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REPORT TO THE COMMITTEE ON INTERNATIONAL RELATIONS HOUSE OF REPRESENTATIVES

Role Of The International Atomic Energy Agency In Safeguarding Nuclear Material

Department of State
Energy Research and Development Administration

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

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JULY 3,1975

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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The Honorable Thomas E. Morgan
Chairman, Committee on International
Relations
House of Representatives

Dear Mr. Chairman:

In response to your request of July 30, 1974, we are making an indepth review of international agreements for peaceful cooperation in nuclear energy. As your office requested, we are providing individual reports on specific issues raised in your request.

This, our third report, deals with the activities of the International Atomic Energy Agency in safeguarding nuclear material. As requested by the Committee, we are furnishing this report without obtaining formal agency comments. We did, however, obtain comments of agency officials informally and have included them, as appropriate.

Sincerely yours,

Comptroller General
of the United States

Contents

ABBREVIATIONS

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

COMPTROLLER GENERAL'S REPORT TO THE COMMITTEE ON INTERNATIONAL RELATIONS HOUSE OF REPRESENTATIVES

ROLE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY IN SAFEGUARDING NUCLEAR MATERIAL

Department of State
Energy Research and Development Administration

D I G E S T

WHY THE REVIEW WAS MADE

GAO was asked to provide reports on a broad range of subjects concerning international agreements for peaceful cooperation in the field of nuclear energy. This is GAO's third such report and deals with the role of the International Atomic Energy Agency in safeguarding nuclear material.

FINDINGS AND CONCLUSIONS

The Agency, an autonomous organization under the aegis of the United Nations, administers an international nuclear safeguards program designed to detect diversion of nuclear materials for nonpeaceful purposes.

Its 106 member countries include all nations with significant amounts of nuclear activity, except the Peoples Republic of China and the Republic of China (Taiwan). The latter's nuclear facilities, however, are subject to Agency safeguards. (See pp. 1 and 11.)

Membership in the Agency does not obligate a country to accept safeguards on its facilities. For example, nuclear facilities of major nuclear weapons countries, such as the United States and the Soviet Union, are not subject to Agency safeguards except on a voluntary basis. In addition, India, which exploded a nuclear device in 1974, along with Argentina, Egypt, Israel, Spain, Japan, Pakistan, and South Africa are members with nuclear facilities not subject to Agency safeguards. (See pp. 8, 11, and 13.)

The Agency's safeguards system consists of material accountability, onsite inspections, and surveillance and containment devices such

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as cameras and seals. The principle is that the detection capability of the system will deter a would-be diverter. However, limitations in the scope and applicability of inspections must be recognized.

--Agency safeguards are designed only to detect diversions on the national level, and it is assumed that member nations will protect nuclear material from terrorist or subnational groups. (See p. 14.)

--Agency safeguards do not include physical protection, the safe international transport of nuclear material, or the safeguarding of nuclear waste. (See p. 28.)

--The Agency does not have the authority to seek out undeclared or clandestine nuclear facilities and cannot pursue or retrieve diverted nuclear material. (See p. 15.)

With the expected spread in peaceful uses of nuclear energy throughout the world, problems encountered in the administration and implementation of the Agency's safeguards system can be expected to increase. They relate to such matters as:

--Adequacy of material accountability records within the member countries and their compatibility with the Agency's system. (See p. 20.)

--Continuing need for more advanced measuring instrumentation. (See p. 21.)

--Equitable apportionment of costs of the safeguards system among member nations. (See p. 22.)

--Differences in safeguards agreements with member countries and their interpretation. (See p. 23.)

Actions the Agency can currently take in the case of nuclear diversion are

--notification to member countries and the United Nations,

--suspension of Agency membership rights and privileges, and

--the recall of Agency-sponsored material and technical assistance.

It is not clear, however, how Agency-sponsored material would be retrieved. (See p. 16.)

In view of dangers involved in the spread of nuclear weapons capability, stronger penalties may be needed for those who might violate their pledge to use nuclear material only for peaceful purposes. (See p. 33.)

Real effectiveness of Agency safeguards is not known. There is no public evidence to show whether Agency safeguards have prevented or detected diversion of nuclear material from intended peaceful purposes. (See p. 16.)

The mere fact that the Agency has never disclosed a diversion is not sufficient assurance for many countries that the safeguards are effective. (See p. 27.)

--Effective international safeguards depend in large measure on the intent and cooperation of the country to which they are applied and the adequacy of technological control and implementation. (See p. 14.)

--U.S. and 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. 20.)

--Since the Agency does not disclose to member nations results of its inspections, on the grounds that proprietary information might be disclosed, the Agency faces the difficult problem of how to assure member nations that safeguards are being applied effectively, fairly, and consistently in all countries. (See p. 27.)

The question of whether U.S. interests are best served through bilateral or Agency safeguards is difficult to answer. Agency safeguards tend

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to be more uniform and less costly than numerous bilateral safeguards would be. Bilateral safeguards provide the supplier with greater confidence that material it supplied is not diverted but provide no assurances on material supplied by others. (See p. 7.)

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AGENCY ACTIONS AND UNRESOLVED ISSUES

As requested by the Committee, GAO did not obtain formal agency comments on this report. However, the report was discussed with officials of the agencies involved, and they generally agreed with the information.

MATTERS FOR CONSIDERATION BY THE COMMITTEE

The Committee, together with the Joint Committee on Atomic Energy, may wish to pursue with executive branch officials major policy matters related to the role of the Agency, including:

--The need for expanding Agency responsibilities in the physicial protection of nuclear material, control of nuclear waste, and safe transport of nuclear materials internationally.

--The technical and political limitations in applying Agency safeguards.

--The lack of sufficiently strong penalties or sanctions on a country that diverts nuclear material for military purposes or that knowingly supplies material to another country for developing nuclear explosive devices. (See p. 33.)

In addition, the Committees may wish to discuss with executive branch officials the desirability of proposing that the Agency publish annually a 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 accounted for during Agency inspections, while not divulging host country proprietary information. This could help assure all member countries that safeguards are effective and that safeguarded material is not being diverted. (See p. 34.)

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CHAPTER 1

INTRODUCTION

On July 30, 1974, the Chairman of the House Committee on International Relations asked that we report to the Committee on a broad range of subjects concerning international agreements for peaceful cooperation in the field of nuclear energy. This report deals with the role of the International Atomic Energy Agency (IAEA) in safeguarding against the diversion of nuclear material for nonpeaceful purposes.

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 nonpeaceful 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.

IAEA, founded in 1957, is an autonomous intergovernmental organization headquartered in Vienna, Austria. Under the aegis of the United Nations, it is recognized as the agency responsible for international activities concerned with the peaceful uses of atomic energy. This responsibility includes 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 the 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 to cooperation with many international, regional, and national organizations as well.

Membership in IAEA consists of 106 nations. (A list of members is shown in app. II.) 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, with 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

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five major departments as shown in appendix III. 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 IAEA 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 are estimated to be $35.5 million for 1975. (See app. IV for budget information.)

In addition, IAEA receives assistance-in-kind from member nations in the form of 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 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 hoped 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, although these rates are also expected to decrease in the future. U.S. voluntary cash contributions in 1973, for example,

amounted to about one-third of the total pledges by member nations. U.S. gifts-in-kind in 1973 were estimated at 35 percent of all such contributions.

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 the Atomic Energy Commission, 1/ 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, which is headed by the U.S. Representative with the rank of Ambassador. The resident staff of the Mission includes a deputy U.S. representative; two officials recruited from ERDA who deal generally with scientific and technical affairs; and two Foreign Service Officers who serve as political advisors and also handle budget and administrative matters.

The Mission protects and fosters U.S. interests in IAEA by recommending policy positions, representing the United States at most nonscientific meetings, assisting the U.S. Representative 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 liaison with missions and representatives of other IAEA member nations.

SCOPE OF REVIEW

Information for this report was obtained through a review of pertinent records and discussions with officials at the Department of State, the U.S. Mission to IAEA, ERDA, U.S. Arms Control and Disarmament Agency, and IAEA. We visited

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1/The Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission assumed the responsibilities of the Atomic Energy Commission on January 19, 1975.

the IAEA laboratory and a research reactor in Seibersdorf, Austria. We also observed an IAEA inspection of Japanese-owned plutonium being stored in Cheswick, Pennsylvania.

Within IAEA, our review was primarily centered around interviews with officials in the Department of Safeguards and Inspections. Since IAEA does not provide to other member countries the results of its inspections or related documents, on the grounds that host country proprietary information might be disclosed, major portions of our review were necessarily based on discussions.

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CHAPTER 2

DEVELOPMENT AND CURRENT STATUS OF SAFEGUARDS

Nuclear reactors can be fueled with uranium ranging from its natural state (containing 0.7 percent fissionable material) to highly enriched (containing 90 percent or more fissionable material), as well as plutonium. Only plutonium and highly enriched uranium are suitable for making nuclear explosives. Between 5 and 10 kilograms of plutonium or between 20 and 30 kilograms of highly enriched uranium are needed to make a nuclear explosive device.

Nuclear power reactors in use throughout the world today are fueled with either natural or slightly enriched uranium. After natural or slightly enriched uranium has been used to fuel a power reactor for about a year, plutonium is produced as a byproduct in the spent fuel.

To detect any diversion of nuclear material from peaceful activities, international safeguards were established. Since the inception of the IAEA safeguards in the early 1960s, the amount of nuclear material and the number of facilities subject to such safeguards has continued to grow. It has been estimated that by 1980 the number of power reactors in IAEA member countries will increase from the 1974 level of 182 (with a capacity of about 72,000 megawatts) to about 400 (with a capacity of about 263,000 megawatts). An IAEA survey estimated the market for nuclear power reactors in developing countries between 1981 and 1990 would amount to an additional 355 units with a total capacity of 220,000 megawatts.

This rapid growth of nuclear power as a source of energy greatly enhances the opportunity for countries to develop nuclear weapons.

U.S. INTEREST IN SAFEGUARDS DEVELOPMENT

Shortly after his Atoms for Peace message before the United Nations General Assembly in December 1953, President Eisenhower proposed revising the Atomic Energy Act of 1946 to allow for cooperation with allies in certain atomic energy matters. The Atomic Energy Act of 1954 (42 U.S.C. 2011) authorized the Atomic Energy Commission to distribute nuclear materials to foreign countries through bilateral Agreements for Cooperation for the civil uses of atomic energy. Each agreement indicated among other things, that materials would not be used for any military purpose and would not be transferred to unauthorized persons.

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The safeguards evolved from a U.S. decision to insure that the "not to further any military purpose" clause in the bilateral cooperative agreements was being adhered to by recipient countries. Safeguards provisions in early U.S. agreements were rather broad in scope, but later agreements gave the United States more detailed safeguards rights in such areas as facility design review, records, reports, and inspections.

IAEA benefited from the U.S. experience with safeguards gained in administering bilateral agreements. When the U.S. agreement with IAEA came into force in July 1957, the United States had had almost 3 years of experience in negotiating and administering bilateral agreements.

In 1961, IAEA adopted guidelines for a safeguards system. Then in 1963, the United States and Japan--a bilateral partner--completed an agreement to transfer to IAEA the function of safeguarding U.S.-supplied material and equipment. This was the first trilateral safeguards transfer agreement. Since that time, the safeguards functions of most U.S. bilateral cooperative agreements have been transferred to IAEA.

As of December 31, 1974, the United States had in effect bilateral agreements with 29 countries, as well as agreements with the European Atomic Energy Community (EURATOM) and IAEA. The safeguards portions of the majority of these agreements have been suspended in favor of trilateral agreements between the United States, IAEA, and the recipient country. Under trilateral agreements, the United States suspends its safeguards rights in favor of IAEA's safeguards. The supply and cooperation provisions of the bilateral agreements remain in effect, and the safeguards provisions are suspended--not superseded. If for some reason the trilateral agreement were terminated, bilateral safeguards would be reinstated.

An alternative method for countries to obtain nuclear materials and equipment from the United States is through IAEA project agreements. Under this arrangement, the United States supplies materials and equipment to a country under the aegis of IAEA, which assumes the safeguards responsibilities. For example, the United States has agreed to supply nuclear materials and equipment to Yugoslavia and Mexico through IAEA project agreements.

BILATERAL VERSUS INTERNATIONAL SAFEGUARDS

United States bilateral safeguards and IAEA safeguards are difficult to compare because (1) most of the U.S. experience in international safeguards was gained during the formative years and dealt primarily with research reactors,

(2) the United States subsequently assigned the majority of its bilateral safeguards responsibilities to IAEA, and (3) the U.S. experience applied, for the most part, to the types of reactors and equipment which were produced and exported from the United States, whereas IAEA safeguards apply to foreign as well as U.S. types of reactors and equipment. With assistance from certain member nations, IAEA is advancing the state of the art in safeguards.

The question of whether U.S. interests are best served through bilateral or IAEA safeguards also is difficult to answer since there are advantages and disadvantages to both. U.S. officials have outlined the following advantages to IAEA safeguards.

--IAEA safeguards may be viewed globally as more credible than bilateral safeguards, particularly in instances where the supplier and the recipient are close allies.

--IAEA safeguards would be more uniform and thus would minimize discriminatory application. If several supplier countries had bilateral safeguards systems, effective application might well be reduced to the least strict system.

--Safeguards applied by an international organization can serve as an important precedent for international inspection for any future disarmament agreement.

--It would be more expensive, in the aggregate, for many supplying countries to establish duplicative inspection systems than for one international organization to undertake the job.

--Relying upon IAEA to carry out the safeguards function enhances its prestige and increases its responsibilities and thereby makes it a more effective instrument in all of its fields of endeavor.

--Because of costs and technical manpower limitations, many supplying countries would find it difficult if not impossible to undertake bilateral safeguards on nuclear materials which they supply.

On the other hand, IAEA and Mission officials stated, in certain instances a supplier country might be in a position to negotiate stronger safeguards provisions bilaterally than IAEA. This is particularly true when the supplier country is a primary or sole source as it may be able to override any restrictions or limitations desired by the recipient

country on safeguards application. However, as more countries become exporters of similar nuclear commodities, suppliers may become reluctant to put themselves at a commercial disadvantage by requiring too stringent safeguards.

The obvious advantage of the bilateral safeguards system is that the supplier would have more confidence in an inspection or system which it controlled than in the efforts of others. Bilateral safeguards provide the supplier with greater assurance that material it supplied is not diverted but provide no assurance on materials supplied by others.

According to a State Department official, a supplier, even one like the United States that has transferred its bilateral safeguards responsibilities to IAEA, can get few details of the precise status of materials supplied because IAEA inspection reports are not made available to the supplier. Politically, however, U.S. officials believe that IAEA safeguards are preferable.

THE NON-PROLIFERATION TREATY

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which came into effect on March 5, 1970, initiated a new era of IAEA safeguards responsibilities. NPT is an unprecedented concept in international relations, in that it requires a general commitment to international inspection of all nuclear programs within a nation's borders. Outside NPT, IAEA applies safeguards to only certain facilities and/or nuclear material within a country.

NPT divides nations into two classes: those which had nuclear weapons prior to 1967 (nuclear weapons countries) and those which did not (non-nuclear-weapons countries). It commits the non-nuclear-weapons countries, which are party to NPT, to accept international inspections in return for assurance that inspections would also be made to detect any diversion of nuclear material for nonpeaceful purposes by other such NPT adherents. Nuclear weapons countries are not required to accept international safeguards under NPT but may accept them on a voluntary basis.

Under NPT, only the United States, the United Kingdom, the Union of Soviet Socialist Republics, France, and the Peoples Republic of China are considered nuclear weapons countries. These last two countries, as well as India which exploded a nuclear device in 1974, have not signed NPT.

As of May 12, 1975, 105 non-nuclear-weapons countries were party to NPT. Adherents to NPT are not required to be members of IAFA, and IAEA members are not required to become

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parties to NPT. A total of 26 nations that had signed, acceded to, or ratified NPT were not members of IAEA and 24 IAEA members were not party to NPT.

NPT safeguards do not begin the day a country signs the Treaty. The process between signing and safeguards application is normally one of lengthy and intensive political, legal, and technical consideration and consultation, normally following this pattern:

--Signing of or accession to NPT by the country.

--Ratification according to national law, if applicable.

--Agreement between the country and IAEA governing safeguards implementation. This outlines the general requirements of both parties and states general exemptions from safeguards.

--Subsidiary arrangements between the country and IAEA detailing procedures for executing the agreement.

--Facility attachments, appended to the subsidiary document, detailing safeguards application for each facility subject to coverage.

As of May 12, 1975, only 35 of the 105 non-nuclear weapons countries had safeguards agreements in force. (See app. V.)

Nine European IAEA member nations (Belgium, Denmark, Federal Republic of Germany, France, Ireland, Italy, Luxembourg, the Netherlands, and the United Kingdom) belong to EURATOM and have their own multilateral safeguards system. The facilities in these countries are not currently subject to IAEA safeguards. However, pursuant to NPT, EURATOM and IAEA have negotiated, but not yet implemented, an agreement providing for IAEA verification of the findings of the EURATOM safeguards system in its non-nuclear-weapons countries.

Several countries appear unlikely to adhere to NPT for political, nationalistic, or security reasons; and little is known about the intentions of others. Among the nonsignators are the Peoples Republic of China, France, India, Israel, South Africa, Brazil, Argentina, Pakistan, and Spain. Fifteen countries, including Japan, Egypt, and Indonesia, have signed but not ratified NPT.

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. These offers are now being negotiated. The United States, in an effort to encourage participation in NPT, recently announced it would give preference to NPT countries over non-NPT countries in providing technical assistance-in-kind.

TWO IAEA SAFEGUARDS SYSTEMS

IAEA applies safeguards to nuclear material and facilities under two systems: the NPT system and an earlier IAEA system. IAEA's first broadly applied safeguards system--described in IAEA Information Circular 66--borrowed heavily from the early bilateral experience of the United States. Although this system has been supplemented to an extent by the later, more extensive NPT safeguard system, the Circular 66 system still has wide application.

The Circular 66 safeguards system is primarily facility oriented, having originally been developed to serve in connection with project agreements, safeguards transfer agreements, or unilateral submission agreements. These agreements, as a rule, pertain to a single nuclear facility or to a limited number of facilities rather than to all of a country's nuclear activities. In fact, under a safeguards agreement pursuant to Circular 66, a country may put a single facility or certain nuclear material under IAEA safeguards while retaining numerous unsafeguarded facilities or material.

The Circular 66 system, although requiring that a country maintain facility inventory records of safeguarded nuclear material and submit inventory reports, does not require the country to establish a national nuclear material accounting and control system.

The stated purpose of Circular 66 is to establish a system of controls to insure that IAEA assistance is not used in such a way as to further any military purpose and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement or, at the request of a country, to any of that country's activities in the field of atomic energy. The country's obligations under Circular 66, therefore, go beyond those arising from NPT. The Circular 66 agreements prohibit not only the development and manufacture of any nuclear explosive device but also any other activity that furthers a military purpose. These prohibitions, however, pertain only to specified nuclear material, equipment, and facilities.

The NPT system is designed to safeguard all nuclear material and facilities within a country so that there are no unsafeguarded areas in the national program for peaceful uses of the atom. Thus the main inspection effort may be concentrated where it is most needed and can be most effective.

NPT does not prohibit the use of nuclear energy for military purposes except for the manufacture of nuclear weapons or other explosive devices. It implies that such nonproscribed military uses do not come under safeguards. However, NPT requires assurances that any nonproscribed military use does not constitute a course through which nuclear material could be channeled into prohibited uses. This obligates a country to inform IAEA of the activity in question and to make arrangements for the nonapplication of safeguards for the time that the nuclear material is in the military activity. The country must also demonstrate that such uses are not in conflict with any undertaking it may have previously entered into to which IAEA safeguards apply.

Safeguards activities of IAEA have grown considerably since NPT came into force. Generally the safeguards under agreements concluded pursuant to Circular 66 are suspended while an agreement pursuant to NPT is in force; however, the original agreement remains in existence. This means that the safeguards requirements of the original agreement are deemed to be satisfied by the application of NPT safeguards for the time that the latter agreement is in force. It is worth noting that, since the entry into force of NPT, a number of additional agreements have been concluded under Circular 66 with countries that are not party to NPT.

FACILITIES AND MATERIALS SAFEGUARDED

IAEA member nations include all countries with significant amounts of nuclear activity except the Peoples Republic of China and the Republic of China (Taiwan). However, the nuclear facilities of Taiwan, a former IAEA member nation, are subject to IAEA safeguards. Not all member nations have nuclear facilities, and not all of the facilities within the member nations are covered by IAEA safeguards. Mere membership alone does not obligate a nation to accept IAEA safeguards. In 1974, 181 nuclear facilities were subject to safeguards under Circular 66 and 234 facilities were subject to safeguards under NPT.

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Nuclear Facilities Subject to IAEA Safeguards

Type of facility	1973 Circular 66 safeguards	1973 NPT safeguards	1973 Total	1974 Circular 66 safeguards	1974 NPT safeguards	1974 Total
Power plants	21	10	31	20	40	60
Conversion plants	1	1	2	1	2	3
Fuel fabrication plants	6	3	9	5	18	23
Reprocessing plants	-	-	-	2	3	5
Pilot fuel fabrication plants	8	3	11	8	3	11
Pilot reprocessing plants	4	-	4	4	-	4
Research reactors	54	31	85	47	99	146
Research and development facilities	17	10	27	13	40	53
Other facilities and locations	83	28	111	81	29	110
Total	194	86	280	181	234	415

As of December 1, 1974, records showed the following quantities of nuclear material to be under IAEA safeguards.

	Total kilograms	Under NPT	Under Circular 66
Special nuclear material:			
Plutonium	6,000	25%	75%
Enriched uranium	2,177,000	8	92
Source material:			
Natural uranium	3,555,000	83	17
Depleted uranium	282,000	56	44
Thorium	11,000	86	14

The quantity of nuclear materials under IAEA safeguards in 1974 was about an 80-percent increase over the quantity under safeguards in 1972.

IAEA does not keep records of amounts of special nuclear material in countries or facilities where it does not apply safeguards. IAEA estimates from publicly available information that the following quantities of nuclear material are not safeguarded by the IAEA.

	Kilograms
Plutonium	5,000
Enriched uranium	1,600,000
Natural uranium	780,000

According to IAEA, the greater part of this material is subject to EURATOM safeguards.

Information is not readily available on the total number of nuclear facilities worldwide not subject to IAEA, EURATOM, or U.S. bilateral safeguards. Although we did not have information on potential bilateral safeguard arrangements with supplier countries other than the United States, we identified the following facilities in eight IAEA member non-nuclear-weapons countries, which are not known to be internationally safeguarded:

Country	Facility
Argentina	Small reprocessing plant
Egypt	Inshas research reactor
India	Cirus research reactor
	Apsara research reactor
	Zerlina research reactor
	Purnima research reactor
	Fuel fabrication plant
	Reprocessing plant
Israel	Dimona research reactor
Japan	Experimental uranium enrichment plant
Pakistan	Small reprocessing plant
South Africa	Prototype uranium enrichment plant
	Pelinduna research reactor
Spain	Pilot reprocessing plant
	Vandellos power reactor (jointly operated and controlled with France)

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CHAPTER 3

EFFECTIVENESS OF IAEA SAFEGUARDS

Effective safeguards depend in large measure on the intent and cooperation of the nation to which they are applied and the adequacy of technological control and implementation. However, technological control in the absence of genuine political commitment is inadequate and political willpower and cooperation is likewise insufficient without a corresponding effort at the technological level.

At the present time, the challenges to safeguards are great. Rapid growth is expected in nuclear facilities throughout the world, and IAEA will be tasked to respond. Instrumentation and techniques will need to be developed and refined. Adequate numbers of qualified staff will need to be recruited, and political solutions and compromises with participating nations and facility operators will be needed.

Although IAEA is working diligently in the safeguards area, problems do exist and will probably continue to develop.

LIMITATIONS ON SAFEGUARDS

The desired effects of IAEA safeguards are to (1) deter, through prompt detection, national diversions of safeguarded nuclear material; (2) place responsibility on the country for instituting domestic programs to guard against subnational diversion of safeguarded nuclear material (i.e., by individuals or groups acting contrary to government policy); (3) reduce specific international tensions by providing a degree of assurance among countries, especially hostile neighbors, that the safeguarded country is not developing nuclear explosive devices; and (4) insure that international nuclear commerce can be freely conducted without contributing to insecurity and tension among nations. It would be difficult if not impossible to prove whether or to what degree the safeguards actually accomplish the desired effects, as described above. Although certain technical conclusions can be derived from safeguards activities, the extent to which the safeguards are effective is largely a matter of judgment.

It is important to recognize the constraints on IAEA safeguards before discussing their implementation or effectiveness. Several key limitations are identified below.

--IAEA safeguards are not foolproof; the system cannot provide absolute assurance that nuclear material has not been diverted. When large quantities of nuclear

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material are being used or processed, technical limits on the ability to measure inventories of nuclear material will leave uncertainties as to the actual quantities which are subject to safeguards. If the safeguarded country, or facility operator, has more sophisticated and accurate control of the nuclear material than IAEA is aware of and can detect, diversion within the limits of IAEA detection capabilities might take place over an extended period without detection. It is a question of competition for technological competence.

--IAEA has no authority to implement physical protection measures in safeguarded activities, such as armed guards, locks, and other exclusion devices, or to pursue and recover diverted material. These measures can only be employed by sovereign nations (against subnational groups or individuals) which have legal bases and jurisdiction for applying them. Therefore, IAEA safeguards provide no physical protection against takeover of safeguarded nuclear material for military purposes but only an assurance that such takeover would be discovered.

--IAEA safeguards under NPT agreements cover only declared peaceful nuclear activities. IAEA has no authority to seek out possible undeclared or clandestine facilities or stockpiles of nuclear material. Under non-NPT safeguards agreements, IAEA might apply safeguards at only one minor facility out of a large civil nuclear program involving many facilities. It has no authority with respect to those other facilities unless safeguarded nuclear material is transferred to them.

--IAEA safeguards under NPT agreements do not preclude a country from using nuclear materials in military programs, such as naval propulsion, as long as those programs are not developing nuclear explosive devices. Further, if a country wishes to use nuclear material in such a nonproscribed military use, IAEA safeguards will not be applied to that material and no international controls to verify nondiversion for nuclear weapons would be in effect for those activities. For a supplier to prevent its assistance from being used in this way under NPT safeguards agreements, it must enter into a special understanding with IAEA and the recipient country as the United States has.

--IAEA safeguards under non-NPT agreements specifically preclude "furthering any military purpose." Several

countries consider this to allow development of peaceful nuclear explosives. However, the Director General of IAEA, recently announced at a Board of Governors meeting that he considered IAEA safeguards responsibilities to preclude the development of any nuclear explosive devices.

--A country has the right to withdraw from NPT upon 3 months' notice, if it considers its national interests to be seriously jeopardized. Critics contend that a nation could proceed secretly as far as possible with all the plans for making nuclear weapons and, when it was ready, merely notify IAEA and the United Nations Security Council that it was withdrawing its nuclear facilities from IAEA safeguards and complete development of the nuclear explosives outside the realm of safeguards.

Under the IAEA Statute, detection of diverted nuclear material carries limited sanctions. If IAEA cannot 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 the United Nations 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 as well as suspension of membership rights and privileges. By the time these sanctions are applied, the country may have had sufficient time to complete its weapons development. It is also not clear how IAEA-sponsored material would be retrieved, if the country were unwilling to voluntarily return it.

The U.S. Mission pointed out that IAEA had never publicly disclosed that material was diverted or unaccounted for. It should be noted that the documents and reports relating to inspections may contain sensitive information due to proprietary concerns of operators and sovereign concerns of the country and are therefore treated as confidential. Just because IAEA has never publicly reported that material was diverted or unaccounted for is no real proof that IAEA's safeguards system is effective.

SAFEGUARDS IMPLEMENTATION

IAEA's safeguards systems depend on two elements: (1) the maintenance and review of records showing the receipt, production, consumption, transfer, and storage of nuclear materials and (2) onsite inspections. While recognizing that

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two systems are involved--NPT and Circular 66--and that requirements and procedures of the earlier system, Circular 66, are more general, IAEA safeguards consider the following items.

--A review of the design of the nuclear facilities.

--A review of facilities' material records and reports.

--Inspections and surveillance of the facilities.

A basic step in implementing safeguards after the underlying agreements are concluded is to review the facility design. This enables IAEA to determine the character, purpose, capacity, and layout of the facility.

After consulting the country, IAEA selects which surveillance techniques and containment devices such as cameras and seals, if any, will be employed; selects key points for measuring material flows and inventories; and establishes requirements for records and reports.

The decisions reached on what safeguards will be implemented at the plant level are reflected in the facility attachment document. This also contains information on the number, scope, and mode of inspections which, to a large degree, are governed by the amount and type of nuclear material handled at the facility. Under NPT, inspection access is more specifically defined than under the earlier Circular 66 system.

IAEA recently initiated a program to prepare an internal "Safeguards Implementation Practices" document for each safeguarded facility. This document establishes the safeguards approach for a given facility. Among other things, the document analyzes the material diversion possibilities and notes any inspection limitations or shortcomings due to such factors as facility design, instrumentation, legal agreements, and the degree of the country's cooperation. To date, this program has been applied to only a limited number of facilities.

A major concept, which has special emphasis under the NPT system, is that each country should establish its own system to account for and control all nuclear material and to interface with the IAEA system. The IAEA safeguards are then applied in such a way as to verify the country's national accountability system.

The starting point for any inspection, according to IAEA officials, is the inventory data submitted by the country.

Changes in the inventory since the last inspection, based on receipt and transfer notices, are recorded. This book inventory then becomes the basis for inspection. To verify the inventory, IAEA inspectors may count, weigh, and measure the material; take samples for independent analysis; inspect previously applied seals; and make comparisons with the accounting records. The major steps of an inspection are shown in the photos on the following page.

Inspection results are reviewed with the facility operator by the inspector to preclude misunderstandings, and a detailed report is subsequently submitted to IAEA. The report is reviewed within the Department of Safeguards and Inspections; and upon completion of the review process, IAEA provides the country with a statement of its results and conclusions. Inspection results are reported only to the country.

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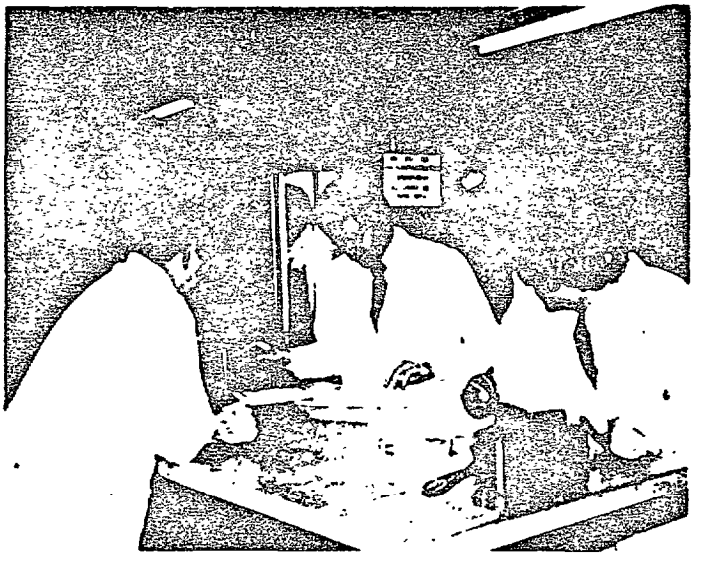

Review of Material Accountability Records.

Inspection of IAEA Container Seal.

Physical Inventory of Plutonium Rods.

IAEA INSPECTION OF JAPANESE-OWNED PLUTONIUM STORED AT WESTINGHOUSE NUCLEAR CENTER IN CHESWICK PENNSYLVANIA. FEBRUARY 1975

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SAFEGUARDS PROBLEMS

IAEA hopes to apply safeguards with a high degree of reliability and assurance, within acceptable cost limits and without unduly interfering with commerical operations. IAEA officials stated that safeguards would never be completely effective--they could never be fully confident that no material had been diverted. Mission and IAEA 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.

Mission officials feel safeguards are keeping pace with the growth of nuclear activities throughout the world; however, problems exist and probably will continue to develop.

Due to the confidential nature of inspection reports and other IAEA documents, the information presented below was obtained primarily through discussions with IAEA and Mission officials and is not specifically attributed to any particular country or facility. The problems identified by officials are, therefore, necessarily general in nature and in a few cases reflect anticipated rather than current problems. Mission officials cautioned that many of these problems, particularly those discussed under the technical section, are not unique to IAEA but would be encountered by any organization or country attempting to apply safeguards.

Material accountability problems

As previously stated, IAEA verfication of national and facility material accountability records is a primary safeguards function. To the extent that these records are incomplete or inaccurate, verification is hampered. Some of the problems encountered with the accountability records have been due to differences in internal reporting systems between individual facilities and the national system. Others are due to national systems not fully interfacing with the corresponding IAEA system.

For example, some countries are slow to report to IAEA the receipt and/or export of materials and at least one country was not fully complying with IAEA standards for measuring nuclear material on hand. Another problem is that initial inventory data, which is the starting point for safeguards inspections, may not always be accurate. In at least one case, the national system did not require a physical inventory of materials until just recently.

Although alternative techniques for compiling and verifying data may offset some of these problems, IAEA will probably have serious difficulties until adequate national systems are fully implemented.

Technical problems

Technical problems can generally be divided into two groups: those dealing with instrumentation development and refinement and those dealing with limitations in safeguards application. To an extent, these problems overlap and in some instances, particularly those concerning bulk processing facilities where IAEA has had very little experience in applying safeguards, the problems are anticipatory rather than current.

Problems identified in the development and use of instrumentation are:

--Some instruments in current use do not measure with the accuracy which will be necessary when larger amounts of accountable material are processed.

--In some facilities, IAEA must rely on the same measuring instruments as the operator. This may not be as reliable as desired. However, IAEA does check calibration of these instruments.

--In other areas, instruments have not been developed to measure materials which do not lend themselves to sampling and evaluation except at a laboratory. Examples include fuel elements and sludge from chemical reprocessing.

--The high cost of instruments which IAEA may wish to install in facilities could present funding difficulties unless the country or facility operator shares in the costs.

To help IAEA keep pace, many member countries, including the United States, develop instrumentation at little or no cost to IAEA.

Technical application of safeguards is limited in some instances and difficult to apply in others.

--Some countries exclude or limit the use of certain surveillance and containment devices (cameras and seals) in their facilities.

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--Statistical errors in sampling and measurement set limits on accuracy, and there can be no assurance of the detection of every slight loss. This problem decreases the ability to detect potential diversion when large amounts of nuclear material are handled.

--Proprietary concerns of the operator and design features of some facilities may make it difficult to apply techniques or install instrumentation in the best and most efficient manner.

--Simultaneous inventorying at all nuclear facilities within a country (especially at bulk processing facilities) is not practicable under present operating constraints, and this presents an opportunity for inventory manipulation. Although this is not now a problem in most countries, its significance will increase with facility growth.

--Some countries limit the number of inspectors by not accrediting as many to their country as IAEA may deem desirable.

IAEA is continually developing and refining safeguards techniques and has devoted extensive effort to producing standards of application and alternative means of applying safeguards. It is developing a very detailed safeguards technical manual covering safeguarding methods and techniques to be applied at various nuclear activities and facilities.

Financing problems

Safeguards financing has been the subject of intensive negotiations within IAEA, and apparently it will continue to be a point of contention, threatening effective safeguards application.

With the advent of NPT, many members, particularly developing countries, were concerned that IAEA's responsibilities and related safeguards expenses would increase considerably. This could have the effect of increasing assessed contributions and/or diminishing other IAEA programs. Intensive discussions resulted in varying views--from the concept that the country being safeguarded should pay for safeguards to that of the advanced countries paying the entire cost of safeguards. The United States, among others, argued that safeguards benefit all members and should, in accordance with the IAEA Statute, be included as an administrative expense under the regular budget.

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In the end, a complex formula was developed which would, in effect, limit the financial liability for safeguards of most developing countries to their 1971 (the pre-NPT) level, leaving the bulk of the increased costs of safeguards to the more advanced countries where the greatest part of the world's nuclear activities are located.

The developing countries' concern has not been completely unwarranted. Mission computations show that, while the cost of safeguards as a percentage of the total resources available to IAEA increased from 9.2 percent ($1.9 million) in 1971 to an estimated 9.7 percent ($3.4 million) in 1974, resources available for technical assistance decreased from 25.6 percent to 21.3 percent for the same period. 1/

The increase in safeguards costs caused the developing countries' 1974 safeguards assessments to exceed their 1971 assessments by about $33,000 in total, or an average increase of $470 per country. This increase appears small in light of the fact that in 1974, the 31 advanced countries paid a total of $2.3 million more toward safeguards than they paid in 1971. However, some of the developing countries are contending that the safeguards formula has not progressed as foreseen. The developing countries have made it known that they intend to invoke, as soon as possible, the provision of the agreement which calls for a review of the formula after 1975.

Financing the safeguards program appears to be one of the key issues facing IAEA. Costs will undoubtedly increase appreciably as more inspectors and more advanced techniques and equipment are needed to keep pace with the rapidly expanding nuclear world.

Political problems

Some problems exist today and others may develop concerning what IAEA can and cannot do in the area of safeguards in a sovereign nation. Some of these are:

--In negotiating safeguards agreements, some countries may place more restrictions on how safeguards are to be applied than other countries.

1/Although the percentage decreased, the dollar value of funds, equipment, and services actually increased from $5.2 million in 1971 to $7.4 million in 1974.

--Different interpretations of agreements between some countries and IAEA exist, particularly under the Circular 66 agreements which are less specific in certain details than those under NPT.

--It is unclear what would happen if IAEA took certain actions, such as attempting to compel a country to fully comply with all standards contained in IAEA's NPT implementing procedures or at what point the standards conflict with national sovereignty.

--IAEA, in some cases, is not requiring strict compliance with NPT implementing standards because it does not want to frighten off potential NPT adherents by establishing burdensome requirements. However, it may be setting undesirable precedents.

SAFEGUARDS INSPECTORS

The Statute of the IAEA provides that:

"The paramount consideration in the recruitment and employment of the staff and in the determination of the conditions of service shall be to secure employees of the highest standards of efficiency, technical competence, and integrity. Subject to this consideration, 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."

The Department of Safeguards and Inspections, as of September 25, 1974, was composed of 62 professional staff members. Within this Department, the Division of Operations, which is responsible for conducting the safeguards inspections, was staffed by 40 professionals from 33 countries. Guatemala, Nigeria, and Sudan, who have representatives within the Division, have no nuclear activities of their own.

IAEA's Division of Operations
Professional Staffing Allocation
by Country

Argentina (1)	Hungary (1)	Romania (1)
Australia (1)	India (1)	Spain (1)
Austria (1)	Indonesia (1)	Sudan (1)
Belgium (1)	Israel (1)	Sweden (1)
Canada (1)	Italy (3)	Switzerland (1)
Chile (1)	Japan (1)	Union of Soviet Socialist Republics (2)
Czechoslovakia (1)	Netherlands (1)	
Egypt (1)	Nigeria (1)	
Federal Republic of Germany (2)	Norway (1)	United Kingdom (3)
	Poland (1)	United States (2)
France (1)	Portugal (1)	Yugoslavia (1)
Greece (1)	Republic of China (1)	
Guatemala (1)		

Mission officials feel the U.S. representation in the Department of Safeguards and Inspection is low (8 out of 62 professionals appointed on a geographic basis), especially in view of U.S. interest in this area, and they are making a conscious effort to place U.S. personnel in positions as they become vacant. However, the Mission considers the positions currently held to be key positions in that six of the eight U.S. professionals are at supervisory levels in safeguards development. On an overall basis, U.S. personnel occupy 20 percent of the 290 professional IAEA positions subject to geographic distribution.

The selection of professional staff for safeguards inspector positions generally starts with a vacancy notice. IAEA prepares vacancy notices for a position, listing the required background qualifications, experience requirements, and salary, and circulates the notice to member countries. The countries may then nominate candidates and IAEA accepts or rejects each nominee. Mission officials stated that IAEA will not hire an individual unless the country of which the candidate is a citizen gives its approval. There are no background security checks of employees, such as those conducted by the United States on some of its employees.

Agency officials stated that once an inspector is hired, they prefer to retain the inspector and to experience as little turnover as possible. This supposedly eases the fears of the member countries of industrial espionage as generally the same inspector or group of inspectors continues to review the same facilities in the same countries. Safeguards inspectors must be accredited to the country in which they are to inspect, and the country has the opportunity to accept or reject each inspector.

Because of differences in inspectors' backgrounds, countries' preferences, and IAEA practices, some problems have arisen. Staffing and training have the following problems.

--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.

--To date, IAEA has no comprehensive training program in safeguards and most inspectors obtain 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 safeguards training program under way in the near future.

--An overall philosophical approach to safeguards has not been developed. As a result, 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 and might not cooperate at all.

--Recruiting the 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, there may be problems in recruiting qualified inspectors at salary ranges commensurate with IAEA resources. This may be especially true if competition between IAEA and national safeguards systems for the limited number of qualified inspectors becomes keener.

ASSURANCE TO MEMBER NATIONS OF SAFEGUARDS EFFECTIVENESS

In February 1972, a panel established by the Secretary of State to review U.S. policy objectives toward IAEA concluded that a weak or marginal safeguards program would probably be worse than no safeguards at all because it would further a false sense of security. However, reliable evaluation of safeguards effectiveness presents a dilemma.

One of the most difficult problems facing IAEA is how to assure member nations and the world at large that safeguards are effective and yet retain the necessary confidentiality of inspection results. The mere fact that IAEA has never reported a diversion is not sufficient assurance for many countries. Linked to this problem is the one of assuring member nations that safeguards are being applied fairly and consistently in all countries.

IAEA officials do not believe safeguards will ever be considered effective by everyone merely on the basis of IAEA's saying everything is satisfactory. However, changes are being contemplated to make more information available to assure member nations that the safeguards are effective.

One internal change being considered is a process, independent of the Safeguards Department, for reviewing inspection results. IAEA is also going to make available to members the safeguards technical manual which will explain how inspections are carried out in a particular type of facility.

Some nations want further assurances. Japan, seeking assurance that safeguards will be applied in a nondiscriminatory manner, is trying to convene a standing committee to perform an oversight function of IAEA safeguards. U.S. Mission officials favor a committee of this type but are unsure of how much information could be made available to the public because of the proprietary nature of safeguards information.

The United States is seeking consultations with IAEA to review the results of safeguards activities under U.S. trilateral transfer agreements. The United States suspended its bilateral inspection rights in favor of these safeguards but does not receive the results of inspection activities. IAEA has indicated a willingness to discuss these matters, but the final outcome is still uncertain.

CHAPTER 4

SAFEGUARDS-RELATED ISSUES

The expected growth of nuclear activity throughout the world has heightened concern over several related issues, such as nuclear terrorism, physical protection, and disposal of highly radioactive wastes. Some countries want the benefits of the "peaceful atom" yet are concerned about encroachment on their national sovereignty by an international organization. Some countries wish to sell nuclear materials and equipment but are reluctant to attach safeguards to nuclear exports. There is also concern about the handling and disposal of highly radioactive wastes that must be controlled, in some cases, for centuries.

IAEA is basically limited on what it can do in these areas. It carries out the decisions of its member nations, and therefore direction must ultimately come from agreements reached among this large and rather diverse group.

Concerning waste management, physical protection, safe transport, and for the most part health and safety, IAEA has no responsibility for controlling, supervising, regulating, or inspecting member countries' activities. Its standards and guidelines in these areas are largely advisory.

Although these matters are not included under the safeguards systems, they, along with the exporting policies of supplier nations, have an important bearing on safeguards.

PHYSICAL PROTECTION AND TRANSPORTATION

IAEA has no regulatory authority over physical protection and transportation and must limit its activities to recommending standards and advising and assisting member nations. Many countries feel that physical security is an individual national concern.

Recognizing that physical protection is an essential supplement to a country's system of accounting and control of nuclear material, IAEA sponsored a panel of experts which developed recommendations for physical protection. Although the recommendations outlined in a publication known as the "grey book" are not binding upon countries, IAEA recommends their use in establishing physical protection systems. The U.S. Resident Representative to the IAEA stated that many developing countries have adopted the grey book as their national system while most advanced countries have their own systems.

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IAEA's recommendations include general and detailed requirements for physical protection of nuclear material in use, in storage, and in transit. Responsibility for physical protection of nuclear material during international transfers is agreed upon by the parties involved. An IAEA official informed us that IAEA sometimes, upon request, seals shipping containers for member countries but has no requirement or authority to safeguard materials in transit.

NUCLEAR SAFETY AND ENVIRONMENTAL PROTECTION

IAEA's nuclear safety and environmental protection program consists of three major segments--nuclear safety, radiological safety, and waste management. For the most part the IAEA's authority is limited to establishing and recommending safety standards which can be adopted by member nations. It may establish and apply safety standards to facilities which have received IAEA assistance; to facilities covered under special bilateral or multilateral arrangements; or, if requested, to a nation's nuclear activities. When applying safety standards, it leaves the country great latitude in applying its own standards and measures once it is determined that the country's system is adequate. Adequacy is determined through examining operation plans, safety measures to be applied, and other records. Efficiency and effectiveness are further evaluated through observation.

IAEA's standards are written in such a way that a country can easily incorporate them as its own national safety system. According to a Mission official, the IAEA's experience in applying safety standards has been limited to research reactors. It is planning to draw up specific detailed safety standards for power reactors.

In the nuclear safety area, IAEA's objective is to provide member nations with advice and assistance for the safe location, design, construction, and operation of research reactors, nuclear power plants, and plants storing and processing nuclear material. IAEA also advises on licensing procedures and compliance controls. Codes of practice have been promulgated as part of its safety standards.

IAEA develops standards for radiological safety and assists member nations in protecting man, his property, and his environment against any harmful effects of radiation. Emphasis has gradually shifted from preparing standards to helping member countries apply standards, train specialists and technicians, and promote and coordinate research.

The objectives of the waste management program are to develop standards, promote and coordinate research, and

develop and review techniques for preventing the release of harmful nuclear contaminants. IAEA also develops and disseminates information and advises member countries on the safe management of radioactive waste.

POLICIES OF MAJOR EXPORTING COUNTRIES

Article III.2 of NPT states that:

> "Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material to any non-nuclear weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article."

Several major exporting countries, who are party to NPT, mutually agreed in 1974 not to provide certain categories of material and equipment to any non-nuclear-weapons country for peaceful purposes unless such material and equipment is subject to an appropriate safeguards agreement. The list of items to be safeguarded included special nuclear materials, nuclear-related materials, and various equipment for reactors, fuel fabrication, and reprocessing.

The above safeguards requirements also extend to retransfers. It was made clear that this "trigger list," was a minimum listing and that exporters could require safeguards on additional items.

The participating exporting countries are Australia, Belgium, Canada, Denmark, the Federal Republic of Germany, the Netherlands, Norway, Finland, the Union of Soviet Socialist Republics, the United States, the United Kingdom, Poland, and the German Democratic Republic. Some countries, although not participating, have indicated they will support the same conditions while others, such as the Peoples Republic of China, India, and France, have not indicated what policy they will follow. As additional countries begin to export nuclear items, it is not known what policies they will adopt. Some African countries, for instance, export large quantities of natural uranium but have not yet subscribed to any safeguards policies.

According to Mission officials, the trigger list was an attempt to take safeguards out of the marketplace. That is, if all exporting countries could agree to a common policy of safeguarding exports, no one country would have a commercial advantage because it did not require safeguards.

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Mission officials stated that the United States requires safeguards on more export items than those appearing on the trigger list. The United States applies end-use criteria to its nuclear and nuclear-related exports. For example, the United States may require safeguards on equipment which is identified for use in a reactor, as well as equipment for heavy water or reprocessing plants, even though such equipment may also be commonly used in industries outside the nuclear field. Switzerland and France evidently do not use the same criteria because Swiss and French companies are assisting India by supplying equipment and technical expertise to build a heavy water plant, which, when completed, will be unsafeguarded. The plant will allow India to produce its own heavy water, a moderator needed in a natural uranium reactor, which is on the trigger list. The United States also places certain restrictions on technical training and assistance while most other countries do not. These types of self-imposed restrictions could possibly affect U.S. sales.

Mission officials feel that U.S. policies should be adjusted to compare with those of other nuclear exporters and that the United States should guard against being too restrictive as such a policy might cause customers to purchase their nuclear needs from other sources. Mission officials also believe the United States should work jointly with other countries in this area because there is little the United States or any other single country can do unilaterally since no nuclear monopoly exists today.

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CHAPTER 5

CONCLUSIONS AND MATTERS FOR CONSIDERATION BY THE COMMITTEE

The real effectiveness of IAEA safeguards is not known. There is no public evidence to show whether IAEA safeguards have prevented or detected diversion of nuclear material from intended peaceful purposes. The mere fact that IAEA has never disclosed a diversion is not sufficient assurance to many countries that IAEA safeguards are effective.

Effective international safeguards depend in large measure on the intent and cooperation of the country to which they are applied and the adequacy of technological control and implementation. However, technological control in the absence of genuine political commitment is inadequate. IAEA officials have stated that safeguards would never be completely effective--they could never be fully confident that no material has been diverted. U.S. and IAEA 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.

Although certain technical conclusions can be derived from the safeguards activities, the extent to which IAEA safeguards are effective is largely a matter of judgment. Since IAEA does not disclose to member nations the results of its inspections, on the grounds that proprietary information might be disclosed, it faces the difficult problem of how to assure member nations that safeguards are being applied effectively, fairly, and consistently in all countries.

Membership in IAEA does not obligate a country to accept safeguards on its facilities. For example, the nuclear facilities of major nuclear weapons countries, such as the United States and the Soviet Union, are not subject to IAEA safeguards except on a voluntary basis. In addition, India, Argentina, Egypt, Israel, Spain, Japan, Pakistan, and South Africa are IAEA members with nuclear facilities not subject to IAEA safeguards.

Limitations in the scope and applicability of IAEA inspections must also be recognized. IAEA safeguards are designed only to detect diversions at the national level. IAEA safeguards do not include physical protection, the safe international transport of nuclear material, or the safeguarding of nuclear waste. It does not have authority to seek out undeclared or clandestine nuclear facilities and cannot pursue or retrieve diverted nuclear material.

With the expected spread of peaceful uses of nuclear energy throughout the world, the problems encountered in the administration and implementation of the IAEA safeguards system can be expected to increase. They relate to such matters as:

--The adequacy of material accountability records within the member countries and their compatibility with the IAEA system.

--The continuing need for more advanced measuring instrumentation for inspectors.

--The differences in safeguards agreements with member countries and their interpretation.

--The equitable apportionment of the costs of the safeguards system among member countries.

If IAEA cannot verify the nondiversion of special nuclear material, the country involved is to be given a "reasonable time" to take corrective action before noncompliance procedures may be initiated. Such procedures include notification to member countries and the United Nations 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 as well as suspension of membership rights and privileges. By the time these sanctions are made, the country may have had sufficient time to complete its weapons development. It is also not clear how IAEA-sponsored material would be retrieved.

In view of the dangers involved in the spread of nuclear weapons capability, stronger penalties may be needed for those who might violate their pledge to use nuclear material for peaceful purposes.

MATTERS FOR CONSIDERATION BY THE COMMITTEE

The Committee, together with the Joint Committee on Atomic Energy, may wish to pursue with responsible executive branch officials major policy matters related to the role of IAEA, including:

--The need for expanding the responsibilities of IAEA in the physical protection of nuclear material, the control of irradiated nuclear waste, and the safe transport of nuclear materials internationally.

--The technical and political limitations in applying IAEA safeguards.

--The lack of sufficiently strong penalties or sanctions on a country that diverts nuclear material for military purposes or knowingly supplies material to another country for the purpose of developing nuclear explosive devices.

In addition, the Committees may wish to discuss with executive branch officials the desirability of proposing that IAEA publish annually a 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 accounted for during the inspections, while not divulging host country proprietary information. This could help to assure all member countries that safeguards are effective and that safeguarded material is not being diverted.

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CHARLES W. WHALEN, JR., OHIO
ROBERT B. (BOB) MATHIAS, CALIF.
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MARIAN A. CZARNECKI
CHIEF OF STAFF

Congress of the United States
Committee on Foreign Affairs
House of Representatives
Washington, D.C. 20515

July 30, 1974

The Honorable Elmer B. Staats
Comptroller General of the United States
Washington, D.C.

Dear Mr. Staats:

As you may know, the Committee on Foreign Affairs has directed its Subcommittees on International Organizations and Movements and the Near East and South Asia to conduct a series of hearings on foreign policy implications of the export of nuclear technology to the Middle East. In addition to that inquiry, the full committee has pending before it a resolution of inquiry (H. Res. 1189 and 1219) requesting the President to furnish the House of Representatives certain information regarding the proposed nuclear agreements with Egypt and Israel. Finally, apart from the Committee's ongoing deliberations in this area, an amendment to the Atomic Energy Act which would require that such proposed nuclear agreements be referred to the House Foreign Affairs and Senate Foreign Relations Committees for their comments and recommendations will be offered when H.R. 15582, enabling Comgress to approve or disapprove nuclear agreements for peaceful cooperation, is considered by the full House.

In connection with these activities, the Committee will be in need of a broad range of information in the field of nuclear agreements. I would like to request, on behalf of the Committee, that the General Accounting Office undertake an in-depth study of the international agreements for peaceful cooperation in nuclear energy both entered into and currently proposed by the United States.

It is my understanding that the GAO has already initiated a survey in this area with emphasis on the role of the International Atomic Energy Agency. In addition to this aspect of the agreements, the committee is also interested in the GAO's analysis of the following issues:

1. The effectiveness of bilateral safeguards imposed by the United States in agreements presently in force;

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2. The additional safeguards proposed by the United States with regard to the proposed agreements with Egypt and Israel;

3. The financial arrangements for such agreements; and

4. The decision to enter into provisional atomic fuel supply contracts with Egypt and Israel when domestic requests for such fuel are being turned down by the Atomic Energy Commission.

It would be appreciated if the Committee were kept informed about the progress of this study. The staff of the Committee will be available to consult with your staff with regard to the development of the requested study.

With best wishes, I am

Sincerely yours,

Chairman

TEM:rbnd

APPENDIX II

IAEA MEMBER NATIONS

May 12, 1975

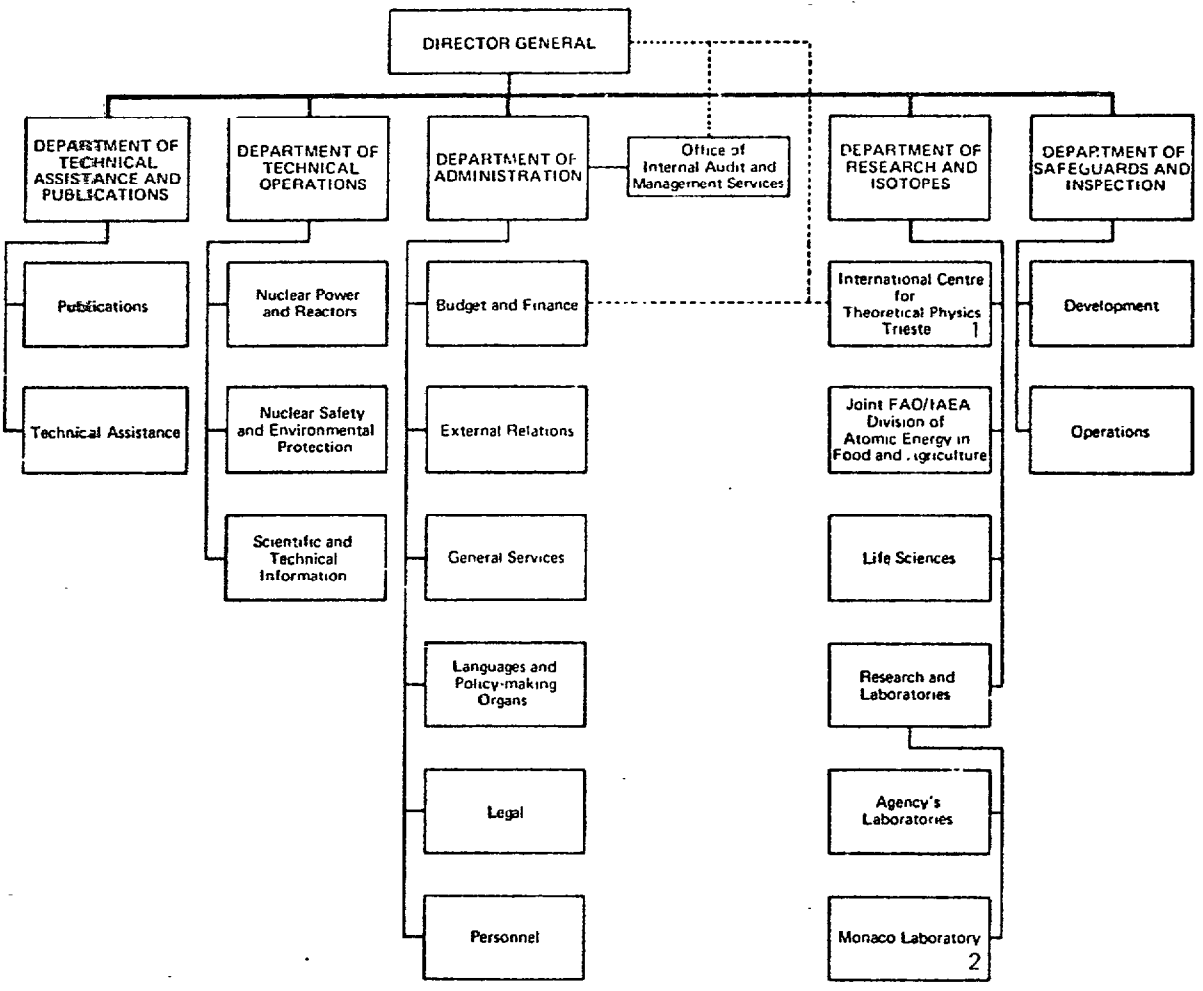
Afghanistan
Albania*
Algeria*
Argentina*
Australia
Austria
Bangladesh*
Belgium
Bolivia
Brazil*
Bulgaria
Burma*
Byelorussian Soviet Socialist Republic*
Cameroon
Canada
Chile*
Colombia
Costa Rica
Cuba*
Cyprus
Czechoslovak Socialist Republic
Denmark
Dominican Republic
Ecuador
Egypt, Arab Republic of
El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

APPENDIX II

Portugal*
Romania
Saudi Arabia*
Senegal
Sierra Leone
Singapore
South Africa*
Spain*
Sri Lanka
Sudan
Sweden
Switzerland
Syrian Arab Republic
Thailand
Tunisia
Turkey
Uganda*
Ukrainian Soviet
Socialist Republic*
Union of Soviet
Socialist Republics
United Kingdom of
Great Britian and
Northern Ireland
United States of America
Uruguay
Venezuela
Vietnam
Yugoslavia
Zaire, Republic of
Zambia*

* Indicates member nations that are not party to NPT.

IAEA
ORGANIZATION CHART



[1]Jointly operated by IAEA and the United Nations Educational, Scientific and Cultural Organization.

[2]Includes participation by the United Nations Educational, Scientific and Cultural Organization and the Food and Agriculture Organization.

APPENDIX IV

IAEA CONSOLIDATED BUDGET (note a)

RECEIPTS	1973 actual	1974 adjusted	1975 estimate
Regular budget:			
Assessed contributions of member nations	$17,017,697	$23,137,000	$26,660,000
Transfer of 1971 and 1972 cash surpluses for use in 1973	234,277	-	-
Transfer of balance of contingent financing appropriation for 1974	-	-	800,000
Special contributions	178,786	-	-
Miscellaneous income	1,699,430	1,927,000	2,215,000
General fund:			
Voluntary contributions	2,836,246	3,000,000	4,500,000
Miscellaneous income	159,055	80,000	100,000
Operating fund I:			
Special contributions by member nations	330,548	345,000	395,000
Direct contributions for special projects	454,852	686,600	696,500
Miscellaneous income	10,781	32,400	29,500
Drawings on unobligated balance	99,170	-	-
Savings on prior years' operations	1,055	-	-
Operating fund II:			
Government contributions for technical assistance	80,136	65,000	80,000
Miscellaneous income	28,294	-	-
Additions to unobligated balance	-298,299	-	-
	$22,832,028	$29,273,000	$35,476,000

EXPENDITURES	1973 actual	1974 adjusted	1975 estimate
Regular budget:			
Safeguards	$ 3,037,030	$ 3,868,000	$ 4,802,000
Information and technical services	2,268,435	2,427,000	2,997,000
Administration	2,542,701	2,640,000	2,976,000
General services	2,456,389	2,632,000	2,918,000
Physical and life sciences	1,981,508	2,481,000	2,648,000
Laboratories	1,575,390	1,777,000	2,090,000
Policymaking and program planning	1,244,819	1,460,000	1,596,000
Technical assistance and training	1,112,767	1,142,000	1,285,000
Nuclear safety and environmental protection	1,282,699	1,500,000	2,309,000
Nuclear power and reactors	1,141,952	1,211,000	1,728,000
Food and agriculture	987,312	1,080,000	1,191,000
Adjustment of cost estimates	-	2,600,000	2,800,000
Other	250,166	246,000	335,000
Operating fund I:			
Trieste Centre	833,007	1,009,000	1,051,000
Monaco Laboratory	63,399	55,000	70,000
Operating fund II:			
Experts and equipment	1,969,012	2,445,000	3,180,000
Fellowships and training	836,420	700,000	1,500,000
Total	b/$23,583,006	$29,273,000	$35,476,000

a/Budget information on a calendar year basis.

b/The difference of $750,978 between expenditures and receipts represents the provisional cash deficit for 1973.

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APPENDIX V

STATUS OF NPT PARTICIPATION

May 12, 1975

	Signed NPT	Acceded to or ratified NPT	Safeguard agreement with IAEA
Nuclear weapons countries (3):			
Union of Soviet Socialist Republics	x	x	
United Kingdom	x	x	Under negotiation
United States	x	x	Under negotiation
Non-nuclear-weapons countries (105):			
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	
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	Signed
Egypt, Arab Republic of	x		
El Salvador		x	Approved by Board
Ethiopia	x	x	Under negotiation
Fiji*		x	In force
Finland	x	x	In force
Gabon		x	Approved by Board
Gambia*	x	x	
German Democratic Republic	x	x	In force

	Signed NPT	Acceded to or ratified NPT	Safeguards agreements with IAEA
Non-nuclear-weapons countries (105) (con.):			
Germany, Federal Republic of	x	x	Signed
Ghana	x	x	Signed
Greece	x	x	Provisionally in force
Guatemala	x	x	Under negotiation
Haiti	x	x	Approved by Board
Holy See (Vatican City)		x	In force
Honduras*	x	x	Approved by Board
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		Under negotiation
Jordan	x	x	Approved by Board
Kenya	x	x	Under negotiation
Khmer Republic		x	
Korea, Republic of	x	x	
Kuwait	x		
Laos*	x	x	Under negotiation
Lebanon	x	x	In force
Lesotho*	x	x	In force
Liberia	x	x	
Libyan Arab Republic	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
Mongolia	x	x	In force
Morocco	x	x	Signed
Nepal*	x	x	In force
Netherlands	x	x	Signed
New Zealand	x	x	In force
Nicaragua*	x	x	Approved by Board
Nigeria	x	x	Under negotiation

APPENDIX V

	Signed NPT	Acceded to or ratified NPT	Safeguard agreement with IAEA
Non-nuclear-weapons countries (105) (con.):			
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
San Marino*	x	x	Under negotiation
Senegal	x	x	Under negotiation
Sierra Leone		x	Under negotiation
Singapore	x		
Somalia*	x	x	Under negotiation
Southern Yemen*	x		
Sudan	x	x	Approved by Board
Sri Lanka (formerly Ceylon)	x		
Swaziland*	x	x	Approved by Board
Sweden	x	x	Approved by Board
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 Volta*	x	x	
Uruguay	x	x	Signed
Venezuela	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

* Indicates a country not a member of IAEA.