution 1887,¹³ which call “for further progress on all aspects of disarmament to enhance global security.” If they are applied effectively, the technical, political, and institutional factors that constitute the key elements in a global nonproliferation regime will provide a continued high confidence that civil nuclear facilities and materials will not be diverted to military programs.
2. **Successfully addressing current and evolving proliferation threats requires that the United States work effectively with both industrialized and developing nations and with established international institutions such as the International Atomic Energy Agency (IAEA).** The Nuclear Suppliers Group also plays a key role in nonproliferation by helping to preclude inappropriate access to nuclear technology. The imperative need for active U.S. involvement arises from its broad global responsibilities, extensive nuclear weapons stockpile, and status as the world’s leading generator of energy from nuclear power. Given the varying energy needs around the world and the diversity of fuel cycle options today and in the future, the nonproliferation regime cannot practically be tied to one particular fuel cycle. U.S. Governmental policy and actions should accept the variety of approaches toward nonproliferation chosen by other countries, including the use of alternative fuel cycles. In particular, European nuclear power programs have demonstrated that effective safeguards can be designed into programs that involve the separation of plutonium in the fuel cycle.¹⁴ Industrial-scale reprocessing has been carried out at La Hague in France and Sellafield in the United Kingdom for decades, and significant amounts of the resulting plutonium have been fabricated into mixed oxide (MOX) fuel and used in commercial nuclear power reactors in Belgium, France, Germany, and Switzerland. The ANS strongly endorses (see [ANS Position Statement 45, “Nuclear Fuel Recycling”](#)) an orderly transition to a U.S. policy that encompasses nuclear fuel recycling in parallel with the establishment of a high level waste repository (see [ANS](#)



Position Statement 80, “Licensing of Yucca Mountain as a Geological Repository for Radioactive Waste”).

3. **The ANS encourages the U.S. Government to establish a policy that definitively endorses peaceful applications of nuclear technology.** A strong domestic nuclear industry and supporting infrastructure are essential to the credibility of the United States in working effectively with other countries in meeting the proliferation challenges of today and tomorrow.^{15,16} If the United States is not actively involved in all aspects of the nuclear fuel cycle, it loses much of its ability to influence the outcome. The ANS applauds (see [ANS Position Statement 21, “Stewardship of Nuclear Engineering Education”](#)) efforts by agencies of the U.S. Government to revitalize the nuclear workforce and to support education programs in nuclear science and technology.
4. **The United States should continue to explore and develop technologies that will further enhance the proliferation resistance of nuclear power systems.** The safeguarded civilian nuclear fuel cycle needs to remain an unattractive route for acquiring nuclear weapons. U.S. research and development policy should recognize the widely held view that the long-term benefits of nuclear power will depend on utilizing more fully the vast potential energy resources in uranium (see [ANS Position Statement 45, “Nuclear Fuel Recycling”](#)) and thorium (see [ANS Position Statement 78, “The Use of Thorium as a Nuclear Fuel”](#)). Consequently, research and development of recycle options is warranted to ensure a secure and sustainable energy future with reduced proliferation risk (see [ANS Position Statement 45, “Nuclear Fuel Recycling”](#)). However, all nuclear fuel cycles involving fissile material are potentially vulnerable to theft or diversion of that material. Intrinsic attributes alone are not sufficient to prevent the spread of nuclear weapons; extrinsic safeguards measures must be employed effectively and consistently around the world in order to achieve nonproliferation goals.⁸⁻¹⁰
5. **The United States should continue to invest in the development of technologies to monitor and safeguard nuclear materials.** This includes strengthening material accountability and physical protection of nuclear materials in cooperation with other countries and IAEA.¹⁰ The ANS endorses the principles and objectives of UN Security Council Resolution 1540 (2004),¹⁷ which requires states to implement “effective measures to establish domestic controls to prevent the proliferation of nuclear, chemical, or biological weapons, and their means of delivery, including by establishing controls over related materials....” The resolution requires states to criminalize the proliferation of weapons of mass destruction and all related materials, to enact and enforce strict export controls, and to secure sensitive materials within their borders. This resolution promotes more effective laws and enforcement measures.¹⁷ Resolution 1673 (2006)¹⁸ and then Resolution 1810 (2008)¹⁹ extended the mandate of the 1540 Committee to April 2011, strengthening the role of the Committee in facilitating technical assistance, including by engaging actively in matching offers and requests for assistance, therefore confirming its clearinghouse function.



6. **Significant quantities of weapons-grade plutonium and highly enriched uranium (HEU) pose a continuing proliferation threat to the world community.** Important efforts to secure these materials and to transform them into more proliferation-resistant forms require and warrant substantial attention and resources. Significant progress has been made with HEU. Essential programs such as plutonium disposition (see [ANS Position Statement 47, “Utilization of Surplus Weapons Plutonium As Mixed Oxide Fuel”](#)) have been initiated in the United States and Russia but are still some years away from full implementation as proposed by several organizations and individuals.^{7, 20–22} Anticipated future reductions in nuclear weapons stockpiles will add to the magnitude of this challenge. The benefit can be substantial—not only does the disposition of former weapons material preclude its theft or diversion, but it sends a powerful message regarding the commitment of nuclear weapons states to nonproliferation goals. Efforts underway in the United States and Russia should be extended to other states as well.

CONCLUSION

The continued support of a strong nuclear nonproliferation regime is a vital national security objective for the United States. In order to be effective, U.S nonproliferation policies must be developed and implemented in a manner that ensures broad and bipartisan national support and carried out with the dedication and constancy that are essential in meeting challenging, long-term objectives.

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