
International Co-operation in Nuclear Safety

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Introduction

International co-operation in the peaceful uses of atomic energy started in the mid-1950s as soon as industrially developed countries began their efforts to harness nuclear energy for civilian application. At the beginning, however, nuclear safety was not a priority concern of either governments and intergovernmental organizations or private developers. Although bona fide attempts to ensure nuclear safety were made, in particular on the national level, it was only after major accidents at civilian nuclear power plants occurred that the attention of the world community was focused on the need to establish a universally applicable and effective international regime of nuclear safety.

The IAEA Nuclear Safety Regime

The statute of the International Atomic Energy Agency (IAEA), which entered into force on 29 July 1957 authorized the Agency 'to establish or adopt . . . standards of safety for protection of health and minimization of danger to life and property (including such standards for labour conditions), and to provide for the application of these standards.'¹

Practical development of effective international co-operation in the field of nuclear safety had its beginning in the early 1960s and reached its present wide-ranging scale in the 1980s and 1990s, after the Chernobyl and Three Mile Island accidents.

Today the international regime of safe development of nuclear energy is based on a system of international legal instruments, international mechanisms, and other intergovernmental structures, as well as on organizational and administrative measures which are aimed at ensuring the protection of the health of population and the sustainability of the environment in the process of peaceful nuclear activities. The creation of the regime was made possible through the elaboration of international recommendations, norms, and standards, the implementation of co-ordinated scientific programs, the exchange of scientific and technological information, the establishment of databases, and the conclusion of international conventions and bilateral

and multilateral agreements which required allocation by governments of substantial financial and material resources.

The 1996 Moscow Summit

A significant impetus to the further strengthening of international co-operation was given by the meeting of heads of state and government of leading world powers, who held a conference in Moscow on 19–20 April 1996, which adopted the Nuclear Safety and Security Summit Declaration. In the declaration the leaders of the eight powers stated their commitment 'to give an absolute priority to safety in the use of nuclear energy'.

The summit meeting was preceded by the non-governmental organization (NGO) Preparatory Meeting in Advance of the Nuclear Safety Summit, which took place in Moscow on 17–18 April 1996. The NGO meeting was sponsored by the Center for Russian Environmental Policy (Russia), the Natural Resources Defense Council (United States), and the Bellona Foundation (Norway).

A need for further improvements in the international nuclear safety regime is growing as the development of peaceful uses of nuclear energy continues unabated.

Over the last several years world-wide development of the peaceful uses of nuclear energy in its various applications has continued, though at a slower pace than previously. In 1998, according to the International Atomic Energy Agency, 437 reactor units were in operation, with some countries having 40 per cent or more of nuclear share of electricity generation (Lithuania, France, Belgium, Ukraine, Sweden, Bulgaria, Slovakia, and Switzerland—in the order of percentage). In addition, 36 reactor units were under construction, including six in the Republic of Korea and four each in China, India, the Russian Federation, Slovakia, and the Ukraine.²

The Present Safety Regime

At present the international regime of nuclear safety is comprised of the following fundamental elements.

International Norms and Standards

The International Atomic Energy Agency's Board of Governors approved as early as 1960 *The Agency's Health and Safety Measures*. In 1962 the board adopted *Basic Safety Standards for Radioactive Protection*. In 1982 the Agency issued on behalf of the International Labour Organization, the Nuclear Energy Agency, and the World Health Organization, as well as the IAEA, the revised *Basic Safety Standards for Radiological Protection*.

In 1974 the Agency launched its major Nuclear Safety Standards (NUSS) programme, which was largely completed in 1986. This comprehensive series of codes and safety guides is intended to ensure the safe design, siting, and operation of nuclear power reactors and enhance their quality assurance and reliability. The NUSS still remain as universally recognized safety recommendations. In 1987 replies to an IAEA questionnaire from 47 member states showed that the basic concepts, purposes, and functions of their regulatory bodies generally conformed to the NUSS recommendations.

The IAEA Board of Governors on a number of occasions considered proposals to make NUSS recommendations legally binding but decided against such suggestions because of concern that it would thus 'petrify' standards that were likely to be subject to changes over time.

The International Atomic Energy Agency has been sending special missions to observe and improve nuclear safety standards and activities in member states—Radiation Protection Advisory Teams (RARATs), Operational Safety Review Teams (OSARTs), and Assessment of Safety Significant Events Teams (ASSETs).

The IAEA International Nuclear Event Scale (INES) classifies incidents and accidents at nuclear reactors on a scale that ranges from the most minor (level 1) to the most severe (level 7). Levels 1–3 are termed 'incidents' while levels 4–7 are 'accidents'. Chernobyl would have been a level 7 accident. About 60 member states of the Agency use INES.³

In 1995 a total of 62 events were communicated through the INES information system, of which 56 occurred in nuclear power plants and six in other facilities. None were at level 3 or higher.⁴

According to the latest available data, of 52 incidents reported in 1996, 27 were below the INES scale, one was classified as a 'serious incident', level 3, which involved overexposure of an individual, seven events were reported at level 2, and the 17 remaining reported events were at level 1.⁵

According to the Russian State Corporation 'Rosenergoatom', as reported by Interfax News Agency on 13 December 1998, in January through November 1998 Russian nuclear power plants had one level 2 incident and three level 1 incidents. During a similar period in 1997,

according to the same source, there were three level 1 incidents.

For many years the Agency has been regularly publishing the *IAEA Safety Standards Series* under five categories: General Safety Issues, Nuclear Safety, Radiation Safety, Radioactive Waste Safety, and Safe Transport.⁶

International Agreements

*The Convention on Early Notification of a Nuclear Accident (Notification Convention)*⁷ is aimed at providing relevant information about nuclear accidents with possible transboundary consequences as early as possible in order to minimize environmental, health, and economic effects.

The Convention was negotiated and concluded under the auspices of the IAEA in 1986, in the wake of the Chernobyl accident. It covers any accident involving a release of radioactive material which occurs or is likely to occur and which has resulted or may result in an international transboundary release that could be of radiological safety significance for another state or states.

Under the Convention, its parties undertake to notify other states forthwith, directly or through the IAEA, the nature of the nuclear accident, the time of its occurrence, and its exact location where appropriate, and promptly provide them with such available information that is relevant to minimizing the radiological consequences.

States may voluntarily notify accidents related to military nuclear activities, with a view to minimizing the radiological consequences of the nuclear accident. All five nuclear-weapon states have declared their willingness to make such notifications.

The IAEA is for all practical reasons a central point in the notification process. Under Article 4 the Agency is to inform states of any notification it has received.

The Convention entered into force on 27 October 1986. As of February 1999 the total number of parties reached 111 states.

After the conclusion of the Convention many states have signed bilateral agreements concerning mutual notification of nuclear accidents. Thus Russia signed bilateral intergovernmental agreements with Finland, Denmark, Sweden, Norway, and some other states. Under these agreements, in the event of a nuclear accident involving facilities or activities of a contracting party, or of persons or legal entities under its jurisdiction or control, it shall forthwith notify the other contracting party. Such bilateral arrangements have contributed to enhancing reciprocal trust and co-operation in addressing any hazardous nuclear accidents.

*The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention)*⁸ establishes an international framework aimed at facilitating the prompt provision of assistance in the event

of a nuclear accident or radiological emergency, directly between states parties, through or from the IAEA, and from other international organizations; and at minimizing consequences and protecting life, property, and the environment from effects of radioactive releases.

Under the Convention, if a state needs assistance in the event of a nuclear accident, whether or not such accident originates within its territory, it may call for such assistance. The Convention does not establish a special mechanism for providing assistance but sets up procedures for establishing such a mechanism which could be established and would function if the need arose to provide assistance.

At the basis of the entire system of requesting and providing assistance lies the principle of respect for the sovereignty of states and of the voluntary nature of providing assistance. Procedures for agreeing to the scope and type of assistance required provide for their specification by a requesting state which, where practicable, would furnish the assisting party with such information as may be necessary for that party to determine the extent to which it is able to meet the request.

As in the case of the Notification Convention, the Assistance Convention assigns to the IAEA a leading role in making necessary arrangements in the event of a nuclear accident or radiological emergency (such as collecting and disseminating information concerning experts, equipment, materials, methodologies, techniques, etc.) which fully corresponds to the Agency's statute and would make ample use of its over 40 years of experience in contributing to the safe development of peaceful uses of nuclear energy.⁹

The Assistance Convention entered into force on 26 February 1987. As of January 1999 the total number of parties to the Convention reached 77 states.

*The Convention on Nuclear Safety*¹⁰ is aimed at achieving and maintaining a high level of nuclear safety world-wide through the enhancement of national measures and international co-operation, including, where appropriate, safety-related technical co-operation; at establishing and maintaining effective defences in nuclear installations against potential radiological hazards in order to protect individuals, society, and the environment from harmful effects of ionizing radiation from such installation; and at preventing accidents with radiological consequences and mitigating such consequences should they occur.

Under the Convention, each contracting party undertakes to establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations; it shall also establish and designate a regulatory body entrusted with the implementation of such a legislative and regulatory framework. The Convention establishes an important review procedure which would in effect constitute some sort of monitoring of the performance of parties in ensuring the safety of their nuclear installations.

Under this review procedure, each party is to submit for review a report on the measures it has taken to implement the obligations of the Convention. Such reports are to be reviewed at periodic meetings of parties (called 'review meetings'). The intervals between review meetings shall not exceed three years. An extraordinary meeting of contracting parties may be held if so agreed by a majority of parties.

The Nuclear Safety Convention was opened for signature on 20 September 1994 and entered into force on 24 October 1996. As of October 1998 there were 65 signatories and 47 parties.

A preparatory meeting of contracting parties was held in Vienna in April 1998 and an organizational meeting in September–October 1998. The majority of the parties, including Russia, have submitted reports required by the Convention. The first review meeting of contracting parties took place in Vienna in April 1999.

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was adopted in September 1997, but has not yet entered into force. As of February 1999, 38 states had signed the Convention and six had become parties. The Convention shall enter into force after 25 states have ratified, accepted, or approved it.

The Joint Convention has as its objectives: to achieve and maintain a high level of safety world-wide in spent fuel and radioactive waste management, through the enhancement of national measures and international co-operation, including, where appropriate, safety-related technical co-operation; to ensure that, during all stages of spent fuel and radioactive waste management, there are effective defences against potential hazards so that individuals, society, and the environment are protected from harmful effects of ionizing radiation in such a way that the needs and aspirations of the present generation are met without compromising the ability of future generations to meet their needs and aspirations; and to prevent accidents with radioactive consequences should they occur during any stage of spent fuel or radioactive waste management.

The Convention covers existing facilities and past practices, the siting of proposed facilities, the design and construction of facilities, the assessment of safety of facilities, the operation of facilities, the disposal of spent fuel, the decommissioning of nuclear facilities, the transboundary movement of spent fuel, and radioactive waste, and provides for review procedures of states' performance similar to those set forth in the Nuclear Safety Convention.

The Convention on the Physical Protection of Nuclear Material likewise constitutes a significant part of the international nuclear safety and security regime. Provisions of the Convention oblige parties to ensure that, during international transport across their territory or on ships or

aircraft under their jurisdiction, nuclear materials for peaceful purposes (plutonium, uranium-235, uranium-233, and irradiated fuel) are protected at the agreed levels, as categorized in the annexes to the Convention.

Under certain conditions, the Convention shall also apply to nuclear material used for peaceful purposes while in domestic use, storage, and transport.

The Convention entered into force on 8 February 1987. As of November 1998 the total number of parties reached 63 states.

Civil liability for nuclear damage is also considered an indispensable element in the international system of ensuring nuclear safety. However, a universal agreement to regulate civil liability has not yet seen the light of day, and such liability is currently administered by a number of international agreements with limited memberships.

*The Vienna Convention on Civil Liability for Nuclear Damage*¹¹ is aimed at establishing minimum standards to provide financial protection against damage resulting from the peaceful uses of nuclear energy. The Convention was adopted on 21 May 1963 but entered into force only 14 years later, on 12 November 1977. By November 1998 the total number of parties reached 31 states. The United States and Russia are not parties to the Convention. The Russian Federation signed it but has not yet consummated the process of ratification: the prospects of ratification by the present State Duma (new parliamentary elections will take place in late 1999) are not at all clear.

Since many countries did not consider satisfactory the provisions of the Vienna Convention, in 1997 governments undertook an important step towards strengthening the liability regime. In September 1997, at a diplomatic conference in Vienna, representatives of 80 states adopted the *Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage*, as well as the *Convention on Supplementary Compensation for Nuclear Damage*.

The Protocol sets the limit of possible civil liability of the operator at the level of an approximate equivalent of \$US400,000. It contains a broader definition of nuclear damage, which covers the costs for reinstatement of impaired environment and the costs of preventive measures. The Protocol broadens the geographic scope of the Vienna Convention and lengthens the period for claiming compensation for nuclear damage. The Protocol, as of December 1998, was signed by 14 states and ratified by one (Romania). It is still to enter into force.

The Convention on Supplementary Compensation is a legal instrument to which any state may accede, irrespective of its participation in any existing regional or other agreements on civil liability, such as the 1960 OECD *Paris Convention on Third Party Liability in the Field of Nuclear Energy*. The new Convention provides for supplementary compensation for nuclear damage beyond the amount set

in the Convention if the contracting parties make available additional public funds. As of December 1998 the Convention was signed by 13 states and ratified by none. It has not yet entered into force.

Both new legal instruments, taken together, are aimed at strengthening the global basis for compensation for nuclear damage as provided for by the existing agreements on civil liability.

In recent years, several important international conventions, negotiated under IAEA auspices, have helped to fill gaps in the international nuclear safety regime. It should be noted, however, that the pace of ratification of the various international conventions concluded is uneven. For a comprehensive international safety regime to be established, states must subscribe to the conventions they have sought, negotiated, and adopted.

The above listed international collaborative efforts to promote a high level of nuclear safety world-wide must, certainly, be based and are dependent upon the prime responsibility of national governments in the field of nuclear safety and radiation protection. Sustainable nuclear safety also requires a supportive economic and legal environment where operators, national regulatory bodies, and the public at large can fully assume their respective responsibilities.

General Assessment of the Safety Regime

In assessing the overall efficacy of the nuclear safety mechanism that has been promoted and developed under the auspices of the International Atomic Energy Agency since the establishment of this organization in late 1950s, one can conclude that during the last decade some important progress has been achieved. Since Chernobyl no major accidents in civilian nuclear activities have taken place, which may be attributed in no small measure to the efforts of the IAEA. However, most of the existing safety norms have a recommendatory nature, since many governments still prefer to rely on national legislation and consider that it is primarily their sovereign right and obligation to enforce safety rules. Thus the Agency has a long way to go before it can become a comprehensive international mechanism for ensuring nuclear safety.

The meeting of the contracting parties of the Nuclear Safety Convention held in April 1999 set a landmark in establishing international monitoring of the safety status of participating countries, but the results of this review are still to be evaluated in terms of their impact on the promotion of a reliable safety regime world-wide.

Review and advisory safety services provided by the IAEA can become purely routine, therefore efforts to keep them relevant to a large and mature modern nuclear industry are necessary.

The Need for Better Safety Culture

Nuclear safety can and must be enhanced by greater transparency in nuclear power activities. All these efforts must be oriented towards developing and continuously upgrading the general nuclear safety culture.

Although humankind has been conducting nuclear activities for over fifty years, one is forced to recognize that there is a general reason for the persistent deficiencies in ensuring operational nuclear safety, even in states with long-standing nuclear programmes. While specific problems and their immediate causes may have been different in any particular case, it seems evident, that the basis of almost all existing problems has been the lack of key elements of a general safety culture.

In order to develop and implant such a safety culture in each and every country engaged in nuclear activities, governments and operators must constantly exert systematic efforts to educate all those who are involved with nuclear installations and nuclear activities.

It is to be expected that newly developing areas of IAEA activities, such as involvement of the Agency in the verification of weapon-origin fissile materials under the tripartite (IAEA, Russia, United States) initiative of September 1996 and, in future, nuclear control agreements (e.g. the Fissile Material Cut-off Treaty which is being negotiated

by the Geneva Conference on Disarmament), would be of substantial benefit to the general nuclear safety regime.

In conclusion, it is important to emphasize that, whatever efforts are undertaken to improve and enhance nuclear safety and security, their full realization can be achieved only in the framework of the overall security both on national and international levels. Nuclear security is inseparable from general security.

Notes and References

- 1 IAEA Statute, Art. III.A.6.
- 2 *IAEA Bulletin* (1998), 40/3, 50.
- 3 For more on the IAEA activities in the area of nuclear safety, see David Fischer (1997), *History of the International Atomic Energy Agency: The First Forty Years* (Vienna: IAEA), 183–242.
- 4 *The IAEA Annual Report for 1995* (Vienna: IAEA), GC(40)/8, 43.
- 5 *IAEA Yearbook 1997*, pp. D 20–21.
- 6 For more on recent activities of the Agency in nuclear safety, see *IAEA Bulletin*, 40: 2 (1998).
- 7 For description, see Agreements section in this *Yearbook*.
- 8 For description, see *ibid.*
- 9 For more on the two conventions, see A. O. Adede (1987), *The IAEA Notification and Assistance Conventions in Case of a Nuclear Accident. Landmarks in the Multilateral Treaty-making Process* (London/Dordrecht/Boston: Graham & Trotman/Martinus Nijhoff).
- 10 For description, see Agreements section in this *Yearbook*.
- 11 For description, see *ibid.*

