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REPORT TO THE CONGRESS



*BY THE COMPTROLLER GENERAL
OF THE UNITED STATES*



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Assessment Of U.S. And International Controls Over The Peaceful Uses Of Nuclear Energy

Worldwide development of peaceful nuclear technology is of urgent concern because of the corresponding potential for nuclear weapons proliferation. What steps can the U.S. Government take to improve international, as well as its own, controls over the peaceful uses of nuclear energy? While recent steps to improve controls are to be commended, much more can and must be done.

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To the President of the Senate and the
C1 Speaker of the House of Representatives

The growing international market for nuclear materials, equipment, and technology for peaceful purposes has increased the potential for nuclear weapons proliferation. This report evaluates the adequacy and effectiveness of United States and international controls over peaceful nuclear programs designed to deter the proliferation of all nuclear explosive devices.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; Secretaries of State and Commerce; Administrator, Energy Research and Development Administration; Chairman, Nuclear Regulatory Commission; Director, Arms Control and Disarmament Agency; and President and Chairman, Export-Import Bank of the United States.

Thomas A. Steeds
Comptroller General
of the United States

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ABBREVIATIONS

ACDA	Arms Control and Disarmament Agency
ERDA	Energy Research and Development Administration
EURATOM	European Atomic Energy Community
GAO	General Accounting Office
IAEA	International Atomic Energy Agency
NPT	Treaty on the Non-Proliferation of Nuclear weapons
NRC	Nuclear Regulatory Commission

D I G E S T

The continued development of nuclear technology in foreign countries and the corresponding potential for nuclear weapons proliferation is a matter of urgent concern. Compounding that concern is the possibility of terrorists or subnational political factions stealing nuclear material or sabotaging nuclear facilities.

Nations could acquire a nuclear weapons capability through means other than peaceful nuclear cooperation. However, as nuclear trade accelerates, the potential for achieving a weapons capability will increase. It is therefore imperative that effective controls be exercised over peaceful uses of nuclear material, equipment, and technology.

Although the United States has supplied about 70 percent of the world's nuclear reactors and much of the related fuel and technology, nations seeking nuclear assistance can now turn to other suppliers, including the Soviet Union, France, West Germany, Sweden, Canada, and the United Kingdom. Therefore, halting U.S. exports would not eliminate the escalating risks and could cost the United States its ability to influence international nuclear policies.

As the world's leading nuclear exporter, the United States has a responsibility to exercise leadership in deterring other nations from developing nuclear explosives and should exercise whatever leverage it has to achieve its non-proliferation objectives. Continued dominance in nuclear sales, using the strongest practical precautions, will give the United States the best opportunity to continue to promote global non-proliferation policies. However, the expanding market will be shared by a growing number of supplier countries, which will make multilateral control efforts absolutely necessary.

In view of the seriousness of the issue, GAO reviewed U.S. and international controls over the peaceful uses of nuclear energy to determine their adequacy for deterring nuclear weapons proliferation and found that:

- The United States has sought improvements in international safeguards and physical security of nuclear materials and equipment, but much more must be done. (See chs. 3, 4, and 6.)
- Despite U.S. efforts, certain countries have not ratified the Treaty on the Non-Proliferation of Nuclear Weapons which would preclude them from operating unsafeguarded facilities and from developing nuclear explosives. (See p. 77.)
- Recent nuclear suppliers' efforts designed to achieve parallel nuclear export policies have been made without being subjected to intense congressional or public scrutiny. (See p. 75.)
- International safeguards are designed only to detect diversions of nuclear material on a national level, and it is assumed that nations will protect nuclear material from terrorist or subnational groups. The principle of such safeguards is that the risk of early detection and unmasking in the world community will deter a would-be diverter. (See p. 19.)
- U.S. and International Atomic Energy Agency officials generally conceded that a country could circumvent safeguards if it was willing to assume the risk of detection, incur the expense, and take the trouble to do so. (See p. 40.)
- The United States has accepted safeguards applied by the International Atomic Energy Agency and the European Atomic Energy Community as satisfying U.S. requirements but in GAO's opinion has not received sufficient information to determine how effective these safeguards are. (See pp. 38 to 44.)

--Should a country divert nuclear material from peaceful purposes or knowingly supply material or technology to another country for developing nuclear weapons, the only actions the International Atomic Energy Agency can currently take are (1) notification to member countries and the United Nations, (2) suspension of Agency membership rights and privileges, and (3) recall of Agency-sponsored material and technical assistance. It is not clear, however, how Agency-sponsored material would be retrieved if a nation were unwilling to return it. (See p. 27.)

--Based on limited first-hand observations, GAO believes the United States may be relying on international safeguards inspections that are not adequately carried out. (See p. 41.)

--The United States has authorized the distribution of substantial amounts of nuclear materials and equipment to certain countries through international organizations without reserving U.S. safeguards and inspection rights as a fallback to international safeguards. (See p. 14.)

--The U.S. peaceful nuclear export licensing and regulatory control program is fragmented among the Nuclear Regulatory Commission, the Energy Research and Development Administration, and the Department of Commerce. (See p. 46.)

INTERNATIONAL SAFEGUARDS

Although the global expansion of nuclear energy makes effective international safeguards crucial to U.S. and world security, international organizations have no authority to require physical protection measures, no authority to supervise, control, or implement such measures, and no authority to pursue and recover diverted or stolen material. Their inspectors have neither unlimited access nor authority to seek out possible undeclared or clandestine facilities or stockpiles of nuclear material. In addition, technical, political, financial, and staffing obstacles hamper the effective implementation of international safeguards. Reinstating U.S. bilateral safeguards, however, is not a viable alternative to strengthening international safeguards.

The United States should exercise leadership in ensuring that international safeguards are adequately, fairly, and consistently applied and that all nations receive sufficient assurances that their trust in international safeguards is not misplaced.

GAO is making specific recommendations designed to

- improve the effectiveness of International Atomic Energy Agency safeguards;
- provide the United States and other nations with more information concerning safeguards effectiveness;
- upgrade the capabilities of the International Atomic Energy Agency safeguards staff; and
- urge all Agency member nations to establish adequate sanctions against nations diverting nuclear material for nuclear explosive purposes. (See pp. 37 and 44.)

PHYSICAL SECURITY

Because of the desirability of applying adequate physical security measures to nuclear materials and facilities worldwide, the Department of State, with the other concerned agencies, should actively pursue the U.S. proposal for an international convention on physical security of nuclear materials.

GAO recommends that the goals of such a convention include (1) acceptance of physical security standards, (2) assurance that each member nation would enact appropriate national laws to implement such standards, (3) guarantees that no member nation would provide safe haven for nuclear terrorists or saboteurs, and (4) provisions for physical security reviews as part of the International Atomic Energy Agency's regular safeguards inspection efforts. Until this can be accomplished, GAO recommends that the Nuclear Regulatory Commission and the Energy Research and Development Administration continue to jointly perform all U.S. physical security reviews of foreign facilities. (See p. 67.)

AGREEMENTS FOR COOPERATION

Because U.S. agreements for cooperation provide the framework for U.S. nuclear cooperation with individual nations and international organizations, they should provide for the strongest, most uniform U.S. position on the control of nuclear materials and equipment. GAO recommends ways to strengthen these agreements. (See pp. 17 and 18.)

EXPORT CONTROLS

The Nuclear Regulatory Commission was established to separate the regulatory and licensing function from U.S. nuclear development and promotional activities. However, the Department of Commerce still licenses certain nuclear components and nuclear-related items and the Energy Research and Development Administration authorizes government-to-government transfers, retransfers between other countries and is responsible for controlling the exports of nuclear technology.

GAO recognizes that major changes in the nuclear export control procedures might have some adverse impact on perceptions by others of U.S. reliability for supplying nuclear material and equipment but believes that a centralized regulatory review process is a good means of controlling all nuclear exports. Therefore, GAO recommends that the Nuclear Regulatory Commission, Energy Research and Development Administration, and Department of Commerce set up and implement formal interagency procedures for the Nuclear Regulatory Commission to be the focal point for monitoring and regulating the foreign distribution of all nuclear material, equipment, and technology, including government-to-government shipments, retransfers of U.S.-supplied material between foreign countries, and nuclear components and parts currently approved by Commerce. (See p. 59.)

MULTILATERAL EFFORTS

The United States, recognizing the need for multilateral cooperation, has been working with other nuclear suppliers to help remove safeguards from the marketplace so that one supplier does not offer less stringent safeguards to promote nuclear sales than another. The Department of State, the Arms Control and Disarmament Agency, and the Energy Research and Development Administration with the advice of the Nuclear Regulatory Commission should develop and implement a diplomatic and technical strategy for:

- Achieving continued dialog and concluding further, more binding arrangements on common export policies, particularly for sensitive technologies.
- Reestablishing the United States as a reliable supplier of uranium enrichment services and discouraging individual foreign countries from developing their own enrichment capacities.
- Assisting developing countries to evaluate their total energy needs in determining whether and how much of their energy requirements should be filled by nuclear energy.
- Establishing adherence to the Non-Proliferation Treaty or at least a guarantee by the recipient country to subject its entire peaceful program to international safeguards as a general prerequisite for future U.S. nuclear cooperation and promoting this policy as a standard for cooperation by all supplier countries. (See p. 82.)

AGENCY COMMENTS AND
UNRESOLVED ISSUES

The State Department readily agreed that more effective controls to prevent nuclear weapons proliferation must be sought. However, it felt that many of GAO's suggestions for improving the effectiveness of international controls and safeguards would not be acceptable to foreign governments because they would impinge on their sovereign rights. Recognizing these concerns, GAO still believes the United States has a major responsibility to use whatever influence it has to convince other nations that it is in their self-interests as well as in the interest of world security to accept more stringent controls. (See app. VII.)

The Energy Research and Development Administration stated that although it did not agree with all of the GAO recommendations, the report generally takes into consideration its views on the matters discussed. (See app. XII.)

The Nuclear Regulatory Commission indicated that the present U.S. nuclear export program provides adequate control and review and should not be subjected to further major alterations. However, the Commission did note that arrangements were taking effect to involve

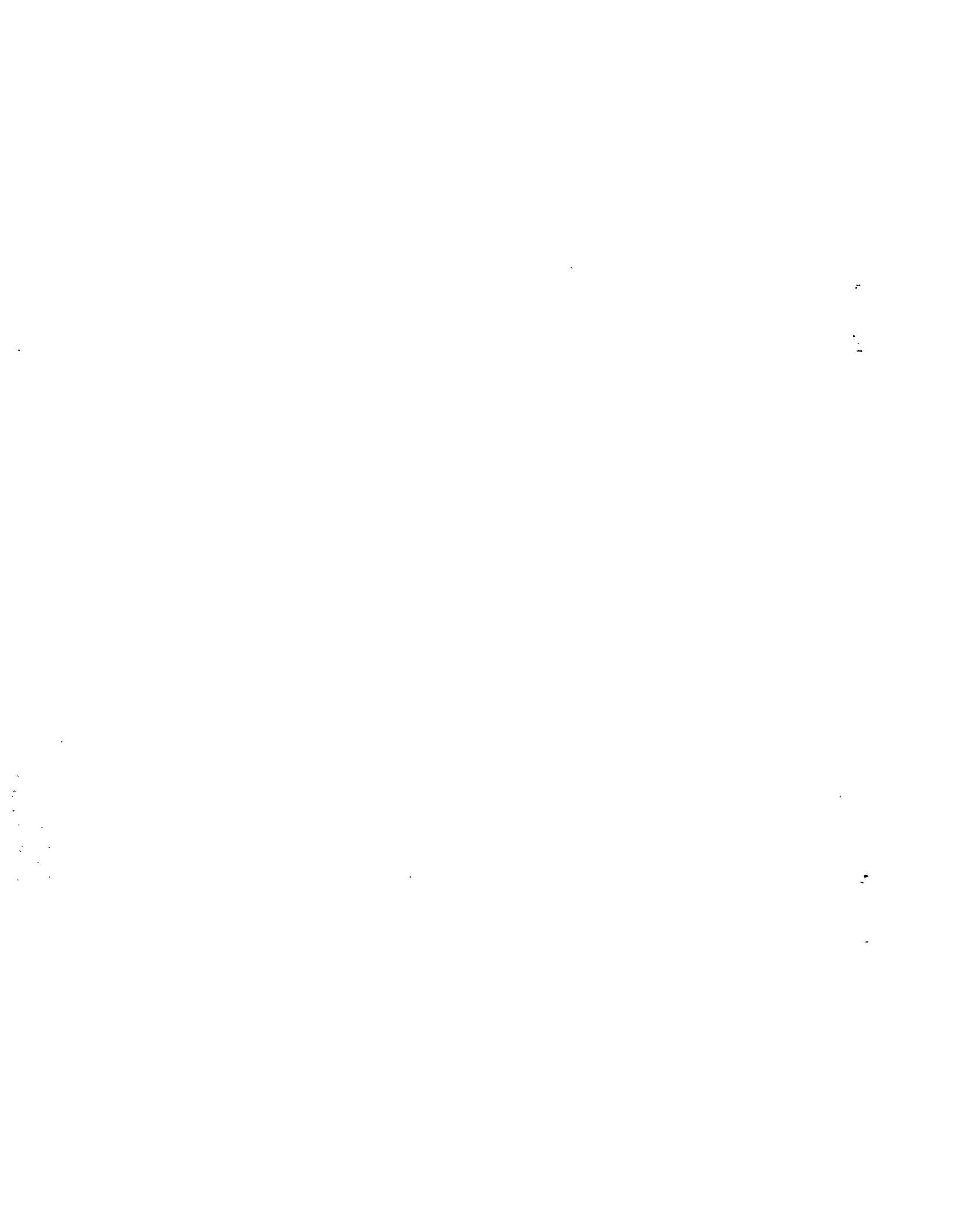
the Commission, on a consultative basis, in proposed retransfers between countries and in any government-to-government transfers. Several consultations on retransfers have already taken place. (See app. VIII.)

The Arms Control and Disarmament Agency commented that to have the Nuclear Regulatory Commission exercise overall authority in regulating the foreign distribution of all nuclear material and equipment would purport to remove functions from the executive branch mandated to it by both statute and the Constitution. (See app. IX.) GAO believes the Commission is part of the executive branch.

MATTERS FOR CONSIDERATION
BY THE CONGRESS

To insure that U.S. nuclear cooperation is in line with U.S. non-proliferation objectives, the Congress should:

- Make future U.S. nuclear cooperation contingent upon adherence to the Non-Proliferation Treaty or agreement by the recipient country to subject its entire peaceful nuclear program to international safeguards. The only exceptions should be those few unusual cases when the President would certify that such cooperation is in the U.S. national security interests. (See p. 84.)
- Insist that any binding arrangements made by the executive branch with other nuclear suppliers be subjected to congressional review and ratification. (See p. 84.)
- Prohibit further foreign commitments of substantial amounts of plutonium, enriched uranium, or nuclear equipment without reserving U.S. safeguards rights as a fallback to international safeguards. (See p. 18.)
- Clarify its intent concerning the decisionmaking authority for permitting the foreign distribution of U.S. nuclear material and equipment in cases where other involved agencies do not agree with the position of the Nuclear Regulatory Commission. This should prevent any possible misunderstanding as to the intent of the Energy Reorganization Act of 1974. (See p. 59.)



CHAPTER 1

PEACEFUL NUCLEAR COOPERATION: BENEFITS AND RISKS

The devastation of Hiroshima and Nagasaki in 1945 underscored the responsibility of the United States to influence the future direction of nuclear energy to ensure against its threatening the existence of life on this planet. Although the memories of these historical events are beginning to fade, the challenges offered by the enormous power of nuclear energy remain ever as great and are in many respects more urgent.

The peaceful uses of nuclear power have grown from an American monopoly to a multibillion dollar industry shared by both developed and developing nations. As nations seek to reduce their dependence on imported oil, they will look increasingly to nuclear power as an alternative energy source. It is estimated that total nuclear power reactors worldwide will quadruple to 800 over the next 10 years.

U.S. willingness to work with other nations in developing nuclear power can be credited largely for this international spread of nuclear materials, equipment, and capabilities. At the same time, the United States must also accept much of the responsibility for the increased prospects of global nuclear proliferation (international spread of nuclear weapons capabilities) that has come through widespread nuclear trade and technical assistance.

A nuclear power reactor generates enough electricity each year to supply the entire power needs of a city of a million people. However, a byproduct of this electric generation is plutonium, which, after separation from the spent fuel, could be converted into numerous nuclear weapons each year.

According to the Arms Control and Disarmament Agency, by 1985 nearly 40 countries are expected to have enough plutonium in the spent fuel from their reactors for each to make a few bombs. This estimate does not take into account the possibility that nations could acquire a nuclear weapons capability through means other than peaceful nuclear cooperation. Nonetheless, as peaceful nuclear trade accelerates, the potential for achieving a weapons

capability will increase. Moreover, the addition of even a few more nuclear weapons countries would seriously compound U.S. difficulties in maintaining military security.

Whether or not a country turns to nuclear weapons development depends upon its capability for producing such weapons and its political self-interest. Capability is governed to a large extent by access to (1) nuclear technology, the principles of which are becoming widely known, and (2) nuclear materials, such as plutonium or highly enriched uranium. Nations which perceive an immediate military threat to their existence are likely to attempt to develop nuclear weapons capabilities. Other countries may seek a nuclear weapons capability as a matter of national prestige.

The potential danger of peaceful international nuclear cooperation was demonstrated in 1974 when India, using material reportedly produced in an unsafeguarded research reactor, conducted what it termed a "peaceful nuclear explosion." There is no fundamental distinction between the technology of a nuclear explosive used as a weapon and a nuclear explosive used for a peaceful purpose. India's explosion underscores the danger of peaceful nuclear activities which occur outside the purview of the international safeguards system.

Individuals and organizations concerned about the dangers of nuclear cooperation are quick to point out other drawbacks, including possible theft of nuclear materials; sabotage by terrorists; and dangers inherent in exporting nuclear technology to developing countries, some of which may not have the technological capability or skilled manpower to build and operate nuclear power plants safely without close supervision and training by nuclear supplier nations.

However, while critics point with alarm to the international spread of nuclear technology charging that the United States may be contributing to the further development of nuclear weapons, we do not believe that withdrawal from the international market is the best way to advance U.S. non-proliferation objectives. By engaging in nuclear trade, the United States may be able to impose controls over nuclear exports which might not be imposed by other supplier nations. Important political and economic advantages which accrue to the United States from international nuclear trade must also be considered. For example:

- The Department of State has claimed that nuclear cooperation with less developed countries provides important political benefits by furthering their economic development and eliminating the need for costly duplicative research and development programs.
- The cost of domestic nuclear power should be reduced as U.S. manufacturers, by supplying the export market, are able to spread their huge research and development costs over a larger number of units.
- The worldwide nuclear investment projected for 1976-78 is expected to reduce worldwide reliance on oil by about 1.3 billion barrels, which is roughly twice the annual production of a major oil producer like Kuwait.
- The United States has reaped important balance-of-payments benefits through the export of an estimated \$2 billion worth of nuclear materials and equipment.
- The expected \$10 billion in U.S. nuclear exports during 1976-78 should provide about 120,000 jobs, according to the Department of Labor, and an estimated \$1.3 billion in tax revenue.

The key issue then, is: How can the the United States continue to share in the economic benefits of the international nuclear market while ensuring that its exports are not diverted to nuclear weapons development? The United States, as the world's leading nuclear exporter, has a particular responsibility to ensure that its policies are designed to deter other nations from developing nuclear explosives. Clearly, U.S. policy must strike a balance between two extremes--overzealous pursuit of foreign nuclear sales without regard to proliferation and withdrawal from the international nuclear market.

Continued leadership in nuclear sales, with the strongest practical precautions, will give the United States the best opportunity to influence the international nuclear market. However, as the number of supplier countries grows, multilateral efforts will be increasingly necessary.

Although the United States supplies about 70 percent of the world's nuclear reactors and much of the related components and technology, nations seeking nuclear assistance can

now turn to other suppliers, including the Soviet Union, France, West Germany, Sweden, Canada, and the United Kingdom. Several other nations are expected to become nuclear suppliers in the near future. These nations have or soon will have the capacity for manufacturing power reactors and the capabilities for all stages of the fuel cycle, 1/ including uranium enrichment and chemical re-processing.

Capability to enrich uranium for use as a fuel in power reactors was once unique to the U.S. Government, whose policy has been to sell the uranium enrichment services needed to fuel reactors but not to sell enrichment facilities or technology. The United States has, however, offered to cooperate with other nations in the enrichment area under carefully controlled conditions.

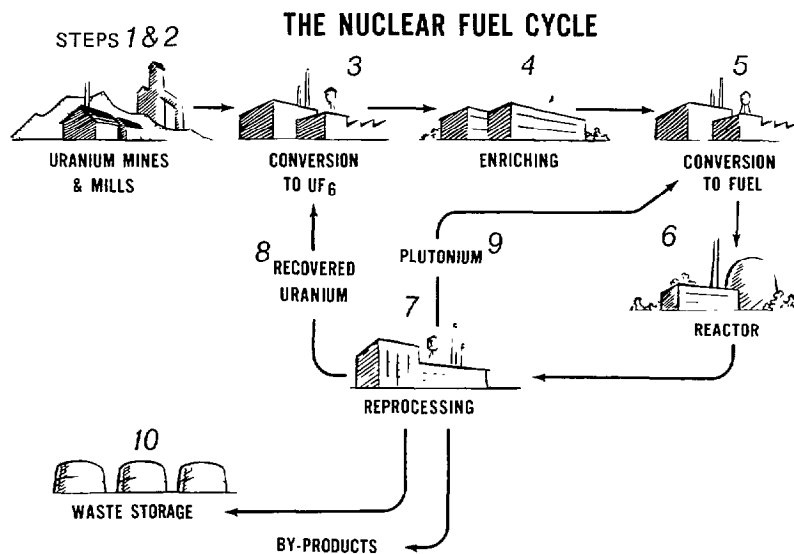
The uncertainties of future U.S. enrichment capacity and the desire of foreign countries to diversify the sources of enriching services for their accelerating nuclear programs have encouraged the emergence of foreign uranium enrichment capacities. The implications of foreign development of this capability are significant, since this process can also be used to further nuclear weapons purposes.

Also, reprocessing--the highly complex chemical method of separating plutonium and unused uranium from spent fuel--has become a controversial issue as more

1/

The nuclear fuel cycle includes the mining and milling of uranium, refining of uranium and conversion to uranium hexafluoride, enrichment of the uranium in the isotope uranium-235, conversion of enriched uranium to fuel material, fabrication of reactor fuel elements, use of fuel elements in nuclear power plants, chemical reprocessing of spent fuel to obtain reusable fuel material, recovery and marketing of plutonium and other by-products, and disposal of radioactive wastes.

(CREDIT: ERDA)



nations begin to develop or acquire this capability. Plutonium recovered through reprocessing can be transformed for use in weapons production. Further, recovered plutonium in this form is an attractive target for theft by terrorists.

Reprocessing, despite the controversy and inherent dangers surrounding it, may be necessary in the future. Since the supply of uranium is considered to be limited, the United States recognizes the possibility that future reprocessing of used reactor fuel may be necessary to sustain the nuclear power industry.

The development of the liquid metal fast breeder reactor by the United States and at least five other countries gives additional importance to the reprocessing issue. ^{1/} The breeder reactor can create more fuel (plutonium) than it uses. However, its commercial success depends on efficient reprocessing of the used fuel.

The United States, recognizing the serious consequences of unrestrained trade in highly sensitive and potentially dangerous nuclear technologies, has joined with six other major nuclear exporting nations to discuss the issues. In January 1976 these supplying nations agreed on some common nuclear export policies. (See ch. 7 for a more detailed discussion.) A followup conference of these nations and of several other nuclear suppliers was held in June 1976.

The United States has also (1) proposed an international convention on the physical protection of nuclear material, (2) continued to urge all nations to become parties to the Treaty on the Non-Proliferation of Nuclear Weapons, and (3) sought improved International Atomic Energy Agency safeguards.

Although these efforts to improve international controls over the peaceful uses of nuclear energy are to be commended, much more must be done. The serious dangers of nuclear proliferation demand stringent controls.

^{1/} See GAO reports, "The Liquid Metal Fast Breeder Reactor: Promises and Uncertainties," July 31, 1975 (OSP-76-1), and "The Liquid Metal Fast Breeder Reactor--Past, Present, and Future," Apr. 8, 1975 (RED-75-352).

The United States should act quickly and decisively to influence the future of nuclear power before its influence is further eroded by supplier competition.

Throughout the development of the nuclear industry, the United States has been the leader in establishing basic policies of international nuclear cooperation. U.S. policymakers believe this leadership role should be continued. In exercising this role, the United States will focus on the following issues.

- How can international safeguards be improved to ensure that nuclear materials and equipment are not used to further weapons development?
- How might the United States strengthen its controls over the export of nuclear technology, material, and equipment?
- What actions are needed to ensure that nuclear materials and equipment are adequately protected against theft, sabotage, and terrorism?
- How might the United States best influence the actions of other nuclear suppliers to ensure that the future development of the international nuclear industry will be a peaceful, responsible, well-controlled, and cooperative effort?

The following chapters discuss our analysis of U.S. peaceful nuclear cooperation and actions that we believe are urgently needed to improve controls over international nuclear cooperation.

CHAPTER 2

AGREEMENTS FOR COOPERATION: FRAMEWORK FOR THE U.S. PEACEFUL NUCLEAR PROGRAM

The proposed nuclear cooperation with Egypt, Israel, and Iran has spurred an intensive scrutiny of all U.S. agreements for cooperation. U.S. officials are now considering several ways to strengthen them. We believe that the improved precautions discussed in this chapter should become mandatory for U.S. cooperation. We have also identified several other issues which should be dealt with in negotiating and amending agreements for cooperation.

EVOLUTION OF INTERNATIONAL NUCLEAR COOPERATION

Since World War II, U.S. policy has been to prevent the spread of nuclear weapons. In 1946, the United States presented to the United Nations the Baruch Plan which would have prohibited nuclear weapons and placed sensitive peaceful nuclear activities under international ownership and control. When the Plan was not accepted by the Soviet Union, the United States continued a policy of strict secrecy as a means of containing nuclear proliferation until effective international safeguards could be developed.

It is now generally conceded that the U.S. policy of nuclear secrecy did not accomplish the desired results. By 1953, the Soviet Union and the United Kingdom had developed nuclear explosive devices, other countries had established peaceful nuclear programs, and many more were looking for help in setting up nuclear programs. Thus, it was clear that nuclear science could not remain an American monopoly and that its spread was inevitable.

The United States recognized that its prestige as a world leader in nuclear energy development was at stake and decided to seek control of that which it could not prevent. President Eisenhower, in his "Atoms for Peace" address before the U.N. General Assembly in December 1953, proposed increased international cooperation in the peaceful applications of atomic energy and called for the establishment of an international agency to regulate the use of atomic energy.

Behind this shift in policy was the realization that the United States, by assisting foreign nuclear programs, might influence the nuclear policies of other nations,

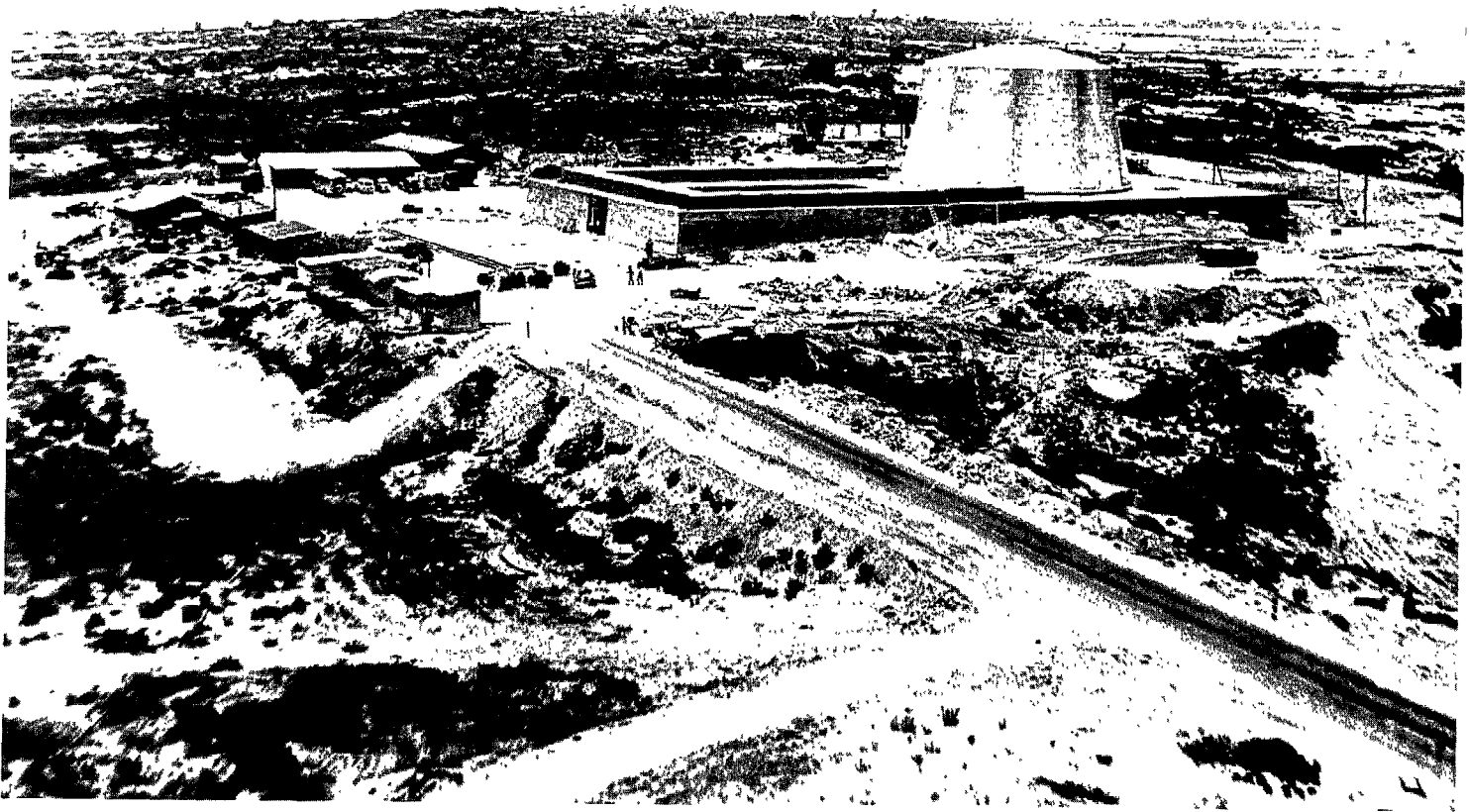
share in their technological developments, obtain guarantees on safeguarding of nuclear materials, and hasten the adoption of broader disarmament measures.

The Atomic Energy Act of 1954 (42 U.S.C. 2011) established the basis for U.S. participation in an international nuclear cooperative program. It authorized the United States to enter into Agreements for Cooperation in the Civil Uses of Atomic Energy with individual nations or groups of nations, enabling it to furnish them with the necessary information, assistance, equipment, and nuclear materials to construct and operate research reactors. In return for U.S. cooperation, each nation or group of nations was required to provide guarantees against nuclear weapons development.

The new "Atoms for Peace" program resulted in agreements for cooperation with nations wishing to undertake modest nuclear programs. It centered initially around the use of research reactors used for training, education, basic research, medical therapy, radioisotopic production, and reactor engineering and physics. The program, however, was not destined to remain a vehicle for modest international cooperation in nuclear research. The United States soon began negotiating agreements providing for comprehensive exchanges of technology for research and power reactors and for specific power projects. Thus, the U.S. policy was established--share the benefits of peaceful uses of nuclear energy (both research and power) with other nations but maintain strict safeguards against nuclear weapons proliferation.

The United States has not only provided other nations with nuclear material, equipment, and technology but has also been actively involved in financing a large share of U.S. nuclear exports through loans, grants, gifts, special contractual arrangements, and financial support of international training courses, schools, and conferences. (See app. I.)

Also, the United States provides financial support to the International Atomic Energy Agency (IAEA), which is composed of 109 nations and was established in 1957 under the aegis of the United Nations to promote international cooperation in the peaceful uses of atomic energy. (See app. II.)



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**U.S. NUCLEAR RESEARCH REACTOR SUPPLIED
TO ISRAEL UNDER THE ATOMS FOR PEACE PROGRAM**

The United States currently has agreements with 28 individual nations, the IAEA, and the European Atomic Energy Community (EURATOM), 1/ and is negotiating several new agreements. Each agreement, including amendments, must be personally approved by the President in writing after determining that it will constitute no unreasonable risk to the common defense and security. Subsequently, each agreement is submitted to the Congress and referred to the Joint Committee on Atomic Energy which must report on it to the Congress. The Congress may prevent the agreement from entering into force by adopting a concurrent resolution to that effect within a 60-day period. (See app. III for a complete list of current U.S. agreements for cooperation.)

The Energy Research and Development Administration (ERDA) and the Department of State are primarily responsible for negotiating and administering U.S. agreements for cooperation. The Nuclear Regulatory Commission (NRC) has the primary role in controlling the export of nuclear material and equipment, but ERDA, and the Department of Commerce are also significantly involved. The Atomic Energy Act of 1954, the Energy Reorganization Act of 1974 (Public Law 93-438), and Titles 10 and 15 of the U.S. Code of Federal Regulations established the guidelines and procedures for licensing and exporting nuclear material, equipment, and technology.

Agreements for cooperation are not exactly alike, due to provisions tailored to the needs of recipients, changes in U.S. statutory and regulatory requirements, new international treaties, technological developments, and an evolving U.S. non-proliferation policy. They also differ according to the scope of nuclear cooperation involved. Most agreements cover both research and power applications of nuclear energy; a few cover only research or only power.

1/ EURATOM, composed of Belgium, Denmark, France, West Germany, Ireland, Italy, Luxembourg, the Netherlands, and the United Kingdom, was established in 1957 to "create conditions necessary for the speedy establishment and growth of nuclear industries" in member countries.

CONTROLS IN U.S. AGREEMENTS

U.S. agreements for cooperation enable but, generally, do not commit the United States to transfer nuclear reactors, technology, and material to other nations. Certain controls in the agreements are designed to assure both the United States and the cooperating nation or group of nations that materials and equipment transferred between the parties will be used for authorized purposes only and will be properly safeguarded. Major control provisions common to most U.S. civil agreements are briefly described below.

- Cooperating nations guarantee that (1) material provided under the agreement will not be used for atomic weapons, for research and/or development of atomic weapons or for any other military purposes, (2) material made available will not be transferred to unauthorized persons or beyond the jurisdiction of the cooperating party except as authorized by ERDA, and (3) safeguards will be maintained.
- Quantities of enriched uranium and plutonium may not be supplied in excess of a ceiling specified in the agreement. A specific technical or economic justification is required for supplying uranium enriched to more than 20 percent because of the suitability of highly enriched uranium for weapons development as well as use in reactors.
- The reprocessing of any special nuclear material 1/ may be performed in facilities acceptable to both parties upon a joint determination that the safeguards provisions of the agreement may be effectively applied.
- Only unclassified data is supplied; materials, equipment, and services cannot be supplied if they would result in restricted data being communicated.
- The United States has the right to (1) require the recipient to maintain materials accountability records and submit reports, (2) make onsite

1/ Plutonium or uranium enriched in the isotopes U-233 or U-235 or any material artificially enriched in this way.

inspections, and (3) suspend or terminate the agreement and require the return of any material and equipment after a reasonable time in the event of noncompliance.

The United States initially established its own system of inspection and verification to ensure compliance, but when it ratified the IAEA Statute in 1957, IAEA inspections were expected to eventually replace U.S. safeguards inspections. U.S. safeguards "rights" specified in agreements are now suspended while international safeguards apply.

Under U.S.-EURATOM Agreements for Cooperation, EURATOM is responsible for implementing international safeguards on U.S.-supplied nuclear material and equipment within the European Community. (See ch. 3 for detailed discussion of international safeguards implementation.)

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which entered into force in March 1970, initiated a new era of IAEA safeguards responsibilities, under which:

- Each nuclear weapons country party to the Treaty (currently the United Kingdom, Soviet Union, and United States) agrees not to transfer nuclear explosives to or in any way help or encourage non-nuclear weapons countries acquire or develop nuclear explosives or weapons.
- Each non-nuclear weapons country party to the Treaty agrees not to receive or manufacture nuclear explosives or to seek assistance in manufacturing nuclear explosives.
- Each non-nuclear weapons party to the Treaty accepts international safeguards on its entire peaceful nuclear program.
- Each member nation agrees not to transfer nuclear material or equipment "designed or prepared for the processing, use or production of special fissionable material" to a non-nuclear weapons country unless subject to international safeguards.

The Non-Proliferation Treaty is an unprecedented concept in international relations in that it requires a general commitment to international inspection of all peaceful nuclear programs within a nation's borders. In non-NPT countries, IAEA applies safeguards only to specified facilities and/or nuclear material within the country.

PROPOSED CONTROLS FOR FUTURE AGREEMENTS

Over the years, the United States has identified weaknesses in the wording of the agreements and has sought corrective action. The importance of the strong framework that is established by agreements for cooperation should not be underestimated. To upgrade this framework, ERDA is considering several new control provisions for future agreements which would:

- Expressly prohibit the use of U.S.-supplied material or equipment for any nuclear explosive device, including peaceful nuclear explosives; most agreements now only prohibit the use of such goods for military purposes.
- Require the recipient to establish and effectively implement physical security arrangements deemed adequate by the United States; agreements do not now include specific requirements for physical security measures over U.S.-supplied material.
- Require U.S. approval of fabrication and storage facilities for highly enriched uranium and plutonium.
- Require any replication of U.S.-supplied technology constructed within the recipient country to be placed under effective safeguards; current agreements for cooperation do not mention such replication.

ERDA emphasized that these provisions are being considered for future agreements but that it is prepared to seek the insertion of some of these proposed provisions in existing agreements where warranted. However, the State Department commented that using such specific language in new agreements may weaken the language in the existing ones.

The United States has proposed several additional controls for the yet-to-be-concluded agreements with Egypt and Israel which recognize the unique circumstances between these two nations. 1/ One provision would give the United

1/ Our March 10, 1976, report, "Progress Report on U.S. Negotiations of Middle East Nuclear Agreements" (ID-76-41, classified SECRET, NO FOREIGN DISSEMINATION), discusses these proposed additional controls.

States the option to buy back any plutonium produced through the use of U.S. materials or reactors. This type of provision was included in early agreements but was excluded from more recent ones. The State Department indicated that it was unlikely that the Congress would make funds available for this purpose, but the United States has always retained the right to approve where U.S.-provided material can be reprocessed.

U.S. SAFEGUARDS RIGHTS

The provisions proposed for tightening U.S. controls over the use of U.S.-supplied nuclear materials and equipment appear to be positive steps to upgrade U.S. agreements. We endorse such efforts to ensure that agreements have no loopholes through which U.S. nuclear materials could be used to further proliferation. However, there are several other safeguards issues which should be dealt with in strengthening agreements for cooperation.

Reserving rights

To be eligible to receive U.S. nuclear materials, a nation need not have a separate agreement for cooperation with the United States as long as it is a party to an organization which has such an agreement. Thus, under U.S. agreements with IAEA and EURATOM, any member country of those organizations may receive U.S. nuclear material and equipment under acceptable international safeguards. However, the United States has not reserved the right to impose U.S. safeguards over materials and equipment transferred in this manner in the event international safeguards cease to be applied.

The United States has supplied EURATOM countries with large amounts of nuclear material and equipment under U.S.-EURATOM Agreements for Cooperation and has also supplied small quantities of nuclear material abroad for research projects under the U.S.-IAEA Agreement for Cooperation. However, in 1974 it agreed to supply, through IAEA, power reactors and uranium enrichment services to Mexico and Yugoslavia, which do not have agreements for cooperation with the United States. Although an ERDA official testified in February 1975 that it was not ERDA's intention at that time to use IAEA as a device for selling reactors abroad to member countries other than in these two cases, we believe action should be taken to formally preclude this practice.

U.S. officials advised us that reserving U.S. safeguards rights are important because, at a minimum, they provide insurance in the event that international safeguards cannot be applied. The transfer of large quantities of materials and equipment through international organizations leaves the United States with no authority to impose its own safeguards or to call for the return of the material or equipment if international safeguards are no longer effectively applied in a specific country. In our opinion, failure to reserve such rights also weakens U.S. leverage to influence international nuclear policies.

Reinstating rights

The U.S. safeguards rights specified in agreements with individual nations are not superseded by IAEA safeguards but are merely suspended as long as IAEA safeguards are applied. However, there is some question as to when and under what circumstances the United States could or would reinstate its own safeguards. U.S. agreements do not consistently describe when U.S. safeguards will be suspended in favor of IAEA safeguards.

The agreements variously specify that U.S. safeguards rights are suspended

- during the time and to the extent that IAEA safeguards apply,
- during the time and to the extent that the United States agrees that the need to exercise such rights is satisfied by IAEA, or
- as long as the nuclear material and equipment remains on the IAEA safeguards inventory listing.

U.S. officials have stated that the United States could reinstate its own safeguards if the Government concluded that IAEA safeguards were not being effectively implemented. However, the U.S.-EURATOM agreements do not provide the United States with safeguards rights. The fact that the United States has a treaty obligation under the Non-Proliferation Treaty to use and support IAEA safeguards adds to the confusion. Also, U.S. officials point out that threatening to reinstate U.S. safeguards would have major political repercussions.

In our opinion, the differing language of the various agreements, coupled with a U.S. treaty obligation under the NPT, raises practical questions which should be studied as to the circumstances under which the United States could or would reinstate its safeguards.

Extending rights

The agreements do not specifically provide for extending U.S. safeguards over U.S.-supplied materials and equipment beyond the expiration date of the agreements. Although U.S. officials contend that safeguards rights extend indefinitely beyond agreement expiration dates, a foreign country could argue that U.S. rights expire with the agreement. As of December 1975, eight nations whose agreements for cooperation have expired had small amounts of U.S.-supplied enriched uranium and/or plutonium. Although this material is still subject to international safeguards, the residual U.S. safeguards rights appear open to question.

To date, no problems have arisen along these lines. However, this matter was of apparent concern to U.S. officials who exchanged notes with the Government of Greece in July 1974 to insure mutual understanding that the safeguards and guarantees contained in their expired agreement for cooperation would remain in effect pending the entry into force of a new agreement. Ten of the agreements for cooperation with individual countries currently in force will expire within the next 5 years. Although the materials under these agreements will continue to be safeguarded, some effort should be made to promptly clarify U.S. safeguards rights before the expiration of any of these agreements.

CONCLUSIONS

Because U.S. agreements for cooperation are the implementing documents for U.S. participation in international peaceful nuclear cooperation, it is important that they contain adequate controls to ensure against such cooperation becoming a vehicle for foreign nuclear weapons development.

We endorse the concepts of additional controls proposed by the executive branch. We believe the provision for the plutonium buy-back option may be warranted where regional conflicts pose particular dangers. However, the

economic, political, and environmental ramifications of implementing such a provision should be fully explored before deciding whether it should be extended to other agreements.

We identified three other issues specifically related to U.S. safeguards rights: (1) the lack of residual U.S. safeguards rights when large amounts of nuclear material and equipment are exported to other countries through international organizations, (2) the question of when the United States could or would reinstate its own safeguards, and (3) whether U.S. safeguards rights extend beyond the expiration dates of agreements.

AGENCY COMMENTS

The State Department commented that it would not be productive to attempt to identify in advance, within the large variety of possible situations, those cases for which the United States could or would reinstate U.S. safeguards. State added that attempting to do so could seriously undermine the credibility, and full acceptance by other nations, of IAEA safeguards. (See app. VII.)

RECOMMENDATIONS

The Energy Research and Development Administration, together with the Department of State, should:

- Develop specific criteria and provide the Congress, in a classified form if necessary, a thorough assessment of the bases and circumstances under which the United States could or would exercise its right to reinstate U.S. safeguards, including an analysis of the legal, political, and economic aspects.
- Work toward the mutual understanding of all parties to agreements for cooperation with the United States that U.S. safeguards rights specified in the agreements extend indefinitely beyond the expiration dates of the agreements.

In negotiating new agreements for cooperation and in revising or extending existing ones, the United States should strive to strengthen the agreements to provide for the strongest, most uniform position on the control of U.S. nuclear material and equipment supplied abroad for peaceful purposes. Accordingly, we recommend that all new agreements:

- Expressly prohibit the use of U.S. nuclear exports and any nuclear material produced through their use for any nuclear explosive device, regardless of its intended use.
- Require recipient countries to implement country-wide acceptable physical security programs.
- Require specific U.S. approval on where highly enriched uranium and plutonium may be stored and fabricated.
- Prohibit the use of any U.S.-supplied technology in future facilities built by a country unless covered by appropriate safeguards.

In addition, Energy Research and Development Administration and State Department officials should explore the possibility of amending existing agreements to reflect the most effective precautions against nuclear weapons proliferation.

MATTERS FOR CONSIDERATION
BY THE CONGRESS

We recommend that the Congress prohibit further commitments of substantial amounts of plutonium, enriched uranium, or nuclear equipment to other countries under U.S. agreements for cooperation with international organizations without reserving U.S. safeguards rights as a fallback to international safeguards. The Congress may wish to seek the assistance of the executive branch and the Nuclear Regulatory Commission in establishing criteria for materials and equipment provided in this manner.

CHAPTER 3

INTERNATIONAL NUCLEAR SAFEGUARDS

The term "safeguards" within the international context refers to a system of inspection and verification which, when applied to one country's nuclear activities, will provide assurance to other countries that nuclear material is not being diverted for non-peaceful purposes. The IAEA safeguards are designed only to detect diversions of nuclear material on a national level, and it is assumed that member nations will protect such material from terrorist or subnational groups. The principle of such safeguards is that the risk of early detection and unmasking in the world community will deter a would-be diverter.

International safeguards mean material accountability complemented by containment devices and surveillance. The task is to apply such safeguards with a high degree of reliability and assurance within acceptable cost limits and without unduly interfering with commercial operations.

The detection capability is greatly hampered by limits and constraints on the scope of the safeguards systems. International safeguards must be improved to provide a stronger deterrent to nuclear weapons proliferation. Technical, financial, and political problems must be overcome. Sanctions against nuclear violators should be strengthened.

INTERNATIONAL SAFEGUARDS PROGRAMS

International safeguards are currently being applied to U.S.-supplied nuclear material and equipment by the IAEA and EURATOM and, bilaterally, by the United States. IAEA safeguards are divided into two categories--those under NPT and those under non-NPT agreements.

The following chart shows the amount of U.S.-supplied plutonium and enriched uranium subject to safeguards programs as of December 31, 1975.

<u>Safeguards applied by</u>	<u>Plutonium</u>		<u>Enriched uranium</u>	
	<u>Kilograms</u>	<u>Percent</u>	<u>Kilograms</u>	<u>Percent</u>
United States	2	a/	378	a/
EURATOM	1,060	46	2,323,662	44
IAEA:				
NPT	18	a/	540,924	10
Non-NPT	634	28	2,180,724	42
Other b/				
United Kingdom	602	26	202,068	4
Uruguay	c/		16	a/
Iraq	c/		-	
	<u>2,316</u>		<u>5,247,772</u>	

a/ Less than 1 percent

b/ Safeguards applied only by recipient country

c/ Less than 1 kilogram

U.S. safeguards

Since the first agreement for cooperation went into effect in 1955, the United States has required that all U.S. nuclear material, equipment, and devices supplied to other countries under agreements for cooperation be used only for peaceful purposes. To insure such use, the United States has typically included necessary provisions in the agreements for the right to verify these peaceful uses.

U.S. bilateral safeguards primarily provide for (1) review of records and reports showing receipt, production, consumption, transfer, use, and location of U.S.-supplied nuclear material and (2) onsite, independent verification of these records through physical inventory inspection. They do not call for review and evaluation of physical security measures used to protect U.S.-supplied material and equipment. Since 1959, the United States has conducted about 1,000 bilateral inspections in 28 countries in Europe, South America, and the Middle and Far East. 1/

Although the United States currently has bilateral agreements for cooperation with 28 countries, it has substantially phased out its bilateral safeguards program in favor of IAEA and EURATOM programs because:

- The concept of maintaining bilateral controls was considered unworkable in the long term.
- Safeguards applied by an international organization may be viewed globally as more credible than bilateral safeguards, particularly when supplier and recipient countries are close allies.
- Bilateral safeguards give the supplier country greater assurance that the material it supplies will not be diverted, but give no assurance for materials supplied by others.
- It would be more expensive, in the aggregate, for many supplying countries to establish duplicative inspection systems than for an international organization to do the job.
- Politically, safeguards applied by an international organization are preferable.

(App. IV compares IAEA and U.S. domestic safeguards requirements.)

1/ Our Feb. 9, 1976, report, "U.S. International Nuclear Safeguards Rights--Are They Being Effectively Exercised?" (ID-76-21, classified CONFIDENTIAL), deals with these inspections in more detail.

IAEA safeguards

The United States, recognizing the advantages of having IAEA apply safeguards, has actively worked in the development of the IAEA safeguards program.

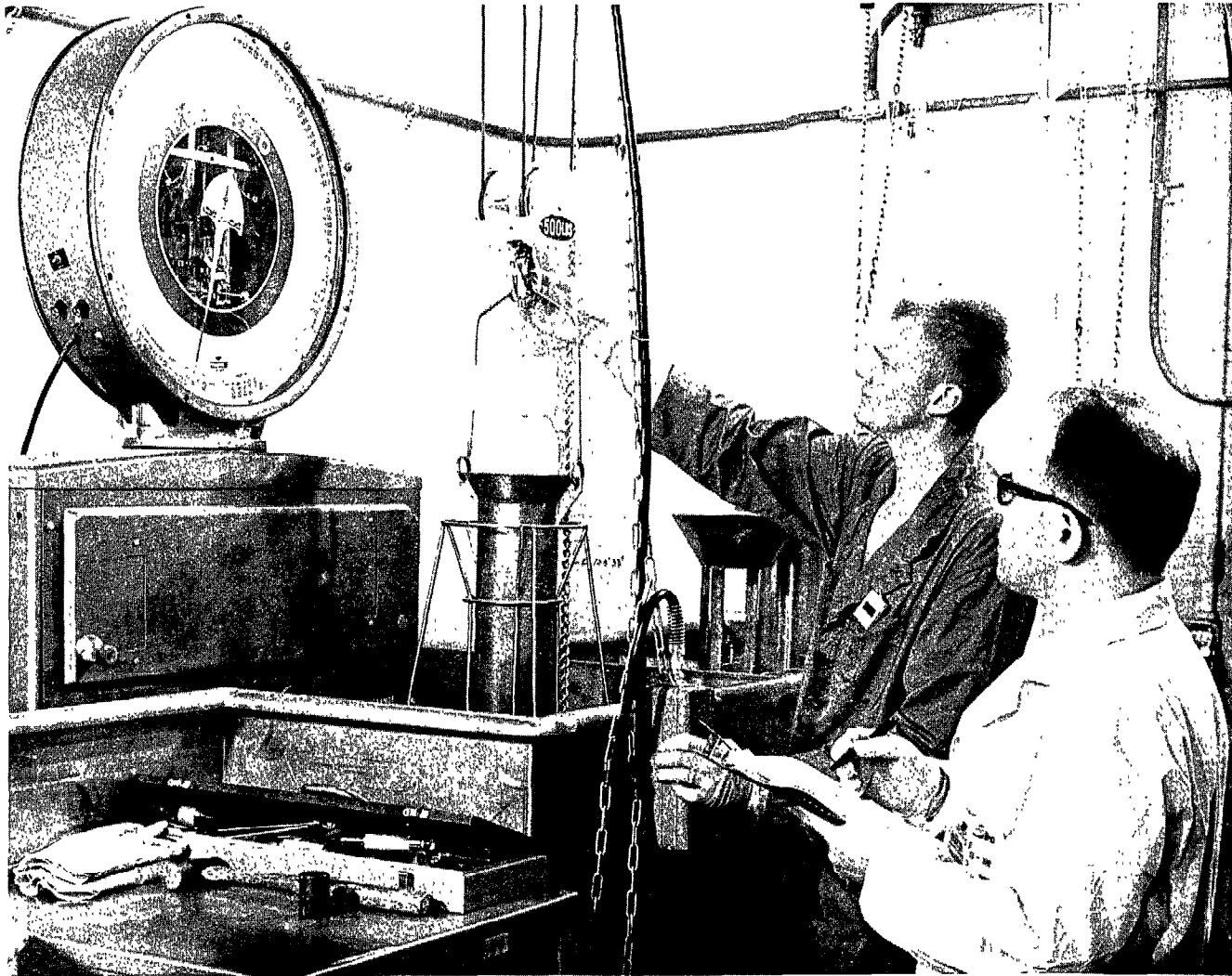
In 1963, the United States and Japan--a bilateral partner--signed an agreement to transfer to IAEA the responsibility for safeguarding U.S. material and equipment supplied to Japan. This was the first tri-lateral safeguards transfer agreement. Since that time, the safeguards functions of most U.S. bilateral cooperative agreements have been transferred to IAEA. Generally, under these agreements, only specific individual nuclear facilities and material are subject to IAEA safeguards.

In 1970, the Non-Proliferation Treaty gave IAEA principal responsibility for carrying out safeguards provisions in non-nuclear weapons countries that were party to the Treaty. As of June 1976, 95 such NPT countries have agreed in principle to permit IAEA inspections of all their peaceful nuclear programs. The United States, United Kingdom, Soviet Union, France, and People's Republic of China, 1/ which have nuclear weapons, are not required to accept international safeguards but may voluntarily accept them.

To demonstrate to non-nuclear weapons countries that NPT safeguards would not represent an excessive burden or put them at a commercial disadvantage, the United Kingdom and the United States have offered to subject to IAEA safeguards their nuclear facilities not associated with national security.

The NPT safeguards system is consistent with and contains the same basic elements as the earlier non-NPT safeguards system. The main difference is that IAEA's earlier system is primarily facility-oriented while the NPT system, with some exceptions, is designed to safeguard all peaceful nuclear material and facilities within a country.

1/ France, the People's Republic of China, and India, which exploded a nuclear device in 1974, have not signed the Treaty. India is not a nuclear weapons state under the definitions given in the NPT.



(CREDIT ERDA)

**IAEA SAFEGUARDS INSPECTORS WEIGH NUCLEAR MATERIAL
AS PART OF INVENTORY VERIFICATION**

NPT adherents are not required to be members of IAEA, and IAEA members are not required to become parties to the NPT. As of June 1976, a total of 28 nations that had signed, acceded to, or ratified the Non-Proliferation Treaty were not members of IAEA, and 27 IAEA members had not signed, acceded to, or ratified the NPT. (See app. V for the status of individual nation's participation in the NPT and app. VI for a list of IAEA member nations.)

EURATOM safeguards

The United States has supported the development and operation of the European Atomic Energy Community safeguards system because it spread acceptance of the idea of international safeguards and demonstrated the feasibility of operating such a safeguards system. The EURATOM safeguards system is mandatory for its nine member countries and has the same basic elements--material accounting and inspection--as the U.S. bilateral program. The United States developed a special safeguards relationship with EURATOM which recognized EURATOM's unique regional control responsibilities and supranational characteristics and the strong political interest in support of the European integration movement.

Although all EURATOM countries are IAEA members and all but France are parties to the Non-Proliferation Treaty, nuclear facilities in EURATOM countries, except Denmark's, are not subject to IAEA safeguards. Pursuant to the Non-Proliferation Treaty, EURATOM and IAEA have negotiated but, as of July 1976, not implemented an agreement providing for IAEA verification of the findings of the EURATOM safeguards system in its non-nuclear weapons countries.

Information is not readily available on the total number of nuclear facilities not subject to IAEA, EURATOM, or U.S. bilateral safeguards. However, several IAEA member non-nuclear weapons countries, including Argentina, Egypt, India, Israel, Spain, and South Africa, have nuclear facilities which are not known to be internationally safeguarded.

LIMITS ON INTERNATIONAL
SAFEGUARDS PROGRAMS

In addition to the fact that several facilities in non-NPT countries are not under international safeguards programs, there are also limits and constraints on international safeguards as they are applied.

- International nuclear safeguards programs are designed to detect and, hopefully, deter diversions of nuclear material on a national level, not to prevent them. The host country is responsible for protecting nuclear material from terrorist or subnational groups.
- IAEA safeguards do not include safe international transport of nuclear material, physical security reviews, or controls over nuclear waste.
- Even under NPT agreements, the safeguarded country can exempt some nuclear material and equipment from IAEA safeguards. Under U.S. agreements for cooperation a country cannot exempt U.S.-supplied material.
- U.S. bilateral safeguards are generally limited to U.S.-supplied material and equipment and do not cover replications of U.S. technology.
- IAEA safeguards under agreements with non-NPT countries specifically preclude "furthering any military purposes." Some countries, however, interpret this as not precluding development of peaceful nuclear explosives.
- The U.S. bilateral program, IAEA, and EURATOM have no authority to implement physical protection measures, such as armed guards or fences, in their safeguarded activities or to pursue and recover nuclear material.
- IAEA and U.S. inspectors do not have unlimited access on their inspections.

--International nuclear inspectors, even under NPT agreements, have no authority to seek out possible undeclared or clandestine facilities or stockpiles of nuclear material. 1/

We are not implying that these limitations could be overcome, but rather showing that international safeguards by themselves are not a panacea for halting nuclear proliferation or nuclear terrorism or sabotage.

Limited sanctions

Typically, if a country does not comply with the terms of an agreement for cooperation, the United States can suspend or terminate the agreement and require the return of any materials, equipment, or devices supplied.

Sanctions available to EURATOM include

- warnings;
- withdrawing special advantages, such as financial or technical assistance;
- placing the facility under the administration of a person or board appointed jointly by EURATOM and the country having jurisdiction over the facility; and
- withdrawing, completely or partially, nuclear materials.

If IAEA is not able to verify the nondiversion of special nuclear material, the country involved is to be given a "reasonable time" to take corrective action before procedures for noncompliance may be initiated. Such procedures may include notification to member countries and to the U.N. Security Council and General Assembly. Continued failure by the country to rectify the situation may also result in the recall of IAEA-sponsored material and technical assistance and in suspension of membership rights and privileges. It is not clear, however, how nuclear material would be retrieved if the country was unwilling to voluntarily return it.

1/ Our July 3, 1975, report, "Role of the International Atomic Energy Agency in Safeguarding Nuclear Material" (ID-75-65), discusses IAEA safeguards activities.

According to one State Department official, agreement among IAEA member nations to strengthen the sanctions is not negotiable, since it would require commitments to take specific and, presumably, serious actions against other governments under circumstances which cannot be adequately defined in the abstract. The official commented that it may be extremely difficult, for example, to reach a concensus in advance on what constitutes a violation, how it would be verified that one had occurred, or what sanctions would be appropriate in a given set of circumstances. Most nations would want to preserve a wide measure of national discretion for deciding these matters as specific cases arise.

We believe that efforts to strengthen such sanctions should not be prejudged as non-achievable. If IAEA can now adequately determine what constitutes a violation, then reaching a concensus on what constitutes a violation should not be a problem in the future. Presumably IAEA would not now report a violation without the proper verification. We believe sanctions should be de-politicized; if any country diverts or helps another to develop or obtain material to fabricate nuclear explosives, the sanctions, or at least minimum sanctions stronger than mere disclosure, should be predetermined. When and if a specific case arises, the countries would still have much national discretion to apply added penalties or sanctions.

SAFEGUARDS PROBLEMS

Safeguards problems identified by U.S. and IAEA officials fall into five general areas--material accountability, technical limitations, financing, political attitudes, and availability of qualified safeguards inspectors. They are not specifically attributed to any particular country or facility and in a few cases reflect anticipated rather than current problems. U.S. officials indicated that they are seeking solutions to these problems and that they support efforts to strengthen safeguards.

Material accountability

Verification of national and facility material accountability records is a primary safeguards function. IAEA can independently verify the integrity of nuclear materials but makes extensive use of national accountability systems to carry out its safeguards responsibilities.

Inventory verification by inspectors is hampered to the extent that country or facility material accountability records may be incomplete or inaccurate. The form required for the accounting records is generally left to the discretion of facility operators as long as the records include certain basic information.

Some problems have been encountered by IAEA because of differences in internal reporting systems between facilities and the national system; others occur because national systems do not fully interface with the corresponding international system. In addition, some countries are slow to report the receipt and/or export of nuclear material. IAEA specifies the frequency of inventory reporting but assumes that facility operators will take physical inventories as necessary and does not insist on standards of frequency for them. If the timing called for by the country's safeguards program is felt to be inadequate, IAEA might request that the frequency be increased.

A major concept which IAEA has given special emphasis under the Non-Proliferation Treaty is that each country should establish its own system to account for and control all nuclear material and to interface with the IAEA system. IAEA safeguards are then applied in such a way as to verify the country's national accountability system. Although alternative techniques for compiling and verifying data may offset some of the problems, IAEA will probably encounter difficulties until adequate national systems are fully implemented.

ERDA commented that IAEA is developing a training course on national accounting systems for member nations, especially developing countries engaged in or planning nuclear power programs.

Technical limitations

After accountability records have been reviewed, the remaining inspection itinerary is planned so that onsite verification of records can be made with minimal interference to facility operations. A physical inventory is conducted to independently verify whether the material on hand agrees with the reported figures.

Measuring nuclear material involves the isotopic content as well as the quantity of the material. The nuclear material subject to safeguards is in many different forms, including highly radioactive material. This factor and the physical location of the materials within the facility have an important bearing on how effectively a physical inventory can be taken and on verification techniques that can be used.

In some situations, the exact quantity of nuclear material or its isotopic content cannot be accurately determined, and various assumptions or observations must be made to verify the material on hand. According to an Energy Research and Development Administration official, the most cost effective approach must be determined, considering the importance of the material quantitatively and qualitatively, the uncertainty of these amounts, and the time and technical capability required for verification.

There are technical limitations on the accuracy of current measuring instruments. Since 1968, the U.S. Arms Control and Disarmament Agency (ACDA) has awarded about \$3.3 million in contracts to U.S. firms and Government agencies for research on safeguards instrumentation and techniques based on needs developed and identified by IAEA. Yet instrumentation has not been developed for measuring materials, such as spent fuel elements and sludge from chemical reprocessing, which lend themselves to sampling and evaluation only at a laboratory.

Additional technical problems of safeguarding enrichment and reprocessing facilities and new technologies, such as the breeder reactor, will be encountered as these technologies spread throughout the world. The State Department commented that the technical problems have been greater than anticipated, but with more research and development, they will be resolved.

Financing problems

Safeguards financing, particularly between developed and developing countries, has been a key issue facing IAEA. Costs will undoubtedly increase appreciably as more inspectors and more advanced techniques and equipment are needed to keep pace with rapidly expanding nuclear activities worldwide. In 1975, IAEA budgeted its safeguards costs at \$4.8 million out of a total Agency budget of about \$35 million. Adding to the financial problems will be the implementation of the IAEA-EURATOM safeguards agreement and the offers of the United States and United Kingdom to subject to IAEA safeguards their nuclear facilities not associated with national security.

Political attitudes

Some political problems exist today and others may develop in the future over what international inspectors can and cannot do in sovereign nations. For example, in negotiating safeguards agreements, some countries may place more restrictions on how safeguards are to be applied than will others. Also, interpretations of agreements differ between IAEA and some countries, particularly under earlier safeguards agreements which contain less specific details than do those under NPT. The IAEA Director General has made a public declaration that IAEA safeguards under non-NPT agreements are aimed at precluding development of peaceful nuclear explosions, but some countries believe their agreements do not preclude such explosions.

It is not clear at what point IAEA implementing procedures might conflict with national sovereignty and what would happen should IAEA try to compel full compliance with all its standards. IAEA does not always require strict compliance with NPT implementing standards because it does not want to frighten off potential NPT adherents by establishing burdensome requirements.

Staffing and training of safeguards inspectors

According to the IAEA Statute, in recruiting a competent staff, including inspectors, "due regard shall be paid to the contributions of members to the Agency and to the importance of recruiting the staff on as wide a geographical basis as possible." At the time of our re-

view, IAEA had 40 inspectors to safeguard about 400 facilities throughout the world. A few inspectors were from member countries that have no nuclear activities or programs.

Because of differences in inspectors' backgrounds, country preferences, and IAEA practices, the following staffing and training problems have arisen.

- Safeguards inspectors must be accredited to the country they are to inspect, and the country has the opportunity to accept or reject each inspector. Some countries hamper IAEA safeguards activities by not accrediting as many inspectors as IAEA may deem desirable.
- Some inspectors, although academically qualified, have limited practical experience in nuclear facilities or safeguards and require a long period with IAEA before becoming fully effective. Because some of these same inspectors stay with IAEA for only a few years, their useful contribution is limited.
- Many inspectors obtain much of their training on the job. However; some personnel have participated in safeguards training courses in the United States and IAEA hopes to have a comprehensive program underway in the near future.
- No overall philosophical approach to safeguards has been developed; some inspectors take an adversary approach in applying safeguards while others take a more lenient approach. One IAEA official stated that if the adversary approach were pushed too hard, countries would be less inclined to cooperate or might not cooperate at all.
- According to the State Department, IAEA is adequately staffed for inspecting reactors but is not currently inspecting any enrichment or reprocessing facilities.
- Recruiting staff on as wide a geographical basis as possible has occasionally placed individuals in positions for which they were either underqualified or overqualified.

--As nuclear activity expands, recruiting qualified inspectors at salaries commensurate with IAEA resources may be difficult, especially if competition for the limited number of qualified inspectors between IAEA and national safeguards systems becomes keener.

According to a 1972 report to the Secretary of State, the IAEA staff, with few exceptions, has been composed of high quality individuals. However, a more recent study conducted for the Energy Research and Development Administration concluded that:

"Few states (particularly less developed countries) have large numbers of experienced personnel from which the Agency may draw, and the present two-year terms for appointments as inspectors hardly provide the inspector with sufficient background and training to become an efficient and effective contributor to the safeguards program. Hence it is difficult to obtain a truly international inspection team, which may create some difficulties with nationals of one nation inspecting their own, or their allies', or rival nations' facilities. The salaries are generally too low to attract the most talented personnel from the advanced states, but are quite attractive to the less developed nation's personnel, who in turn are anxious to serve but are not necessarily well skilled." 1/

In response to this study, ERDA points out that IAEA is not limited to retaining inspectors for only 2 years. If an individual performs satisfactorily, he is offered a second 2-year contract. At the end of the 4th year, he may be offered a 5-year contract. ACDA added that most inspectors stay for at least 4 years and a substantial number stay much longer.

1/ "LDC Nuclear Power Prospects, 1975-1990: Commercial, Economic, and Security Implications," R.J. Barber Associates, Inc. (ERDA-52; UC-2).

ERDA also believes that, although developing countries are likely to have fewer experienced candidates for posts in IAEA's Department of Safeguards and Inspections, there have been sufficient numbers available to assure a wide representation. As of January 1976, 36 nations were represented in this department. ERDA further commented that inspectors from developing countries are not necessarily less qualified than inspectors from developed countries; in many cases they attended the same educational institutions. In addition, ERDA indicated that salaries are no impediment to IAEA in attracting and retaining qualified personnel; they are based on salaries paid by the U.N. Secretariat and are comparable to U.S. Civil Service salaries.

EFFORTS TO CORRECT SAFEGUARDS PROBLEMS

U.S. officials, believing that reinstating U.S. bilateral safeguards is not a rational alternative to strengthening IAEA safeguards, have been working diligently on safeguards with IAEA. To help IAEA keep pace with worldwide growth of nuclear activities, many member countries, including the United States, develop safeguards instrumentation, including measuring equipment, and surveillance and passive containment devices at little or no cost to IAEA.

IAEA is continually developing and refining safeguards techniques and has devoted extensive effort to producing standards of application and alternative means of applying safeguards. For example, it recently initiated a program to prepare a "Safeguards Implementation Practices" document for each safeguarded facility which, among other things, analyzes material diversion possibilities and notes any inspection limitations or shortcomings due to facility design, instrumentation, legal agreements, and degree of country cooperation. To date, these documents have been prepared for a limited number of facilities.

Various U.S. officials have pointed out where the United States can and should intensify its efforts to constructively influence IAEA safeguards, including:

--Training IAEA inspectors.

--Helping in the research and development of new and better safeguards techniques and equipment.

- Working closely with IAEA staff to identify problems and find solutions.
- Giving high priority to staffing the IAEA safeguards department with competent U.S. safeguards experts.
- Undertaking cooperative U.S.-IAEA safeguards experiments and development programs.
- Making extensive use of U.S. experts and advisors in all areas of IAEA safeguards.
- Using U.S. gifts-in-kind to further strengthen IAEA safeguards.

Despite these efforts, problems do exist and probably will continue as nuclear activities grow. In this respect, ERDA in its Final Environmental Statement on Nuclear Power Export Activities, (ERDA-1542) dated April 1976, concluded:

"As the volume of material increases and as the facilities elsewhere in the world grow in their technical complexities, improvements in safeguards equipment, as well as increases in staffing, frequency of inspection, and funding of the IAEA system are, and will continue to be needed. A high level of U.S. financial, diplomatic, and technical support will continue to be necessary. U.S. involvement in and support of the IAEA is essential if the U.S. is to continue to have a positive influence on the safeguards policies and programs of the Agency."

CONCLUSIONS

At the present time, the challenges to safeguards are great. Rapid worldwide nuclear growth is expected, and international safeguards will be tasked to respond. Instrumentation and techniques will need to be developed and refined and adequate numbers of qualified inspectors will need to be recruited. Political solutions and compromises with participating nations and facility operators must be found, together with an equitable means for financing the increasing costs of inspections and sophisticated equipment.

In implementing safeguards systems, a broad range of technical and procedural applications is possible, from occasional visits involving minimal cursory efforts to a strong, independent technical program of verification. We believe it is imperative that international safeguards be applied effectively, fairly, and consistently in all countries if such safeguards are to be considered reliable. Despite the current efforts to strengthen IAEA safeguards, we believe more can and should be done.

AGENCY COMMENTS

ERDA officials commented that:

"It is the judgement of U.S. and foreign safeguards experts that IAEA safeguards system will provide timely detection of diversion and thus make an important contribution to deterring diversion. However, the United States recognizes that improvements are both necessary and possible, in light of the Agency's growing safeguards responsibilities, and the United States and other countries are working closely with the Agency to ensure that it possesses not only the necessary technical and financial resources, but also the political support to carry out its responsibilities effectively."

The Department of State added that efforts to increase the effectiveness of IAEA safeguards are being pursued in a manner consistent with the fact that countries have accepted IAEA safeguards voluntarily and must be persuaded of their own interests in these matters before they will accept tighter safeguards controls. (See app. VII.)

NRC fully agreed that the IAEA safeguards system must be strengthened to keep abreast of expanding nuclear energy programs and that many challenges beset this goal, including several noted in this report. However, NRC believes the IAEA safeguards system is not inadequate to the tasks it is performing. (See app. VIII.)

NRC questioned whether the IAEA was the proper forum for consideration of additional sanctions and noted that interested nations and/or the United Nations might

take action deemed appropriate. ERDA officials informally added that the United States as well as other countries could undertake a broad spectrum of actions ranging from diplomatic and economic to military measures.

RECOMMENDATIONS

The Department of State, after consultations with the Energy Research and Development Administration, the Arms Control and Disarmament Agency, and the Nuclear Regulatory Commission, should propose that the International Atomic Energy Agency:

- Reemphasize to member nations that national and facility material accountability systems should easily interface with the IAEA system.
- Conduct a thorough analysis of its financing problems to determine future actions necessary to ensure that sufficient funds are available to finance an adequate safeguards program, especially with the addition of EURATOM facilities and those expected in the United States and the United Kingdom.
- Seek strict compliance in all countries with safeguards-implementing procedures and uniformly enforce such procedures.
- Implement, as soon as practical, its plan for an independent comprehensive safeguards training program for inspectors.
- Establish standards for the number of inspectors needed for effective and efficient inspections and have each country accredit enough inspectors to meet these standards.

In addition, the Department of State should urge IAEA member nations to establish adequate sanctions against countries that divert nuclear material in order to fabricate explosive devices or that knowingly supply material or technology to another country for developing nuclear explosives.

CHAPTER 4

U.S. RELIANCE ON INTERNATIONAL SAFEGUARDS

The United States has been promoting the concept of international safeguards throughout the world and has played an important role in the development of current IAEA procedures, methods, instrumentation, and techniques. It is, therefore, imperative that the United States exercise leadership in ensuring the reliability of international safeguards and that all nations receive sufficient assurances that their trust in these safeguards is not misplaced.

From our review of executive branch records and limited first-hand observations, we believe the United States does not have adequate assurances that international safeguards inspections are being adequately carried out.

CONFIDENCE IN IAEA SAFEGUARDS

In February 1972, a panel established by the Secretary of State to review U.S. policy objectives toward the International Atomic Energy Agency concluded that a weak or marginal safeguards system would probably be worse than no safeguards at all because it would further a false sense of security.

In our opinion, the United States does not possess sufficient information to judge the adequacy of the current IAEA system. According to ERDA officials, the United States now uses the following methods for monitoring IAEA safeguards abroad:

- Information on IAEA inspections and exercises in the United States, although no detailed analyses of these inspections are made.
- Observations by ERDA officials who visit foreign nuclear facilities for purposes unrelated to IAEA safeguards and have incidentally seen IAEA seals and automatic cameras in use.
- Services provided by ERDA to the IAEA safeguards program, such as chemical analysis of samples taken by an IAEA inspector.

--Overview information from U.S. membership in IAEA advisory committees.

--Data from the U.S. Mission to IAEA.

--Frequent discussions between U.S. safeguards experts and their IAEA counterparts on a wide variety of problems experienced by IAEA.

--The U.S. technical training given to some IAEA inspectors.

--Use of U.S. research and development resources and staff to help solve IAEA problems.

The United States must rely on these indirect methods of obtaining information. IAEA is committed to restrict dissemination of inspection information, ^{1/} so neither the United States nor any other nation has access to IAEA inspection results. According to one State Department official, a nuclear supplier, even one that has transferred its bilateral safeguards responsibilities to IAEA, can get few details of the precise status of material it supplied.

The IAEA also keeps other potentially sensitive information confidential and protects it from further dissemination. For example, its Subsidiary Arrangements and Facility Attachments documents which detail the procedures for implementing safeguards are kept confidential.

Assuring member nations and the world at large that safeguards are effectively, fairly, and consistently applied while retaining the necessary confidentiality of inspection results is one of IAEA's most difficult problems. Thus far, it has published only limited information on safeguards implementation. ERDA advised us that IAEA has only once given the United States information on inspection results, and then only with the consent of the inspected nation in conformity with IAEA procedures.

^{1/} In response to the concerns of many nations that safeguards would result in the disclosure of industrial secrets or commercially sensitive information, IAEA, since its creation, has prohibited the publication or communication of information obtained in connection with safeguards implementation.

The IAEA Statute requires that the Director General report any detected material diversion or suspicious loss to the Board of Governors, but no diversion or loss has ever been reported. U.S. officials indicated they are confident such events have not occurred; however, the mere fact that IAEA has never reported a diversion is not sufficient assurance to some nations. IAEA admits that its safeguards will never be considered effective by all nations merely because it says everything is satisfactory.

The R. J. Barber Associates report prepared for the Energy Research and Development Administration (ERDA-52; UC-2), stated that:

"In the case of a suspected diversion by a national government the response to such an accusation would be extremely difficult. It is unlikely that an international inspector will ever witness a diversion; all he will have to go on will be indirect evidence--discrepancies between the suspect nation's domestic accounting system and the audit of the international inspectorate, breakdown in remote observation equipment, or suspicious procedural roadblocks in the way of international inspection. The nation involved could argue that such discrepancies were due to human error, mechanical failure, or normal process losses--and it could well be correct. In such an uncertain atmosphere, the IAEA would be very hesitant in making public accusations."

ERDA officials, fully backing the international organization they were instrumental in developing, believe IAEA safeguards are being adequately implemented. However, the U.S. Mission to IAEA and IAEA officials generally concede that the safeguards are not foolproof and that a country could circumvent them if it was willing to assume the risk of detection, incur the expense, and take the trouble to do so.

CONFIDENCE IN EURATOM SAFEGUARDS

The U.S.-EURATOM Agreements for Cooperation do not specifically provide that any diversions or suspicious losses detected by EURATOM safeguards inspectors must be

reported to the United States. Therefore, the United States has no guarantee that such losses or diversions of U.S.-supplied nuclear material have not occurred. U.S. officials advised us that if EURATOM failed to maintain safeguards in accordance with the U.S.-EURATOM Agreements for Cooperation, the United States would terminate further assistance under that agreement. According to ERDA, however, the United States does not currently verify that EURATOM safeguards are effectively implemented or receive the results of EURATOM inspections.

The agreements do state the intention of the United States and EURATOM to conduct frequent consultations and exchanges of visits to assure that EURATOM safeguards and control systems effectively meet the responsibility and principles stated in the agreements and that the standards of the material accountability systems of the United States and EURATOM are kept reasonably comparable.

Accordingly, a joint U.S.-EURATOM Technical Working Group was established to verify by mutually approved scientific methods the effectiveness of EURATOM safeguards applied to U.S.-supplied nuclear material. This Working Group, however, has not met since 1970. ERDA officials advised us that it has been replaced by U.S. technical exchanges between individual nations or within IAEA consultant groups, panels, and symposia. Less technical information is exchanged through the U.S. Mission to the European Communities. Consequently, no joint U.S.-EURATOM effort is being made to verify the effectiveness of EURATOM safeguards. In our opinion, this situation should not continue in view of the fact that a large amount of U.S. nuclear material supplied to foreign countries is subject to EURATOM safeguards.

OBSERVATIONS OF INTERNATIONAL INSPECTIONS

To obtain firsthand information on the adequacy of international safeguards, a GAO representative accompanied a U.S. inspector in October 1974 to nuclear facilities overseas which were subject to EURATOM safeguards. The representative also observed in February 1975 an IAEA inspection of Japanese-owned plutonium being stored at the Westinghouse Nuclear Center in Cheswick, Pennsylvania.

Our specific observations and opinions of the adequacy of these inspections, classified CONFIDENTIAL by ERDA and the Department of State, are contained in our February 9, 1976, report, "U.S. International Nuclear

Safeguards Rights--Are They Being Effectively Exercised?" (ID-76-21). Although examples mentioned in this classified report may be isolated cases, they point out the possibility that the United States may be relying on international safeguards inspections that may not be adequately carried out.

U.S. EFFORTS TO OBTAIN GREATER ASSURANCES OF SAFEGUARDS EFFECTIVENESS

U.S. officials are seeking further assurances of the effectiveness of international safeguards. For example, in October 1974 the United States sought to review with the International Atomic Energy Agency its implementation of safeguards responsibilities transferred to it by the United States, the results of such activities, and future IAEA activities that will be required. These consultations were underway, but as of July 1976 the final outcome was still uncertain. State commented that this U.S. request has been overtaken by IAEA's progress in meeting the more general U.S. request that information on safeguards be given to the IAEA Board of Governors.

In November 1974, the Acting Director of ERDA's Division of Safeguards and Security indicated that consultations on a wide range of issues, including placement of seals and physical protection activities, could be carried out within the context of a reconstituted U.S.-EURATOM Joint Technical Working Group pursuant to the U.S.-EURATOM agreements. U.S. officials met with EURATOM representatives in Washington, but no Working Group consultations have yet been held. The current Director of ERDA's Division of Safeguards and Security believes such consultations could be carried out through bilateral discussions or within IAEA channels after Non-Proliferation Treaty safeguards are in force.

U.S. officials point out that EURATOM and IAEA have negotiated, but not yet implemented, an agreement providing for future IAEA verification of the findings of the EURATOM safeguards system in its non-nuclear weapons countries. Once the EURATOM-IAEA safeguards agreement enters into force, U.S. officials believe any diversions or suspicious losses would be reported through IAEA.

ERDA officials advised us that they analyze intelligence information on the overall effectiveness of international safeguards. They gave us a classified document summarizing the objectives and scope of ERDA's program but declined to give us the results of this program because of the nature and source of the information.

IAEA EFFORTS TO MAKE MORE SAFEGUARDS INFORMATION AVAILABLE

The IAEA is contemplating changes to make more information available to assure member nations that safeguards are effective. For example, it is considering a process, within its Department of Safeguards and Inspections, for internally reviewing inspection results. It also plans to make available to members the safeguards technical manual explaining how inspections are carried out in particular types of facilities.

Other nations want further assurance. For example, Japan has been seeking assurance that safeguards will be applied in a nondiscriminatory manner. In line with requests for such assurance, an IAEA Standing Advisory Group on Safeguards Implementation was established and IAEA is preparing a special safeguards implementation report for its Board of Governors. However, it is not clear how much information could be made available, since IAEA does not normally disclose safeguards information, on the grounds that proprietary information may be divulged.

CONCLUSIONS

The United States has accepted IAEA and EURATOM safeguards standards as satisfying U.S. requirements but, in our opinion, has not taken adequate steps to assure itself that such standards are effectively implemented. Neither IAEA nor EURATOM provide sufficient information for the United States to evaluate safeguards effectiveness.

We recognize the need for continued confidentiality of some sensitive information, but believe the United States can and should obtain greater assurances of the effectiveness of EURATOM and IAEA safeguards because (1) effective international nuclear safeguards are crucial to U.S. and world security and (2) reinstating bilateral safeguards is no rational substitute for positive efforts to evaluate and strengthen international safeguards.

AGENCY COMMENTS

The State Department commented that (1) there is a legitimate basis for the contention that IAEA safeguards are of value even in the absence of an ability to specifically quantify how effective they are, (2) the United States has extensive information on the IAEA safeguards system and its implementation, even though the United States does not receive actual inspection results, and (3) recommendations on obtaining IAEA reports and monitoring onsite IAEA inspections are not realistic in light of the attitudes of other nations. State believes that there are more acceptable and equally effective means of allowing IAEA member states to evaluate Agency safeguards but did not elaborate on these means. (See app. VII.)

ERDA officials informally commented that IAEA is aware of the need to maintain the credibility of safeguards, and that there are grounds for optimism that it will be possible for the IAEA Board of Governors to be provided with sufficient information to permit member states to scrutinize the quality and uniformity of safeguards implementation on a continuing basis.

ERDA advised us that U.S. agreements for cooperation with EURATOM contain guarantees similar to those in agreements with individual nations. It commented further that, since the United States does not apply U.S. safeguards requirements in addition to IAEA safeguards when dealing with individual nations, the United States has not required that additional safeguards be applied with the European allies who constitute EURATOM. (See app. XII.) While we recognize that the guarantees are similar, there is no provision for U.S. onsite inspections in the EURATOM agreements similar to those with individual nations. We also believe it is inappropriate to compare U.S. reliance on IAEA with its reliance on EURATOM, of which the United States is not even a member. In addition, when the IAEA-EURATOM safeguards agreement comes into force sometime in the future, IAEA will be overseeing EURATOM safeguards activities.

RECOMMENDATIONS

To obtain greater assurances that IAEA and EURATOM safeguards are adequately, fairly, and consistently applied, we recommend that the Department of State, with the Arms Control and Disarmament Agency, and Energy Research and Development Administration:

- Request that IAEA lift to the fullest extent possible its restrictions against disclosing information on safeguards effectiveness to member nations.
- Urge the recently convened IAEA Standing Advisory Group on Safeguards Implementation to perform on-site evaluations of IAEA safeguards implementation.
- Propose that IAEA publish an annual report showing by member country the amount of nuclear materials subject to its safeguards and the amount and/or percentage of material which could not be reasonably accounted for during inspections.
- Obtain, with the consent of the inspected nation, IAEA inspection reports for facilities and material supplied by the United States.
- Propose that qualified representatives of nuclear supplier nations be allowed to periodically monitor onsite IAEA inspections with the consent of the inspected nation.
- Evaluate the implementation of IAEA safeguards inspections in the United States.
- Urge that the Joint U.S.-EURATOM Technical Working Group be reconstituted to verify the effectiveness of EURATOM safeguards applied to U.S.-supplied material and equipment until the IAEA-EURATOM safeguards agreement is implemented.

CHAPTER 5

U.S. NUCLEAR EXPORT AND RETRANSFER CONTROLS

IAEA and EURATOM safeguards provide the primary control over U.S. nuclear material and equipment supplied to foreign countries, but the United States, through a series of statutory requirements and procedures, administered by various Government agencies, endeavors to ensure that such exports will not be detrimental to the common defense and security of the United States. However, from our review, we believe the involved agencies should more fully coordinate the various aspects of the peaceful nuclear export control program, and that a focal point for such coordination should be established.

DIVISION OF RESPONSIBILITY

Coordination of the U.S. nuclear export controls program is important since NRC, the Department of Commerce, and ERDA are all responsible for some aspect of the control process. NRC is the primary licensing agency for peaceful nuclear exports and is responsible for licensing most nuclear materials, reactors, and other equipment. Commerce licenses nuclear reactor parts and certain other items. ERDA authorizes nuclear exports made infrequently on a government-to-government basis, approves retransfers of U.S. materials between foreign countries, and is responsible for controlling technology transfers.

The Energy Reorganization Act of 1974 (Public Law 93-438) abolished the Atomic Energy Commission and established the Energy Research and Development Administration and the Nuclear Regulatory Commission. The Congress, by enacting this statute, recognized that it was no longer appropriate for nuclear regulatory functions to be performed by an agency which also had nuclear development and promotional responsibilities. Consequently, the Atomic Energy Commission's licensing and regulatory functions were transferred to the newly created independent Nuclear Regulatory Commission. NRC is now responsible for peaceful nuclear export licensing and must ultimately decide whether the export would be detrimental to the common defense and security of the United States.

The statutory authority of Commerce in this area is the Export Administration Act of 1969, as amended, which gives the Secretary of Commerce authority to control the export of articles, materials, or supplies, including technical data, or other information, for reasons of national security, foreign policy, or domestic short supply. However, this authority is generally not exercised with respect to exports which other departments and agencies are authorized by statute to regulate.

NRC EXPORT LICENSING PROCEDURES

The Energy Reorganization Act of 1974, together with the Atomic Energy Act of 1954 and Part 10 of the Code of Federal Regulations, set forth the responsibilities of NRC in authorizing and licensing exports of natural and enriched uranium, plutonium, radioactive byproducts, and reactors or facilities designed to produce enriched uranium or plutonium.

Under interagency procedures established by Executive Order 11902, NRC forwards copies of the export license applications it receives to the Department of State, which consults such other agencies as ERDA, the Departments of Defense and Commerce, and the Arms Control and Disarmament Agency in developing the "executive branch position" on whether an export will be used exclusively for peaceful purposes and will not be a risk to the U.S. common defense and security.

The Department of State provides information and statements to NRC on (1) the purpose of the export, (2) whether the export is covered by an agreement for cooperation, (3) whether the importing country has accepted and implemented acceptable international safeguards, (4) the acceptability of the importing country's accounting and inspection procedures, (5) the adequacy of physical security arrangements to deal with threats of diversion of significant quantities of nuclear weapons materials, (6) the importing country's position on non-proliferation of nuclear weapons, (7) the importing country's understanding with the United States regarding the prohibition of using U.S.-supplied material in developing nuclear explosives, and (8) other pertinent information.

The NRC then considers this information, together with data developed by its staff, in deciding whether to issue a license. NRC independently verifies some, but not all, of the information provided. For example, an NRC official told us that agreements for cooperation are examined to ensure that the export will be under appropriate safeguards and that on occasion additional information on physical security precautions had been requested.

NRC believes that, although it must rely heavily on the information provided in the executive branch position paper, this is a proper procedure since those involved agencies are able to make integrated policy evaluations concerning international relations and national defense. NRC officials believe it is impractical for them to develop an independent capability for collecting and validating similar information solely for nuclear exports.

Potential problem--regulatory versus foreign affairs authority

The role of NRC in approving nuclear exports has caused some concern because the functions of other regulatory agencies are primarily domestically oriented. A problem could arise if an NRC export license decision did not conform to the "executive branch position," especially if it is related to overriding foreign policy issues.

NRC believes most differences could probably be resolved. However, should irreconcilable differences arise, NRC feels that it has the ultimate decisionmaking responsibility for the issuance of an export license. Other agencies do not fully accept this interpretation on the grounds that the President has the constitutional authority for executing foreign policy.

NRC said that there probably would be few cases where its judgment in issuing an export license would differ from "the executive branch position." Export license transactions fall within the framework of the agreements for cooperation, which are developed by the executive branch and approved by the Congress, and within the President's responsibility for conducting foreign policy. Therefore, NRC officials believe the President's views on foreign policy matters should be given great weight by NRC in making its decisions.

Although there may be only a few cases where NRC would differ from the "executive branch position," such a situation could create a major confrontation and be of a very sensitive nature.

ROLE OF COMMERCE IN
LICENSING NUCLEAR EXPORTS

The Department of Commerce now licenses four general categories of nuclear exports:

1. Radioactive isotopes not produced in nuclear reactors.
2. Specially designed components of nuclear reactors that constitute substantially less than a complete reactor. (NRC licenses complete or essentially complete nuclear reactors).
3. Maritime (civil) nuclear propulsion equipment and technology.
4. Multipurpose items for both military and peaceful nuclear as well as non-nuclear related activities and military uses, such as computers, high-speed cameras, and neutron generators.

Commerce export controls operate on the premise that exports of all items under its jurisdiction require licenses. Some items are under general license, which means that exporters may freely export the items without requiring specific Commerce authorization. Other items, including the above-mentioned nuclear exports, require validated export licenses, which means that Commerce must give prior approval before export shipments may be made.

Nuclear reactor components licensed by Commerce require specific export licenses which are issued only if the components are to be shipped to a country having an agreement for cooperation with the United States or if the facility in which the components are to be used is subject to appropriate international safeguards. ERDA provides Commerce with the necessary assurances regarding the applicable agreements for cooperation and safeguards arrangements.

Nuclear-related commodities not specifically designed for use in reactors may be licensed to countries that do not have agreements for cooperation with the United States, because they can be used for non-nuclear applications and are available from a number of foreign sources. Under certain circumstances, however, special licensing conditions are attached to such multipurpose commodities as reactor-grade zirconium which may be used only in facilities subject to safeguards acceptable to the United States.

In July 1975, Commerce strengthened its regulations on nuclear reactor components and significant elements of the nuclear fuel cycle exported to non-nuclear weapons states not party to the Non-Proliferation Treaty. The recipient country or international organization must now certify in writing that the commodity will be subject to the terms of an agreement for cooperation or that (1) nuclear material produced, processed, or used in a facility using the commodity will not be utilized for nuclear explosive devices or nuclear weapons, (2) such produced or processed material will be subject to a safeguards agreement with IAEA, (3) the commodity to be exported will be subject to IAEA safeguards, and (4) the commodity will not be re-exported to other non-nuclear weapon states not party to the NPT without similar written certification from these recipient states.

About 100 items on Commerce's Commodity Control List were identified by the Atomic Energy Commission as being of special strategic nuclear interest, including such reactor items as control rods, special steam turbines, coolant pumps, fuel fabrication equipment, and other nuclear-related items such as deuterium, beryllium, neutron generators, and high-speed cameras.

During its existence, the Atomic Energy Commission was consulted by Commerce before licensing decisions were made. This review procedure has been continued with the Energy Research and Development Administration. Commerce does not issue licenses for these 100 items without ERDA concurrence. The Nuclear Regulatory Commission's advice is sought only on license applications received by Commerce for reactor components.

Commerce has continued to license nuclear reactor components under a 1963 agreement with the Atomic Energy Commission, even though authority was assigned to NRC in January 1975 under the Atomic Energy Act of 1954 as amended, by the Energy Reorganization Act of 1974. According to the Under Secretary of Commerce, the Department takes its policy direction from ERDA on export license applications for such reactor parts.

A consideration in the 1963 interagency agreement was the relatively small dollar value of these exports. An examination of records by the Atomic Energy Commission for a 6-month period in 1962 showed that exports of reactor components totaled \$500,000. However, these exports have grown considerably since that time. According to ERDA statistics, exports licensed by Commerce from January 1 to October 15, 1975, for specially designed reactor components and multipurpose items having a nuclear application amounted to \$85 million.

After studying the current procedures, NRC concluded it was appropriate for Commerce to continue the export licensing of reactor components, but arrangements were made for (1) NRC participation in meetings of the Interagency Advisory Committee on Export Policy when nuclear-related matters are on the agenda, and (2) staff level consultations between NRC and Commerce on nuclear-related exports.

GOVERNMENT-TO-GOVERNMENT TRANSFERS

The Energy Research and Development Administration may authorize nuclear material and equipment exports under agreements for cooperation without going through established Nuclear Regulatory Commission or Commerce licensing procedures. Such exports are generally referred to as government-to-government transfers.

Originally, U.S. exports of nuclear items were authorized only on a government-to-government basis. However, since the Atomic Energy Act was amended in 1964 to permit private ownership of enriched uranium and plutonium, the need for government-to-government transfers has been reduced and the use of export licenses has increased.

According to ERDA, government-to-government transfers are now relatively few and generally involve the movement of very small (gram) quantities of materials for research and laboratory purposes from such facilities as the national laboratories or the Bureau of Standards.

However, our review of ERDA's records showed that some exports of larger amounts of nuclear material had been authorized for government-to-government shipment, as noted below.

<u>Recipient</u>	<u>Year</u>	<u>Enriched Uranium</u> (kilograms)	<u>Percent of Enrichment</u>
Canada	1973	1,417.2	1.61
	1973	5.4	93.15
	1974	997.2	1.91
	1974	901.3	4.95
EURATOM	1971	44.1	93.14
	1971	10.2	90.03
France	1975	1,490.5	2.60
India	1967	82,886.0 a/	2.25
	1971	14,546.3	2.18
	1973	4,547.9	2.67
Switzerland	1972	8.4	90.03
Japan	1971	7.3	93.19
United Kingdom	1970	67.8	93.17

a/ ERDA commented that the large amounts exported to India are unique because the original contract indicated that the shipments would be made on a government-to-government basis.

Except for the overall parameters of the agreements for cooperation no written criteria or procedures govern the use of government-to-government shipments or limit the quantity or types of material or equipment that can be exported under this arrangement. In the past, ERDA decided on the shipments on a case-by-case basis without approval of or consultation with any other Government agencies. ERDA officials advised us that in April 1976

they initiated the practice of consulting State, ACDA, and NRC regarding all proposed government-to-government transfers.

RETRANSFERS OF U.S. NUCLEAR
MATERIAL OVERSEAS

According to a typical agreement for cooperation, U.S.-supplied nuclear materials or equipment, or nuclear material produced through the use of such material or equipment, will not be transferred to unauthorized persons or beyond the jurisdiction of the cooperating party (i.e., retransferred from one agreement to another agreement) without U.S. approval. Any such retransfer must be within the scope of an agreement for cooperation between the United States and the party to which the material is retransferred.

The procedure for authorizing the movement of U.S. nuclear material, equipment, and devices from one foreign country to another is substantially different from the export licensing procedure. Several Government agencies are involved in the original nuclear export licensing process, but retransfers are authorized exclusively by the Energy Research and Development Administration. Yet, retransfer authorizations and export licenses are designed to accomplish the same end--regulation and control of U.S. nuclear material and equipment abroad.

In the past, ERDA generally did not seek the views of the Departments of State and Defense, the Arms Control and Disarmament Agency, or the Nuclear Regulatory Commission in approving retransfers. In fact, it did not even inform NRC of retransfers and theoretically could have authorized a nuclear retransfer to a facility or country for which NRC had denied an export license. ERDA officials commented that they began in April 1976 to consult with State, NRC, and ACDA on all retransfers.

From 1961 to 1974, about 575 retransfers of U.S.-supplied nuclear material were made between foreign countries, excluding retransfers of leased material. According to ERDA, violation of the retransfer provisions of the agreements have not been significant, either in number of violations or quantity of material involved. Our review of ERDA records showed at least 19 retransfer violations from May 1971 through July 1974. For example, in 1973 and 1974:

- Uranium was transferred within Europe after a previously approved U.S. authorization had expired. 30 grams of plutonium were also transferred that were not authorized even under the expired authorization.
- 8 kilograms of highly enriched uranium was transferred between two European countries without proper U.S. authorization. The party transferring the material stated that it had obtained verbal approval before the fact.
- Slightly enriched uranium was transferred between two European countries without U.S. approval.
- An unauthorized shipment of slightly enriched uranium was made from one country to another for fabrication into fuel rods. 1/

ERDA said that the country that had committed the greatest number of retransfer violations had been notified that continuous violations would lead to more restrictive procedures and possible refusal to supply U.S. nuclear materials in the future.

We believe the Nuclear Regulatory Commission should be fully involved in the approval of nuclear retransfers and should consider a country's retransfer violations when deciding whether to issue future export licenses.

TRANSFER OF TECHNICAL INFORMATION

Under the Atomic Energy Act, the agreements for cooperation establish the parameters for exchanging scientific nuclear energy information between the United States and foreign countries. In trying to share the benefits of the peaceful atom, the United States has declassified much nuclear information over the years. However, some technology is still classified or restricted.

The Atomic Energy Act defines restricted data as all data concerning (1) design, manufacture, or utilization of atomic weapons, (2) production of special nuclear material, and (3) use of special nuclear

1/ The State Department has classified the names of the countries involved in these examples.

material in the production of energy, not declassified or removed from the restricted data category. Agreements for cooperation generally prohibit the transfer of restricted data.

The agreements typically specify that unclassified information about the application of peaceful atomic energy and related considerations of health and safety can be exchanged through reports, conferences, and visits to facilities, and may include information on:

--Development, design, construction, operation, and use of research and power reactors.

--Use of radioactive isotopes and source material, special nuclear material, and byproduct material in physical and biological research, medicine, agriculture, and industry.

Section 57 of the Atomic Energy Act permits U.S. citizens to assist a foreign nuclear activity engaging directly or indirectly in the production of special nuclear material only under a formal agreement for cooperation or upon determination by the ERDA Administrator that such activity will not be detrimental to U.S. interests. Pursuant to this statutory provision, the Atomic Energy Commission published a regulation which provides general authorization for U.S. citizens and companies to engage in unclassified activities in countries outside the Communist bloc, except for certain activities in uranium enrichment, chemical reprocessing, and heavy water production. These activities require specific authorization from ERDA if undertaken outside the United States.

This general authorization permits the export of civilian nuclear power reactor technology and assistance to free world destinations, but specifies that any "significant" activity resulting in such exports must be reported to ERDA within 30 days from the commencement of the activity. According to an ERDA official, reports provided by private companies describe the information being transferred in the broadest terms, with only indications of its technological importance. No monetary value is reported on the information transferred. ERDA stated that in most cases there was no way to identify whether private companies or individuals were complying with the reporting requirement on technology exports

because there is no means to monitor them. It should also be noted that NRC is not notified of such reports nor does it receive summaries of data transferred.

Federal regulations do not prohibit foreign recipients from retransferring either U.S. civilian nuclear power reactor technology or the products derived from such technology. At present, the United States relies on the commercial interests of U.S. companies to obtain non-retransfer provisions in any contractual arrangements pertaining to U.S.-origin reactor technology.

ERDA commented that although companies do notify the Government and competition frequently alerts the Government of any transaction by another company, there is no way of knowing, in most instances, if any law or regulation is complied with unless the violator is observed or reported.

U.S. nuclear power reactor technology is widely available in unclassified technical literature. However, unpublished information on uranium enrichment, reprocessing, or heavy-water production requires specific authorization by the Energy Research and Development Administration before it can be transferred.

CONCLUSIONS

With the growing international trade in nuclear materials, equipment, and technology, the United States faces the problem of how to continue to cooperate with the nations of the world in the peaceful uses of atomic energy without contributing to the proliferation of nuclear weapons. Export controls complement U.S. international agreements and are essential to U.S. cooperation in the peaceful applications of nuclear energy.

The Energy Reorganization Act of 1974 separated the nuclear promotion from the regulatory functions and made the Nuclear Regulatory Commission the independent regulatory body for licensing peaceful nuclear exports. However, the Department of Commerce and the Energy Research and Development Administration authorize exports of nuclear material and equipment outside the sphere of NRC regulatory control.

Our review showed that (1) Commerce was licensing nuclear components with policy direction from ERDA, when the NRC was assigned this licensing responsibility; (2) ERDA authorized exports of nuclear material and equipment through the use of government-to-government transfers, for which no specific criteria or procedures have been established to limit the quantities or types of items that may be exported; (3) government to government authorizations were approved solely by ERDA without coordinating with other executive branch agencies or NRC; (4) retransfers of U.S.-supplied nuclear material within or between foreign countries were authorized solely by ERDA; and (5) while NRC has the primary role in licensing nuclear material and equipment, ERDA monitors the exports of nuclear technology.

There are also questions concerning NRC's heavy reliance on information provided by the State Department to determine whether an export license should be issued. Foreign policy development is a function of the President, while nuclear export licensing is a principal regulatory function of NRC. These unique responsibilities could cause a confrontation if for foreign policy reasons other involved agencies disagree with a NRC export licensing decision.

The United States requires specific authorization for transfers of technical information related to re-processing, uranium enrichment, and production of heavy water. The transfer of other civilian nuclear power reactor technology requires only that such transfers be reported to ERDA within 30 days. The United States relies on the commercial interests of the U.S. companies to obtain non-retransfer provisions in their contractual arrangements with foreign firms.

We believe strong U.S. controls against nuclear weapons proliferation require the United States to refine existing export procedures and centralize or at least more fully coordinate various Government activities.

AGENCY COMMENTS

The Nuclear Regulatory Commission commented that Commerce has cooperated fully in consultations with NRC and that the present system provides for adequate control and review and should not be subjected to further major alteration in light of experience thus

far. (See app. VIII.) Commerce commented that both ERDA and NRC are now consulted on a weekly basis on pending applications of interest. The Department consults with ERDA, as it earlier consulted the Atomic Energy Commission, for technical and policy advice regarding several different areas of concern, the national nuclear nonproliferation policy, the Nuclear Non-Proliferation Treaty, international strategic controls, and the Limited Nuclear Test Ban Treaty. Commerce did not comment on the specific reasons it consults with NRC. (See app. X.)

NRC commented that arrangements are now taking effect to involve NRC, on a consultative basis, in proposed retransfers between countries and in any proposed government-to-government transfer. Several consultations on retransfers have already taken place. The Commission is also developing appropriate in-house analytical capabilities and has access to and verifies all information it considers necessary to making an independent determination on proposed nuclear exports.

For all practical purposes, NRC finds no basis in fact for concluding that the executive branch can circumvent normal U.S. licensing and regulatory review procedures. Moreover, NRC believes the reality or appearance of further substantial change in the U.S. nuclear export framework, following so close on last year's major reorganization, would create a justified perception overseas of instability and unpredictability in U.S. nuclear export policy and procedures. Reliability of supply depends as much on predictable regulation and avoidance of unnecessary procedural delays as on supply capacity itself. The State Department added that centralization of nuclear export authority in a regulatory agency creates a serious risk that other nations will view U.S. reliability as a supplier as seriously diminished and that they would seek other sources of supply.

The Arms Control and Disarmament Agency commented that to have NRC exercise overall authority in regulating the foreign distribution of all nuclear material and equipment would purport to remove functions from the executive branch mandated to it by both statute and the Constitution. (See app. IX.) ACDA did not elaborate on the specifics of why adding the few remaining nuclear export regulatory functions to NRC would conflict with

either the Constitution or current legislation. In our opinion, such action would not remove functions from the executive branch since NRC is part of the executive branch.

RECOMMENDATIONS

We recognize that major changes in the nuclear export control procedures might have some adverse impact on foreign perceptions of U.S. reliability for supplying nuclear material and equipment but believe that a centralized regulatory review process is a good means for controlling all nuclear exports. Therefore, we recommend that the Nuclear Regulatory Commission, Energy Research and Development Administration, and Department of Commerce set up and implement formal interagency procedures for NRC to be the focal point for monitoring and regulating the foreign distribution of all peaceful nuclear material, equipment, and technology including government-to-government shipments, retransfers of U.S. supplied material between foreign countries, and peaceful nuclear components and parts currently approved by Commerce.

In addition, the NRC, ERDA, State Department, and ACDA should jointly establish criteria for the quantities and types of nuclear material and equipment that may be transferred under government-to-government arrangements without the benefit of the normal, complete licensing review process.

MATTERS FOR CONSIDERATION BY THE CONGRESS

To avoid any possible misunderstanding as to the intent of the Energy Reorganization Act of 1974, the Congress should clarify its intent concerning the decisionmaking authority for permitting the foreign distribution of U.S. nuclear material and equipment in cases where other involved agencies do not agree with the position of the Nuclear Regulatory Commission.

CHAPTER 6

PHYSICAL SECURITY OF NUCLEAR MATERIAL: AN EMERGING CONCERN

The physical protection of U.S. nuclear material and equipment supplied abroad has become of increasing concern. Physical security encompasses measures to deter, prevent, and promptly detect the theft, sabotage, or other unauthorized use of nuclear materials and equipment by subnational groups. U.S. regulations require the physical protection of nuclear facilities and significant quantities of nuclear materials domestically, including material prior to its export.

Basically, physical security at fixed sites includes the use of alarms, locks, surveillance mechanisms, protective fences, and guards. Buildings that house special nuclear material must be of special construction, and access to the material must be controlled. A communications capability with nearby police forces must be maintained.

Highly enriched uranium or plutonium in transit must be in locked and sealed containers and accompanied by armed guards who keep the material under continuous visual surveillance. Frequent communication must be maintained between the transport vehicle and either the shipper or the receiver. Such export shipments must be accompanied by a monitor who keeps the material under surveillance until it is unloaded in another country.

The degree of protection afforded nuclear material in the U.S. civil program depends upon both the quantity and quality of the material. Quantities of plutonium and highly enriched uranium totaling 2 and 5 kilograms or more, respectively, are given the highest degree of protection. The Nuclear Regulatory Commission and the Energy Research and Development Administration are responsible for insuring that U.S. regulations are met by domestic licensees and Government contractors, respectively, for highly enriched uranium or plutonium at fixed sites and during transit. This is done primarily through onsite inspections.

REVIEWING PHYSICAL SECURITY ABROAD

No current agreement for cooperation specifically provides for U.S. rights to verify the adequacy of foreign physical security systems. According to ERDA officials, the safeguards rights in current agreements reflect the primary concern of the pre-terrorism years--detection of national-level diversion--rather than the additional present-day concern for assurance of a national capability to guard against subnational activities. ERDA officials have indicated that future agreements for cooperation will provide for mutual agreement on adequate physical security measures for any U.S.-supplied nuclear materials, equipment, or devices.

In late 1974, the Atomic Energy Commission established a new export licensing policy under which no export license would be issued for significant quantities of highly enriched uranium or plutonium unless the recipient country had a system of physical security measures acceptable to the United States. It notified 39 countries and EURATOM headquarters of the policy change, explaining that "generally physical security standards comparable in effect to those employed in the United States would be the basis for determining the adequacy of the measures in effect in a recipient country." The Commission expressed its desire to meet with appropriate officials at an early date to review the physical security measures in effect and asked for the countries' regulations and for detailed information on current and planned physical security measures.

ERDA now makes physical security reviews in foreign countries and provides its evaluation to the State Department which incorporates this information into the overall executive branch assessment. The Nuclear Regulatory Commission uses the physical security information, together with other pertinent data, to determine whether an export would be inimical to the common defense and security of the United States.

In conducting an incountry physical security review, U.S. officials first meet with appropriate atomic energy representatives to discuss and review the country's physical security regulations. These regulations and/or procedures, which in some countries are not written, are compared with those used in the United States and with

standards recommended by the International Atomic Energy Agency. The U.S. team then makes onsite observations at selected nuclear facilities which will be receiving significant quantities of U.S.-supplied highly enriched uranium or plutonium and tries to evaluate the (1) threat of diversion or sabotage within the country, (2) attitude of federal, state, and facility officials toward the need for various elements of a physical security system, and (3) application and adequacy of the physical protection system at the facilities visited and for incountry shipments of nuclear material.

ERDA stated that it is necessary to evaluate a country's overall system to determine whether it is generally comparable to the system used in the United States to protect similar materials and equipment. Because of differing factors and conditions within other countries, it is not possible to make point-by-point comparisons of foreign physical security systems with the U.S. system. For example, one country does not allow nuclear facility guards to carry firearms, while U.S. guards, by regulation, must be armed.

In two of the 18 countries visited by ERDA through February 5, 1976, physical security observed at certain facilities was considered inadequate. However, country representatives indicated that corrective actions would be taken and ERDA plans to make followup visits to these countries in the near future.

ERDA commented that it had judged physical security systems of a number of countries to be inadequate. In those cases, ERDA delayed making its recommendations while it worked with the country in question to upgrade their physical security measures.

It is generally recognized that the weakest link in protecting nuclear material from theft or diversion occurs when the material is being transported. We were advised that during its first 10 physical security reviews conducted through August 1975 the ERDA team had not observed the protection afforded nuclear material in transit within a country. Because of the limited number of shipments

made, ERDA's evaluation of this significant component of total security systems in the countries visited was based on discussions, reviews of available regulations, and observations of transportation vans and routes.

Based on its review and observations, together with intelligence information received from Government sources, the ERDA team prepares an evaluation of the foreign country's physical security system as applied to the facilities visited. The evaluation is then forwarded to the Department of State, which includes in its "executive branch view" an assessment of the country's physical security system as it relates to the nuclear facilities visited. With this information NRC determines whether the protection measures afforded U.S. material are adequate. As of February 1976, NRC had denied no export licenses for physical security reasons.

In March 1976, we recommended that NRC and ERDA develop an interagency agreement under which NRC personnel regularly participate in inspections of the physical security measures to be applied to U.S.-supplied nuclear materials, equipment, and facilities in importing countries. ^{1/} We had concluded that in this manner NRC could improve its capability to independently judge the adequacy of the country's physical security system. NRC commented that since March 1976 its personnel had participated in all such physical security reviews and that arrangements have been made with ERDA on an informal basis for the continuing participation by NRC in future inspections in "appropriate countries."

PHYSICAL SECURITY AND INCOUNTRY TRANSFERS

The agreements for cooperation allow the transfer of enriched uranium or plutonium from one nuclear facility to another within a country. As long as nuclear material remains under the scope of the same agreement for cooperation it may be used at different facilities. Such a transfer of

^{1/} See GAO's report, "Development of Interagency Relationships in the Regulation of Nuclear Materials and Facilities," Mar. 10, 1976 (RED-76-72).

nuclear material within a country creates a potential loophole whereby U.S. material could be relocated to facilities whose physical security is considered inadequate because some countries do not have uniformly applied physical security standards.

The transfer loophole is potentially more extensive in the EURATOM countries. Because the United States views the nine EURATOM countries as a single entity, U.S. nuclear material authorized for use within them can generally be transferred to different facilities within or between EURATOM countries without U.S. approval. ERDA officials stated that U.S. material licensed for use in a particular facility must be used there, otherwise U.S. approval would be necessary to transfer it to a different EURATOM facility. However, if the nuclear material were actually used at the designated facility it could be subsequently transferred to other facilities within EURATOM because a second use does not require U.S. approval.

According to ERDA, U.S. nuclear material supplied to third countries under the U.S.-IAEA agreement for cooperation can be transferred within the country upon approval by the IAEA and U.S. approval would not be required. It should be noted that the IAEA does not conduct physical security evaluations as part of its safeguards activities and would not report back to the United States on the measures employed to protect U.S.-supplied nuclear material.

Incountry transfer procedures allowed under the agreements for cooperation with individual nations and international organizations thus create the possibility of U.S. nuclear material being used at facilities which do not have adequate physical protection measures.

EFFORTS TO STRENGTHEN FOREIGN PHYSICAL SECURITY SYSTEMS

The United States has proposed an international convention on physical security of nuclear material. State Department indicated that the convention would be aimed at achieving recommendations applicable to national facilities, international transportation of nuclear material, and recovery of material lost during such transit.

The United States is also cooperating extensively with individual nations to strengthen their physical security programs. Representatives from other countries have been invited to the United States to discuss their programs with U.S. officials and have been informed of the latest U.S. physical security efforts and developments. Representatives from Canada, West Germany, the United Kingdom, France, Israel, the Netherlands, and Sweden have participated in meetings aimed at strengthening national systems. In addition, the United States and other suppliers are now requiring that recipients meet stringent physical security standards.

An IAEA advisory group of international physical security experts, including representatives from four U.S. agencies, met in April 1975 to review and update IAEA's recommended physical protection guidelines. IAEA's earlier guidelines had been developed in 1972. The resulting recommendations reflected the progress which had been made in the physical protection of nuclear material and considered additional problems created by the increasing use of nuclear energy for peaceful purposes.

NEED FOR INTERNATIONAL PHYSICAL SECURITY REVIEWS

The International Atomic Energy Agency currently has no authority to require member countries to establish acceptable physical security systems nor can it supervise, control, or implement such systems. It has developed physical security guidelines similar to those in effect in the United States, which serve as a model. Most countries believe that the implementation of physical security is an individual national responsibility, involving police powers which have never been granted to an international organization.

Physical protection of nuclear material is of such international concern that the review of a physical security system by a supplier country such as the United States may not provide sufficient assurance to the world at large that nuclear material is being adequately protected. Continuation of U.S.-conducted physical security reviews in other countries may be unworkable in the long term.

Just as the United States transferred its bilateral safeguards responsibilities to IAEA, it may also be preferable for IAEA member nations to accept physical security standards and to permit IAEA to ensure compliance during onsite inspections. This would insure adequate physical protection not only over U.S. material subject to IAEA safeguards but over all material safeguarded by the IAEA.

Below are some of the potential advantages of having physical security reviews made by IAEA rather than by each exporting country.

- IAEA could make physical security reviews as part of its regular safeguards inspection activities.
- Physical security measures would tend to be more uniform and would be continually subject to inspection.
- It would be more expensive, in the aggregate, for many supplier countries to establish duplicative physical security reviews than for one international organization to undertake the job.
- To rely on IAEA to perform physical security reviews would enhance its prestige, increase its responsibilities, and might make it more effective in its other efforts, including safeguards.

Before IAEA could make physical security reviews, its Statute would have to be amended to provide such authority and responsibility. This could be accomplished by approval of two-thirds of the members.

CONCLUSIONS

Because stolen nuclear material may be used anywhere, effective worldwide physical security should be a concern of all nations.

The Nuclear Regulatory Commission will not issue export licenses for significant quantities of highly enriched uranium or plutonium unless foreign nuclear facilities are considered to be adequately protected. However, there is a potential loophole whereby U.S. material could be relocated to a facility which is not adequately protected. The potential for such an occurrence is particularly evident in the case of the

nine EURATOM countries, which the U.S. treats as a single entity, or for material transferred abroad under the U.S.-IAEA agreement.

Many nations believe physical security of nuclear material and equipment is a national responsibility. The United States, however, has for almost 2 years conducted physical security reviews in other countries which to date has been acceptable to other countries. The United States and other major suppliers have recently agreed to follow common policies requiring recipients to meet stringent physical security standards. Accordingly, other suppliers may decide to follow the U.S. lead and also perform physical security reviews on material and equipment they export.

In the long term, continued reviews of one country's security by another may be unacceptable. As it has done with safeguards inspections, the United States may find it more politically and economically feasible to have the International Atomic Energy Agency assume this responsibility. IAEA currently has no authority to make physical security reviews or to implement or control physical security within member countries. Since physical security is an international concern, it is incumbent upon the United States to promote as strongly as possible the expansion of IAEA authority to include physical security reviews of all nuclear materials under IAEA safeguards.

RECOMMENDATIONS

To insure adequate universal protection of nuclear material subject to IAEA safeguards, we recommend that the Department of State, with the assistance of ERDA, ACDA, and NRC, actively pursue its proposal for an international convention. We recommend that the goals of such a convention include (1) acceptance of physical security standards, (2) assurance that each member nation would seek enactment of appropriate national laws to implement such standards, (3) guarantees that no member nation would provide safe haven for nuclear terrorists or saboteurs, and (4) inclusion of physical security reviews as part of IAEA's regular safeguards inspection efforts.

Until IAEA assumes responsibility for reviewing physical security, we recommend that ERDA and NRC continue to jointly perform all physical security reviews of foreign facilities.

AGENCY COMMENTS

The Nuclear Regulatory Commission commented it had found some countries' physical security programs adequate and is continuing to acquire information on other countries' programs. Although NRC concentrates on key site analysis, the physical security reviews take into account the countries' overall physical security policies, program guidance, regulations, and requirements, as well as the results of visits to representative sites.

According to NRC, it was difficult to conclude that the potential loophole in incountry transfers is significant because (1) the designated consignee and the end-use statements for most license applications indicate the intended use, and changes in the consignees are to be approved by the NRC, (2) physical security reviews are not simply done on a site basis, and (3) irradiated spent fuel presents a much less attractive target for theft or diversion than unirradiated plutonium or highly enriched uranium.

ERDA provided a further comment concerning incountry transfers:

"The potential loophole that the GAO alleges in its report was recognized early in the physical security review program. For example, during one of the early reviews, the ERDA team found security inadequate at one of several representative sites visited in a major importing country. The ERDA team advised the country's authorities that no U.S. exports of such materials to any facility would be approved until the security at the site in question was made acceptable by upgrading it.***"

Upon completion of the upgrading, the ERDA team revisited the country and ascertained that the physical security at that facility was adequate. ***Only after these steps were taken did ERDA judge that the country's overall physical security system was adequate." (See app. XII.)

In our opinion, ERDA's comments tend to support the position that a country's entire system may be considered acceptable on the basis of the sites visited even though the national physical security procedures may be inconsistently applied among various facilities.

NRC stated that U.S. experience to date provides little basis for the view that U.S. physical security reviews may ultimately prove unacceptable but commented that more analysis should be given to the potentially serious disadvantages regarding the feasibility and possible implications of getting IAEA involved. (See app. VIII.)

The State Department commented that contacts by U.S. and IAEA officials with other countries indicate that internal security is a national concern, and both near-term and long-term IAEA security reviews are, and may continue to be, unacceptable to member states.

Concerning the international convention on physical security, State Department said that the desirability of including specific provisions in a convention will need to be balanced against the desirability of obtaining wide international adherence. In general, the Department believes that the importance of obtaining broad international acceptance of physical protection standards must be given great weight in making such judgments. (See app. VII.)

CHAPTER 7

FUTURE U.S. STRATEGY AND OPTIONS

The United States has taken some initiatives to minimize the risks of nuclear proliferation but it can and should expand its role in seeking solutions. It must recognize that the growing nuclear market will be shared by other supplier countries and therefore multilateral efforts will be increasingly necessary.

The ability of the United States to provide safe, reliable power reactors and long-term enrichment services to fuel them has over the years given it the leverage to influence foreign nuclear programs. U.S. decisions concerning plutonium recycling, development of new uranium enrichment capacity, and breeder reactors will have important bearings on future U.S. leverage.

There are, of course, limits on how much influence the United States can exercise in achieving its non-proliferation objectives, but it should explore the many means available to sway other countries' nuclear policies.

RELIABLE SUPPLY OF NUCLEAR FUEL

The United States has for years been the major supplier of enriched uranium services needed to fuel most of the world's reactors. However, uncertainty of future U.S. enrichment capacity and policies and the desire of other countries to diversify sources of enrichment services have encouraged foreign uranium enrichment development.

U.S. enrichment sales to foreign governments has been a factor in limiting the spread of nuclear weapons. According to U.S. officials, sales of enrichment services have been used as leverage (1) to obtain safeguards and non-proliferation guarantees and (2) to enlist the support of other nations in using nuclear power as an alternative to oil. It is important, therefore, that the United States maintain as much of the foreign enrichment services market as possible or it will lose the leverage that a dominant supplier position provides.

Agreements for cooperation state that foreign countries will have "equitable access" to U.S. enriching services. This language had been interpreted to the

Congress and foreign governments as meaning access on a first-come-first-served basis for all customers, foreign and domestic.

This policy was followed because:

- Plans giving obvious preference to domestic utilities could be perceived as inconsistent with the U.S. goal for an equitable international energy resource supply.
- Any plan, other than one based on chronological sequence, could be perceived as deliberately favoring one utility, domestic or foreign, at the expense of another.
- The United States should be able to assure foreign governments that it will be a dependable source of enrichment services. Any attempt to make a preferred distribution would undermine U.S. dependability.
- The United States has emphasized the policy of nondiscrimination in its international nuclear transactions, and this policy is a major asset in achieving U.S. objectives.

However, in the wake of the oil embargo, the demand for long-term enrichment contracts outstripped the available U.S. supply. Recognizing the emerging enrichment supply problem, the United States temporarily suspended signing long-term enrichment contracts except to cover Presidential commitments with Israel, Egypt, and Iran if they signed the necessary agreements for cooperation.

After signing these provisional contracts with the Middle East countries, the United States further deviated from its first-come-first-served policy, giving preferential treatment to (1) a domestic utility, (2) Mexico and Yugoslavia because of prior commitments involving IAEA, and (3) France, West Germany, and Spain because it was determined that the first-come-first-served approach would have resulted in an inequitable distribution of the remaining U.S. capacity between Japan and Western European countries. With all available U.S. capacity committed, 45

non-preferred customers were then offered contracts conditioned upon capacity becoming available. 1/

U.S. enrichment services contracts as of April 30, 1976, are distributed between foreign and domestic customers as follows.

<u>Type of contract</u>	<u>Domestic</u>	<u>Foreign</u>	<u>Total</u>
	----(thousands of megawatts)----		
Standard	208	107	315
Conditional	-	^a 13	13
TOTAL	<u>208</u>	<u>120</u>	<u>328</u>

a/ On August 6, 1974, the President assured foreign countries that the United States would, in any event, fulfill the fuel requirements of the conditional contracts.

Since 1971, executive branch policies and programs have encouraged private industry development of uranium enrichment. In June 1975, the President proposed legislation, called the Nuclear Fuel Assurance Act of 1975 (S. 2035), to the Congress that would enable ERDA to assist private organizations to build, own, and operate uranium enrichment plants. The legislation is intended to provide needed enrichment capacity and to create a competitive uranium enrichment industry.

Considerable controversy has surrounded this proposal, primarily because of concern over the transfer of large amounts of restricted technology from Government to private hands and the implications of foreign investment in private enrichment facilities. 2/

1/ See GAO report, "Allocation of Uranium Enrichment Services to Fuel Foreign and Domestic Nuclear Reactors," Mar. 4, 1975 (ID-75-45).

2/ See GAO report, "Evaluation of the Administration's Proposal for Government Assistance to Private Enrichment Groups," Oct. 31, 1975 (RED-76-36).

The longer the United States delays in constructing new capacities, the worse its position in competing for foreign customers will become. The Soviet Union currently has the largest enrichment capacity outside the United States; however, two European consortia, EURODIF and URENCO, ^{1/} are expected to have substantial capacities by the early to mid 1980s. Plans for additional enrichment plants are being discussed by France, Canada, South Africa, Japan, Australia, and Brazil.

Some countries are developing new techniques, including laser separation and centrifuge methods, which, if successful, could provide the world with a less expensive source of enriched uranium. This possibility may further weaken U.S. influence in the international nuclear arena.

We believe the United States, as part of its overall energy policy, should reestablish itself as a reliable and economical source of sufficient future enrichment services for both foreign and domestic customers.

REVIEW OF ENERGY ALTERNATIVES

It is generally recognized that nuclear power is likely to play an important role in many developing countries due to their lack of indigenous energy sources and to recent increases in the prices of oil and other fossil fuels. Accordingly, the International Atomic Energy Agency has actively assisted these countries in planning their nuclear power programs. It is estimated, however, that by 1980 only 8 percent of the installed electrical capacity of all developing countries will be nuclear-powered. Thus, these countries will also seek alternative energy sources to nuclear power and may turn to the United States for assistance.

The United States, having committed itself to international cooperation in seeking solutions to the world's energy problems, is in a good position to offer such assistance. It has tremendous potential for domestic energy development, has committed massive resources to energy research, and possesses the most advanced energy science and technology in the world.

^{1/} EURODIF is composed of France, Italy, Belgium, Spain, and Iran. URENCO is composed of the United Kingdom, the Netherlands, and West Germany.

By volunteering to help individual nations tailor plans to meet their total projected energy needs through a variety of energy sources, the United States might advance its non-proliferation objectives, by (1) dissuading a nation from seeking uneconomical enrichment and reprocessing facilities for a small nuclear program and (2) convincing a nation that alternative forms of energy are preferable to nuclear where appropriate. In addition the United States might obtain insight into the objectives of the nation's plan, gain leverage in influencing its nuclear program and promote various U.S. energy-related products.

EXPORT RESTRICTIONS ON SENSITIVE TECHNOLOGIES

Plutonium reprocessing and uranium enrichment are strategically sensitive steps in the nuclear fuel cycle because they allow the production of material for immediate use in nuclear explosives.

U.S. policy has been to sell foreign customers the uranium enrichment services needed to fuel reactors but not the enrichment facilities or technology. Similarly the U.S. policy has been not to export reprocessing facilities or technology, but there are no U.S. reprocessing plants in operation on a commercial basis to provide this service.

The export of restricted data on enrichment or reprocessing technology is prohibited in most of the agreements for cooperation. According to a State Department spokesman, however, most reprocessing technology has long been unclassified with much general information about it available. He concluded that U.S. ability to effectively restrain the spread of reprocessing capabilities is therefore limited. On the other hand, enrichment technology has remained classified for the most part, and is not generally available. Unlike reprocessing, the process and equipment used in enrichment are far from conventional and are not readily available in most countries.

While the United States has refused to export such sensitive technologies, other nuclear supplier countries have agreed to sell them to developing nations. For example,

--France recently agreed to supply Pakistan, which is not party to the Non-Proliferation Treaty,

with a reprocessing plant. U.S. officials have stated that there is no economic justification for Pakistan to operate a reprocessing facility and that Pakistan's interest in such a facility primarily stems from India's development of nuclear explosives.

--West Germany has also negotiated a large-scale nuclear arrangement with Brazil. Reportedly, West Germany will supply Brazil with enrichment and reprocessing facilities as well as power reactors. Brazil is not party to the NPT.

Still other countries are either negotiating to buy reprocessing or enrichment plants or are developing their own.

The issue of reprocessing is recognized as particularly controversial since it involves the recovery of plutonium, which may come into future widespread use as a fuel but which could also be diverted to make nuclear explosives. The Nuclear Regulatory Commission is studying whether the widespread use of plutonium as a fuel should be permitted in the United States; however, a final decision is not expected until sometime in 1977.

Recognizing that technical barriers to developing a nuclear capability are crumbling, the Secretary of State, in September 1975, proposed the establishment of multinational regional nuclear fuel-cycle centers to reduce the incentive for individual countries to build small and inefficient enrichment and reprocessing facilities. The International Atomic Energy Agency is currently studying the various legal, institutional, economic, and technical aspects of regional fuel-cycle centers. However, a firm commitment from all supplier countries to restrict the export of sensitive nuclear technologies and equipment is needed to minimize the spread of these capabilities.

NUCLEAR SUPPLIERS CONFERENCE

The United States has been working with other nuclear supplier countries to help ensure more adequate safeguards over exports of nuclear material and equipment. Following consultations, the United States and six other major nuclear suppliers, in January 1976, notified one another of their intentions to unilaterally follow certain common nuclear export policies. The primary

objective was to remove nuclear safeguards from the marketplace so that one supplier would not offer less stringent safeguards in order to promote nuclear sales.

As a result, the principles adopted by the United States as a matter of national policy on future nuclear exports include:

- Provisions for applying IAEA safeguards to exports of material, equipment, and technology.
- Prohibitions against recipients using assistance for any nuclear explosions, including those for "peaceful purposes."
- Requirements for physical security measures by recipients on nuclear equipment and materials.
- Application of restraint in transferring sensitive technologies, such as enrichment and reprocessing.
- Encouragement of multinational regional facilities for reprocessing and enrichment.
- Special conditions governing the use or retransfer of sensitive material, equipment, and technology.

These notifications did not constitute an international agreement and therefore did not require ratification by the Congress. Neither the United States nor any other nation is bound by the unilateral statement of policy.

Another round of supplier negotiations took place in June 1976; however, executive branch officials have been reluctant to tell GAO anything about those discussions. State and ERDA commented that interested congressional committees have been kept informed of developments in the consultations.

The secrecy which has surrounded the suppliers meetings has been due largely to the reluctance of other participating countries to permit the details of the arrangements to be made known. Moreover, the United States has never officially identified the countries with whom notes were exchanged. However, such secrecy clouds the intentions of the nuclear suppliers and could have the effect of increasing the desire of nuclear have-not countries for self-sufficiency. On the other hand, State,

NRC, and ERDA said that open and formal agreements by major suppliers could be detrimental to establishing controls if perceived by importing nations as a form of nuclear cartel.

The public statement of the principles agreed upon at the initial nuclear suppliers conference made no reference to the safety aspects of nuclear trade, management over nuclear waste produced by their exports, and international safeguards on the transport of nuclear materials.

The suppliers must, in our opinion, join together in a stronger, more comprehensive, more binding agreement to prevent the sale of nuclear material and equipment from being treated as a purely competitive commercial enterprise. As one alternative, the United States could explore with other nuclear suppliers the feasibility of establishing an international committee to control the trade of strategic nuclear commodities and technologies.

EFFORTS TO ACHIEVE ADHERENCE TO THE NON-PROLIFERATION TREATY

According to the Arms Control and Disarmament Agency, the Non-Proliferation Treaty is the foremost legal instrument the international community has for inhibiting the spread of nuclear weapons. The United States has encouraged other countries to become parties to the Non-Proliferation Treaty but has not required them to become Treaty members as a condition for receiving U.S. nuclear material or equipment, nor has it provided sufficient incentives to promote NPT adherence. Under the NPT, non-nuclear weapons countries are committed not to manufacture or acquire nuclear weapons and to subject all peaceful nuclear facilities to IAEA safeguards.

Although 98 countries are now parties to the NPT, several countries have not become Treaty members. According to ACDA, the reasons why these countries have not signed the Treaty fall into two main categories: apprehension about security from aggression by a neighbor and the claim of discrimination in the development of nuclear energy for peaceful uses.

Among the non-signatories are the People's Republic of China, Israel, France, India, South Africa, Brazil, Argentina, Pakistan, and Spain. As of June 1976, 12 other countries including Egypt, Indonesia, and Switzerland had signed but had not ratified the Treaty.

The United States currently has agreements for cooperation with 11 non-NPT countries and is now negotiating new agreements with such non-NPT countries as Egypt and Israel. In its agreements for cooperation, the United States requires that U.S.-supplied materials and equipment be covered by international safeguards. However, certain non-NPT countries with whom the United States has agreements, including Argentina, India, and South Africa, have reactors, uranium enrichment, and/or chemical reprocessing plants which are not subject to IAEA safeguards.

The Secretary of State testified in March 1976 that he believed proposals to embargo nuclear transfers to non-NPT parties or to provide nuclear exports to non-NPT parties only if they accepted IAEA safeguards on all their peaceful nuclear programs were overly severe constraints which would seriously set back, rather than advance, U.S. non-proliferation efforts. He stated that, in essence, adoption of either of these proposals would:

- Violate the spirit, if not the letter, of a number of international undertakings for cooperation in peaceful nuclear programs, including Article IV of the Non-Proliferation Treaty.
- Damage U.S. political relationships, well beyond the nuclear area, with a large number of countries who have entered into long-term arrangements with the United States.
- Cast further doubt on the credibility of U.S. supply commitments and the constancy of U.S. policy at precisely the moment the United States can least afford such doubt.
- Reduce the influence the United States is now able to extend in support of non-proliferation objectives inasmuch as it is unlikely that such proposals will be supported by all major suppliers.
- Might well result in the breakdown of supplier cooperation and a return to relatively uncontrolled competition among other supplier countries.

We do not totally agree with this line of reasoning in view of the fact that all U.S. cooperation is predicated on its cooperation not constituting an unreasonable risk to the U.S. common defense and national security. It can be argued that if a country is not willing to sign a pledge against any nuclear explosives or weapons development, it should be considered a risk to U.S. national security and should not be receiving U.S. nuclear products and equipment. This is especially true of countries that have stated their intentions of making nuclear explosive devices or of countries identified by the Arms Control and Disarmament Agency or the U.S. intelligence community as strong potential nuclear proliferators.

On a point-by-point basis, the Secretary's reasons are open to debate.

1. Article IV of the Non-Proliferation Treaty provides that NPT parties in a position to cooperate with other countries in developing peaceful applications of nuclear energy should do so. However, it does not pledge unbridled distribution of nuclear material and equipment.

2. The Secretary argues that political relations with a large number of countries would be damaged; however, a very large majority of the countries of the world are parties to the Treaty and others have signed but not yet ratified it.

3. The State Department claims that U.S. policy since World War II has been to prevent nuclear proliferation. However, we are now asked to believe that requiring a non-proliferation guarantee would cast doubts on the constancy of U.S. policy. We believe it would be only a logical extension of U.S. belief in non-proliferation.

The lack of firm plans for developing the next increment of enrichment capacity and the change in U.S. policy in the allocation of uranium enrichment services to give preferential treatment to some at the expense of others casts real doubts on the reliability of U.S. supply commitments, not the U.S. position on non-proliferation.

4. If the United States, still the largest nuclear exporter with the leverage to influence foreign nuclear policies, were able to convince even a few

of the supplier nations who are party to the NPT to also require NPT adherence or its equivalent for cooperation, the source of supply might be so limited to non-NPT purchasers that they would reconsider their positions toward the Treaty.

5. Most major nuclear suppliers are party to the NPT. If the nuclear suppliers conference participants cannot agree that stopping the spread of nuclear explosives is the primary purpose of their cooperation, then such cooperation is meaningless.

Since many nations are already party to the NPT, and nuclear energy as a source of power is expected to increase worldwide, adherence to the Treaty as a prerequisite for U.S. cooperation should not place an undue hardship on long-term future U.S. commercial interests in nuclear sales abroad. But such a shift in U.S. policy probably would create certain immediate problems. Non-NPT countries might seek other sources of supply which could affect short term U.S. commercial interests. The United States has current commitments with non-NPT countries, such as uranium enrichment service contracts. In addition, as of December 31, 1975, the Export-Import Bank of the United States had authorized loans and guarantees of about \$1.2 billion for nuclear reactors and fuel to non-NPT countries.

The principal difficulty with adopting NPT adherence as a condition of U.S. nuclear cooperation is that it is questionable whether other supplier countries would also adopt this policy. France is not an NPT party, and other suppliers have said they would not accept such a policy on grounds that it would deprive them of the ability to maintain constructive associations with non-NPT parties and to influence their policies.

ERDA commented that the U.S. Government does not require NPT adherence or safeguards on all peaceful nuclear activities because

- other suppliers do not require this condition so non-NPT parties could and would obtain their supplies elsewhere;
- it is better to assure that non-NPT parties have as many facilities as possible subject to safeguards than to halt cooperation and thus stimulate an impetus to unsafeguarded self-sufficiency; and

--continued cooperation with non-NPT parties is the best way to encourage their adherence to the Treaty.

We believe the United States must take the lead in convincing non-NPT countries that the technical, economic, and political considerations involved make it in their interests to become parties to the Treaty.

CONCLUSIONS

Ways must be found to ensure that worldwide promotion of the peaceful uses of nuclear energy does not lead to any more countries obtaining nuclear weapons or explosives capability. The United States has recognized the problem and initiated some actions, but more can and should be done.

Since the 1950s the United States has been the major supplier for the world's nuclear programs. This has contributed significantly to U.S. ability to influence international nuclear policies, particularly non-proliferation of nuclear weapons. However, as other nations develop or acquire civil nuclear capabilities, the United States may lose the leverage that a dominant trading position provides in achieving non-proliferation objectives.

Continued U.S. leadership in nuclear supply, with the strongest practical precautions, coupled with intensified efforts to achieve agreements with other nuclear suppliers provide the most reasonable approach for the United States.

Some progress has already been made by major supplier nations in cooperatively working out certain minimum standards for nuclear exports. However, the secrecy that surrounds this cooperation clouds the intentions of the nuclear suppliers and could have the effect of increasing the desires of nuclear have-not countries for self-sufficiency.

The United States might advance its non-proliferation objectives by volunteering to help individual developing nations tailor plans to meet their total projected energy needs through a variety of energy sources, not necessarily nuclear power.

Above all, the United States should continue to seek universal adherence to the Non-Proliferation Treaty by making Treaty adherence, or at least a guarantee by the

recipient country to subject its entire peaceful nuclear programs to international safeguards, a prerequisite for receiving U.S. nuclear materials, equipment, and technology.

RECOMMENDATIONS

We recommend that the Department of State, the Arms Control and Disarmament Agency, and the Energy Research and Development Administration with the advice of the Nuclear Regulatory Commission, develop and implement a diplomatic and technical strategy for:

- Achieving continued dialog and concluding further, more binding arrangements on common export policies, particularly for sensitive technologies.
- Reestablishing the United States as a reliable supplier of uranium enrichment services and discouraging individual foreign countries from developing their own enrichment capacities.
- Assisting developing countries to evaluate their total energy needs in determining whether and how much of their requirements should be filled by nuclear energy.
- Establishing NPT adherence or at least a guarantee by the recipient country to subject its entire peaceful program to international safeguards as a general prerequisite for future U.S. nuclear cooperation, and promoting this policy as a standard for cooperation by all supplier countries.

We also recommend that the State Department explore the feasibility of establishing an international committee to control the trade of strategic nuclear commodities and technologies.

AGENCY COMMENTS

The Arms Control and Disarmament Agency commented that requiring NPT adherence or its equivalent as a standard for U.S. cooperation could force termination of some international obligations to U.S. prejudice. (See app. IX.) The State Department said that to require such a policy as a prerequisite of U.S. supply but merely promote a similar policy by other suppliers would in effect set a double standard. The State Department commented that it could support our recommendation if it were changed to read:

"Promoting, as a common prerequisite for nuclear cooperation or assistance by all nuclear supplier nations, the minimum standard of NPT adherence or a guarantee by the recipient country to subject its entire peaceful program to international safeguards." (See app. VII.)

As the world leader in the field of nuclear energy, the United States should, in our opinion, exercise a leadership role in unilaterally adopting this policy without regard to the prospects of other nuclear suppliers also doing so.

The State Department commented that the announcements by nuclear suppliers to unilaterally follow common export policies does not constitute an agreement. The Department advised us that it would, of course, expect to submit to Congress any international agreements which might be concluded in this area.

The Arms Control and Disarmament Agency stated the decision on whether or not to conclude any agreements with other nuclear suppliers as an executive agreement or a treaty is one which will be taken by the executive branch at the appropriate time and with regard to the terms and scope of the agreement. (See app. IX.)

The State Department defended the secrecy of its arrangements with other nuclear suppliers commenting that progress would not likely take place under other circumstances. State emphasized that because of the nature of the negotiations involved the process must be confidential to obtain participation of other countries.

The State Department said consultations among the major supplier nations have made it evident that they would not all be prepared to participate in an international committee to control the trade of strategic nuclear commodities and technologies. The Department believes that such a committee would not be viable unless it included all the major suppliers. In these circumstances the Department believes that it must continue to seek consensus and a common approach through less formal and less institutional consultations.

MATTERS FOR CONSIDERATION
BY THE CONGRESS

To insure that U.S. nuclear cooperation is consistent with U.S. non-proliferation objectives, the Congress should:

- Make future U.S. nuclear cooperation (the distribution of nuclear material, equipment, and technology) contingent upon adherence to the Non-Proliferation Treaty or agreement by the recipient country to subject its entire peaceful nuclear program to international safeguards. The only exceptions should be those few unusual cases when the President certifies that such peaceful nuclear cooperation is in the U.S. national security interests.
- Insist that any binding arrangements made by the executive branch with other nuclear suppliers be subjected to congressional review and ratification, because such arrangements are a matter of national policy and an important facet of U.S. foreign relations.

CHAPTER 8

SCOPE OF REVIEW

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Information for this review was developed from records and discussions with officials at the Energy Research and Development Administration, Nuclear Regulatory Commission, Departments of State and Commerce, Arms Control and Disarmament Agency, Export-Import Bank of the United States, U.S. Mission to the International Atomic Energy Agency, and IAEA Headquarters in Vienna, Austria. 66, 67
32, 74
456, 170
CNG 01109

We observed an IAEA inspection of Japanese-owned plutonium stored in Cheswick, Pennsylvania, and nine U.S. bilateral safeguards inspections in Italy. During the inspections in Italy we visited facilities which were also subject to EURATOM safeguards. In addition, we observed U.S. bilateral inspections at five nuclear facilities in France which were subject to U.S. safeguards under a mutual defense agreement.

Export controls over nuclear material and equipment were discussed with officials of the Nuclear Regulatory Commission in Chicago and in King of Prussia, Pennsylvania, and with Commerce Department officials in New York. We also observed the export controls and physical security provided for an air shipment of highly enriched uranium being exported from Chicago.

The IAEA laboratory and a research reactor in Seibersdorf, Austria, and a U.S.-licensed power reactor facility in Surry, Virginia, were also visited during the review.

This report in draft form has been reviewed by a group of private consultants knowledgeable in the nuclear area as well as by the Departments of State and Commerce, the Energy Research and Development Administration, the Nuclear Regulatory Commission, the Arms Control and Disarmament Agency, and the Export-Import Bank of the United States. Their suggestions and comments have been incorporated throughout the report. See app. VII-XII for formal comments received from the agencies.

U.S. GOVERNMENT ASSISTANCE
UNDER INTERNATIONAL AGREEMENTS
FOR COOPERATION IN THE CIVIL USES OF ATOMIC ENERGY (note a)

<u>Type of assistance</u>	<u>Number of countries involved</u>	<u>Reactors or equipment</u>	<u>Special nuclear materials</u>	<u>Other</u>	<u>Total value</u>
(000 omitted)					
Atoms For Peace program (1953-62):					
Research reactor grants	26	X			\$ 8,950
Research equipment grants	19	X			2,730
Agency for International Development (1962-74):					
Capital assistance loan	1	X			71,772
Capital assistance grants	2			X	1,396
Technical assistance grants	27		X	X	6,276
Program assistance loans and grants (note b)	5	X	X		3,904
Atomic Energy Commission assistance to foreign countries (1954-74):					
Deferred sales	3		X		88,761
Lease charges waived	(c)			X	342
Export-Import Bank (1958-74):					
Loans	15	X	X	X	2,136,535
Guarantees	10	X	X	X	736,331
Contributions to Inter- national Atomic Energy Agency (1958-74):					
Regular U.S. assess- ment					54,208
Voluntary cash con- tributions to operational budget					10,730
Gifts-in-kind					9,255
U.S. International Atomic Energy Agency research contracts					1,145
Voluntary gifts of special nuclear material					713
U.S. Arms Control and Disarmament Agency research contracts					3,344

a/ Excludes research and development costs shared with the European Atomic Energy Community and Canada and international nuclear training and educational programs, conferences, and exhibits.

b/ For fiscal years 1969-74 only.

c/ Not readily available.

Source: May 28, 1975, GAO report entitled: "U.S. Financial Assistance In The Development Of Foreign Nuclear Energy Programs" ID-75-63

BACKGROUND INFORMATION ON THE
INTERNATIONAL ATOMIC ENERGY AGENCY

The International Atomic Energy Agency, founded in 1957, is an autonomous intergovernmental organization headquartered in Vienna, Austria. Under the aegis of the United Nations, the IAEA is responsible for international activities concerned with the peaceful uses of atomic energy, including the important function of establishing and administering international safeguards.

IAEA's other functions include exchanging scientific and technical information on peaceful uses of atomic energy; providing assistance to developing countries; and encouraging and assisting research, development, and application of atomic energy through programs in food, agriculture, and physical and life sciences. It also has a program in nuclear safety and environmental protection. Its programs and activities extend not only to member nations but also to cooperation with many international, regional, and national organizations.

Membership in IAEA as of June 1976 consisted of 109 nations. The Board of Governors, composed of representatives from 34 member countries, considers policy and recommends budgets and programs to the General Conference. The General Conference, which has representatives of all member nations, convenes once a year to debate general policy and to consider recommendations of the Board of Governors. IAEA, headed by the Director General, is organized into five major departments. It has 1,100 employees, including 350 professional staff members. Of the professional staff positions, 290 are filled according to a geographic selection process. Experts in certain nuclear-related fields fill the 60 remaining positions and serve under special agreements. The United States supplies the largest number of professional personnel, filling 20 percent of the positions subject to geographic selection.

IAEA funding is primarily derived from assessed contributions and voluntary and special contributions of member nations. Other income is derived from such sources as the sale of publications and excess property and receipts from international organizations and governments for services and technical assistance. Expenditures for calendar year 1974 were about \$29.3 million and were estimated at \$35.5 million for 1975.

In addition, IAEA receives assistance-in-kind from member nations in the forms of expert help, fellowships, equipment, supplies, special nuclear material, films, publications, cost-free experts, and other types of goods and services. It also receives assistance through contracts and other arrangements subsidized by member nations.

Since the inception of IAEA, U.S. financial participation in all categories has amounted to about one-third of IAEA's measurable resources and through 1974 totaled about \$76 million. This includes payments of \$54.2 million for regular IAEA budget assessments, \$10.7 million in voluntary contributions; \$9.3 million in gifts-in-kind, \$1.1 million in research contracts, and \$0.7 million in gifts of special nuclear material.

The U.S. share of assessed contributions has been decreasing steadily since 1960. In 1972 the Congress imposed a 25-percent limit on assessed payments to international organizations. IAEA was exempt from this limitation, in part because of the undesirable effect that reduced U.S. funding might have on safeguards. However, in keeping with congressional intent to reduce U.S. obligations to international organizations, the overall share of assessment will be reduced from 31.9 percent (\$7,382,611) in 1974 to 28.0 percent (\$7,452,741) in 1975. U.S. officials hope by 1978 to reduce the U.S. rate of assessed contributions on the nonsafeguard portion of the IAEA budget to 25 percent. The U.S. percentage of voluntary and special contributions is slightly higher than regular assessed contributions, but is expected to decrease in the future.

The United States has provided other types of support. For instance, since 1968 the U.S. Arms Control and Disarmament Agency has awarded about \$3.3 million in contracts to U.S. firms for research on safeguards instrumentation and techniques based on the needs developed and identified by IAEA. Other support, such as information and publications made available by ERDA, is not readily quantifiable.

The United States was instrumental in establishing IAEA and played an active role in its development. The major U.S. interest in IAEA has been in safeguards. Other IAEA programs in which the United States has strong interests are physical security measures, environmental protection, waste management, and reactor safety.

The United States maintains a small diplomatic Mission to IAEA, headed by the U.S. Representative with the rank of Ambassador. The Mission protects and fosters U.S. interests in IAEA by recommending policy positions, representing the United States at most nonscientific meetings, in conducting relations with IAEA, and informing the Department of State, ERDA, and other U.S. Government agencies of developments within and concerning IAEA. The Mission also maintains a liaison with missions and representatives of other IAEA member nations.

AGREEMENTS FOR COOPERATION IN THE CIVIL USES OF ATOMIC ENERGY

(AS OF NOVEMBER 1, 1975)

A. Bilaterals with individual countries:

<u>Country</u>	<u>Scope</u>	<u>Effective date</u>	<u>Termination date</u>
Argentina	Research and power	July 25, 1969	July 24, 1999
Australia	Research and power	May 28, 1957	May 27, 1997
Austria	Research and power	Jan. 24, 1970	Jan. 23, 2014
Brazil	Research and power	Sept. 20, 1972	Sept. 19, 2002
Canada	Research and power	July 21, 1955	July 13, 1980
China, Rep. of	Research and power	June 22, 1972	June 21, 2014
Colombia	Research	Mar. 29, 1963	Mar. 28, 1977
Finland	Research and power	July 7, 1970	July 6, 2000
Greece (note a)	Research	Aug. 4, 1955	Aug. 3, 1974
India	Power (Tarapur)	Oct. 25, 1963	Oct. 24, 1993
Indonesia	Research	Sept. 21, 1960	Sept. 20, 1980
Iran	Research	Apr. 27, 1959	Apr. 26, 1979
Ireland	Research	July 9, 1958	July 8, 1978
Israel	Research	July 12, 1955	Apr. 11, 1977
Italy	Research and power	Apr. 15, 1958	Apr. 14, 1978
Japan	Research and power	July 10, 1968	July 9, 2003
Korea	Research and power	Mar. 19, 1973	Mar. 18, 2014
Norway	Research and power	June 8, 1967	June 7, 1997
Philippines	Research and power	July 19, 1968	July 18, 1998
Portugal	Research and power	June 26, 1974	June 25, 2014
South Africa	Research and power	Aug. 22, 1957	Aug. 21, 2007
Spain	Research and power	June 28, 1974	June 27, 2014
Sweden	Research and power	Sept. 15, 1966	Sept. 14, 1996
Switzerland	Research and power	Aug. 8, 1966	Aug. 7, 1996
Thailand	Research and power	June 27, 1974	June 26, 2014
Turkey	Research	June 10, 1955	June 9, 1981
United Kingdom	Research and power	July 21, 1955	July 20, 1976
United Kingdom	Power	July 15, 1966	July 14, 1976
Venezuela	Research and power	Feb. 9, 1960	Feb. 8, 1980
Vietnam	Research	July 1, 1959	June 30, 1979

a/Superseding research and power agreement in abeyance; U.S. material covered by IAEA (NPT) safeguards.

B. Bilaterals with international organizations

<u>Organization</u>	<u>Scope</u>	<u>Effective date</u>	<u>Termination date</u>
European Atomic Energy Community (EURATOM)	Joint nuclear power program	Feb. 18, 1959	Dec. 31, 1985
EURATOM	Additional agreement to joint nuclear power program	July 25, 1960	Dec. 31, 1995
International Atomic Energy Agency (IAEA)	Supply of materials, etc.	Aug. 7, 1959	Aug. 6, 2014

NPT AND SAFEGUARDS STATUS OF COUNTRIES WITH WHICHTHE UNITED STATES HAS AGREEMENTS FOR COOPERATION

<u>Country</u>	<u>NPT status</u>	<u>Safeguards</u>
1. Argentina	-	IAEA trilateral
2. Australia	Ratified	IAEA - NPT
3. Austria	Ratified	IAEA - NPT
4. Brazil	-	IAEA trilateral
5. Canada	Ratified	IAEA - NPT
6. China, Republic of (note a)	Ratified	IAEA trilateral
7. Colombia	Signed, but not ratified	IAEA trilateral
8. Denmark	Ratified	IAEA - NPT
9. Finland	Ratified	IAEA - NPT
10. Greece	Ratified	IAEA - NPT
11. India	-	IAEA trilateral
12. Indonesia	Signed, but not ratified	IAEA trilateral
13. Ireland	Ratified	IAEA - NPT
14. Iran	Ratified	IAEA - NPT
15. Israel	-	IAEA trilateral
16. Japan (note b)	Ratified	IAEA trilateral
17. Korea (note b)	Ratified	IAEA trilateral
18. Norway	Ratified	IAEA - NPT
19. Philippines	Ratified	IAEA - NPT
20. Portugal	-	IAEA trilateral
21. South Africa	-	IAEA trilateral
22. Spain	-	IAEA trilateral
23. Sweden	Ratified	IAEA - NPT
24. Switzerland	Signed, but not ratified	IAEA trilateral
25. Thailand	Ratified	IAEA - NPT
26. Turkey	Signed, but not ratified	IAEA trilateral
27. Venezuela	Ratified	IAEA trilateral
28. Vietnam	Ratified	IAEA - NPT
29. United Kingdom (note c)	Ratified	-

a/An NPT safeguards agreement has not been concluded between the IAEA and ROC as a result of the ROC's expulsion from the IAEA in December 1971. The IAEA trilateral safeguards agreement, however, is still in effect and being implemented.

b/Negotiation of an NPT safeguards agreement is underway with the IAEA.

c/The US/UK Agreement for Cooperation in the power reactor field envisages the application of IAEA safeguards on any enriched fuel provided by the United States. No such material has been provided to date.

Note: In addition to the above, the EURATOM States (Belgium, West Germany, Italy, Luxembourg, and the Netherlands) have ratified the NPT and it is expected that the IAEA/EURATOM safeguards agreement will soon come into force. In the meantime, EURATOM safeguards apply. France, which is not an NPT party, will continue to be subject to EURATOM safeguards insofar as U.S.-supplied materials and equipment are concerned.

U.S.-IAEA TRILATERAL SAFEGUARDS AGREEMENTS FOR
APPLICATION OF IAEA SAFEGUARDS TO U.S.-SUPPLIED MATERIALS

<u>Third party</u>	<u>Effective date</u>	<u>Termination date (note a)</u>
Argentina	7/25/69	AC
Australia (suspended 7/10/74) (note b)	9/26/66	AC
Austria (suspended 7/23/72) (note b)	1/24/70	AC
Brazil (amended 9/20/72)	10/31/68	AC
China, Republic of	12/ 6/71	AC
Colombia	12/ 9/70	AC
Denmark (suspended 3/1/72) (note b)	2/29/68	AC
India	1/27/71	AC
Indonesia	12/ 6/67	AC
Iran (suspended 5/15/74) (note b)	8/20/69	AC
Israel	6/15/66	AC
Japan	7/10/68	AC
Korea (amended 3/19/73)	1/ 5/68	AC
Philippines (suspended 10/16/74) (note b)	7/19/68	AC
Portugal	7/19/69	AC
South Africa (amended 6/28/74)	7/26/67	AC
Spain (amended 6/28/74)	12/ 9/66	AC
Sweden	3/ 1/72	AC
Switzerland	2/18/72	AC
Turkey	6/ 5/69	AC
Venezuela	3/27/68	AC

a/AC indicates termination on same date as agreement for co-operation.

b/Suspended in view of NPT safeguards agreements with IAEA.

ERDA COMPARISON OF
EXISTING IAEA SAFEGUARDS AND U.S.
SAFEGUARDS REQUIREMENTS

The prime objectives of international safeguards and domestic safeguards are different, as well as the legal authority for operation; accordingly, the activities and requirements are not the same.

The international safeguards objectives can be viewed as:

- timely detection of a national government diversion of nuclear materials contrary to an international commitment made by that government;
- deterrence of such diversion through risk of early detection and political sanctions.

The U.S. domestic safeguards objectives can be viewed as:

- guarding against loss or diversion of nuclear material or sabotage of nuclear facilities, by individuals or groups, and guarding against the resultant threat to the U.S. common defense and security and public health and safety.

The underlying authority for application of IAEA safeguards in a country is the cooperation of that sovereign nation and its voluntary acceptance of IAEA safeguards. In contrast, the underlying authority for domestic safeguards is the mandatory subjection of individuals or groups under U.S. jurisdiction to U.S. laws and regulations.

As indicated in the table on the following page, the IAEA has neither the obligation nor the authority to prevent physically the diversion of nuclear material subject to its safeguards. Establishment of such obligation and authority would require nations to agree to giving international civil servants employed by the Agency the right to use force within their borders and thus to exercise a police power. Nations have to date not been willing to give up this much sovereignty. However, an Agency panel has made recommendations concerning physical protection systems for use by member States as they may choose; and the U.S. is working with the IAEA and with other nations in support of adoption by all of sound physical protection measures.

The availability and use of safeguards techniques for domestic and international safeguards are summarized on the following page.

<u>Technique</u>	<u>U.S.-Domestic Safeguards</u>	<u>IAEA-International Safeguards</u>
1. ACCOUNTANCY/INSPECTION (Design Review, Records and Reports Systems, Quantity Verification, etc.)	Yes	Yes
2. SURVEILLANCE (Live or TV or Film Monitoring, Seals, Electronic Detectors, etc.)	Yes	Yes
3. PHYSICAL PROTECTION (Armed Guards, Fences, Locks, Special Ve- hicles, Vaults, Walls, etc.)	Yes	No
4. PERSONNEL CLEARANCE REQUIREMENTS	Yes	No
5. PURSUIT, APPREHENSION, AND RECOVERY OF DIVERTER AND DIVERTED MATERIAL	Yes	No
6. PUNISHMENT/SANCTIONS	Arrest, trial, imprisonment for diversions; fines for infractions.	Notification of diversion to all IAEA members and U.N. Security Council and General Assembly; possible with- drawal of aid; possible expul- sion from IAEA.

With respect to transport, other than employing seals on certain shipments of nuclear material, the Agency has not played an active role in applying safeguards during transport. Diversion during transport is guarded against by physical protection techniques employed by the country with jurisdiction. Detection of such diversion, however, can be accomplished through such safeguards procedures as verifying the integrity of seals and measuring material at the shipping and receiving facilities.

STATUS OF NPT PARTICIPATION
JUNE 22, 1976

	<u>Signed</u> <u>NPT</u>	<u>Acceded to</u> <u>or ratified</u> <u>NPT</u>	<u>Safeguard</u> <u>agreement</u> <u>with IAEA</u>
Nuclear weapons			
countries (3):			
Union of Soviet Socialist Republic	x	x	
United Kingdom	x	x	Under negotiation
United States	x	x	Under negotiation
Non-nuclear-weapons			
countries (106):			
Afghanistan	x	x	Approved by Board
Australia	x	x	In force
Austria	x	x	In force
Barbados*	x		Under negotiation
Belgium	x	x	Signed
Bolivia	x	x	Signed
Botswana*	x	x	Under negotiation
Bulgaria	x	x	In force
Burundi*		x	
Cameroon	x	x	
Cambodia (Khmer Republic)		x	Under negotiation
Canada	x	x	In force
Central African Republic*		x	
Chad*	x	x	
China, Republic of*	x	x	
Colombia	x		
Costa Rica	x	x	Signed
Cyprus	x	x	In force
Czechoslovak Socialist Republic	x	x	In force
Dahomey*	x	x	
Denmark	x	x	In force
Dominican Republic	x	x	In force
Ecuador	x	x	In force
Egypt, Arab Republic of	x		
El Salvador		x	In force
Ethiopia	x	x	Approved by Board
Fiji*		x	In force
Finland	x	x	In force
Gabon		x	Approved by Board
Gambia*	x	x	

	<u>Signed NPT</u>	<u>Acceded to or ratified NPT</u>	<u>Safeguard agreement with IAEA</u>
Non-nuclear-weapons countries (106) (cont.):			
German Democratic Republic	x	x	In force
Germany, Federal Republic of	x	x	Signed
Ghana	x	x	In force
Greece	x	x	Provisionally in force
Grenada*		x	
Guatemala	x	x	Under negotiation
Haiti	x	x	Signed
Holy See (Vatican City)		x	In force
Honduras*	x	x	In force
Hungary	x	x	In force
Iceland	x	x	In force
Indonesia	x		
Iran	x	x	In force
Iraq	x	x	In force
Ireland	x	x	In force
Italy	x	x	Signed
Ivory Coast	x	x	
Jamaica	x	x	Under negotiation
Japan	x	x	Approved by Board
Jordan	x	x	Signed
Kenya	x	x	Under negotiation
Korea, Republic of	x	x	Approved by Board
Kuwait	x		
Laos*	x	x	Under negotiation
Lebanon	x	x	In force
Lesotho*	x	x	In force
Liberia	x	x	
Libyan Arab Republic	x	x	
Luxembourg	x	x	Signed
Madagascar	x	x	In force
Malaysia	x	x	In force
Maldives*	x	x	Under negotiation
Mali	x	x	Under negotiation
Malta*	x	x	Under negotiation
Mauritius	x	x	In force
Mexico	x	x	In force

APPENDIX V

APPENDIX V

	Signed <u>NPT</u>	Acceded to or ratified <u>NPT</u>	Safeguard agreement <u>with IAEA</u>
Non-nuclear-weapons countries (106) (cont.):			
Mongolia	x	x	In force
Morocco	x	x	In force
Nepal*	x	x	In force
Netherlands	x	x	Signed
New Zealand	x	x	In force
Nicaragua*	x	x	Signed
Nigeria	x	x	Under negotiation
Norway	x	x	In force
Panama	x		
Paraguay	x	x	
Peru	x	x	Under negotiation
Philippines	x	x	In force
Poland	x	x	In force
Romania	x	x	In force
Rwanda*		x	
San Marino*	x	x	Under negotiation
Senegal	x	x	Under negotiation
Sierra Leone		x	Under negotiation
Singapore	x	x	Under negotiation
Somalia*	x	x	Under negotiation
Southern Yemen*	x		
Sudan	x	x	Signed
Sri Lanka (formerly Ceylon)	x		
Swaziland*	x	x	In force
Sweden	x	x	In force
Switzerland	x		Under negotiation
Syrian Arab Republic	x	x	
Thailand		x	In force
Togo*	x	x	
Tonga*		x	Approved by Board
Trinidad and Tobago*	x		
Tunisia	x	x	Under negotiation
Turkey	x		
Upper Vol	x	x	
Uruguay	x	x	Signed
Venezuela	x	x	
Vietnam	x	x	In force
Western Samoa*		x	
Yemen (Arab Republic of)*	x		
Yugoslavia	x	x	In force
Zaire, Republic of	x	x	In force

* Not a member of IAEA.

IAEA MEMBER NATIONS
JUNE 22, 1976

Afghanistan	Iceland
Albania*	India*
Algeria*	Indonesia
Argentina*	Iran
Australia	Iraq
Austria	Ireland
Bangladesh*	Israel*
Belgium	Italy
Bolivia	Ivory Coast
Brazil*	Jamaica
Bulgaria	Japan
Burma*	Jordan
Byelorussian Soviet Socialist Republic*	Kenya
Cambodia (Khmer Republic)	Korea, Democratic People's Republic of*
Cameroon	Korea, Republic of
Canada	Kuwait
Chile*	Lebanon
Colombia	Liberia
Costa Rica	Libyan Arab Republic
Cuba*	Liechtenstein*
Cyprus	Luxembourg
Czechoslovak Socialist Republic	Madagascar
Denmark	Malaysia
Dominican Republic	Mali
Ecuador	Mauritius
Egypt, Arab Republic of	Mexico
El Salvador	Monaco*
Ethiopia	Mongolia
Finland	Morocco
France*	Netherlands
Gabon	New Zealand
German Democratic Republic	Niger*
Germany, Federal Republic of	Nigeria
Ghana	Norway
Greece	Pakistan*
Guatemala	Panama
Haiti	Paraguay
Holy See (Vatican City)	Peru
Hungary	Philippines
	Poland
	Portugal*
	Qatar*

APPENDIX VI

APPENDIX VI

Romania
Saudi Arabia*
Senegal
Sierra Leone
Singapore
South Africa*
Spain*
Sri Lanka
Sudan
Sweden
Switzerland
Syrian Arab Republic
Thailand
Tunisia
Turkey

Uganda*
Ukranian Soviet
Socialist Republic*
Union of Soviet
Socialist Republics
United Arab Emirates*
United Kingdom of
Great Britian and
Northern Ireland
United Republic of
Tanzania*
United States of America
Uruguay
Venezuela
Vietnam
Yugoslavia
Zaire, Republic of
Zambia*

* Member nations that are not party to NPT.



DEPARTMENT OF STATE

Washington, D.C. 20520

August 20, 1976

Mr. J. K. Fasick
Director
International Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Fasick:

I am replying to your letter of July 1, which forwarded copies of the draft report: "Assessment of U.S. and International Controls Over The Peaceful Uses Of Nuclear Energy."

The enclosed comments were prepared by the Acting Assistant Secretary for the Bureau of Oceans and International Environmental and Scientific Affairs.

We appreciate having had the opportunity to review and comment on the draft report. If I may be of further assistance, I trust you will let me know.

Sincerely,

Austin B. McHale
for

Daniel L. Williamson
Deputy Assistant Secretary
for Budget and Finance

Enclosure: As stated

SUBJECT: GAO Draft Report "Assessment of U.S. and International Controls over the Peaceful Uses of Nuclear Energy."

This will confirm certain major and substantive comments on the subject draft report transmitted to the Department by Mr. Fasick's letter of July 1 and discussed in a meeting between Mr. E. G. Woods and other GAO staff members, and representatives of the Department of State on August 2, 1976.

The following remarks reflect our major concerns and corrections. Views of the U.S. Mission to IAEA are incorporated as well.

Major Conclusions:

1. In general, we readily agree with the implicit overall objective of the report, namely, that more effective controls to prevent nuclear weapons proliferation must be sought. However, many ideas in the international safeguards section are based on assumptions that other countries would not consider consistent with the exercise of functions which they perceive as within their sovereign rights. For example, the report points out that IAEA inspectors have neither unlimited access (in safeguarded countries) nor broad authority to seek

out possible undeclared or clandestine facilities or stockpiles of nuclear materials. The implication is that the U.S. should seek to have these limitations overcome where IAEA applies safeguards in other countries. However, it is very unlikely that the U.S. would itself grant such unlimited access or authority to international inspectors in the U.S. Further, it is unlikely that reinstatement of U.S. bilateral safeguards which are suggested as a fallback to IAEA safeguards, could facilitate such access or authority.

2. The major objective of international safeguards implementation is to detect and thereby deter diversion. Emphasis should be placed in the report upon the risk of detection of a diversion which in itself is a deterrent to the act of diversion. This point is omitted from the report and is deserving of inclusion.

Major Comments:

Following is a compilation of the major substantive comments which the Department believes to be applicable to the draft GAO report:

GAO note: Page references in this appendix refer to our draft and may not correspond to the pages of this final report.

Page iii - Digest: The purpose of IAEA safeguards in itself is not to prevent diversion but rather to detect diversion, and thus to deter diversion by the high risk that such diversion will be detected and made public. This point is not made clear in this report.

Page 37: We believe it is misleading to say that international safeguards are "inadequate" without drawing a clearer distinction between the separate function of safeguards and physical protection measures. We also believe that the discussion of this question would benefit from a more precise definition of the terms "proliferation" and "diversion."

"Proliferation" is ordinarily understood to mean the international proliferation of nuclear weapons capabilities; "diversion" is ordinarily understood to mean the covert use by governments of safeguarded nuclear materials for proscribed, i.e., non-peaceful, purposes. Neither term is ordinarily used in reference to theft, sabotage, or other activities at the subnational level.

The task of the IAEA Safeguards System as presently constituted is to detect diversion, and thereby deter international nuclear weapons proliferation by posing a high risk that the diversion of nuclear materials by governments will be promptly detected. This is different from the physical prevention

of such diversion through the application of police power, which would be both impractical and politically unacceptable to most nations, since it would require the continuous presence of an international police force in the host countries' nuclear facilities.

The task of physical protection measures is to prevent theft, sabotage, or other use of nuclear materials by subnational entities or groups, and as the report points out, is normally considered one of the domestic responsibilities of nations, involving the kind of police powers which have never been granted to any international organization.

The United States and other suppliers are now requiring that recipients meet certain stringent standards of physical protection. In addition, the U.S. is currently pursuing a proposal for an international convention on the physical protection of nuclear materials that would not only contain recommendations applicable to national facilities, but would also apply to international transportation of nuclear material and to recovery of material lost during such transit. While we believe that the IAEA could play a role in bringing such a convention into being, experience indicates that it is highly unlikely

that enforcement of physical protection standards by an international body would be acceptable to most governments.

Page iii of Digest: The last item on this page is misleading. "International safeguards system" calls for the United Nations Security Council to be brought into the picture in case of non-compliance, and subsequently the U.N. may take any action it deems appropriate. It is IAEA per se which is limited in the sanctions it can apply.

Page IX - Digest: Certain nuclear supplier nations, following consultations, have each announced their intention unilaterally to follow certain common nuclear export policies. This does not constitute an international agreement. Interested committees of the Congress have been kept informed of developments in the consultations among the nuclear supplier countries, and the Secretary has described the nuclear export policies which we have notified other suppliers that we intend to follow. We would of course expect to submit to Congress any international agreements which might be concluded in this area.

In addition to the fact that no international agreement has been concluded, it is important to

recognize that progress would not likely take place with respect to such arrangements, since the nature of negotiations involved in order to obtain participation of other countries requires that the process be confidential. Nonetheless, we do consult with members of appropriate Congressional committees in order to keep the Congress informed of activities in this area.

Page 27: It is not productive to attempt to identify in advance, within the large variety of possible circumstances and situations, those cases under which the U.S. could or would exercise its right to reinstate U.S. safeguards. Furthermore, to attempt to do so could seriously undermine the credibility and full acceptance by other nations of the IAEA safeguards system. In support of the only international system of its kind in existence, U.S. energies are better directed at reinforcing IAEA safeguards as distinct from a U.S. preoccupation with how and when to reimpose our bilateral safeguards.

Page 34: First paragraph, the sixth line requires clarification. IAEA inspections under NPT are permitted on "all peaceful nuclear programs" and not "all" nuclear programs per se. The same omission appears at the bottom of the page.

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Page 34: Footnote. The distinction should be made that India is not a nuclear weapon state under definitions given in the NPT.

Page 35: The second paragraph is incorrect. IAEA currently applies NPT safeguards in Denmark, a EURATOM country.

Page 37: Second to last item: A footnote should be added stating that the IAEA Director General has made a public declaration that IAEA safeguards under non-NPT agreements are aimed at precluding use of peaceful nuclear explosives.

Page 44: Second to last paragraph: At the end of 1975, the IAEA had 45 inspectors for safeguarding about 300 facilities.

Page 45: It is misleading to say that IAEA has no comprehensive training program. There is a training program which is more than simply "on-the-job" training. The program covers a three-month period for new inspectors and includes lectures and workshops. It is not clear what is intended by the term "comprehensive."

Page 49: The recommendations for increasing effectiveness of IAEA safeguards are all desirable and are being pursued in a manner which is consistent with the fact that safeguarded countries have accepted

IAEA safeguards on a voluntary basis and have to be persuaded of their own interest in these matters before they will accept a tightening of safeguards controls.

Page 52: The report does not acknowledge that our Mission's day-to-day relationships with the IAEA enable the U.S. to obtain considerable information from which to assess the adequacy of the current IAEA system.

Page 54, second paragraph: It is the IAEA Director General, and not the IAEA Inspector, who reports diversions to the Board.

Page 58: The U.S. request to the IAEA in October of 1974, regarding IAEA implementation of safeguards responsibilities under trilateral agreements to which the U.S. is a party, was overtaken by progress made by the IAEA in meeting our more general request for additional information on all safeguards implementation to be given to the IAEA Board of Governors. The establishment and subsequent activities of the Standing Advisory Committee on Safeguards Implementation (SAGSI) and the Secretariat's effort at preparing a special safeguards implementation report (SSIR) for the Board of Governors are examples of this progress.

Page 59, the second full paragraph: The Mission is not aware of IAEA considering the process "independent of its safeguards department" for internally reviewing inspection results. The review process which the agency has in mind would be conducted within the Department of Safeguards and Inspection.

Page 60, first full paragraph: It should be noted that there is a legitimate basis for the contention that IAEA safeguards are of value even in the absence of an ability to specifically quantify how effective they are. The U.S. has extensive information on the IAEA safeguards system and its implementation, even though we do not receive actual inspection results.

Page 60, second full paragraph: Making public such a claim that "The U.S. is largely responsible for whatever effectiveness and credibility can be claimed for current IAEA safeguards" will probably have a negative effect on U.S. ability to support IAEA safeguards in the future, in view of a concern expressed by some governments that the U.S. already has too much influence in this area. They feel that this influence is not in their best interests.

Page 60, second full paragraph: We recommend the first sentence read: "U.S. officials have indicated

that the United States has played an important role in the development of current IAEA..."

Page 61, second to last item: The U.S. per se is not a member of SAGSI. The IAEA Director General selected individuals of internationally recognized leadership in the field to advise him personally.

Page 62: Recommendations on obtaining IAEA reports and monitoring on-site IAEA inspections are not realistic in light of the attitude of other nations. We believe that there are more acceptable and equally effective means of allowing IAEA member states to evaluate agency safeguards.

Page 63, bottom of first paragraph: It is unclear from the draft report why GAO believes the U.S. nuclear export control program needs to be revamped and further, it is unclear how centralization of this program in the NRC will "assure that effective and efficient controls are exercised." The only reason given appears to be that found on page 67 which expresses the concern that "while there may be only a few cases where NRC and the Executive Branch would differ, such a situation could create a major confrontation and be of a very sensitive nature." The involved agencies have stated that such an occurrence would be extremely unlikely. The centralization of nuclear export authority in a regulatory agency creates a serious risk that other nations will view U.S. reliability as a supplier as seriously diminished and that they will seek other sources of supply subject to less effective non-proliferation controls. 111

Page 92, final paragraph: Contacts by U.S. and IAEA officials with other countries have indicated strong opposition, based on their belief that a nation's internal security is a national concern. In light of this, it is unlikely that the IAEA Statute would be amended to provide such authority and responsibility.

Page 96, first full paragraph: It is not stated why continued U.S. security reviews "may be unacceptable." This is particularly important to note in view of the fact that, for the reason noted above, both near-term and long-term IAEA security reviews are, and may continue to be, unacceptable to member states.

Page 96 and page vi of Digest: For factual accuracy, the recommendation should read "...pursue an international convention aimed at ...", deleting the words "its proposal for an." The Department of

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State has not made any proposal for a convention which would necessarily contain the specific elements enumerated in this recommendation.

More generally, we believe that the three specific points made may be regarded as unacceptable by a large number of governments. The desirability of including these or other specific provisions in a convention will need to be balanced against the desirability of obtaining wide international adherence. In general, we believe that the importance of obtaining broad international acceptance of physical protection standards must be given great weight in making such judgments.

Page 108, second paragraph: The principles stated by Secretary Kissinger in March, 1976 testimony were not agreed to by seven supplier countries, per se. Rather, these supplier countries have each announced, following consultations, that they will follow certain common export policies.

Page 118 and pages vii and ix of Digest: The recommendation in its present form would in effect set up a double standard among supplier countries, since it would require such a policy as a prerequisite of U.S. supply, but merely "promotion" of a similar policy by other suppliers. We could support this recommendation if it were changed to read: "Promoting, as a

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common prerequisite for nuclear cooperation or assistance by all nuclear supplier nations, the minimum standard of NPT adherence or a guarantee by the recipient country to subject its entire peaceful program to international safeguards."

Consultations among the major supplier nations have made it evident that they would not all be prepared to participate in a committee or other institution of this kind (international coordinating committee to control the trade of strategic nuclear commodities and technologies). We believe that such a committee, unless it included all of the major suppliers, would not be viable. In these circumstances, we believe that we must continue to seek consensus and a common approach through less formal and less institutional consultations.

Page 121: The IAEA has no research reactors. The research reactor mentioned is most likely the Austrian Government reactor at Seibersdorf.

Page 135: Portugal should be added to the list.


Myron B. Kratzer, Acting



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

August 20, 1976

Mr. Monte E. Canfield, Jr.
Director
Energy and Minerals Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Canfield:

The Nuclear Regulatory Commission has reviewed the proposed draft report, "Assessment of U.S. and International Controls Over the Peaceful Uses of Nuclear Energy."

Several changes were suggested during a meeting between NRC and GAO staff members on July 30, 1976. In addition, NRC promised and subsequently forwarded requested supplementary information on the NRC/Department of Commerce arrangements regarding nuclear-related exports, along with copies of the related correspondence. As noted earlier, the NRC staff has naturally concentrated on license applications concerning items on the Nuclear-Related Commodities List. We would add, however, that Commerce has cooperated fully in our review and consultations on other applications of interest to the NRC.

While the recommendations and conclusions in the draft report were discussed in the meeting, along with other items, we would like to clarify further several matters of specific interest to the NRC.

1. Reference the sections of the draft report on physical security reviews, in-country transfers, and related conclusions and recommendations (pp. vi, 86-91, and 95-97).

These sections need updating and revision to reflect the present situation accurately, in brief as follows. The NRC has been participating, for some time, in the U.S. physical security review team visits abroad. We have found some countries' physical security programs adequate and are continuing to acquire information on other countries' programs as necessary to fulfilling our export licensing responsibilities. Although the NRC concentrates on key site analysis, the physical security reviews take into account the countries' overall physical security policies, program guidance, regulations, and requirements, as well as the results of visits to representative sites.

GAO note: Page references in this appendix refer to our draft report and may not correspond to the pages in this final report.

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Thus, the draft report's conclusions that NRC analysis is based simply on specific site considerations in the review of export license applications for strategic quantities of special nuclear material and that every designated site must be visited prior to approval of such an export are not accurate. Nor is it accurate to imply that the NRC relies solely on ERDA to determine the adequacy of physical security measures abroad. While the NRC certainly takes into account the Executive Branch's assessments and recommendations on these matters, we participate in the visits (as noted above), carefully examine available information, request and analyze further information whenever necessary, and will continue to do so.

As a further consideration with regard to the "potential loophole" in the section on "physical security and in-country transfer," it should be noted that the designated ultimate consignee and end-use statements for most license applications for the export of strategic quantities of special nuclear material indicate intended use in reactors. (Since the beginning of this year all but one of such applications specified intended use in reactors abroad. The single exception involved material to be converted in West Germany and returned for use in a U.S. reactor.) Since the review of physical security measures abroad is not simply site specific, since any changes in the ultimate or intermediate consignees must be approved by the NRC, and since, as you know, the spent fuel resulting from irradiation in a reactor presents a much less attractive target for theft or diversion than unirradiated plutonium or high-enriched uranium, it is difficult to conclude that a significant "potential loophole" regarding physical security and in-country transfer exists in the present system.

2. Reference the view "that the United States may be relying on international safeguards that are not adequately implemented" (pp. iv and 57).

The Commission fully agrees that the IAEA safeguards system must be strengthened to keep abreast of expanding nuclear energy programs and that it is desirable to enhance existing assurances through further information exchange. We also agree that many challenges beset these goals, including several noted in the draft report. We do not believe, however, that this shows the present system to be inadequate to the tasks it is performing.

3. Reference the views that "current international safeguards are inadequate for halting nuclear weapon proliferation because they are designed to detect diversions...rather than prevent them" (pp. iii and 37) and that IAEA sanctions against nuclear diversions should be strengthened (pp. v and 50).

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We believe the report could usefully explore (1) the similarities between safeguards and arms control monitoring measures generally, which normally rely on detection as a deterrent; and (2) the potentially serious disadvantages of pursuing a preventative system as such in terms of its feasibility (given associated economic, political and technical problems) and the implications of casting the IAEA in a new and probably untenable role.

Although the draft report is not specific on how or what measures should be taken to strengthen IAEA sanctions against nuclear diversion, without further specific analysis we would question whether the IAEA is the proper forum for consideration of additional sanctions. Moreover, we believe that the fact that interested countries and/or the United Nations may take actions which are deemed appropriate warrants note in the discussion.

4. Reference the recommendations that the IAEA should be responsible for setting, overseeing, and monitoring physical security standards and programs in other countries (pp. vi, 92-94, and 96-97).

Our concern here is similar to that stated in Item 3 above in that more analysis should be given to the potentially serious disadvantages regarding feasibility and possible implications for the IAEA. Also, our experience to date provides little basis for the view that U.S. physical security reviews may prove unacceptable.

5. Reference the recommendations and related conclusions that the NRC exercise overall authority to regulate the foreign distribution of all nuclear material and equipment and be involved in or assume responsibility for (a) monitoring nuclear and related export license applications received by the Department of Commerce, (b) establishing criteria for the authorization of any government-to-government transfers, and (c) approving retransfers of U.S.-supplied nuclear material within or between foreign countries (pp. viii and 68-84).

The NRC has several comments in this regard. First and as noted previously, Commerce has cooperated fully in consultations regarding nuclear and related export license applications received by Commerce under already existing arrangements. The NRC has not concluded, as implied in the draft report, that the export of component parts requires less stringent control than other nuclear exports. In view of the present arrangements, the opportunity they provide for further refinements should these

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prove desirable, and the procedures followed and criteria applied by Commerce, we have concluded that the present system provides for adequate control and review, or checks and balances, and should not be subjected to further major alteration in light of experience thus far.

Second, while retransfers within countries have already been discussed, it should be noted that arrangements are taking effect to involve the NRC, on a consultative basis, in proposed retransfers between countries and in any proposed government-to-government transfers. Several consultations on retransfers have already taken place.

Third, the assumptions that further centralization would provide more adequate controls and that the present system does not provide sufficient checks and balances are unsupported. Thus, for all practical purposes, we find no basis in fact for the conclusion that the Executive Branch can circumvent normal U.S. export licensing and regulatory review procedures.

Fourth, the assertion that "export licensing procedures essentially have changed very little since NRC was established" ignores several fundamental changes which have in fact taken place. The NRC has initiated new export licensing review procedures, including interagency arrangements, which are proving effective. The Commission is developing appropriate in-house analytical capabilities and, contrary to the implications in the draft report, has access to and verifies all information it considers necessary to making an independent determination on proposed nuclear exports.

Finally, the NRC fully shares the objective of assuring that the conduct of the U.S. nuclear export program contributes effectively to our nation's efforts to inhibit nuclear proliferation. One of our major concerns is that the reality or appearance of further substantial change in our nuclear export framework, following so close on last year's major reorganization, would create a justified perception overseas of instability and unpredictability in U.S. nuclear export policy and procedures. This would, in our view, weaken our nation's voice in international safeguards and nuclear export control matters. We believe that reliability of nuclear supply for legitimate civil uses is an essential ingredient in U.S. non-proliferation policy

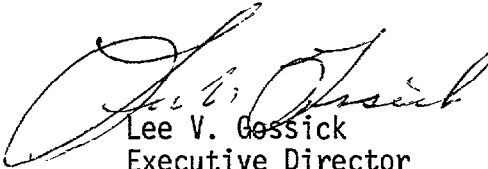
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and strategy. We would add that reliability of supply depends as much on predictable regulation and the avoidance of unnecessary procedural delays as on supply capacity itself.

We appreciate this opportunity to comment on the draft report and hope that our comments prove useful.

Sincerely,



Lee V. Gossick
Executive Director
for Operations



UNITED STATES ARMS CONTROL AND DISARMAMENT AGENCY

WASHINGTON, D.C. 20451

August 10, 1976

Mr. J. Kenneth Fasick
Director
International Division
General Accounting Office
Room 4824
441 G Street N.W.
Washington, D.C. 20548

Dear Mr. Fasick:

At your request, I write to provide comments of this Agency on the GAO draft proposed report entitled "Assessment of U.S. and International Controls Over the Peaceful Uses of Nuclear Energy".

The comments of this Agency are as follows:

A. p. iii, first paragraph -- add the following introductory language: "The number of unsafeguarded facilities in operation or planned is very small, indicating an acceptance of international monitoring unique in history. Nearly 100 countries are parties to the Treaty on the Non-Proliferation of Nuclear Weapons. However," (Reason: balance presentation);

B. p. iii, second paragraph -- change "agreements" to "efforts", change "common" to "parallel", change "through" to "the subject of ", add "or congressional" after public, and end sentence after "scrutiny", deleting balance of sentence. (Reason: the unilateral adoption by the nuclear supplier governments of parallel export policies was not an international agreement or treaty);

C. p. iii, third paragraph -- change "are inadequate for" to "cannot by themselves", change "halting" to "halt", delete "after they have occurred" (Reason: draft language gives inaccurate impression of purpose of international safeguards);

GAO note: Page references in this appendix refer to our draft and may not correspond to the pages of this final report.

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D. p. iv, third full paragraph -- add introductory clause, "In the case of certain government-to-government transfers, the Executive Branch" (Reason: precision);

E. p. viii, final paragraph -- since this recommendation would purport to remove functions from the Executive Branch mandated to it by both statute and the Constitution, the paragraph should be deleted;

F. p. ix, first paragraph -- since implementation of this recommendation could force termination of some US international obligations to our prejudice, ACDA is of the view that this paragraph should be either deleted or rewritten to indicate the risks inherent in such a recommendation.

G. p. ix, second paragraph -- delete words "and ratification" (Reason: the decision whether or not to conclude any such agreement as an Executive Agreement or as a Treaty is one which will be taken by the Executive at the appropriate time, and with regard to the terms and scope of the agreement).

H. p. 7 -- at line 9, insert words "the possibility" between "recognizes" and "that", and at line 11, add after word "industry" a comma and the words "if a plutonium re-cycle economy comes into being" (Reason: draft language prejudices the decision on this question, which is now under study by the Nuclear Regulatory Commission);

I. p. 16, final paragraph -- add words "Quantities of" at beginning of first sentence (Reason: clarification);

J. p. 18, last paragraph -- after second line, begin new paragraph with words "-- All parties agree not to transfer nuclear material or equipment 'especially designed'" (Reason: accuracy);

K. p. 19, line 4 -- after words "Outside of NPT" delete comma and add word "safeguards" (Reason: accuracy);

L. p. 20, line 14 -- end sentence after word "agreements" (Reason: accuracy);

M. p. 31, line 9 -- add word "domestic" after "U.S." (Reason: accuracy);

N. p. 35, line 25 -- after words "South Africa", add "and Spain" (Reason: accuracy);

O. p. 41 -- add at end of "Material Accountability" section the following sentence: "Because there exists an

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irreducible minimum of uncertainty below which such accounting cannot resolve questions of detectability, a concomitant need exists for surveillance by on-site inspectors." (Reason: completeness of presentation);

P. p. 43 -- add at end of final paragraph the following sentence: "(However, there are fewer limitations on numbers of inspections and fewer requirements for advance notice thereof under such agreements.)" (Reason: completeness of presentation);

Q. p. 46 -- add following sentence to footnote: "Although the present terms of appointment are for two years, most inspectors stay for at least 4 years and a substantial number are effectively permanent, i.e., service for 9 or more years." (Reason: completeness of presentation);

R. p. 49, line 10 -- add after word "commission" the words "Arms Control & Disarmament Agency" (Reason: provide for thoroughness of review);

S. p. 53, line 10 -- insert word "all" between words "to" and "IAEA" (Reason: access to some results is enjoyed by the U.S. Government);

T. p. 54, lines 8 and 9 -- insert period after "results" and replace balance of draft sentence with the following: "These results were provided with the consent of the inspected nation, in conformity with IAEA procedures approved by the U.S. Government." (Reason: to clarify presentation);

U. p. 59, final full paragraph -- at end of paragraph, after sentence ending in word "facility", add new sentence: "Most importantly, at the urging of the U.S. Government, the IAEA is working on the form and content of a routine, detailed safeguards implementation report." (Reason: completeness of presentation);

V. p. 61, line 15 -- after word "State", add "ACDA," (Reason: completeness of mandate);

W. p. 63, first paragraph -- replace words "provide the primary control over" with word "monitor", replace words "has also established" with word "through", replace words "to insure" with words "endeavors to ensure", and delete word "However" (Reason: accuracy) see also substantive views presented in paragraph E of this letter, above;

X. p. 77, line 3 -- delete word "not" (Reason: accuracy);

Y. p. 80, line 10 -- add word "later" before "Excluded", change word "are" to "were" (Reason: accuracy);

Z. pp. 83 and 84 -- see again the substantive views presented in opposition to this recommendation in paragraph E of this letter, above;

AA. p. 89, line three -- change word "acceptable" to "unacceptable" (Reason: accuracy);

BB. p. 96, line 20 -- after word "with", add "ACDA" (Reason: completeness of mandate):

CC. p. 105 -- at 12th line from bottom, replace word "critical" with "strategically sensitive", and fifth line from bottom, end sentence after word "technology", deleting balance (Reason: since no necessity as yet exists for reprocessing in the nuclear fuel-cycle, comparison with enrichment is misleading);

DD. p. 107, line 19 -- add, after word "various", words "legal, institutional" (Reason: accuracy);

EE. p. 108 -- at line 6, delete words "a set" and replace with words "unilaterally adopt a policy", and at line 11, delete word "principles" and replace with words "unilateral policy" (Reason: accuracy);

FF. p. 109 -- at line 3, replace word "agreements" with word "policies" and words "made through" with words "the subject of ", at line 18, replace word "principles" with word "policy", at line 24, replace words "stronger, more" with words "strong and" (Reason: accuracy);

GG. p. 110, fourth line from bottom -- replace number "98" with number "99" (Reason: accuracy);

HH. p. 113, fourth line from bottom -- replace number "98" with number "99" and word "ratified" with words "adhered to" (Reason: accuracy);

II. p. 115, line 19 -- replace word "principle" with word "principal" (Reason: clarity);

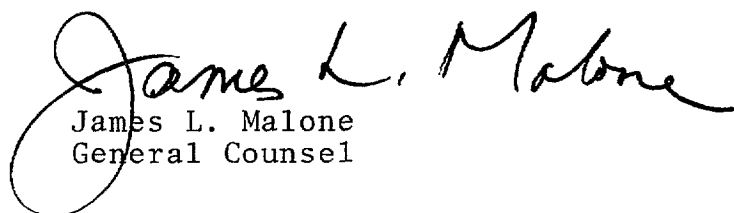
JJ. p. 116, line 12 -- add following sentence: "However, in exercising this caution, the United States must also be careful that decisions taken on its domestic nuclear fuel-cycle do not exacerbate the risks of nuclear proliferation." (Reason: completeness of presentation);

- 5 -

KK. p. 133 -- to list, add "Benin" and delete "Dahomey", delete "Cambodia" and add words "succeeded to" to heading "acceded to or ratified NPT" (Reason: accuracy);

LL. p. 134 -- to list, add "Khmer Rep.", add words "succeeded to" to heading "acceded to or ratified NPT" (Reason: accuracy);

MM. p. 135 -- to list, add "Surinam", add words "Succeeded to" to heading "Acceded to or ratified NPT" (Reason: accuracy).


James L. Malone
General Counsel



AUG 23 1976

Mr. Henry Eschwege
Director, Community and Economic
Development Division
United States General Accounting Office
Washington, D.C. 20547

Dear Mr. Eschwege:

In response to your letter of July 1, 1976, addressed to the Secretary, I am providing herewith the comments of the Department of Commerce regarding your draft report, "Assessment of U.S. and International Controls Over the Peaceful Uses of Nuclear Energy."

In the nuclear field, as you know, the Nuclear Regulatory Commission (NRC) and the Energy Research and Development Administration (ERDA) have primary export licensing jurisdiction. The Department of State and the Arms Control and Disarmament Agency, along with ERDA, are chiefly responsible for international aspects of nuclear nonproliferation. The Department of Commerce plays a supportive role and most of our comments and suggestions will be devoted to export licensing aspects of the report. Our detailed remarks thereon are attached. First, however, I wish to set forth some general statements that will place our involvement in the nuclear field in a broader prospective.

This Department not only carries out export licensing on a limited number of nuclear-related products, it also participates in the development of an Executive Branch position on proposed export licenses for nuclear materials and equipment submitted to the Nuclear Regulatory Commission. Commerce's position reflects an assessment of (a) the commercial and economic interests of the United States; (b) the domestic supplies of critical material and equipment; and (c) related Commerce export licensing activities. In addition, the National Bureau of Standards reviews whether the importing country is participating in bilateral or international agreements that provide for independently determining the adequacy of measurement and accounting aspects of nuclear safeguards in the importing country.

GAO note: Page references in this appendix refer to our draft and may not correspond to the pages of this final report.

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In the digest section of the report (page ii), GAO states, and we agree, that "continued [U.S.] dominance in nuclear sales, using the strongest practical precautions, will give the United States the best opportunity to continue to promote global nonproliferation policies." On page 27, however, the report recommends that Congress prohibit foreign distribution of certain nuclear items with the assistance of the executive branch and the Nuclear Regulatory Commission.

The recommendation should be explicit. It is not clear if the GAO meant that Congress should legislate certain additional criteria in our export policy or if they meant Congress should review (administer) exports on a case by case basis, or do both. Our belief is that an uncertain and equivocal export policy will place the U.S. suppliers of nuclear equipment even further at a competitive disadvantage abroad. Because of the uncertainty presently revolving around our nuclear export policy, U.S. suppliers report that the United States' competitive posture overseas has been damaged. Worse, they fear that if Congress preempts the right to approve exports, then the United States will be tagged as an unreliable source by foreign countries because Congressional approval is uncertain and introduces a new and large uncertainty in an already complex process of agreements for cooperation and license approval. We suggest that the recommendation be revised to state that Congress only legislate certain criteria so as to provide stability in our export policy. This will help restore the United States to the leadership role as a reliable source.

It appears from the draft (page 120) that the GAO did not obtain the views of U.S. industry in this matter through either direct contact with companies or through the Atomic Industrial Forum. It is industry's belief that they can make a useful contribution to the formulation of policy options in this area. This view was recently communicated to the President by Mr. John W. Simpson, Chairman of the Atomic Industrial Forum. The GAO may find it useful to obtain from Mr. Simpson a copy of the Forum's recent statement on nuclear export policy.

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With respect to the technical problem of nuclear safeguards, the following suggestions are made:

--On page 32 add to (1) the phrase "based on accurate measurements" so that (1) reads

(1) the maintenance and review of records, based on accurate measurements, showing the receipt, production, consumption, transfer, and storage of nuclear materials and (2) onsite inspections.

--On pages 47 and 48 add the following to the list of items identifying the areas where the United States should intensify its efforts constructively to influence IAEA safeguards

Providing measurement standards to assure compatible and accurate measurements for inventory control on a national and international basis.

One of the recommendations of this report (appearing on pages 83 and 84) is that NRC exercise overall authority to regulate the foreign distribution of all nuclear material and equipment, including the monitoring of license applications for nuclear and related exports that are currently approved by the Department of Commerce. In this connection, NRC is already monitoring export applications for commodities that Commerce licenses for it, and provision can be made for consultation or information on other commodities in the nuclear field that are of interest to the NRC. We do not believe, however, that the NRC should regulate exports of commodities licensed by Commerce that are reviewed by ERDA and/or other departments of the Executive Branch because of their application in the design, development, production and testing of nuclear weapons or are otherwise under export control because of non-peaceful nuclear end-uses.

Finally, throughout this report the terms "nuclear materials and equipment" is used. The term is ambiguous and subject to misinterpretation in a way that could run counter to the purpose of the report. The GAO should make clear at the outset what products it means to cover. For example, "nuclear materials" may include the source materials and special nuclear materials cited in the Atomic Energy Act of 1954, as amended. It may also cover byproduct materials as defined in that Act.

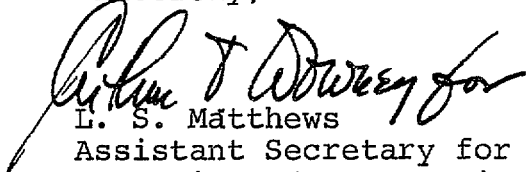
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It may be interpreted to cover other materials that have a close relationship to the nuclear industry, such as zirconium, beryllium and lithium. "Equipment" can similarly be interpreted to include only utilization and production facilities as set forth in the Atomic Energy Act, or to cover also specially designed components and accessories therefor, or it could even extend to other nuclear related commodities not caught within that legislation. It is essential that the term, therefore, be defined in such a manner as to make clear exactly what items are covered by the GAO's various statements and recommendations, so that the impact thereof may be properly assessed. While this comment applies to the entire report, it becomes particularly relevant in connection with Chapter 5, where the term is used constantly. Here also is found the term "nuclear-related materials", which should probably be set off in quotation marks to show that it means something very different from "nuclear materials and equipment."

More detailed comments regarding Chapter 5 are provided in the enclosure.

I hope the foregoing will be helpful to you. If your staff wish elucidation or further information, questions should be directed to Rauer H. Meyer, Director, Office of Export Administration, in our Bureau of East-West Trade.

Sincerely,



L. S. Matthews
Assistant Secretary for
Domestic and International Business

Enclosure



EXPORT-IMPORT BANK OF THE UNITED STATES

WASHINGTON, D.C. 20571

PRESIDENT
AND
CHAIRMANCABLE ADDRESS "EXIMBANK"
TELEX 89-461

July 14, 1976

Mr. J. K. Fasick
Director
International Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Fasick:

On July 1, 1976, you requested the comments of the Export-Import Bank of the United States on a draft GAO report, "Assessment of U. S. and International Controls Over the Peaceful Uses of Nuclear Energy."

As you know, Eximbank has assisted in financing the export of U. S. goods and services involving or relating to nuclear energy production. Although Eximbank examines the economic and financial merits of such transactions, we are not in a position to assess the adequacy of controls over the peaceful uses of the nuclear material, equipment and services which we may assist in financing, and thus defer on that question to such agencies as the Department of State, the Energy Research and Development Administration, the Nuclear Regulatory Commission and the Arms Control and Disarmament Agency. Accordingly, while my staff and I have carefully reviewed the GAO draft report, Eximbank takes no position on its contents and defers instead to the views of the agencies mentioned previously.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Stephen M. DuBrul, Jr.", is written over a light-colored background.

Stephen M. DuBrul, Jr.



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

SEP 10 1976

Mr. J. Kenneth Fasick, Director
International Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Fasick:

Thank you for the opportunity to comment on the draft report entitled "Assessment of U.S. and International Controls Over the Peaceful Uses of Nuclear Energy."

The revised GAO draft takes into consideration or gives a recognition to most of the detailed comments and views we provided at our July 27, 1976, meeting. Although we do not agree with all the GAO conclusions and recommendations, the report in general represents a commendable effort. However, to more accurately portray and clarify the areas involved, we suggest that the following comments be considered in preparing the final report.

The sections on "Reviewing Physical Security Abroad" and "Physical Security and In-Country Transfers" in Chapter 6 provide an inaccurate representation of the physical security review process. The implications that ERDA physical security reviews are based only on visits conducted at selected facilities, that NRC assessments are based on specific site evaluations, that NRC requires specific facility approval, and that no country's total physical security system had been found acceptable are inaccurate. ERDA conducts its reviews and makes its recommendations based on an evaluation of a country's overall physical security system. This evaluation includes a review of the country's physical security policies, laws, procedures and regulations as well as an assessment of the implementation of these regulations including on-site visits to representative facilities.

The potential loophole that the GAO alleges in its report was recognized early in the physical security review program. For example, during one of the early reviews, the ERDA team found security inadequate at one of several representative sites visited in a major importing country. The ERDA team advised the country's authorities that no U.S. exports of such materials to any facility



Mr. J. Kenneth Fasick

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SEP 10 1976

would be approved until the security at the site in question was made acceptable by upgrading it to the level of other facilities. Personnel from the U.S. embassy maintained active liaison with the nuclear authorities over a six-month period while security was being upgraded. Upon completion of the upgrading, the ERDA team revisited the country and ascertained that the physical security at that facility was adequate. Only after these steps were taken, did ERDA judge that the country's overall physical security system was adequate and recommend approval of the export applications for significant nuclear materials.

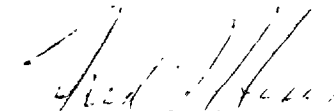
In this connection, the statement on page 63 that, "As of February 1976, NRC had denied no export licenses for physical security reviews," could be misinterpreted to mean that all exports of significant nuclear materials are routinely approved. ERDA has in fact judged the physical security systems of a number of countries to be inadequate. ERDA in those cases has held up its recommendations while it worked with the countries in question to upgrade their physical protection measures.

In summary, these sections of the draft GAO report are inaccurate, and the conclusion that in-country transfer procedures create the possibility of U.S. nuclear material being used at facilities which lack adequate physical security is not warranted.

It should be mentioned as a final comment that, although U.S. bilateral safeguards rights have, in virtually all cases, been suspended in favor of IAEA safeguards, the U.S. Agreements for Cooperation with EURATOM contain guarantees similar to those found in agreements with individual nations. Since the U.S. does not apply U.S. safeguards requirements in addition to IAEA safeguards when dealing with individual nations, the U.S. has not required these additional safeguards when dealing with our NATO allies who constitute EURATOM. All this is not to say that fruitful discussions are not conducted with EURATOM on a variety of safeguards and non-proliferation issues.

Other comments of a less substantive nature were furnished to Mr. Joe Murray of your staff.

Sincerely,



M. C. Greer
Controller

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