

International law and nuclear energy: Overview of the legal framework

The global legal order for the atom's safe and peaceful uses is grounded on a mix of binding norms and advisory regulations

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Peaceful applications of nuclear energy — and all the promise they entail for humanity — are paradoxically often perceived in juxtaposition with the prospects of nuclear weapons' proliferation and nuclear war. The mixed perception is understandable: the materials, knowledge, and expertise required to produce nuclear weapons are often indistinguishable from those needed to generate nuclear power and conduct nuclear research.

As a result, the focus of the international community has always been to ensure that nuclear energy is used peacefully and safely. The approach is defined by a complex network of national and international measures. For while it was accepted that the primary responsibility for the regulation of the use of nuclear energy rests with national authorities, it has been equally recognized that other countries may be affected as well. Consequently, the regulation of nuclear energy, like so many other human activities which could have potential transboundary impacts, necessitates the endowment of the international community with residual responsibility, or in certain instances co-responsibility, to ensure among other things uniformity of standards, co-ordination, pooling of resources and services, as well as compliance.*

In this respect, the IAEA, among other international and regional organizations, has served as a focal point. Article II of the IAEA Statute provides that "the Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health, and prosperity throughout the world" and to ensure so far as it is able, "that assistance provided by it or at its request or under its supervision or control is not

used in such a way as to further any military purpose".

Over the past three decades, international cooperation in the field of nuclear energy has yielded a mix of legally binding rules and advisory standards and regulations. This article presents an overview of this global legal framework for nuclear energy's safe and peaceful development. It specifically addresses areas of nuclear safety, radiation protection, radioactive waste management, the transport of radioactive materials, emergency assistance and planning, civil liability for nuclear damage, physical protection of nuclear material, armed attacks against nuclear installations, and IAEA safeguards and verification.

The safe use of nuclear energy

Article III.A.6 of the IAEA Statute empowers the Agency to establish or adopt standards of safety for the protection of health and the minimization of danger to life and property. That provision also requires that those standards must be applied to the IAEA's own operations and to operations making use of materials, services, equipment, facilities, and information made available by the Agency or at its request or under its control or supervision. States which receive technical assistance or reactor project assistance must sign an agreement with the IAEA in which they undertake to apply to the assisted operations the Agency's safety standards and measures that are specified in the agreement. The Statute also authorizes the Agency to apply its safety standards, at the request of States, to any of their operations or activities.

In fulfilling its statutory function of developing safety standards, the IAEA takes account of

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* See generally, "The Role of the IAEA in the Development of International Law", by Dr. Hans Blix, *Nordic Journal of International Law*, 58 (1989).

the work of relevant international scientific and technical bodies, such as the International Commission on Radiological Protection (ICRP), the United Nations Committee on the Effects of Atomic Radiation (UNSCEAR), the World Health Organization (WHO), and the International Labour Office (ILO).

Concern to ensure the safe use of nuclear energy — which includes activities making use of the by-products of nuclear energy and the use of radioactive substances in medical, industrial, and agricultural activities — is caused by the capacity of ionizing radiation to cause damage to living beings and the environment. The safety objectives strive to protect living beings, society, and the environment against the adverse effects of ionizing radiation.

International action in this field began with the establishment of the ICRP, which has issued recommendations on radiation protection since its inception in 1928. In 1955, the United Nations General Assembly established UNSCEAR to evaluate doses, effects, and risk from ionizing radiation on a worldwide scale. The work of these two bodies provides the basis for the standards elaborated by other international and regional organizations, such as the IAEA, ILO, WHO, Euratom, and the NEA. In developing standards, these organizations have built close working relationships.

The need to establish appropriate standards designed to ensure the safe use of nuclear energy is reflected in the constituent instruments of such organizations. The binding nature of the safety standards developed pursuant to such international instruments varies. Thus, while the safety standards developed by Euratom are mandatory, the activities relating to safety regulation of the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA) and the Arab Atomic Energy Agency (AAEA) are recommendatory. The IAEA's safety standards are mandatory with regard to nuclear activities undertaken with IAEA assistance, but where such assistance is not provided the standards are recommendatory.

Radiation protection. The scientific basis for radiation protection standards is found in recommendations made, and periodically reviewed, by the ICRP which take account of the UNSCEAR studies.

The work underlies the *International Basic Safety Standards (BSS) for Protection Against Ionizing Radiation and for the Safety of Radiation Sources* by which the IAEA, ILO, WHO, and NEA have provided a worldwide basis for harmonized and up-to-date standards. The BSS recently were reviewed and revised by those four organizations together with the Food and Agri-

culture Organization (FAO) of the United Nations, and the Pan-American Health Organization (PAHO). The IAEA Board of Governors approved the revised standards in September 1994.

The BSS are complemented by other standards dealing with particular aspects of radiation protection: occupational protection; protection of the public and the environment; and intervention in case of a nuclear accident or radiological emergency.

Safety of nuclear power plants

The IAEA has developed Nuclear Safety Standards (NUSS) for nuclear power plants which were prepared by experts from its Member States. They cover the following five areas: governmental organization of regulation of nuclear power plants; safety in nuclear power plant siting; safety in the design of nuclear power plants; safety in nuclear power plant operation; and quality assurance for safety of nuclear power plants. It was considered that formalized safety criteria, covering these areas, in the form of codes of practice and guides, would considerably assist in ensuring that the basic requirements on which the safety of nuclear power plants rest are understood and met. These basic requirements are: an adequate supply of trained personnel at a plant and to staff a regulatory agency; the ability to conduct a careful and detailed safety evaluation of a nuclear power plant project from its inception and at all stages throughout its life; and, the ability to conduct an appropriate quality assurance programme including control and inspection.

Codes of Practice relating to each of the five areas were initially issued in 1978, and have been subsequently revised. The Codes are supplemented by more than 60 Safety Guides which detail their implementation.

Although the international community at large is not yet willing to transform these recommendations into binding standards, they are widely used in the elaboration of national regulations. However, the application of NUSS is mandatory where assistance is provided by or through the IAEA.

Nuclear safety convention. In September 1994, the International Convention on Nuclear Safety was opened for signature at the IAEA General Conference. Since then, six of the 58 signatory States have become parties to the Convention.

The Convention commits participating States to ensure the safety of land-based civil nuclear power plants including such storage, handling, and treatment facilities for radioactive materials as are on the same site. States are

obliged to take within the framework of their national laws, the legislative, regulating and administrative measures, and other steps necessary for implementing their obligations under the Convention. Main features include the establishment of a reporting system on the implementation by Contracting States of the obligations of the Convention.

Notification of a nuclear accident and emergency assistance. Following the Three Mile Island (TMI) nuclear accident in 1979 in the United States, the need to create a framework for reporting and mutual assistance in nuclear accidents was brought home to the international community. Under the auspices of the IAEA, two documents were developed after TMI that set guidelines for States.

In the aftermath of the Chernobyl accident in 1986, two conventions — the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency — were elaborated and adopted within the framework of the IAEA. The Conventions came into force on 27 October 1986 and 26 February 1987, respectively. Seventy-four States have become parties to the early notification convention and 70 States have become parties to the assistance convention.

A number of bilateral and regional arrangements also exist in these areas. In 1963, the Nordic Emergency Assistance Agreement in Connection with Radiation Accidents was concluded between the IAEA and the governments of Denmark, Finland, Norway, and Sweden. Also the Council of European Communities adopted on 11 December 1984 a Decision on Community Arrangements for the Early Exchange of Information in the Event of a Radiological Emergency.

Radioactive waste management

In view of the potential hazard to man and the environment posed by radioactive waste, its management and disposal have become an important issue in considering the nuclear power option and in the use of nuclear materials. The IAEA has developed safety objectives for the management of radioactive waste. Several IAEA documents further have established criteria to govern the management and disposal of radioactive waste. The IAEA also established the Radioactive Waste Safety Standards (RADWASS) programme in 1991 to prepare a harmonized approach to the safe management of radioactive waste at the international level. RADWASS will constitute a hierarchy of documents headed by a Safety Fundamentals document.

In 1990, the IAEA General Conference adopted a Code of Practice on International Transboundary Movement of Radioactive Waste. The Code's purpose is to provide preventive measures against any uncontrolled international movement and disposal of such waste.

States and international organizations have also been engaged in the regulation of radioactive waste. Two examples may be given. The Antarctic Treaty (Article V) prohibits the disposal of radioactive waste in the Antarctic region. Similarly, Article IV of the London Convention 1972 regulates the sea dumping of radioactive waste. In February 1994, amendments to the London Convention took effect that prohibit the dumping of all types of radioactive waste at sea. Further, Article 5 of the Convention on the Prevention of Marine Pollution from Land-Based Sources obliges Member States to adopt measures to eliminate pollution of the marine area by radioactive substances from land-based sources.

Regional regulation of sea dumping of radioactive waste has also been undertaken in various parts of the world. In 1977 a Decision of the OECD Council replaced the *ad hoc* and voluntary arrangements previously in existence with a Multilateral Consultation and Surveillance Mechanism for Sea Dumping of Radioactive Waste. The decision commits participating countries to apply the guidelines and procedures adopted within the NEA and to subject their sea dumping operations to the system of prior consultation and international surveillance organized by the NEA. Other examples of regional arrangements are the Convention on the Pollution of the Mediterranean Sea, 1976 and its two Protocols of 1976 and 1980; the Convention on the Protection of the Marine Environment of the Baltic Area, 1974; and the South Pacific Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, 1986.

The concern of developing countries that radioactive waste is not imported into their territories was largely responsible for the inclusion in Article 39 of the Fourth Convention (1989) between African, Caribbean, and Pacific States and the European Economic Community of an undertaking by the Community to prohibit the export of such waste from the territory of its Member States. On the other hand, the African, Caribbean and Pacific States undertook to prohibit the import of radioactive waste from the Community or from any other country. In conformity with this provision, Article 4 of the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa — which was adopted by the Organization of African States in January 1991 — prohibits the import of all hazardous

wastes including radioactive substances into Africa from non-contracting parties.

Steps toward convention on radioactive waste management. In 1993, the IAEA General Conference requested the Director General "to initiate preparations for a convention on the safety of waste management as soon as the ongoing process of developing waste management safety fundamentals has resulted in broad international agreement". At its March 1995 session, the IAEA Board approved the safety fundamentals document entitled "The Principles of Radioactive Waste Management". The document will facilitate the work of an open-ended group of technical and legal experts charged with carrying out the necessary substantive preparations for a convention on the safety of radioactive waste management. Toward this end, the group has held meetings in February and in July 1995.

Transport of radioactive material

The IAEA has taken the lead in developing appropriate regulations for the safe transport of radioactive material. It first published *Regulations for the Safe Transport of Radioactive Materials* (Safety Series No. 6) in 1961 for application to all means of national and international transport. The Regulations since then have been widely accepted and adopted by competent international bodies as binding requirements for the transport of radioactive materials.

The transport of radioactive materials has also been dealt with through conventions. A well known example is the International Convention for the Safety of Life at Sea (SOLAS), 1974. It regulates, *inter alia*, the transport of dangerous goods including radioactive materials. Article 23 of the United Nations Convention on the Law of the Sea, 1982, regulates the exercise by foreign nuclear-powered ships or ships carrying nuclear substances of the right of innocent passage through the territorial sea of States.

Safety standards for nuclear merchant ships. Action to reconsider the safety standards for nuclear merchant ships, established by the International Maritime Organization (IMO) in 1981 has been instituted. In September 1990, the IAEA General Conference requested the Director General "to consult, ...with the International Maritime Organization the plans of the international maritime community regarding civilian nuclear-powered ships, the need to review the Code of Safety for Nuclear Merchant Ships in the light of existing nuclear safety technology, and whether the Code at present applies to all existing and projected civilian nuclear-powered ships, and if not, the implications of extending the Code to all such ships".

In 1993, a Joint Working Group of the IAEA, IMO, and United Nations Environment Programme (UNEP) elaborated a draft "Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High Level Radioactive Wastes in Flasks on board Ships". The Code has received the approval of the IMO Assembly and of the IAEA's policy-making organs.

Civil liability for nuclear damage

The mitigation of the consequences of a nuclear accident through prompt and adequate compensation is an important component of the regime for the safe utilization of nuclear energy. Today several international conventions regulate liability for nuclear damage.

The first is the 1963 Vienna Convention on Civil Liability for Nuclear Damage, concluded under the auspices of the IAEA. This Convention is worldwide in scope but only 14 States have become parties. The second is the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy concluded within the framework of the OECD. This Convention, which is regional in character and has 14 Western European States Party to it, was supplemented in 1963 by the Brussels Supplementary Convention. Both the Paris Convention and the Brussels Supplementary Convention have been amended by Protocols in 1964 and 1982.

The basic features of the Vienna and Paris Conventions are identical. Both are based on the exclusive and strict liability of the operator of a nuclear installation, on limitation of liability in amount and in time, and on the jurisdiction of the courts of the installation State. Both Conventions provide for a minimum amount of compensation and for financial coverage through insurance or other financial security and, in the case of the Brussels Supplementary Convention, through a system of state funding.

Two other Conventions deal with the question of liability in the context of marine carriage. The 1962 Convention on the Liability of Operators of Nuclear Ships, which is not yet in force, and the 1971 Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Materials. Both Conventions are based on the principle of strict liability of the operator.

Regarding nuclear-related incidents in outer space, liability for nuclear damage is covered by the 1972 Convention on International Liability for Damage Caused by Space Objects. It would govern, *inter alia*, situations where a space object is either propelled with nuclear power or carries nuclear objects. In 1992 the UN General Assembly adopted a resolution on the principles

relevant to the use of nuclear power sources in outer space.

For nuclear power plants, the Chernobyl accident made it clear that the existing liability regime is not adequate to ensure equitable and rapid compensation, particularly in the event of large-scale damage. This is because of the regime's limited territorial application, its narrow definition of damage, and the low level of guaranteed compensation under it.

The existing regime is being strengthened. In 1988, a Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention was concluded. Its basic aim is to extend the scope of application of both Conventions. It also resolves potential conflicts of law which could result from the simultaneous application of the two Conventions to the same nuclear accident, notably in the case of international transport.

In 1990, the IAEA Board of Governors decided to set up a Standing Committee on Liability for Nuclear Damage. It was requested to consider international liability for nuclear damage, including international civil liability, international State liability, and the relationship between international civil and State liability.

The work of the Standing Committee has shown broad areas of agreement on proposals for the revision of the Vienna Convention. Attention has shifted mainly to the feasibility of elaborating a supplementary funding convention. A number of proposals have been considered in this respect but no general agreement has been reached. The Committee has recommended to the IAEA Board that a diplomatic conference be convened in 1996 to be devoted to the revision of the Vienna Convention and supplementary funding. The Board is expected to act on the recommendation at its meetings in September 1995.

Physical protection of nuclear material

Two international instruments provide the basis for the physical protection of nuclear material: a set of recommendations and a Convention, both developed under IAEA auspices.

The set of recommendations was first developed in 1972 and has been revised on three occasions since then: 1975, 1977, and 1989. The major purposes of the most recent revision were to give equal treatment to the concerns relating to unauthorized removal of nuclear material and sabotage of nuclear facilities; to reflect the existence of the Convention on the Physical Protection of Nuclear Material; and to strengthen the recommendations on several points of standard practice.

The recommendations reflect a broad consensus among IAEA Member States on the re-

quirements for effective physical protection. They apply to nuclear material in domestic use, transport and storage; to nuclear material in international transport; and to nuclear facilities in a State. Although these recommendations are not binding, their application is required by the IAEA in agreements with States that receive assistance from it. An equivalent requirement has been included by a number of States in bilateral nuclear co-operation agreements.

The Convention on the Physical Protection of Nuclear Material was adopted on 26 October 1979 and entered into force on 8 February 1987. Its scope of application is narrower than the recommendations, in that the Convention applies primarily to nuclear material while in international nuclear transport (which necessarily includes storage incidental to such transport).

A Review Conference of Parties to the Convention was held in Vienna in September 1992. Among other things, the Conference affirmed that the Convention provides a sound basis for physical protection of nuclear material during international transport and is acceptable in its current form. The Conference also called upon the IAEA to organize a meeting to examine the IAEA physical protection recommendations in IAEA document INFCIRC/225/Rev. 2, and to consider the incorporation of further guidance on such issues as irradiated fuel, nuclear material contained in waste, and other matters. As a result of a Technical Committee meeting in June 1993, revised recommendations were issued in September 1993 (as INFCIRC/225/Rev.3) that reflect the Committees's views in these respects.

Armed attacks against nuclear installations

Protocols I and II Additional to the Geneva Conventions of 1949* relate to the protection of victims of international armed conflicts and of non-international armed conflicts, respectively. Article 56 of Protocol I and Article 15 of Protocol II relate to the protection of, among other things, nuclear electrical generating stations

The protection accorded by the Protocols applies only to a limited category of nuclear installations. The phrase "nuclear electrical generating stations" obviously includes nuclear power reactors. However, it would not include nuclear research reactors, enrichment facilities, fuel fab-

* The four 1949 Geneva Conventions to which the Protocols are additional relate, respectively, to: the amelioration of the wounded and sick in armed forces in the field; the amelioration of the conditions of wounded, sick and shipwrecked members of armed forces at sea; the treatment of prisoners of war; and, the protection of civilian persons in times of war.

rication facilities, reprocessing facilities, and spent fuel storage facilities. All such facilities, particularly the last two, could cause substantial radioactive releases if attacked.

Although the need to prohibit armed attacks on all nuclear facilities and the urgency of concluding an international agreement relating thereto, seems to be generally recognized, the establishment of more comprehensive international rules in this area is still in the process of development. Thus, for example, the IAEA General Conference in 1987 adopted a resolution regarding Protection of Nuclear Installations against Armed Attacks. In the preamble of that resolution, the General Conference recorded that it was "aware of the fact that an armed attack on a nuclear installation could result in radioactive releases with grave consequences within and beyond the boundaries of the State which has been attacked" and was "convinced of the need to prohibit armed attacks on nuclear installations from which such releases could occur and of the urgency of concluding an international agreement in this regard".

The peaceful uses of nuclear energy

The impetus to ensure the peaceful use of nuclear energy that finds expression in the IAEA Statute and the European Atomic Energy Community (Euratom) Treaty has been supplemented by various non-proliferation conventions.

The ultimate objective of the international community is the achievement of general and complete disarmament. In the context of nuclear disarmament, avoidance of vertical proliferation (i.e. increases in existing nuclear arsenals) is fostered by the adoption of arms reduction agreements between nuclear-weapon States. The prohibition of nuclear weapons is also being sought through the adoption of requirements applicable to all States, regardless of whether they possess nuclear weapons and through the adoption of requirements designed to ensure that those States that do not have nuclear weapons do not acquire them (prevention of horizontal proliferation).

Examples of requirements applicable to all States are the Antarctic Treaty; the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water; the Treaty on Principles to Govern the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies; and the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil thereof. They are designed to limit the geo-

graphical locations where nuclear weapons can be tested, deployed, and/or used.

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the Treaty for the Prohibition of Nuclear Weapons in Latin America (the Treaty of Tlatelolco), and the South Pacific Nuclear Free Zone Treaty (the Treaty of Rarotonga) illustrate the requirements applicable to non-nuclear weapon States. They are designed primarily to prevent horizontal proliferation. These three treaties couple the prohibition on the acquisition of nuclear weapons with a requirement that the parties thereto accept IAEA safeguards on all existing and future nuclear activities.

During the early 1970s, two non-treaty initiatives were undertaken by a number of States to support the non-proliferation regime. The first group of States, known as the "Zangger Committee", are all parties to the NPT. The Committee's aim was to establish a uniform approach to the implementation of the obligation contained in Article III.2 of the NPT, by defining the source and special fissionable material and the equipment or material especially designed or prepared for the processing, use or production of special fissionable material, the provision of which requires the application of IAEA safeguards. (The results of this initiative are reproduced in IAEA document INFCIRC/209/Rev. 1 and Add. 1 and 2.)

The second group of States, which include participants in the Zangger Committee initiative, is known as the London Suppliers' Group and includes States that are and are not parties to the NPT. This Group of States has produced a set of guidelines (reproduced in IAEA document INFCIRC/254) for the export of nuclear material, equipment, or technology. Consequently, the guidelines set forth additional conditions applicable to the export of nuclear material, equipment and technology that, for example: link the duration of safeguards to the continued existence of safeguardable material and equipment regardless of the duration of the safeguards agreement; require the application of physical protection measures; require the exercise of restraint in the transfer of sensitive facilities, technology, and weapons-usable materials; and impose limitations on the re-transfer of certain exported items. The guidelines are also intended to remove assurances relating to safeguards and non-proliferation from the field of commercial competition.

IAEA safeguards system

Article III.A.5 of the IAEA Statute authorizes the Agency "to establish and administer safeguards designed to ensure that special fissionable and other materials, services, equip-

ment, facilities and information made available by the Agency or at its request or under its supervision or control are 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 State, to any of the State's activities in the field of atomic energy."

The Agency's safeguards system was thus conceived as a legally binding scheme of verification for all IAEA-related nuclear transactions which would apply when a State received assistance from or through the IAEA under an Agency project. Nuclear activities in which the IAEA was *not* involved would be subject to safeguards only on a voluntary and selective basis.

During the 1970s, the IAEA's safeguards system underwent a major transformation in character and scope. The change was the result of the development of what is referred to as the "non-proliferation regime"; that is the set of legal norms and voluntary undertakings which were developed both within and outside of the framework of the IAEA to deal with the peaceful uses of nuclear energy and nuclear weapons proliferation.

By virtue of the 1967 Treaty of Tlatelolco in Latin America, each party undertakes to use exclusively for peaceful purposes the nuclear material and facilities which are under its jurisdiction and to prohibit and prevent in its territory the testing, use, manufacture, production, acquisition, receipt, storage, installation, deployment and possession of any nuclear weapons. Each party also assumes the obligation to negotiate multilateral or bilateral agreements with the IAEA for the application of safeguards to its nuclear activities.

Of wider significance is the 1968 NPT, which is of a universal character. It provides that each non-nuclear-weapon State party to the Treaty assumes a basic obligation not to manufacture, acquire, receive or control nuclear weapons or other nuclear explosive devices. In addition, such a State agrees to accept the safeguards set forth in an agreement to be negotiated and concluded with the IAEA in accordance with the latter Statute and its safeguards system. The exclusive purpose of this agreement is the verification of the fulfilment by the State of its treaty obligation to prevent the diversion of nuclear energy uses to nuclear weapons or other nuclear explosive devices.

Additionally, the parties to the Rarotonga Treaty in Southeast Asia and the Pacific and the Brazilian-Argentine Agreement on the Exclusively Peaceful Utilization of Nuclear Energy have also made a non-proliferation commitment. Thus, for States parties to these agreements, acceptance of IAEA safeguards that are comprehensive in scope has become obligatory in character.

Safeguards objectives. Safeguards are *technical* means of verifying compliance with *legal* obligations relevant to the peaceful uses of nuclear energy. Their objectives are political, that is, to *assure* the international community of the peaceful nature of safeguarded nuclear activity and to *deter* the diversion or misuse of safeguarded materials or facilities through the risk of early detection.

The system has a number of basic features which should be understood. The first is that the application of safeguards is primarily but not exclusively based on information provided by the State as to the existence of nuclear material or equipment that should be subject to safeguards. The Agency, however, has a right to undertake special inspections to ensure that all nuclear material that is subject to safeguards are in fact safeguarded and for that purpose to obtain and have access to additional information and locations to guard against possible undeclared activities.

The second is that safeguards cannot by themselves prevent a violation by a State of its obligations not to divert nuclear material from peaceful purposes. The system is designed as an early warning mechanism to initiate the necessary procedures for remedial action in case of violation. Under the IAEA Statute, non-compliance with safeguards obligations is to be reported to the United Nations Security Council for appropriate action.

The third is that safeguards cannot assess the future intentions of States. The system can be analogized to a radar device which can only report on the existing situation.

The actual application of safeguards requires a contractual agreement between the IAEA and the State in which the system will operate, whether the application of the system is the result of a voluntary undertaking by the State, or is in fulfilment of a legal obligation under a bilateral or multilateral agreement.

Safeguards agreements set out the parties' basic rights and obligations, relevant to the application of safeguards. Detailed implementation procedures are found in a technical set of "subsidiary arrangements", which are tailored to the specific requirements of safeguarded facilities. Subsidiary arrangements are implementing instruments that do not require approval of the IAEA Board of Governors. They are concluded between the IAEA Secretariat and the State Party simultaneously with or subsequent to the conclusion of the safeguards agreement. Subsidiary arrangements are considered confidential. They are accessible only to the IAEA Secretariat and the State Party. They are not available to other Member States, except that specific information relating to safeguards implementation may be given to the Board of Governors to the extent

necessary for the IAEA to fulfil its responsibilities in implementing the agreement.

Categories of safeguards agreements. Four categories of safeguards agreements have been entered into by the IAEA.

The *first category* is with non-nuclear-weapon States that have made a non-proliferation commitment, e.g. States Party to the NPT, the Treaty of Tlatelolco, the Treaty of Rarotonga, or the Brazilian-Argentine Agreement on the Exclusively Peaceful Utilization Of Nuclear Energy. These safeguards agreements cover all the nuclear activities of the State. In Argentina and Brazil, IAEA safeguards are carried out under a Quadripartite Agreement, which is *sui generis* in nature, between the two countries, the IAEA, and the Brazilian-Argentine Agency for the Accounting and Control of Nuclear Material (ABACC). The other aforementioned agreements are standard in nature and are based on guidelines (INFCIRC/153) adopted for that purpose by the IAEA Board of Governors. The guidelines serve as the basis for the structure and content of these agreements.

Application of safeguards under these agreements is linked to the safeguarded material. Safeguards are terminated by the IAEA under these agreements upon determination that the material is no longer usable for any nuclear activity relevant from the point of view of safeguards, or has become practically irrecoverable. Safeguards are terminated upon transfer of the safeguarded nuclear material out of the State to another jurisdiction.

Under the Treaty of Rarotonga and the Quadripartite Agreement, Parties are not to provide any State with nuclear material or equipment that require the application of safeguards, unless subject to the IAEA's safeguards. NPT Parties are under a similar obligation, but only with regard to supplies to non-nuclear-weapon States. Provision of nuclear material and equipment to nuclear-weapon States does not require the application of IAEA safeguards under the NPT. Under the Treaty of Tlatelolco, Parties are under no obligation to require the application of IAEA safeguards on supplies of nuclear material and equipment to other States.

The application of safeguards depends equally upon the duration of the safeguards agreement. All the above agreements have provisions stating they shall remain in force as long as the State is Party to the respective Treaty.

The *second category* of agreements is with non-nuclear-weapon States that have not made a binding non-proliferation commitment. These agreements are normally entered into upon the conclusion of a Project Agreement between the IAEA and a Member State; upon unilateral sub-

mission by a State; or upon the conclusion of a supply agreement between two or more States that requires the application of IAEA safeguards. Agreements in this category cover only specified facilities and materials. Assurances by the IAEA are necessarily limited to the safeguarded facilities or materials and do not extend to cover the totality of the State's nuclear activities.

The rights and obligations of the IAEA and the State under this category of agreements are also based on guidelines adopted by the Board of Governors (INFCIRC/66/Rev.2 and its earlier versions). These guidelines were the first to be developed for the purpose of concluding safeguards agreements. Unlike those developed later for NPT safeguards agreements, they deal only with principles and procedures of applying safeguards.

The basic undertaking of the State under these agreements, however, is not to use any material, equipment, facilities or other items under safeguards in such a way as to further any military purpose. This undertaking, which is based on the language of the Statute, is understood by the IAEA to prohibit the manufacture or possession of any nuclear explosive device, and not to permit the withdrawal of any nuclear material subject to safeguards. In most of these agreements, the duration of safeguards and of the agreement itself is linked to the safeguarded material and facilities. Safeguards continue to apply as long as the material or facilities can be used for any nuclear activity which warrant their application. Safeguards generally follow the nuclear material upon its transfer out of the State.

The *third category* of agreements is with nuclear-weapon States. All five nuclear weapon States identified in the NPT — China, France, the Soviet Union (now its successor, Russia), the United Kingdom, and the United States — have accepted the application of safeguards on some or all of their peaceful nuclear activities. These agreements are not designed to verify non-proliferation, but are meant to broaden the IAEA's safeguards experience, to affirm that nuclear-weapon States are not rewarded by being exempt from safeguards on their peaceful activities and, most importantly, to establish a precedent for on-site verification in the nuclear-weapon States. Under these agreements, facilities or nuclear material in facilities notified to the IAEA by the State concerned are offered for the application of safeguards. The agreements provide for the possibility of withdrawal of such facilities or material from the application of safeguards. All of these agreements are of unlimited duration but provide for the right of termination upon six month's notice if the purpose for which the agreement was intended can no longer be served.

The *fourth category* is with non-nuclear-weapon States which have not made a previous non-proliferation commitment but which are ready to make that commitment as a part of the safeguards agreement. No guidelines have been developed for this category. One agreement of this type was concluded with Albania before it became Party to the NPT. The basic undertaking under this agreement is not to use any nuclear material or facility within the territory of Albania, or under its jurisdiction or control for the manufacture of any nuclear explosive device or to further any military purpose. Safeguards under the agreement continue to apply as long as such material or facilities can be used for any nuclear activity that can warrant their application. Albania is obliged not to transfer nuclear material, facilities or relevant technological information to another State before the IAEA has confirmed that it has made appropriate arrangements to apply safeguards. The agreement has an initial duration of 25 years. Termination of the agreement, however, does not affect the continuing application of safeguards on material and facilities subject to safeguards at the date of termination.

Technical features and measures. The IAEA's safeguards system under any of the four categories of agreements has three basic features: material accounting, containment and surveillance, and on-site inspection.

Material accounting establishes the quantities of nuclear material present within defined areas and the changes in those quantities that take place within defined periods of time. Containment and surveillance measures are designed to take advantage of physical barriers such as walls, containers, tanks or pipes, to restrict or control the movement of or access to nuclear materials. Such measures help to reduce the probability that undetected movements of nuclear material or equipment take place. Surveillance is used to detect undeclared movements of nuclear materials, tampering with containment, fabrication of false information or interference with safeguards devices. The aim of on-site inspection is verification of the IAEA's information. The intensity and frequency of inspections are usually specified in the safeguards agreement and vary with the type of facility inspected.

Reporting to the UN Security Council. Article XII of the IAEA Statute requires, among other things, that the Board of Governors report to the UN Security Council and General Assembly as well as to all IAEA Member States any non-compliance with an IAEA safeguards agreement which it finds to have occurred. In two instances, Iraq and the Democratic People's Republic of Korea, the Board of Governors has adopted resolutions recording its finding of non-compliance.

The case of Iraq occurred in the aftermath of the Gulf war and included the revelation that Iraq had constructed a large undeclared nuclear programme, including undeclared enrichment facilities. From this case, it became apparent that the IAEA safeguards system — though effective with regard to declared activities — is incomplete insofar as its ability to detect undeclared activities. Since that time, the focus of the IAEA has been to adopt measures designed to strengthen the safeguards system and in particular to develop an ability for the system to detect and have access to undeclared activities. Important measures already have been taken.

Following recommendations made by the IAEA's Standing Advisory Group on Safeguards Implementation, in April 1993, the Agency instituted a safeguards development programme (Programme 93+2) to consider the feasibility of further measures to strengthen and improve the cost-effectiveness of safeguards. At its March 1995 session, the IAEA Board endorsed the general direction of the Programme and requested specific proposals, which were submitted to the Board in June 1995. In June, the Board took note of the Agency's plan to implement at an early date the measures identified by the Secretariat as being within the scope of existing legal authority of comprehensive safeguards based on INFCIRC/153 (corrected), with the understanding that elaboration of the implementation arrangements for, and clarification of concerns about, them would require consultations between the Secretariat and individual Member States. The Secretariat intends to submit specific proposals relating to those measures that require complementary authority for their implementation to the IAEA Board in December 1995.

IAEA verification under the UN Charter

The IAEA's nuclear inspections in Iraq were undertaken in accordance with resolutions of the UN Security Council. Following the cessation of hostilities in the Gulf War, the Security Council — acting under Chapter VII of the United Nations Charter — adopted Resolution 687 on 3 April 1991. Paragraph 12 of that Resolution required Iraq to unconditionally agree not to acquire or develop nuclear weapons or nuclear-weapons-usable material or any subsystems or components or any research, development, support or manufacturing facilities related thereto; to provide a declaration of the locations, amounts, and types of all items referred to above; to place all of its nuclear-weapons-usable materials under the exclusive control, for custody and removal, of the IAEA, acting with the assistance

and co-operation of a Special Commission to be established pursuant to the Resolution; to accept on-site inspection and the destruction, removal and rendering harmless of all the above-mentioned items; and to accept a plan, to be prepared by the IAEA Director General, for the future ongoing monitoring and verification of its compliance with these undertakings.

Operative paragraph 13 of the Resolution requested the IAEA Director General, with the assistance and co-operation of the Special Commission, to carry out immediate on-site inspection of Iraq's nuclear capabilities based on Iraq's declarations and any additional locations designated by the Special Commission; to develop and carry out a plan for the destruction, removal, or rendering harmless of all items referred to in operative paragraph 12; and to develop a plan for the future ongoing monitoring and verification of Iraq's compliance with operative paragraph 12, including an inventory of all nuclear material in Iraq subject to the IAEA's verification and inspection to confirm that IAEA safeguards cover all nuclear activities in Iraq.

These provisions of Resolution 687 were supplemented by Security Council Resolution 707, adopted on 15 August 1991, which imposed further restrictions on permissible nuclear activities in Iraq.

In carrying out its inspections in Iraq, the IAEA had more extensive verification rights than it has under safeguards agreements. This has been outlined in an Exchange of Letters between the United Nations and Iraq on the rights and privileges necessary for the IAEA and the Special Commission to perform their activities under Resolution 687. The various plans required by Resolution 687 were approved by Security Council Resolutions 699 and 715. It should be noted that the plan for on-going monitoring also contains extensive rights and privileges for the IAEA in comparison with safeguards agreements.

Other verification initiatives

The international community is currently considering three arms control/non-proliferation initiatives with potential impact on the IAEA's verification activities. First, a Committee of the UN Conference on Disarmament (CD) is in the process of developing a Comprehensive Nuclear Test-Ban Treaty (CTBT). Although the work of the CD Committee is still in progress, it seems likely that the CTBT being developed by it will include seismological monitoring, on-site inspections to ascertain the nature of events that have not been satisfactorily explained, on-site monitoring of large non-nuclear explosions, and an International Data Centre to process the infor-

mation obtained from seismological monitoring (and from other monitoring — e.g., of radionuclides in the atmosphere — that may be agreed to be included in the CTBT). It is possible that the CTBT will assign a number of the verification activities under the Treaty to the IAEA.

Secondly, consideration is being given to the development of a treaty that would ban the future production of plutonium and highly enriched uranium for use in nuclear weapons (the so-called "Cut-Off Treaty"). Last year, the General Assembly of the United Nations adopted resolution A/Res/48/75 L, which, among other things:

"Recommend[ed] the negotiation in the most appropriate international forum of a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices;

"Request[ed] the International Atomic Energy Agency to provide assistance for examination of verification arrangements for such a treaty as required; and

"Call[ed] upon all States to demonstrate their commitment to the objectives of a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices".

The third initiative relates to the possibility that the plutonium and highly enriched uranium that was formerly contained in nuclear weapons but is no longer required for that purpose will be submitted to IAEA safeguards by some or all of the nuclear-weapon States.

A changing progressive picture

The international legal order for nuclear energy is characterized by a mix of legally binding rules and agreements and advisory standards and regulations. This mix is constantly changing. What were recently non-binding standards are today binding commitments. The conventions in the area of physical protection and for the notification of a nuclear accident and emergency assistance are but some examples.

The fact that many regulations are still non-binding should not be a matter for concern. Many States have accepted such standards as a basis for their national legislation. By doing so, they have, in effect, voluntarily undertaken to comply with international norms that they formally view as recommendations because of their belief that it is in their best interest to do so.

Long at the centre of the process, the IAEA will remain actively engaged in the progressive international development of nuclear law. □