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MEASURES TO STRENGTHEN INTERNATIONAL CO-OPERATION IN NUCLEAR, RADIATION AND WASTE SAFETY

1. This document, which may be regarded as a successor to document GC(42)/INF/5 (issued last August) and its predecessors, presents an overview of measures to strengthen international co-operation in nuclear, radiation and waste safety. It focuses on recent Agency activities concerned with such measures, but also touches on a number of important initiatives taken outside the Agency. Many of the activities during 1998 are discussed in other General Conference documents, notably the Agency's Annual Report (GC(43)/4) and the Nuclear Safety Review for the Year 1998 (GC(43)/INF/4). This document is therefore also intended to provide supplementary information, such as more detailed accounts of specific subjects and updates on activities in the first half of 1999.

2. The Attachment to this document on recent Agency activities follows a similar general pattern to that adopted in 1998, whereby activities were reported in three main areas:

A. Legally binding international safety agreements such as various conventions which have been adopted or are still being developed;

B. Non-binding international safety standards which have been developed mainly under the auspices of the Agency; and

C. Provisions for the application of those standards.

3. Part A of the Attachment deals with:

- the status of, and recent developments concerning, the *Convention on the Physical Protection of Nuclear Material*, the *Convention on Early Notification of a Nuclear Accident* and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*;

- the status of the *Convention on Nuclear Safety* (more detailed information on the implementation of this Convention, as requested in Resolution GC(42)/RES/10, is given in a separate General Conference document, GC(43)/11, relating to item 13(d) of the Provisional Agenda); and
- the activities following the adoption of the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* to prepare for its entry into force (more detailed information is given in a separate General Conference document, GC(43)/INF/5).

4. Part B of the Attachment concerns the *establishment of non-binding international safety standards* by the Agency, often in collaboration with specialized agencies of the United Nations and with other international bodies, and describes the operation of the Secretariat's process for safety standards preparation and review.

5. Part C of the Attachment describes how the Agency has been *providing for the application of safety standards* through:

- the provision of safety-related assistance under the Agency's technical co-operation (TC) programmes and by other means;
- the fostering of safety-related information exchange;
- the promotion of safety related education and training;
- the co-ordination of safety related research and development; and
- the rendering of safety-related services.

6. In Part C, Annex C-1 describes recent developments in the *provision of safety related assistance through TC programmes* and Annex C-2 deals with two particular areas of safety related assistance; the *provision of assistance related to the safety of nuclear power plants in countries of eastern Europe and the former Soviet Union and in countries of south-east Asia, the Pacific and the far east*. Annex C-3 describes recent activities to *foster safety related information exchange* and Annexes C-4 and C-5 address *the promotion of education and training in nuclear, radiation and waste safety* and *the co-ordination of safety related research and development*, respectively. Annex C-6 describes the status of a number of *safety related services* rendered by the Agency to Member States.

7. Separate General Conference documents provide more detailed information on a number of specific subjects related to the application of safety standards, namely:

- the safety of transport of radioactive materials (GC(43)/9, relating to item 13(b) of the Provisional Agenda, in response to GC(42)/RES/13);
- the safety of radiation sources and the security of radioactive materials (GC(43)/10, relating to item 13(c) of the Provisional Agenda, in response to GC(42)/RES/12);
- measures to address safety aspects of the Y2K computer system problem (in GC(43)/7, relating to item 14 of the Provisional Agenda, in response to GC(42)/RES/11); and
- a report on the International Conference on Strengthening Nuclear Safety in Eastern Europe held in June 1999 (GC(43)/INF/6).

8. A peer review of the Agency's safety programme was conducted in March 1999 by a group of experts designated by Member States. Part D of the Attachment provides a brief description of the main conclusions and recommendations of the peer review.

9. In the interests of reducing duplication in reporting, and in response to a proposal from the March 1999 session of the Board of Governors, a change is planned in the Secretariat's reporting on developments in nuclear, radiation and waste safety. The Nuclear Safety Review for the Year 1999 will, according to the practice adopted in previous years, be submitted in draft form to the March 2000 session of the Board of Governors. The final version, taking account of the Board's discussion, will be published as soon as possible thereafter. The text of the Nuclear Safety Review for the Year 1999 will also be incorporated into the Secretariat's report on Measures to Strengthen International Co-operation in Nuclear, Radiation and Waste Safety to the forty-fourth session of the General Conference, providing a comprehensive overview of nuclear, radiation and safety worldwide within a single report.

PART A

LEGALLY BINDING INTERNATIONAL SAFETY AGREEMENTS

1. Four legally binding international safety agreements aimed at strengthening international co-operation in nuclear, radiation and waste safety have been developed and adopted by the international community and are now being implemented by the parties to them, with the support of the Agency[1]:

- the *Convention on the Physical Protection of Nuclear Material* (which was opened for signature on 3 March 1980 and entered into force on 8 February 1987);
- the *Convention on Early Notification of a Nuclear Accident* (which was opened for signature on 26 September 1986 and entered into force on 27 October 1986);
- the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency* (which was opened for signature on 26 September 1986 and entered into force on 26 February 1987); and
- the *Convention on Nuclear Safety* (which was opened for signature on 20 September 1994 and entered into force on 24 October 1996).

2. Another agreement — the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* — was opened for signature on 29 September 1997 and has not yet entered into force.

3. The IAEA's Director General is designated as depositary for each of these Conventions. In addition, the Conventions assign other tasks to the Agency's Secretariat; these include the collection and dissemination of information and the provision of assistance in the event of nuclear accidents or radiological emergencies.

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[1] . Two other conventions for which the Director General performs depositary functions are the Vienna Convention on Civil Liability for Nuclear Damage (and the Protocol to Amend the Vienna Convention) and the Convention on Supplementary Compensation for Nuclear Damage. The subject of liability for nuclear damage is dealt with in another document being prepared for the General Conference.

4. Table A-1 shows a summary the status of each of the safety related conventions as of 30 June 1999, and relevant events since the last General Conference are described below. Up-to-date information on the status of the conventions is also available on WorldAtom, the Agency's site on the World Wide Web, at www.iaea.org/worldatom/glance/legal/.

Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev. 1)

5. Since the last session of the General Conference, Cyprus has acceded to the Convention and Panama has ratified the Convention. As of 30 June 1999, there were 64 Contracting Parties to the Convention: 63 States and EURATOM.

6. A conference to review — and, if necessary, amend — the Convention is scheduled for 15–19 November 1999 in Vienna.

Convention on Early Notification of a Nuclear Accident (INFCIRC/335)

7. The Convention has not been formally invoked in the period since the last session of the General Conference.

8. Two States — Belgium and Panama — have ratified the Convention since the last session of the General Conference. As of 30 June 1999, there were 84 Contracting Parties to the Convention (81 States and 3 organizations).

Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (INFCIRC/336)

9. Since the last session of the General Conference, the Agency has received requests for assistance under the terms of the Convention in relation to:

(a) treatment of a number of people in Istanbul, Turkey, overexposed to radiation from a cobalt-60 source which had been bought as scrap, and attempts to locate a similar source that was believed to be missing; and

(b) treatment of a person in Peru overexposed to radiation from an industrial iridium-192 source (the patient was eventually sent to France for treatment).

Assistance to the Georgian authorities is continuing, in locating, retrieving and making safe lost or abandoned sources (see GC(42)/INF/5 and the Nuclear Safety Review for the Year 1998, GC(43)/INF/4).

10. As of 30 June 1999, there were 79 Contracting Parties to the Convention (76 States and 3 organizations), two States — Belgium and Panama — having ratified since the last session of the General Conference.

Convention on Nuclear Safety (INFCIRC/449)

11. An Organizational Meeting was held in Vienna from 29 September to 2 October 1998 to prepare for the first Review Meeting of the Contracting Parties to the Convention. The Organizational Meeting, inter alia, allocated Contracting Parties to Country Groups for the Review Meeting, using an agreed process, and selected Co-ordinators and Rapporteurs for each of these Country Groups. The guidelines regarding the review process, the guidelines regarding national reports, and the rules of procedure and financial rules were issued on 8 October 1998 as INFCIRC/571, INFCIRC/572 and INFCIRC/573 respectively.

12. The Review Meeting itself — to review the national reports by each of the Contracting Parties on the measures they have undertaken to implement their obligations under the Convention — was held in Vienna from 12 to 23 April 1999, and was chaired by Mr. Lars Högberg of Sweden. Each Country Group discussed in detail the national reports from the members of that Group (members of other Groups also had the opportunity to comment), and then reported findings to the plenary session. A summary report of the Review Meeting was adopted by consensus by the Contracting Parties. The summary report and a more detailed account of the Meeting are included in a separate document GC(43)/11.

13. Since the last session of the General Conference, four States — Belarus, Cyprus, Denmark and the United States of America — have adhered to the Convention. Armenia, which deposited its instrument of ratification during the last session of the General Conference has also duly become a Contracting Party. A total of 51 States (29 of which have at least one “nuclear installation”, as defined in the Convention, that has achieved criticality in a reactor core) had deposited instruments of ratification, accession or acceptance by the end of June 1999. Of the 19 further States that have signed the Convention but are not Contracting Parties, two — India and Kazakhstan — have at least one nuclear installation that has achieved criticality in a reactor core.

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

14. The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was adopted on 5 September 1997 and opened for signature on 29 September 1997. General Conference Resolution GC(41)/RES/11 appealed to all States to sign and subsequently ratify, accept or approve the Convention, so that it may enter into force as soon as possible.

15. As of 30 June 1999, 39 States had signed the Convention (24 of which have at least one operating nuclear power plant), and nine — Canada, Croatia, the Czech Republic, Germany, Hungary, Norway, Slovakia, Slovenia and Spain (of which all but Croatia and Norway have operational nuclear power plants) — had adhered to it. The Joint Convention will enter into force after 25 States, at least 15 of which have operational nuclear power plants, have deposited instruments of ratification, acceptance or approval.

16. An informal meeting of signatories and other interested States and organizations was held in Vienna, 16–19 November 1998. Under the chairmanship of Mr. George Jack of Canada, the meeting considered draft rules of procedure and guidelines for the reporting and review process to be adopted when the Joint Convention has entered into force. A further informal meeting to continue this preparatory work is scheduled for 18–22 October 1999, in Vienna. A more detailed account of the work to prepare for the Joint Convention's entry into force is given in GC(43)/INF/5.

TABLE A-1

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

In the Table below:

- A date without parentheses indicates, for a Contracting Party, the year of deposition of an expression of consent to be bound (i.e. an instrument of ratification, accession, acceptance, etc.) with the depositary;
- A date in parentheses indicates, for a Signatory which is not a Contracting Party, the year of signature; and
- (ocp) indicates, for a State or organization which is not a Signatory or a Contracting Party, that an official contact point for the purposes of the relevant convention has been made known to the IAEA. Unless otherwise indicated, Signatories and Contracting Parties to the Physical Protection, Early Notification and Assistance conventions have notified the Agency of an official contact point.

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

	Physical Protection	Early Notification	Assistance	Nuclear Safety	Joint Convention
IAEA Member States					
Afghanistan		(1986)[a]	(1986)[a]		
Albania					
Algeria		(1987)	(1987)	(1994)	
Argentina	1989	1990	1990	1997	(1997)
Armenia	1993	1993	1993	1998	
Australia	1987	1987	1987	1996	(1998)
Austria	1988	1988	1989	1997	(1998)
Bangladesh	(ocp)	1988	1988	1995	
Belarus	1993	1987	1987	1998	
Belgium	1991	1999	1999	1997	(1997)
Benin					
Bolivia		(ocp)	(ocp)		
Bosnia and Herzegovina	1998[a]	1998	1998[a]		

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

	Physical Protection	Early Notification	Assistance	Nuclear Safety	Joint Convention
Brazil	1985	1990	1990	1997	(1997)
Bulgaria	1984	1988	1988	1995	(1998)
Burkina Faso					
Cambodia					
Cameroon		(1987)	(1987)[a]		
Canada	1986	1990	(1986)	1995	1998
Chile	1994	(1986)	(1986)[a]	1996	
China	1989	1987	1987	1996	
Colombia	(ocp)				
Costa Rica		1991	1991		
Côte d'Ivoire		(1986)	(1986)[a]		
Croatia	1992	1992	1992	1996	1999
Cuba	1997[a]	1991	1991	(1994)	
Cyprus	1998[a]	1989	1989[a]	1999	
Czech Republic	1993	1993	1993	1995	1999
Democratic Republic of the Congo		(1986)	(1986)[a]		
Denmark	1991	1986	(1986)	1998	(1998)
Dominican Republic	(1980)[a]				
Ecuador	1996	(ocp)	(ocp)		
Egypt		1988	1988	(1994)	
El Salvador					
Estonia	1994	1994	1994		
Ethiopia		(ocp)			
Finland	1989	1986	1990	1996	(1997)
France	1991	1989	1989	1995	(1997)
Gabon		(ocp)			
Georgia					
Germany	1991	1989	1989	1997	1998
Ghana		(ocp)	(ocp)	(1995)	
Greece	1991	1991	1991	1997	(1998)
Guatemala	1985[a]	1988	1988[a]		
Haiti	(1980)[a]				
Holy See	(ocp)	(1986)	(1986)[a]		
Hungary	1984	1987	1987	1996	1998

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

	Physical Protection	Early Notification	Assistance	Nuclear Safety	Joint Convention
Iceland		1989	(1986)[a]	(1995)	
India		1988	1988	(1994)	
Indonesia	1986	1993	1993	(1994)	(1997)
Iran, Islamic Republic of	(ocp)	(1986)	(1986)		
Iraq		1988	1988[a]		
Ireland	1991	1991	1991	1996	(1997)
Israel	(1983)[a]	1989	1989	(1994)	
Italy	1991	1990	1990	1998	(1998)
Jamaica					
Japan	1988	1987	1987	1995	
Jordan	(ocp)	1987	1987	(1994)	
Kazakhstan	(ocp)	(ocp)	(ocp)	(1996)	(1997)
Kenya	(ocp)	(ocp)	(ocp)		
Korea, Republic of	1982	1990	1990	1995	(1997)
Kuwait	(ocp)	(ocp)			
Latvia		1992	1992	1996	
Lebanon	1997[a]	1997	1997	1996	(1997)
Liberia					
Libyan Arab Jamahiriya		(ocp)	1990[a]		
Liechtenstein	1986	1994	1994[a]		
Lithuania	1993	1994	(ocp)	1996	(1997)
Luxembourg	1991	(1986)	(ocp)	1997	(1997)
Madagascar		(ocp)			
Malaysia		1987	1987		
Mali		(1986)[a]	(1986)[a]	1996	
Malta	(ocp)	(ocp)	(ocp)		
Marshall Islands					
Mauritius		1992	1992[a]		
Mexico	1988	1988	1988	1996	
Monaco	1996	1989	1989	(1996)	
Mongolia	1986[a]	1987	1987[a]		
Morocco	(1980)[a]	1993	1993	(1994)	(1997)
Myanmar		1997[a]			
Namibia					

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

	Physical Protection	Early Notification	Assistance	Nuclear Safety	Joint Convention
Netherlands	1991	1991	1991	1996	(1999)
New Zealand		1987	1987		
Nicaragua		1993	1993[a]	(1994)	
Niger	(1985)	(1986)	(1986)		
Nigeria		1990	1990[a]	(1994)	
Norway	1985	1986	1986	1994	1998
Pakistan		1989	1989	1997	
Panama	1999[a]	1999[a]	1999[a]		
Paraguay	1985	(1986)	(1986)		
Peru	1995	1995	1995	1997	(1998)
Philippines	1981	1997	1997	(1994)	(1998)
Poland	1983	1988	1988	1995	(1997)
Portugal	1991	1993	(1986)	1998	
Qatar		(ocp)			
Republic of Moldova	1998	1998	1998	1998	
Romania	1993	1990	1990	1995	(1997)
Russian Federation	1983	1986	1986	1996	(1999)
Saudi Arabia		1989	1989		
Senegal		(1987)	(1987)[a]		
Sierra Leone		(1987)[a]	(1987)[a]		
Singapore		1997	1997	1997	
Slovakia	1993	1993	1993	1995	1998
Slovenia	1992	1992	1992	1996	1999
South Africa	(1981)[a]	1987	1987	1996	
Spain	1991	1989	1989	1995	1999
Sri Lanka		1991[a]	1991[a]		
Sudan		(1986)	(1986)	(1994)	
Sweden	1980	1987	1992	1995	(1997)
Switzerland	1987	1988	1988	1996	(1997)
Syrian Arab Republic		(1987)	(1987)	(1994)	
Thailand		1989	1989		
The Former Yugoslav Republic of Macedonia	1996[a]	1996	1996[a]		
Tunisia	1993[a]	1989	1989[a]	(1994)	

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

	Physical Protection	Early Notification	Assistance	Nuclear Safety	Joint Convention
Turkey	1985	1991	1991	1995	
Uganda					
Ukraine	1993	1987	1987	1998	(1997)
United Arab Emirates		1987	1987[a]		
United Kingdom of Great Britain and Northern Ireland	1991	1990	1990	1996	(1997)
United Republic of Tanzania		(ocp)	(ocp)		
United States of America	1982	1988	1988	1999	(1997)
Uruguay	(ocp)	1989	1989	(1996)	
Uzbekistan	1998[a]				
Venezuela					
Viet Nam		1987	1987		
Yemen		(ocp)	(ocp)		
Yugoslavia	1986	1989	1991[a]		
Zambia		(ocp)			
Zimbabwe		(1986)[a]	(1986)[a]		
Non-Member States[b]					
Antigua and Barbuda	1993[a]				
Belize		(ocp)			
Brunei Darussalam	(ocp)	(ocp)	(ocp)		
Cape Verde	(ocp)	(ocp)			
Chad		(ocp)			
Democratic People's Republic of Korea		(1986)	(1986)		
Dominica	(ocp)	(ocp)	(ocp)		
Grenada		(ocp)			
Guinea		(ocp)			
Guinea–Bissau		(ocp)			
Kiribati		(ocp)			
Kyrgyzstan		(ocp)	(ocp)		
Malawi		(ocp)	(ocp)		
Maldives		(ocp)			
Micronesia, Federated States of	(ocp)				
Papua New Guinea	(ocp)	(ocp)			

STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 1999

	Physical Protection	Early Notification	Assistance	Nuclear Safety	Joint Convention
Saint Lucia		(ocp)	(ocp)		
Samoa		(ocp)	(ocp)		
Tajikistan	1996[a]				
Tonga	(ocp)				
Turkmenistan		(ocp)			
International Organizations[b]					
Arab Atomic Energy Agency		(ocp)	(ocp)		
Euratom	1991	(ocp)			
Food and Agriculture Organization		1990	1990		
International Labour Office		(ocp)	(ocp)		
UN Educational, Scientific and Cultural Organization		(ocp)	(ocp)		
UN Environment Programme		(ocp)			
UN Office for the Coordination of Humanitarian Affairs		(ocp)			
World Health Organization		1988	1988[a]		
World Meteorological Organization		1990	1990[a]		

[a] Signatories and Contracting Parties which have not notified the Agency of an official contact point in relation to the relevant convention.

[b] Non-Member States and international organizations are listed only if they are Signatories or Contracting Parties to at least one convention or if they have notified the Agency of an official contact point in relation to at least one convention.

PART B

ESTABLISHMENT OF INTERNATIONAL SAFETY STANDARDS

Background

1. Under Article III.A.6 of its Statute, the Agency is authorized "To establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property". Since soon after the Agency's inception the Secretariat has been involved in developing and establishing such standards.

2. In 1996, the Secretariat introduced a uniform preparation and review process for safety standards. To this end, it created a set of advisory bodies with harmonized terms of reference to assist it in preparing and reviewing all documents, namely the *Advisory Commission for Safety Standards* (ACSS), the *Nuclear Safety Standards Advisory Committee* (NUSSAC), the *Radiation Safety Standards Advisory Committee* (RASSAC), the *Waste Safety Standards Advisory Committee* (WASSAC) and the *Transport Safety Standards Advisory Committee* (TRANSSAC). It assigned to each of these bodies a Scientific Secretary, who co-ordinates the work of the body with the relevant Agency policies and programmes, and appoints a Technical Officer for the preparation of each document in accordance with recommendations made.

International basis for the Agency's safety standards

3. The Agency establishes its safety standards on the basis of advice provided by its International Nuclear Safety Advisory Group (INSAG), of studies by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and of recommendations made by a number of international bodies, principally the International Commission on Radiological Protection (ICRP).[1]

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[1] In *The Agency's Health and Safety Measures*, INFCIRC/18, it was stated that "The Agency's basic safety standards will be based, to the extent possible, on the recommendations of the International Commission on Radiological Protection (ICRP)".

4. INSAG — an independent advisory group to the Director General of the IAEA — has four reports either recently published or close to publication. A new publication entitled "The Safe Management of Sources of Radiation: Principles and Strategies" (INSAG-11) addresses the fundamental objectives and principles of nuclear, radiation and waste safety. This publication will be used as one of the primary references for the revision of the IAEA's Safety Fundamentals, starting next year. An updated version of an earlier report on the basic safety principles for nuclear power plants (INSAG-3 Rev. 1) and new reports on the management of operational safety at nuclear power plants and on the safe management of the operating lifetimes of nuclear power plants have been approved and will be issued in the near future.

5. As reported in the Nuclear Safety Review for the Year 1998 (GC(43)/INF/4), the UN General Assembly adopted a Resolution A/RES/53/44 indicating that UNSCEAR's existing functions and role should continue. UNSCEAR's major areas of current interest include: estimating worldwide exposures from natural sources; global doses and trends in medical exposure; exposure of the local population from the Chernobyl accident; doses from natural sources in workplaces; the total doses received by people who are occupationally exposed; effects of radiation on children and on the developing brain in utero; mechanisms involved in oncogenesis and hereditary effects; dose and dose rate effects; the adaptive response; epidemiology; and interactions between the effects of radiation and other carcinogens. It is expected that, at its meeting in 2000, UNSCEAR will approve its latest report to the UN General Assembly on sources and effects of ionizing radiation.

6. The ICRP issued a report on genetic susceptibility to cancer (Publication 79) and a database of dose coefficients (on CD-ROM), and also published a special report summarizing the Commission's history, policy and procedures. At its October 1998 meeting, the Main Commission adopted a report on risk estimation for multifactorial disease, which will be ICRP Publication 80. At its April 1999 meeting, Committee 4 adopted a report on protection of the public in prolonged exposure situations, which has been forwarded to the Main Commission. Another Committee 4 Task Group, on the disposal of long-lived solid radioactive waste, is also close to completing its report. Looking to the future, the Commission has circulated a text, through the International Radiation Protection Association, requesting views on some suggestions for the evolution of ICRP recommendations towards a system based on the concept of 'controllable dose'.

The hierarchy of Agency safety standards documents

7. In 1989, following a major expansion of the Agency's safety related activities, the Secretariat introduced a hierarchical structure for IAEA Safety Series publications, which were divided into Safety Fundamentals, Safety Standards, Safety Guides and Safety Practices. In order to clarify the status of the different documents, this structure was modified in 1996, the single Safety Series being replaced by:

- the **Safety Standards Series**, comprising those safety standards issued by the Agency pursuant to Article III.A.6 of its Statute; and
- the **Safety Reports Series**, to contain more descriptive documents of the type previously issued as Safety Practices, which are issued by the Agency for the purpose of safety related information exchange.

8. The Safety Standards Series documents fall into three categories:

- **Safety Fundamentals**, which state the basic objectives, concepts and principles involved in ensuring protection and safety;
- **Safety Requirements**, which specify requirements that must be satisfied in order to ensure safety for particular activities or application areas, these requirements being governed by the basic objectives, concepts and principles stated in Safety Fundamentals; and
- **Safety Guides,** which supplement Safety Requirements by presenting recommendations, based on international experience, regarding measures to ensure the observance of safety requirements..

9. **Safety Reports** give examples and descriptions of methods which can be applied in implementing both Safety Requirements and Safety Guides. They are documents for fostering information exchange.

Activities of the advisory bodies

10. A brief summary is given below of the main activities of the ACSS and the four Advisory Committees since the last session of the General Conference. A document outlining the current status of all of the Agency's safety standards is available from the Secretariat, and will soon be on the Agency's web site at www.iaea.org/ns/coordinet/.

11. Safety Requirements on near surface disposal of radioactive waste, which had previously been endorsed by ACSS, were approved for publication by the March 1999 session of the Board of Governors, and have now been published. Six Safety Guides — one on safety assessment for near surface disposal, three on occupational radiation protection and two on decommissioning — have been approved by the IAEA Publications Committee, and will be published shortly.

Advisory Commission for Safety Standards (ACSS)

12. The Advisory Commission for Safety Standards (ACSS) is a standing body of senior government officials holding national responsibilities for establishing standards and other documents relevant to nuclear, radiation, waste and transport safety. The ACSS has a special overview role with regard to the Agency's safety standards and provides advice to the Director General on the overall safety-standards-related programme.

13. The members of the ACSS were appointed by the Director General for a four-year term, which runs until the end of 1999. The Agency is inviting Member States with major nuclear programmes to nominate senior experts to serve on the ACSS; on the basis of these nominations, the Director General will select members for the 2000–2003 term.

14. The ACSS, chaired by Dr. A. Bishop of the Atomic Energy Control Board, Canada, met in May–June 1999. The Commission endorsed the submission of three Safety Requirements to the Board of Governors for approval, on:

- legal and governmental infrastructure for nuclear, radiation, radioactive waste and transport safety (a General Safety publication);
- safety of nuclear power plants: operation; and
- pre-disposal management of radioactive waste including decommissioning.

15. Four Safety Guides were also endorsed by the ACSS for publication, covering:

- regulatory control of radioactive discharges to the environment;
- preventing, detecting and responding to illicit trafficking in radioactive materials;
- decommissioning of medical, industrial and research facilities; and
- decommissioning of nuclear power plants and research reactors.

**Nuclear Safety Standards Advisory Committee (NUSSAC),
Radiation Safety Standards Advisory Committee (RASSAC),
Waste Safety Standards Advisory Committee (WASSAC) and
Transport Safety Standards Advisory Committee (TRANSSAC)**

16. Each of the four Advisory Committees is a standing body of senior regulatory officials with technical expertise in the relevant area of safety. They provide advice to the Secretariat on the overall safety programme in their respective areas of expertise, and have the primary role in the development and revision of the Agency's safety standards in that area.

17. The original members of the four Advisory Committees — NUSSAC, RASSAC, WASSAC and TRANSSAC — were appointed by the Director General for a three-year term from 1996 to the end of 1998. Since the last session of the General Conference, therefore, these committees have been reconstituted, taking account of nominations from Member States. Each of the Advisory Committees met for the first time with its new membership in the first half of 1999.

18. The Chairmen of NUSSAC (Mr. P. Govaerts of AIB-Vinçotte Nucléaire, Belgium) and WASSAC (Mr. P. Metcalf of the Council for Nuclear Safety, South Africa) were reappointed for the 1999–2001 term. Mr. G.C. Mason of the Australian Radiation Protection and Nuclear Safety Agency was appointed as Chairman of RASSAC to succeed Mr. S.L. Creswell (Health and Safety Executive, United Kingdom), and Mr. C.N. Young of the United Kingdom Department of the Environment, Transport and the Regions succeeded Mr. W. Collin (Bundesamt für Strahlenschutz, Germany) as Chairman of TRANSSAC.

19. Each of the outgoing Advisory Committees prepared reports summarizing the main achievements and issues of their three-year terms. These reports were of value both to the Secretariat in assessing the effectiveness of the new preparation and review process, and to the incoming Committees as a historical record. Notable themes in the reports from the different Committees included the need for coherence and consistency between safety standards on different topics (and hence for co-ordination between the advisory bodies), a wish for greater transparency in the process whereby the Secretariat takes account of Member States' comments on draft safety standards, and, ultimately, the importance of feedback from Member States on the value of the safety standards being produced.

20. All four of the Advisory Committees were involved in reviewing the draft Safety Requirements on legal and governmental infrastructure for nuclear, radiation, radioactive

waste and transport safety, which were also endorsed by the ACSS for submission to the Board of Governors for approval (see above).

21. **NUSSAC** met twice during the past year, once with the original membership and once with the new, and has provided advice on the revision and updating of the existing NUSS documents in the areas of nuclear power plant operation, design and siting and on research reactors. In addition, as the nominated lead Committee for the legal and governmental infrastructure standards, NUSSAC considered drafts of the series of Safety Guides for nuclear facilities, covering organization of the regulatory body, review and assessment, inspection and enforcement, and documentation.

22. The aim is to have completed the redrafting of all priority documents by the end of the year 2000 and the programme is now at the stage where a large number of documents are under preparation and review at any time. A small number of documents are approaching the end of this process, most notably the three Safety Requirements documents on operation, design, and legal and governmental infrastructure. These Safety Requirements, which will replace the existing Codes, are important for identifying assistance needs and for updating the safety review services, such as OSART, IRRT and the Design Safety Review Service (see Annex C-6). The first of the nuclear Safety Requirements, that on operation, was approved for forwarding to ACSS (and subsequently endorsed by ACSS — see above).

23. **RASSAC** met in September 1998 — the last meeting with the 1996–1998 membership — and in May 1999 with the new membership. RASSAC's main priority remains the development of radiation safety guidance in support of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. The September 1998 meeting approved a draft Safety Guide on preventing, detecting and responding to illicit trafficking in radioactive materials for forwarding to ACSS (and subsequently endorsed by ACSS — see above). The Committee also approved, subject to the incorporation of some revisions, the distribution of a draft Safety Guide on radiation protection in the medical exposure of patients to Member States for comment.

24. The May 1999 meeting approved, subject to the incorporation of some comments, the forwarding to ACSS of a draft Safety Guide on regulatory control of radioactive discharges to the environment and the distribution to Member States for comment of a draft Safety Guide on source and environmental monitoring for public protection. The Committee discussed a draft Safety Guide on application of the radiological concepts of exclusion, exemption and clearance — a subject of interest to both RASSAC and WASSAC. They

concluded that guidance was much needed, but that further internal development to clarify (and, if possible, simplify) the concepts and advice was needed. It was noted that the developments on exclusion, exemption and clearance would also affect a draft Safety Guide on consumer products containing radioactive substances, and that other draft safety standards would need to be checked for consistency. RASSAC also considered a discussion document on protection of the environment against ionizing radiation, which addressed some issues concerning the possibility of developing safety standards in this area.

25. Exclusion, exemption and clearance will be one of the topics for discussion at an 'overlapping' meeting of RASSAC and WASSAC planned for April 2000. This opportunity for joint discussions is intended to help in the continuing efforts to improve coherence and consistency in the Agency's safety standards.

26. **WASSAC** met twice since the last session of the General Conference: in November–December 1998 with the 1996–1998 membership; and in June 1999 with the new membership. The November–December meeting approved — subject to RASSAC approval — a draft Safety Guide on regulatory control of radioactive discharges to the environment. A draft Safety Guide on decommissioning of nuclear facilities was approved for distribution to Member States. The meeting also approved the development of a Safety Guide on the safe storage of radioactive waste.

27. The June 1999 meeting of WASSAC approved Safety Requirements on the pre-disposal management of radioactive waste (which were also endorsed by ACSS — see above). The meeting also considered the draft Safety Requirements and Safety Guides on legal and governmental infrastructure, and concluded that concerns which had previously been expressed by WASSAC about the balance of these General Safety documents had now been satisfactorily addressed. The Committee also discussed and commented on the issues of exclusion, exemption and clearance, in the light of RASSAC's discussions (see above) and with particular reference to a draft Safety Guide in the waste safety area, on removal of controls from materials from regulated activities.

28. WASSAC considered a discussion paper on geological disposal, intended to point the way forward towards consensus safety standards on the subject. The Committee also discussed the issue of formalizing the status of the Working Group on Principles and Criteria for Radioactive Waste Disposal and its 'task groups' in relation to WASSAC, and proposed that the Working Group should in future operate under the direction of, and report to, WASSAC.

29. **TRANSSAC** met in April 1999, with a new membership and Chairman. The main achievement of the meeting was to approve a new review cycle for the IAEA Regulations for the Safe Transport of Radioactive Material. Proposed revisions will be reviewed every two years, and a revised version of the Regulations will be produced when there are sufficient changes to warrant one. The new cycle will be better synchronized with the two-year review cycle used by the UN Committee of Experts on Transport of Dangerous Goods, and by modal organizations such as the International Maritime Organization, the International Civil Aviation Organization and the European Agreements concerning the International Carriage of Dangerous Goods by Rail (RID) and by Road (ARD), for their regulations. This change should help to speed up the process of incorporating the Agency's Regulations into those of other organizations.

30. Two Safety Guides — "Advisory Material for the Regulations for the Safe Transport of Radioactive Materials" and "Planning and Preparing for Emergency Response to Transport Accidents involving Radioactive Material" — have been approved by TRANSSAC and will be transmitted to the ACSS for consideration at its meeting in November 1999.

PART C

PROVIDING FOR THE APPLICATION OF SAFETY STANDARDS

1. Article III.A.6 of the Statute authorizes the Agency to provide for the application of standards of safety to its own operations and, at the request of a State, to that State's activities in the field of atomic energy.

2. The Secretariat discharges this function in a number of ways, as follows:

- by providing safety related assistance, through the Technical Co-operation (TC) Programme and other means;
- by fostering safety related information exchange;
- by promoting education and training;
- by supporting and co-ordinating safety related research and development; and
- by rendering safety related services.

3. Annex C-1 describes recent developments in the *provision of safety related assistance through TC programmes* and Annex C-2 deals with two particular areas of safety related assistance; the *provision of assistance related to the safety of nuclear power plants in countries of eastern Europe and the former Soviet Union, and in countries of south-east Asia, the Pacific and the far east*. Annex C-3 describes recent efforts to *foster safety related information exchange* and Annexes C-4 and C-5 address *the promotion of education and training in nuclear, radiation and waste safety* and *the co-ordination of safety related research and development*, respectively. Annex C-6 describes the status of a number of *safety related services* rendered by the Agency to Member States.

4. Separate General Conference documents provide more detailed information on a number of specific subjects related to the application of safety standards, namely:

- the safety of transport of radioactive materials (GC(43)/9, relating to item 13(b) of the Provisional Agenda, in response to GC(42)/RES/13);

- the safety of radiation sources and the security of radioactive materials (GC(43)/10, relating to item 13(c) of the Provisional Agenda, in response to GC(42)/RES/12);
- measures to address safety aspects of the Y2K computer system problem (in GC(43)/7, relating to item 14 of the Provisional Agenda, in response to GC(42)/RES/11); and
- a report on the International Conference on Strengthening Nuclear Safety in Eastern Europe held in June 1999 (GC(43)/INF/x).

ANNEX C-1

PROVISION OF SAFETY RELATED ASSISTANCE THROUGH THE AGENCY'S TECHNICAL CO-OPERATION PROGRAMME

Background

1. The Agency, pursuant to its Statute, helps Member States to comply with its safety standards through — inter alia — technical co-operation (TC) programmes. In doing so, it attaches high priority to the establishment and strengthening of nuclear, radiation and waste safety infrastructures in Member States.

2. Under its TC programmes, the Agency provides safety related technical assistance in the form of experts' services, equipment and training. The current safety related TC programme includes more than 130 national, regional and interregional projects (representing total resources of about US $16 million), of which about 35% are devoted to nuclear safety and 65% to radiation and waste safety. In addition, in the past year about 60 national, regional and interregional workshops and training courses have been organized and more than 300 applications for fellowships and scientific visits have been evaluated (see also Annex C-4 and GC(43)/INF/3).

3. The projects cover a very wide range of nuclear, radiation and waste safety issues, from the establishment of basic technical, legislative and regulatory infrastructure for the use of radiation and radioactive materials in medicine, research and/or industry to assistance in further strengthening the much more complex and sophisticated safety infrastructure needed for the development and operation of nuclear reactors.

Nuclear Safety

4. A major extrabudgetary programme (EBP) on the safety of nuclear power plants in the countries of eastern Europe and the former Soviet Union came to an end in 1998; the achievements of this programme are described separately in Annex C-2. Another extrabudgetary programme, on the safety of nuclear power plants (NPPs) in south-east Asia, the Pacific and the Far East, is under way; this too is described in more detail in Annex C-2.

5. As noted in Annex C-2 in summarizing the conclusions of the EBP on the safety of WWER and RBMK reactors, although a great deal of progress has been made in improving the safety of these reactors, much remains to be done. Although the EBP has come to an end, Agency assistance activities are continuing through the TC programme. Three complementary regional TC projects in particular are providing continuing assistance in important areas of safety, through seminars, workshops, safety review missions and expert advice. These projects cover:

- Support for Safety Assessment of NPPs, aimed at strengthening the capabilities of operating and technical support organizations;
- Capability for Assessment of Operational Safety of NPPs, aimed at assisting operating organizations in reviewing their own operational safety performance; and
- Nuclear Safety Regulatory Infrastructure, aimed at strengthening nuclear safety regulatory bodies.

6. Among other regional TC projects in the nuclear safety area are the following:

- A project to develop collaboration on management issues related to the safe and reliable operation of NPPs in the Asian region. To date, about 20 workshops and technical expert visits on operational safety have taken place through this project. Activities in this project are being closely co-ordinated with those in the Extrabudgetary Programme on the Safety of Nuclear Installations in South East Asia, Pacific and Far East Countries (see Annex C-2); and
- A new project has been started in the Europe region with the objective of enhancing the safety of ageing research reactors and associated spent fuel stores. In the first phase, evaluation missions will collect data and a number of alternative generic solutions and approaches will be developed: the second phase will be to develop action plans using these generic solutions and approaches.

7. The Integrated Strategy for Assisting Member States in Establishing/Strengthening their Nuclear Safety Infrastructure aims to make the IAEA's nuclear safety related assistance more focused, solution oriented and cost effective. To this end, a systematic approach to the identification and prioritizing of TC assistance programmes, developed jointly by the

Departments of Nuclear Safety and Technical Co-operation, is being followed in implementing the Integrated Strategy.

8. The systematic approach involves the following six stages:

(1) Identification of a focal point for nuclear safety issues in the Member State receiving Agency assistance;

(2) Identification of a Country Nuclear Safety Officer (CNSO) — a member of the Agency's staff — responsible for nuclear safety issues in that State;

(3) Development — jointly by the Agency and the Member State — of a Country Nuclear Safety Profile (CNSP), describing the actual nuclear safety situation in the Member State;

(4) Comparison of the actual situation in the Member State (as described in the CNSP) with a predefined 'reference situation' based on the Agency's Safety Requirements. This review — carried out jointly by the Agency and the Member State — aims to identify the areas where the actual situation falls short of the reference situation, and therefore where Agency assistance could most effectively be applied;

(5) Formulation of an agreed Country Nuclear Safety Action Plan (CNSAP), based on the findings from stage (4), the Member State's priorities and the Agency's ability to provide suitable and effective assistance to the Member State; and

(6) Implementation of the CNSAP.

9. Country Nuclear Safety Profiles (CNSPs) have now been completed for all of those Member States receiving Agency assistance that have NPPs in operation. Work has also been completed on the development of questionnaires to facilitate the evaluation of the current safety status against the 'reference situation'. The questionnaires represent the requirements in all five of the NUSS Codes — government organization, siting, design, operations and quality assurance — and are therefore quite extensive, but they have been designed so that, as far as possible, questions require only simple 'yes or no' answers. The Agency has started, together with the relevant counterparts in Member States, preparing Action Plans, using the CNSPs and questionnaires.

11. As part of the implementation of the Strategy, the Agency is organizing a nine-week Basic Professional Training Course, to meet the initial needs of trainees of graduate or equivalent level holding positions related to nuclear safety (see Annex C-4).

Radiation and waste safety

12. A large part of the TC work related to radiation and waste safety is carried out within the Model Project "Upgrading of Radiation Protection Infrastructure" (originally a single interregional project, now five regional projects, but still commonly referred to as "the Model Project"). The aim of the Model Project is to achieve adequate national radiation and waste safety infrastructures in most participating countries by the year 2000. Fifty-one Member States are participating in the project, as listed in the following table.

MEMBER STATES PARTICIPATING IN THE MODEL PROJECT "UPGRADING RADIATION PROTECTION INFRASTRUCTURE"

Africa	West Asia/East Asia	Latin America	Europe
Cameroon	Bangladesh	Bolivia	Albania
Côte d'Ivoire	Jordan	Costa Rica	Armenia
Democratic Republic of the Congo	Kazakhstan	Dominican Republic	Belarus
Ethiopia	Lebanon	El Salvador	Bosnia and Herzegovina
Gabon	Mongolia	Guatemala	Cyprus
Ghana	Myanmar	Jamaica	Estonia
Madagascar	Qatar	Nicaragua	Georgia
Mali	Saudi Arabia	Panama	Latvia
Mauritius	Sri Lanka	Paraguay	Lithuania
Namibia	Syrian Arab Republic		Moldova
Niger	United Arab Emirates		The former Yugoslav Republic of Macedonia
Nigeria	Uzbekistan		
Senegal	Viet Nam		
Sierra Leone	Yemen		
Sudan			
Uganda			
Zimbabwe			

13. The Model Project established a systematic approach to assessing and improving safety status in Member States lacking adequate radiation and waste safety infrastructure, which is

similar to the Integrated Strategy as described in para. 8 of this Annex. This systematic approach is also now being used in other regional TC projects on radiation and waste safety.

14. For all participating States in the Model Project, implementation of the Country Safety Action Plans is well under way. The Action Plans cover ten main components: legislation and regulations; the Regulatory Authority; regulatory control; control of occupational exposure; control of medical exposure; control of public exposure; emergency response; waste management; human resources development; and technical support services. The first milestone for participating countries was the establishment of a system of notification, authorization and control for radiation sources and the transport of radioactive material (including the necessary laws and regulations and inventories of sources). To this end, the Secretariat devised a generic system — adaptable to the conditions in different States — for the notification, registration and licensing of radiation sources and for inspection and enforcement. By the end of 1998, over 80% of the participating countries had approved (or were in the process of approving) legislation and regulations and established systems of notification, licensing and control of sources in accordance with the Basic Safety Standards. It is expected that all but a very small number of participating States will achieve a reasonable working system of control for radiation sources. Work has also started on two of the other milestones, covering the assessment and control of occupational exposure and the protection of patients in radiotherapy.

16. As the implementation of Action Plans progresses, both the Member States and the Agency need to appraise the effectiveness of the measures, to correct weaknesses and optimize the use of resources. Peer review missions, involving experts from Member States as well as Agency staff, are planned for the second half of 1999, to determine the general status of radiation safety in the Member State, assess the national regulatory infrastructure, and determine how effective the Model Project has been in improving the situation. Nine missions are foreseen between August and October 1999, to visit 15 participating States: Ethiopia, Madagascar, Senegal and Zimbabwe in the Africa region; Bangladesh and Viet Nam in East Asia; Kazakhstan, Lebanon and the Syrian Arab Republic in West Asia; Belarus, Cyprus and the Republic of Moldova in Europe; and Bolivia, Costa Rica and Paraguay in Latin America. Each review team will be expected to submit a report detailing their findings, conclusions and recommendations for further strengthening the radiation protection and safety infrastructure in the State(s) visited.

17. The management of a regulatory programme needs prompt and up-to-date information for planning, allocating resources, monitoring safety related data and following up regulatory actions. For this purpose, one of the major tasks under the Model Project has been the development of the Regulatory Authority Information System (RAIS) and the provision of training in its use.

18. RAIS is a PC application with five modules, for use in:

- compiling and maintaining inventories of radiation sources and installations;
- tracking the administrative status of sources and installations through the authorization process;
- maintaining lists of inspections carried out and planned, and of follow-up or enforcement actions (including deadlines);
- maintaining records of occupational exposure, for an installation or for a worker; and
- tracking performance indicators, both for installations (trends in doses, incidents, etc.) and for the Regulatory Authority itself (time to process authorizations, inspections, etc.).

The system is being used successfully in more than 40 participating Member States, and a number of Member States (developing and developed) have also requested copies for their own use. To promote wider use, RAIS is being translated from English into other languages: a version in French is already available, and versions in Arabic, Russian and Spanish are in preparation.

19. A Regional Seminar on Approaches and Practices in Strengthening Radiation Protection and Waste Management Infrastructure in Countries of Eastern Europe and the Former USSR was held in Bratislava, Slovakia, from 28 September to 2 October 1998. The Seminar concluded that the Model Project has played an important role in establishing and strengthening national infrastructures for radiation and waste safety in the Europe Region.

20. The set of Country Safety Profiles developed under the Model Project has provided the IAEA with a fully documented on-line system for assessing the current status of countries with respect to their radiation and waste safety infrastructure, and a prioritized and agreed set of needs that should form the basis of future technical co-operation projects. There will also

be enough data to assess the capacity of the country to assure the safety of other developments of technology or requested items of equipment that could pose radiation hazards. Over time, the system should provide a firmer basis for the IAEA's co-operative work with its Member States and provision of technical assistance in areas of radiation and waste safety.

21. Other regional TC projects in the radiation and waste safety areas include:

- A project on improving occupational radiation protection in nuclear power plants in central and eastern Europe and in Republics of the former Soviet Union. The project aims to improve the implementation of the optimization (ALARA) principle through, inter alia, information exchange meetings of health physicists from WWER and RBMK reactors and training courses on optimization;
- A project on harmonizing radiation protection in Asia, including workshops, training courses, intercomparison studies covering topics such as standards and regulations, accident management and emergency response, radiation protection in medicine, occupational radiation protection and control of radiation sources;
- A project aimed at creating a collaborative, multidisciplinary nuclear disaster preparedness education programme for central and eastern Europe, including the development of curricula and the organization of "train-the-trainers" courses;
- A project on harmonization of nuclear emergency preparedness in central and eastern Europe, aimed at developing a common understanding of the appropriate response to a severe reactor accident. This includes the development of a system of early warning based on reactor conditions, and co-ordinating technical and public information responses; and
- A new project on the rehabilitation of Chernobyl-affected territories in Belarus, the Russian Federation and Ukraine, which will address decontamination techniques for settlements, monitoring of foodstuffs and management of contaminated forests.

Legislative and regulatory assistance

22. In order to foster the establishment of basic legislation as part of safety infrastructure, legislative and regulatory assistance has been provided to Member States within the

framework of various projects under the TC Programme, particularly the Model Project on Upgrading Radiation Protection Infrastructure and a European regional project on Legislative Assistance for the Utilization of Nuclear Energy.

23. This assistance is co-ordinated by the Agency's Legal Division, and provided by teams of lawyers and safety Technical Officers, interacting with the recipient States to match legal and safety requirements. In particular, joint working sessions have been held, involving legal and technical specialists from the Agency and their counterparts from the recipient States, to review draft laws and regulations in the light of Agency safety standards and other requirements.

ANNEX C-2

PROVISION OF ASSISTANCE RELATED TO THE SAFETY OF NUCLEAR POWER PLANTS IN COUNTRIES OF EASTERN EUROPE AND THE FORMER SOVIET UNION, AND IN COUNTRIES OF SOUTH-EAST ASIA, THE PACIFIC AND THE FAR EAST

Background

1. In 1990, in response to requests for assistance from Member States operating 'first generation' WWER-440/230 nuclear power plants (NPPs), the Agency launched a major international programme to evaluate this design, and to provide safety assistance to operators and regulators, as a complement to existing national, bilateral and other international activities. In 1992, the programme was extended to include other WWERs and RBMKs. The programme concluded successfully at the end of 1998. It was financed primarily by voluntary contributions from a number of Member States as an Extrabudgetary Programme (EBP), but some activities were funded from the Agency's Regular Budget and through national and regional Technical Co-operation projects.

2. In addition to the assistance being provided under this programme, the Agency has, at the request of WWER and RBMK operating countries, provided site specific assistance and advice in the form of a wide range of safety services such as the OSART, ASSET and IPERS services (see Annex C-6), mostly through the TC programme.

3. An International Conference was held in June 1999 to review the results of national, bilateral and other international programmes to enhance WWER and RBMK safety, and to indicate where future international assistance might be needed (see GC(43)/INF/6).

4. A new Extrabudgetary Programme has been initiated on the Safety of Nuclear Installations in Countries of South-East Asia, the Pacific and the Far East. The main thrust of the new Programme is to strengthen nuclear safety in countries of the region. In particular, the objective is to enhance the technical capabilities of regulatory authorities and the supporting technical organizations and the nuclear safety infrastructure.

Extrabudgetary Programme on the Safety of WWER and RBMK NPPs

5. The Extrabudgetary Programme (EBP) on the Safety of WWER and RBMK NPPs concluded successfully in December 1998. A comprehensive final report on the Programme was agreed by the Steering Committees in mid-1998 and by the Advisory Group in December 1998.

6. The specific objectives of the Programme were as follows:

(a) to identify safety issues — safety shortcomings in the design and operation of WWER and RBMK NPPs, identified either from comparisons with IAEA standards and international practices or from operating experience — and to evaluate the safety significance of these deficiencies with respect to their impact on the defence in depth of the plants;

(b) to establish international consensus on priorities for safety improvements;

(c) to provide assistance in the review of the completeness and adequacy of safety improvement programmes with respect to IAEA recommendations; and

(d) to undertake specific studies of unresolved topical safety issues.

7. The Programme included: identification and ranking of generic safety issues; reviews of the design safety and seismic reviews; reviews of safety improvement/modernization programmes; studies of generic safety issues; preparation of guidance documents for safety analysis; code validation efforts; selected probabilistic reviews; reviews of operational practices; training workshops; establishment and maintenance of a database of safety issues; and assistance to G-24 Nuclear Safety Assistance Co-ordination (NUSAC).

8. The greater part of the EBP centred on the development of the Safety Issue Books for the different types of WWER and RBMK NPPs. Safety Issue Books are lists of safety issues generic to all units of a plant type, indicating an agreed ranking of their associated safety significance and the corresponding recommendations for safety improvements. The Safety Issue Books covered the WWER-440/230, WWER-440/213, WWER-1000/320, ‘small series’ WWER-1000 and the various generations of RBMK NPPs. The main sources for these Safety Issue Books were the Safety Review Missions carried out under the Programme and the evaluation of the results of other missions performed by the IAEA safety services.

The complex process of producing the Safety Issue Books ultimately ensured the consensus of all donor and recipient Member States involved in the EBP.

9. There was general agreement among countries providing and receiving assistance that the specific objectives of the EBP had been met. The Safety Issue Books provide a clear picture of the design and operational safety issues and their safety importance for the plants under consideration. International consensus was reached on the safety issues related to WWER and RBMKs and on the priority measures required. As a result, Programme findings and related publications are being widely used as a technical basis for the development of safety upgrading programmes for these plants, reviews by national regulatory authorities, and the establishment of safety priorities in national, bilateral and other international programmes. The Programme also enabled a regular exchange of information among all countries involved and in-depth technical dialogue between western and eastern European experts.

10. Despite the improvements in safety already achieved, much remains to be done at individual NPPs, particularly at the WWER and RBMK plants of the first generation. It is particularly important to ensure that the operating organizations draw up a safety case for each NPP based on a plant specific safety analysis, and that it is reviewed and approved by the national regulatory authorities. This will allow an assessment of the overall safety impact of plant modifications. This process, which has been initiated but not finalized in several plants, needs to be completed.

11. Following completion of the EBP, the IAEA will continue to provide nuclear safety assistance to its Member States operating WWER and RBMK reactors in the framework of both its regular Nuclear Safety Programme and its Technical Co-operation projects. A specific project on WWER and RBMK safety has been included in the IAEA Nuclear Safety Programme for 1999–2000, and three ongoing regional Technical Co-operation projects are being extended (see Annex C-1). An important element of this assistance is to strengthen the national regulatory authorities in the countries operating these NPPs, on the basis of IAEA recommendations and good international regulatory practices.

Implementation of RBMK Accident Analysis Guidelines (IRAAG)

12. An extrabudgetary project was established in March 1998 concentrating on RBMK accident analysis and related training, based on the Kursk-1 NPP in the Russian Federation.

The project's primary objective is to verify the applicability of the IAEA's accident analysis guidelines to RBMK reactors. The tasks involved include:

(a) testing the feasibility of accident analysis methodology;

(b) performing design basis accident calculations for selected sequences as a necessary means of testing the guidelines, with special attention being paid to beyond design basis accidents; and

(c) developing and conducting the related training programme.

All the tasks are now under way: the project is due to be completed by the September 2000.

Database on WWER and RBMK Safety Issues

13. A database of WWER and RBMK safety issues, and the plant specific status of safety improvements, was developed as the EBP proceeded. The database, and particularly the information on the status of safety improvement programmes, will continue to be updated periodically and distributed to Member States which participated in the Programme.

G-24 Nuclear Safety Assistance Co-ordination

14. The Secretariat continues to participate as a technical advisor to the G-24 Nuclear Safety Assistance Co-ordination (NUSAC) mechanism, which is intended to identify gaps and overlaps in assistance activities. A meeting of the G-24 Nuclear Safety Plenary Working Group in Brussels in March 1999 discussed, inter alia, the safety of first generation WWER and RBMK reactors, a subject which was also expected to be discussed at the Review Meeting of the Convention on Nuclear Safety (see GC(43)/11), at the G-7 summit in Cologne and at the IAEA/EC/NEA Conference on Strengthening Nuclear Safety in Eastern Europe (see Annex C-3). It was suggested that, following these three events, the Agency and the European Commission should discuss practical arrangements for future collaboration on the issue.

Extrabudgetary Programme on the Safety of Nuclear Installations in South-East Asia, the Pacific and the Far East

15. An Extrabudgetary Programme on the Safety of Nuclear Installations in Countries of South East Asia, the Pacific and the Far East has been initiated. The objective of the

Programme is to strengthen nuclear safety in countries of the region, and in particular to enhance the technical capabilities of regulatory authorities and supporting technical organizations, the nuclear safety infrastructure and human resources development. The participating countries are China, Indonesia, Malaysia, the Philippines, Thailand and Viet Nam, and extrabudgetary contributions towards the Programme, in cash and/or in kind, have been made by Canada, France, Germany, Japan, the Republic of Korea, Spain and the United States of America.

16. The Integrated Strategy for Establishing/Strengthening Nuclear Safety in Member States (see Annex C-1) is being used as a basis for establishing nuclear safety profiles and action plans for prioritizing assistance and co-operation, in a step-by-step approach.

17. The Programme focuses on providing assistance for:

- training in nuclear safety;
- strengthening national regulatory frameworks and technical and management capabilities, including nuclear legislation, regulations, safety assessment, licensing, inspection and enforcement;
- emergency planning and preparedness;
- safe storage of research reactor spent fuel;
- promotion of safety culture concepts;
- preparation of information for decision makers and the public to build understanding of and confidence in nuclear safety; and
- establishing a regional forum to exchange information to harmonize the implementation of nuclear safety concepts.

18. An Advisory Group met in October 1998 to review the implementation of the Programme to date and to advise on activities and priorities for 1999. The meeting was attended by representatives of all the States providing and receiving assistance, as well as Australia and Singapore, who attended as observers.

19. A Regional Workshop on nuclear safety was held in Taejon, Republic of Korea, in October 1998, with 27 participants. The workshop provided training on the basic principles of nuclear safety for current and ‘next generation’ designs of NPP, their design and safety

features and their implementation of defence in depth, and included practical exercises using Agency software for the simulation of PWR transients and accidents and for fault tree analysis.

20. Activities at the national level have focused on the provision of safety review services. IRRT missions provided advice to the regulatory bodies in Indonesia and Viet Nam, an IPERS mission reviewed PSA results for the Guangdong NPP, China, and a conceptual design review was conducted of an experimental fast reactor in China (see Annex C-6). In addition, a seminar on safety culture was organized by the Agency in Beijing, with 28 participants from utilities, technical support organizations and the regulatory body.

21. Activities planned for later in 1999 include Regional Workshops on research reactor safety (in Japan) and NPP siting (in Indonesia), an IRRT mission to Malaysia, an IPERS peer review and a workshop on PSA in China, a design review for Lianyungang NPP and follow-up on the design review of the Chinese experimental fast reactor, and missions to China and Indonesia to advise on emergency preparedness. A further Advisory Group meeting will be held in October 1999, to review progress and advise on activities for 2000.

ANNEX C-3

FOSTERING OF SAFETY RELATED INFORMATION EXCHANGE

Background

1. Fostering the exchange of information on nuclear, radiation and waste safety is an integral part of the Agency activities aimed at providing for application of the Agency's safety standards. Moreover, Article III.A.3 of the Agency's Statute authorizes the Agency to foster the exchange of scientific and technical information on peaceful uses of atomic energy.

Publications

2. All Agency publications issued in 1998 are listed in the Annual Report (GC(43)/4); a list of safety related publications issued so far in 1999 is provided below.

AGENCY PUBLICATIONS ON NUCLEAR, RADIATION AND WASTE SAFETY JANUARY–JUNE 1999

Safety of Nuclear Installations	
Implementation and Review of a Nuclear Power Plant Ageing Management Programme	Safety Reports Series No. 15
RBMK Fuel Channel Integrity	EBP-RBMK-05
Final Report of the Programme on the Safety of WWER and RBMK Nuclear Power Plants	EBP-WWER-15
AMAT Guidelines: Reference Document for the IAEA Ageing Management Assessment Teams	Services Series SVS-04
DSRS Guidelines: Reference Document for the IAEA Design Safety Review Services	Services Series SVS-05
Regulation of the Life Cycle of Nuclear Installations: Peer Discussions on Regulatory Practices	PDRP-3
Achieving Year 2000 Readiness: Basic Processes	TECDOC-1072
Light Water Reactor Generic Safety Issues Database (IAEA-TECDOC-1044)	Electronic version
Light Water Reactor Generic Safety Issues Database: User's Manual	CMS-13
Radiation and Waste Safety	
Near Surface Disposal of Radioactive Waste	Safety Standards Series No. WS-R-1

AGENCY PUBLICATIONS ON NUCLEAR, RADIATION AND WASTE SAFETY JANUARY–JUNE 1999	
Radiation Protection and Safety in Industrial Radiography	Safety Reports Series No. 13
Radiological Conditions at the Semipalatinsk Test Site, Kazakhstan: Preliminary Assessment and Recommendations for Further Study	Radiological Assessment Reports Series STI/PUB/1063
Radiological Conditions of the Western Kara Sea: Assessment of the Radiological Impact of the Dumping of Radioactive Waste in the Arctic Seas	Radiological Assessment Reports Series STI/PUB/1068
Organization and Implementation of a National Regulatory Infrastructure governing Protection against Ionizing Radiation and the Safety of Radiation Sources	TECDOC-1067
Application of Radiological Exclusion and Exemption Principles to Sea Disposal	TECDOC-1068
Intercomparison and Biokinetic Model Validation of Radionuclide Intake Assessment	TECDOC-1071
Safety Measures to Address the Year 2000 Issue at Radioactive Waste Management Facilities	TECDOC-1073
Safety Measures to Address the Year 2000 Issue at Medical Facilities which use Radiation Generators and Radioactive Materials	TECDOC-1074
Communications on Nuclear, Radiation, Transport and Waste Safety: A Practical Handbook	TECDOC-1076
Critical Groups and Biospheres in the Context of Radioactive Waste Disposal	TECDOC-1077
National Competent Authorities Responsible for Approvals and Authorizations in respect of Transport of Radioactive Material — List No. 30 (1999 Edition)	NCAL-30

Electronic information systems

3. Increasing the scope and effectiveness of its use of electronic media in information exchange activities is a priority for the Agency, to improve both the accessibility and ease of use of the information. The NUSAFE (www.iaea.org/ns/nusafe/) and RasaNet (www.iaea.org/ns/rasanet/) services on the Agency's web site are now well established, and continuing to expand. NUSAFE describes the Agency's activities in the safety of nuclear installations, including the extrabudgetary programmes on nuclear safety (Annex C-2) and the provision of safety related services (see Annex C-6). RasaNet provides information on radiation and waste safety, and includes a number of interactive training modules for individuals using radioactive materials, based on the Agency's Practical Radiation Manuals. Each area also includes details of relevant publications and meetings, and points of contact for further information. A new area, CoordiNet (www.iaea.org/ns/coordinet/), will be added

in the near future, providing information on co-ordination of the Agency's safety related activities.

4. In the past year, the Agency has made particular use of electronic media in fostering information exchange on the Y2K or 'millennium bug' issue. Resolution GC(42)/RES/11 encouraged the Secretariat to act as a "clearing house and central point of contact" for the exchange of information on the issue between Member States. In response to this, the Secretariat established a special set of pages on its WorldAtom web site, which can be found at www.iaea.org/worldatom/program/y2k/. This provides not only quick and easy access to the information available, such as guidance documents produced by the Agency, and links to other useful sites, but also a means by which Member States can convey information to the Agency for dissemination: an online questionnaire is included on the site, through which organizations in Member States can report on their experiences in identifying and solving Y2K problems, and there is also a newsgroup (unmoderated) for exchanging views more directly. Further information on the Agency's work on the Y2K issue can be found in a separate document, GC(43)/7.

5. A database has been compiled of generic safety issues for nuclear power plants (NPPs) with light water reactors (LWRs) and the measures that have been taken to resolve them. The database reflects broad international experience with all types of LWRs (including relevant information from the database on WWER and RBMK safety issues described in Annex C-2), and is intended for use by Member States as an internationally accepted reference for the safety reassessment of operating plants. The database is available to Member States, and a TECDOC describing the main issues and measures taken has also been published. In order that the database can be kept up-to-date, Member States are encouraged to continue to provide the Secretariat with information on their national experiences with the identified safety issues, particularly with respect to the measures used in resolving them.

6. Work has begun on the development of a database of generic safety issues for NPPs with pressurized heavy water reactors (PHWRs). It is planned that such a database will be available to interested Member States within the next year.

7. The Agency is the lead organization in relation to radioactive substances in developing an information clearing house mechanism for the UN's Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. One of the activities under way which will provide input to this programme is the development of a database of

discharges of radioactive effluents into the environment. A prototype database was completed in 1998, and a consultants' meeting was held in June 1999 to recommend modifications to the database design and to plan the inclusion in the database of data from Member States.

Conferences, seminars and meetings

8. An important means of fostering the exchange of safety related information is the organization of scientific and technical meetings, ranging from large meetings (such as conferences, symposia and seminars) with broad participation to smaller, specialized meetings (such as Technical Committee meetings) with the participation of selected experts. Information exchanged at such meetings is subsequently made available by the Agency in priced publications such as conference proceedings, or in unpriced ones such as technical documents (the IAEA TECDOC series). Some such meetings are discussed in other Annexes of this document; a number of other important meetings are described below.

9. An International Conference on *Strengthening Nuclear Safety in Eastern Europe* was convened by the Agency, in co-operation with the European Commission and OECD/NEA, in Vienna in June 1999. The objective of the Conference was to assess the past decade of nuclear safety efforts in countries operating WWER and RBMK reactors and to address remaining safety issues which require further work, with a particular emphasis on where international co-operation and assistance efforts should be focused in the future. A detailed report on the Conference is given in GC(43)/INF/6.

10. From 12 to 16 July 1999, the IAEA conducted a workshop concerning the challenge that Y2K presents to operators and regulators of nuclear power plants. A main objective was the exchange of information regarding assessment results and remediation measures. The workshop was attended by 52 participants and lecturers from 21 countries, and included plenary sessions dealing with topics such as:

- results of recent IAEA missions to Chernobyl and Bohunice NPPs;
- inventory and prioritization of Y2K susceptible equipment;
- equipment testing and approaches to solving Y2K challenges; and
- contingency planning.

In conclusion, the countries reported that the Y2K problem is being addressed at their NPPs, and that Y2K vulnerabilities are being remediated. Safety remains the top priority for Y2K activities. Specific information provided by the countries and assistance needs will be made available through the Y2K section of the IAEA's nuclear safety web site NUSAFE at www.iaea.org/ns/nusafe/y2000/y2k.htm.

11. A meeting to finalize the Agency's first guidelines on radiation protection in interventional radiology was held in Málaga, Spain, to coincide with an International Seminar on Radiological Protection in Diagnostic Radiology organized by the University of Málaga. The interest in the Seminar was indicative of the fact that radiation protection of patients undergoing diagnostic and therapeutic medical procedures is attracting increasing attention. This is stimulated in part by a wish to prevent accidents such as those in Zaragoza, Spain, in 1990 and San José, Costa Rica, in 1996, but there is also a growing recognition of the need to control doses form normal procedures — particularly high dose ones, such as interventional radiology. In member countries of the European Union, there is additional impetus from the need to implement the 1997 Council Directive on Health Protection of Individuals against the Dangers of Ionising Radiation in relation to Medical Exposures (see the Nuclear Safety Review for the Year 1997, GC(42)/INF/6).

12. An Agency-sponsored International Symposium on Research Reactor Utilization, Safety and Management is scheduled to be held in Lisbon, Portugal, from 6 to 10 September 1999. The main conclusions of the Symposium will be reported in a separate document, and will be used in planning future Agency work on research reactor safety.

13. Among the major Agency meetings and conferences in the coming months are two aimed at promoting international consensus in important areas of radioactive waste safety:

- an International Symposium on Restoration of Environments with Radioactive Residues will be held in Arlington, Virginia, USA, from 29 November to 3 December 1999, hosted jointly by the United States Department of Energy, Environmental Protection Agency and Nuclear Regulatory Commission; and
- an International Conference on the Safety of Radioactive Waste Management, in co-operation with the European Commission and OECD/NEA, will be hosted by the Government of Spain in Cordoba, from 13 to 17 March 2000.

The Incident Reporting System (IRS)

14. The Incident Reporting System (IRS) is an international system operated jointly by the IAEA and the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA). The IRS was established as a worldwide system to complement national schemes by ensuring proper reporting and feedback on events in nuclear power plants of safety significance for the international community, so that the causes and lessons learned are disseminated widely and can help to prevent the occurrence or recurrence of serious incidents or accidents. The IRS is also a partial response to the obligation under Article 19 of the Convention on Nuclear Safety that Contracting Parties take the appropriate steps to ensure that "programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies".

15. The IRS reports communicate the results of the analyses carried out and lessons to be drawn to experts of other countries. In other words, IRS provides a pre-processed set of data, easily transferable to situations in other countries, allowing an efficient feedback process. In addition, the potential exists to include both the licensee's and the regulator's assessments of an event. The IRS is a source of information for regulators and their technical support organizations, providing insights on important international operational experience for oversight and licensing purposes. It increases awareness of actual and potential safety problems, and is valuable in determining actions to be taken to improve both existing and new designs of NPPs.

16. All 31 of the States with operating nuclear power plants participate in the IRS, and almost 2800 event reports are now in the database, which is distributed to participants as a CD-ROM on a quarterly basis. The annual number of IRS reports in recent years has varied from just under 100 to more than 140, and the number received so far this year (56, as of early July) suggests that the total for 1999 is likely to be within this range.

Review and analysis of reported events

17. The review of NPP events with important lessons reported in 1998–1999 highlighted such features as: foreign material in the reactor; interruption of decay heat removal; lack of radiological control; improper use of combustible material; common mode failure of

engineered safety systems; lack of a procedure; lack of care and attention during an inherently risky operation; and lack of a questioning attitude. Some IRS events in 1998–99 indicated that corporate knowledge of the more important reactor events of the past (e.g. Chernobyl, Three Mile Island and other less serious, but still significant, events) may be being lost with the passage of time. Hence, the issue of the loss of corporate knowledge deserves attention by the nuclear community.

18. The May 1999 meeting of national IRS co-ordinators considered general issues, such as loss of institutional memory and pragmatism in responding to the lessons disseminated through the IRS. Some participants suggested the development of guidelines on finding practical solutions, based on defence in depth principles, in order to reduce the number of incidents and accidents, and the production of documents for regulatory authorities summarizing the main lessons derived from IRS experience and possible solutions to address them. Participants also noted that the regulatory body's roles are changing under conditions of privatization, deregulation and increased competition in energy markets, and that they needed to act more as a 'community' to meet these challenges.

19. Two topics were identified for IRS study in the coming year, namely the maintenance of design knowledge and information for NPPs and the challenges for the regulatory bodies. The former topic was considered the higher priority for detailed study, but greater information exchange on the regulatory challenges issue was also recommended. Topics of IRS studies in the last two years have included: foreign material intrusion in plant systems; interaction between procedures and human activity; latent failures of safety systems; and operating experience in computer-based systems.

20. A Consultants' Meeting and Technical Committee Meeting are planned, for September and December 1999 respectively, to evaluate the results of the initial trial period of the Incident Reporting System for Research Reactors (IRSRR). All States operating research reactors will be invited to participated in the Technical Committee. Meanwhile, work is under way within the Secretariat to simplify the reporting process.

The International Nuclear Event Scale (INES)

21. INES is now used by 60 countries for facilitating rapid communication to the media and the public regarding the significance of events at all nuclear installations associated with

the civil nuclear industry, and is being extended to cover events during the use of radiation sources and the transport of radioactive materials.

22. During 1998, the Agency received and disseminated information relating to 19 events in 13 States — 17 at NPPs and 2 at other nuclear facilities. No events of Level 3 or above were reported in 1998.

23. The INES information service organized a Technical Committee Meeting in Vienna in October 1998 to benefit from feedback from the INES national officers related to their experience in using the INES rating procedures. Drafts of a new INES Users' Manual, reflecting developments in the system and feedback received over recent years, and of a revised INES leaflet were presented during the meeting. It is planned to publish both during 1999.

24. A Consultants' Meeting in October 1998 reviewed the technical ratings of the events on which information was disseminated by the INES Information Service.

ANNEX C-4

PROMOTION OF EDUCATION AND TRAINING

Background

1. Education and training are essential in providing for the application of the Agency's safety standards. The Agency's policy in education and training in this field was developed in response to the 1991 General Conference Resolution GC(XXXV)/RES/552. The Agency, through its Technical Co-operation and Nuclear Safety Departments, promotes education and training by organizing, in collaboration with organizations in host countries, courses of an 'educational' nature covering a broad range of nuclear, radiation and waste safety issues, and more specialized training courses and workshops covering specific subject areas. The Agency also promotes education and training through other mechanisms, such as sponsoring fellowships and scientific visits and publishing educational and training materials.

2. A substantial amount of training is also carried out by the Agency at the national level in the course of providing safety related assistance (e.g. through the Model Project and other TC projects) and safety related services (e.g. training aspects of OSART missions, ASSET and ASCOT seminars). Examples of such training are discussed in the relevant parts of Annex C-1 and Annex C-6 respectively.

Educational courses

3. In the second half of 1998, nine-week Basic Professional Training Courses on Radiation Protection were held in Rabat, Morocco (in French) and in Mumbai, India (in English). Courses in South Africa (in English), the Syrian Arab Republic (in Arabic) and the Russian Federation (in Russian) are scheduled for the second half of 1999. A Basic Professional Training Course in Nuclear Safety will be held in Saclay, France, in late 1999.

4. A Post-Graduate Regional Training Course on Radiation Protection and Nuclear Safety (in Spanish), continues to be held annually in Buenos Aires, Argentina. This year's course, which runs from April–October 1999, is the 22nd.

Specialized training courses and workshops

5. All of the training courses held in 1998 are listed in the Agency's Annual Report (GC(43)/4); safety related regional and interregional training courses in the first half of 1999 are listed in the following table:

REGIONAL AND INTERREGIONAL TRAINING COURSES AND WORKSHOPS JANUARY–JUNE 1999

Title	Host Country	Date
Interregional Courses and Seminars		
Post-Graduate Educational Course on Radiation Protection and Nuclear Safety (in Spanish)	Argentina	April–October 1999
Interregional Training Course on Environmental Qualifications of Equipment in NPPs	Spain	May–June 1999
Regional Courses and Workshops		
Legislative Issues Related to Radioactive Waste Management in the Baltic States	Latvia	January 1999
Selected Event Analysis Methods	Slovakia	January–February 1999
Notification, Authorization, Inspection and Enforcement (in French)	France	February 1999
Joint Utility/Regulatory Benefit of Periodic Safety Review	Hungary	February 1999
Development of a Legal Infrastructure Governing the Radioactive Waste Resulting from Mining and Milling	Slovenia	February 1999
Regulatory Experience in Introducing Advanced Computer-based Technology into Safety Systems	Slovenia	March 1999
Operation and Maintenance of Harshaw TLD Readers	Germany	March 1999
Use of Long Term Safety Assessment Methodologies for Deriving Default Acceptance Criteria for Waste Disposal to Near Surface Facilities	Spain	March 1999
Radiation Protection and Quality Assurance including Optimization of Collective Dose from Diagnostic Radiology	Malaysia	April 1999
Regulatory Review of Licensee Safety Performance	Spain	May 1999
Consolidation of an Adequate Legal Framework for the Safe and Peaceful Uses of Nuclear Energy in Countries of East Asia and the Pacific	Republic of Korea	May 1999
Safety Assessment of Plant Modifications with Emphasis on I&C Modernization and Human–Machine Interface Issues	Slovenia	May 1999
Safety Assessment and Inspection in Industrial, Medical and Research Facilities	Lithuania	May 1999
Control of Medical Practices in Radiotherapy	Mexico	May 1999
Radiation Protection and Safety in Medicine	Belarus	May–June 1999

REGIONAL AND INTERREGIONAL TRAINING COURSES AND WORKSHOPS JANUARY–JUNE 1999

Title	Host Country	Date
Co-operation Issues between Regulatory Body and Other Authorities Involved in the Licensing Process	Czech Republic	June 1999
Train-the-Trainers Course on Radiation Accident Preparedness	Czech Republic	June 1999
Train-the-Trainers Course on Nuclear Safety	Slovenia	June 1999
Design, Implementation and Management of Individual Monitoring Programmes	Czech Republic	June 1999
Occupational Radiation Protection	Australia	June 1999
Licensing of Modifications	Slovenia	June 1999
Radiation Safety in Industrial Radiography	Indonesia	June–July 1999
RAIS (Regulatory Authority Information System)	France	June–July 1999
NPP Operating Cycle Extension, Online Maintenance, Maintenance Optimization, In-service Inspection and Tech Spec Applicability	Slovenia	June–July 1999
Challenges to Utility–Regulator Interface	Germany	June–July 1999

6. As part of one of the projects on Strengthening Radiation Protection Infrastructures, a distance learning course on radiation protection is being developed in co-operation with, and co-ordinated by, the Australian Nuclear Science and Technology Organization (ANSTO). A ‘phase 2’ trial, with revised training materials, is being carried out with 63 students from 7 countries (Australia, Indonesia, the Republic of Korea, Malaysia, New Zealand, the Philippines and Thailand), and an evaluation workshop is planned for November 1999 to recommend improvements.

7. Educational and training activities have also been carried out in the context of legislative assistance, in order to transfer knowledge and know-how on legal issues that are of importance in the law-making process and the establishment of a legal infrastructure as a basis for the implementation of safety requirements. These activities, co-ordinated by the Agency’s Legal Division, have included workshops and fellowships (according to the requests from recipient States), involving multidisciplinary teams of lawyers and safety Technical Officers to ensure adequate acquisition of knowledge by the participants.

Other mechanisms for education and training

8. In addition to providing courses, seminars and workshops, the Agency promotes education and training by arranging fellowships and scientific visits for scientists and engineers from Member States and by producing educational and training materials.

Fellowships and scientific visits

9. During the period July 1998–June 1999, the Agency received and evaluated almost 300 applications for fellowships and scientific visits related to nuclear, radiation and waste safety, from about 50 countries. After evaluation, placement of applicants can take up to several months, and therefore the exact number of successful applications is not known at the time of writing, but past experience suggests that approximately 70% of applications result in placements.

Educational and training material

10. The Secretariat is currently paying particular attention to the preparation of standard packages of training materials — syllabi, lecture notes, visual aids, etc. — for its educational and training courses. This approach not only helps to ensure consistency and quality in the Agency's courses, but also provides Member States with tools that they can use in their own national training activities.

11. A standard syllabus for the Agency's nine-week Basic Professional Training Course on Radiation Protection was prepared in 1995. In the past year, this has been revised, taking account of the 1996 International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources and recent developments emphasizing 'training the trainers'. The training manual for this course is available in Arabic, English, French and Spanish, and a Russian version is being prepared.

12. A standard syllabus for the Agency's nine-week Basic Professional Training Course on Nuclear Safety was prepared in 1998. A handbook of the lectures from the course to be held in Saclay, France, in late 1999 will be published by the Agency.

13. A standard syllabus and set of lecture notes for Agency training courses on Regulatory Control of Nuclear Power Plants are being prepared for publication as a training manual, and will be used at a course in Liverpool, United Kingdom, in September 1999.

14. A draft of a Safety Guide entitled “Building Competence in Radiation Protection and the Safe Use of Radiation Sources” was presented to the Radiation Safety Standards Advisory Committee (RASSAC) at its May 1999 meeting. The Safety Guide covers training on radiation safety and on the radiation protection aspects of transport and waste safety, and addresses responsibilities for training, qualifications and competencies, strategy for building competence and the establishment of training programmes.

15. IAEA Technical Report No. 280, “Training Courses on Radiation Protection”, is being revised and will include updated standard syllabi for Agency training courses. A multimedia package for training courses entitled “Radiation Safety: an Overview”, including a brochure (available in Arabic, Chinese, English, French, Russian and Spanish), a video and a CD-ROM has been developed. A similar package of brochure, video and CD-ROM has also been developed on “Inspection Practices in Industrial Radiography”.

ANNEX C-5

SUPPORT FOR SAFETY RELATED RESEARCH AND DEVELOPMENT

Background

1. The Agency supports research and development related to nuclear, radiation and waste safety mainly through Co-ordinated Research Projects (CRPs). The CRPs are intended to optimize the use of research and development resources by ensuring that researchers co-ordinate their work with that of researchers in related areas. Each CRP includes a number of contracts and agreements (typically about 10–20) with individual institutions in Member States, and typically runs for 3–5 years. Research Co-ordination Meetings (RCMs) between the participating institutions are held at the beginning of, during, and at the end of the CRP to plan the work, discuss progress and report on results achieved.

2. At the time of writing (mid-1999), there were 15 CRPs active, involving over 200 individual contracts and agreements. The following table lists the CRPs in progress, indicating the planned completion dates, and the number of countries participating.

CO-ORDINATED RESEARCH PROJECTS IN PROGRESS (as of 1999-06-30)

Project title	Start–End	Countries participating
Radiation and Waste Safety		
Development of relevant accident data for quantifying risks associated with the transport of radioactive material	1994–1999	10
Limitations of radioepidemiological assessments for stochastic radiation effects in relation to radiation protection	1994–2000	2
Regional personal dosimetry intercomparison	1996–1999	9
Intercomparison of in vivo counting systems using a reference Asian phantom	1996–1999	9
International Programme on Biosphere Modelling and Assessment Methods (BIOMASS)	1996–2000	24
Improvement of Safety Assessment Methodologies for near surface disposal facilities for radioactive waste (ISAM)	1997–2000	32
Formulation of Approaches to Compare the potential impacts of wastes	1997–2000	10

CO-ORDINATED RESEARCH PROJECTS IN PROGRESS (as of 1999-06-30)		
Project title	Start–End	Countries participating
from electricity general technologies (FACTS)		
Development of radiological basis for the transport safety requirements for low specific activity material and surface contaminated objects	1997–2001	6
Accident severity during air transport of radioactive material	1998–2001	6
Cytogenetic biodosimetry	1998–2002	19
Safety of Nuclear Installations		
Management of ageing of in-containment instrumentation and control cables	1992–1999	12
Development of methodologies for optimization of surveillance testing and maintenance of safety related equipment at nuclear power plants	1996–1999	15
Round-robin exercise on WWER-440 RPV weld metal irradiation embrittlement and annealing	1996–2000	8
Investigation of methodologies for incident analysis	1997–2000	14
Safety of RBMK nuclear power plants in relation to external events	1997–2000	6

3. Nine CRPs have ended since the last session of the General Conference:

- Assessment of the safety of uranium hexafluoride transport packages in fires;
- Accident severity at sea during the transport of radioactive material;
- Two CRPs on radiation protection in diagnostic radiology: one for Asia and the Far East and one for eastern Europe;
- Intercomparison for individual monitoring of external exposure from photon radiation;
- Intercomparison and biokinetic model validation of radionuclide intake assessment;
- Comparative health and environmental risks of nuclear and other energy systems, using case studies;
- Application of non-destructive testing and in-service inspection to research reactors; and
- Validation of accident and safety analysis methodology.

The results of CRPs are disseminated to Member States by the Agency, usually in the form of TECDOCs. Researchers also prepare scientific papers for publication in a variety of technical journals and for presentation at meetings and conferences.

4. Two CRPs involving intercomparison exercises on different aspects of dosimetry systems have been completed. From the Agency's involvement in these CRPs, and more generally from providing advice and assistance to Member States, it has become apparent that intercomparisons have an important role to play in improving radiation safety. The ability to measure doses accurately and reliably is a fundamental prerequisite for any radiation protection programme, and intercomparisons are increasingly seen as a way of achieving and demonstrating this capability. The Agency's view is that it can contribute more effectively in these endeavours by providing for intercomparison and intercalibration as a service to Member States, rather than through CRPs. It is intended that there will be one such intercomparison each year.

5. A number of new CRPs have been approved since the last session of the General Conference, and either have started recently or will start shortly. These include projects on:

- Development and application of indicators to monitor operational safety performance at nuclear power plants;
- Reliability data for research reactor PSAs;
- Use of selected safety indicators (concentrations, fluxes) in the assessment of radioactive waste disposal; and
- Application of PSA to radiation sources.

ANNEX C-6

RENDERING OF SAFETY RELATED SERVICES

Background

1. The Agency provides a range of services to Member States related to nuclear installation safety, which are discussed in turn in this Annex:

- operational safety review services, namely the Operational Safety Review Team (OSART) service, the Assessment of Safety Significant Events Team (ASSET) service, the Safety Culture Service and the Management of Operational Safety service;
- the Engineering Safety Review Service (ESRS), including review services on fire safety, ageing management, design safety, seismic safety and software important to safety;
- the International Peer Review Service (IPERS) for probabilistic safety assessments;
- the Integrated Safety of Research Reactors (INSARR) service; and
- the International Regulatory Review Team (IRRT) service.

The provision of such services to developing countries is supported by the Agency's technical co-operation programme; for services to developed countries, the costs are borne by the countries themselves.

2. An additional nuclear safety related service for Member States, the Review of Accident Analysis, is now being offered by the Agency. This service will follow a similar format to that of the services listed above: at the request of a Member State, the Agency will organize international expert missions to review the Member State's own accident analyses or hold seminars on accident analysis methodology and its application.

3. In addition to the more widespread inclusion of radiation, waste and transport safety in the scope of the IRRT service (see below), a number of safety review services in these areas of safety are offered, on request, to Member States, including:

- a Waste Safety Assessment Service (WSAS), which provides international peer reviews of safety assessments for waste disposal facilities;
- as discussed in more detail in GC(43)/9, a new Transport Safety Appraisal Service (TranSAS) has been established to appraise national implementation of the IAEA Regulations for the Safe Transport of Radioactive Material. The first such review was conducted in Slovenia in June 1999; and
- an International Review of Irradiator Safety service (IRIS), has been introduced: the first such service is planned for later this year.

As indicated in Annex C-5, it is also intended that the Agency will move towards operating intercomparison and intercalibration exercises for national dosimetry systems — which are currently operated in the form of CRPs — as a service to Member States.

4. The Agency also carries out, as a service to its Member States on request, radiological assessments of sites where residual radioactive material is present, e.g. as a result of an accident, past waste management practices or nuclear explosions.

Operational Safety Review Services

5. In the OSART and ASSET programmes, improved integration and co-ordination efforts have occurred to tailor safety services to the needs of the user. A combined three-week ASSET–OSART mission took place in November–December 1998, which not only reduced the necessary plant management time and effort but also utilized a number of staff to perform both ASSET and OSART services to aid in developing staff capabilities in all services. The combined mission also provided a saving of one week of mission time as compared to a separate mission schedule. Further development of staff capability and improved service integration is evidenced by the use of ASSET, IRRT and Nuclear Power Engineering Section staff on OSART missions, and an OSART staff member has also participated in an IRRT mission. In these cases, mission preparation and implementation techniques and experience was exchanged.

6. In response to requests by Member States, and as endorsed by a 1996 review of the operational safety review services under the Agency's Programme and Performance Assessment System (PPAS), guidelines and services in the areas of management of operational safety and safety culture are being enhanced to help the senior executive level of utilities and regulators. These developmental efforts will impact the programme areas of OSART, ASSET, Safety Culture missions, and the management of operational safety. The experience gained from the support to Electronuclear, Brazil, in performing a self-assessment of their safety culture as part of a more long-term safety culture enhancement programme, has provided the experience needed for the development of the new safety culture services.

7. Another area receiving attention in operational safety involves efforts towards development of self-assessment tools for use by the member states. A Technical Committee Meeting in December 1998 was supported by utility and regulatory staff representing 18 countries. The TCM focused on an international review of experience gained from reviewing national practices on nuclear power plant (NPP) self-assessment and their effectiveness in enhancing safety performance. A result of this, and supporting efforts, was the preparation for publication of a TECDOC on Self-Assessment of Operational Safety for NPPs. This TECDOC updates and expands the previous TECDOC-954 "Procedures for Self-assessment of Operational Safety". In addition, a 'trial use' self-assessment module was developed which documents attributes that can be used by the Agency's safety services in evaluation of self-assessment processes used by NPPs.

The Operational Safety Review Team (OSART) Service

8. In the past 12 months, five OSART missions, four follow-up missions, and five preparatory missions have been carried out, including, in November 1998, the 100th OSART evaluation at Golfech NPP in France. Staff of the Agency's Operational Safety Section participated in a follow-up visit to the Zaporozhe NPP in Ukraine to assess the progress made since a previous safety review mission in the area of operational safety. Two visits to NPPs were conducted to provide technical assistance in improving operational safety, as a consequence of performance shortfalls identified by OSART. Five seminars on the OSART methodology were also held to assist plant staff or regulatory personnel in implementing and/or enhancing operational self-assessment.

OSART mission findings

9. The five OSART missions were to the NPPs at Golfech in France, Aktau BN-350 in Kazakhstan, Kozloduy in Bulgaria, Chasma in Pakistan, and Bugey in France. A common feature from all these missions was senior management's commitment to improve operational safety. Several examples of good practice were identified, together with recommendations and suggestions offered by the mission teams to improve operational safety. These will be made available to the nuclear industry through the OSMIR database and OSART highlight reports.

10. Particular areas where the OSART missions identified a need for improvement in one or more of the plants were as follows:

- in some plants, management expectations for performance have not been clearly established or effectively communicated to plant staff at all levels;
- in two of the plants, implementation of higher standards of management and staff performance was identified as necessary in order to achieve enhanced goals and objectives;
- in two plants, safety culture enhancements could be achieved, in part, by more effective managerial processes that focus on human performance; and
- in two plants, maintenance and/or surveillance programme improvements were needed.

OSART follow-up missions

11. OSART follow-up missions are conducted as an integral part of the OSART process, approximately 18 months after the main OSART mission. The OSART follow-up visits to Laguna Verde (Mexico), Qinshan (China), Embalse (Argentina), and Paluel (France) demonstrated the effectiveness of the OSART service and the commitment of the plants to implement improvements recommended by the OSART team. The review of actions taken by the plants to correct issues identified revealed that, at most plants, 90 % of the issues were either totally resolved or satisfactory progress had been made. For 10% of the issues the progress was considered insufficient. In some cases it was noticed that the corrective measures implemented went beyond the recommendations made by the OSART mission and addressed a more comprehensive set of issues.

Development of the OSART programme

12. Continued progress has been made in the past 12 months in response to recommendations made by the 1996 PPAS review of the operational safety review services. In addition to the general developments in the operational safety review services discussed above, updating of the OSART guidance has been completed and publication is planned in the near future. In addition, co-operation with international organizations such as WANO, who attend Agency-sponsored operational safety meetings, and involvement with Member States' utility peer reviews (e.g. United Kingdom and France) are integral parts of the programme.

The Assessment of Safety Significant Events Team (ASSET) Service

13. Since the last session of the General Conference, five ASSET missions and two preparatory seminars have been carried out. A workshop on event analysis methodologies aimed at eastern European Member States and a presentation on ASSET methodology at a US Nuclear Regulatory Commission workshop on incident investigation were also performed.

ASSET mission findings

14. The ASSET missions performed in the last 12 months were to Chernobyl (Ukraine), Olkiluto (Finland), Cernovoda (Romania), Aktau BN-350 (Kazakhstan) and South Ukraine NPPs. The dominant trends revealed by the missions were:

- the need for lower internal reporting thresholds and broader reporting criteria;
- the need to continue to develop more comprehensive internal operational experience feedback programmes;
- the need to enhance organizational safety culture, especially in the commitment to correct known safety problems; and
- equipment reliability, procedural inadequacy and personnel proficiency continue to be areas where improvement is necessary.

Developments in the ASSET programme

15. In line with a 1996 PPAS recommendation to include experience feedback into future developments of operational safety services, an assessment of the effectiveness and efficiency of the ASSET review of plant self-assessment of operating events was performed over the last 12 months. This entailed obtaining feedback directly from the plant users and team members during ASSET missions, and consolidating and refining the data at a Consultants Meeting. The result was the development of a new service with the capability of assessing the effectiveness of a plant's total operating experience programme. This will incorporate the core principles of the ASSET event analysis and self-assessment methodology, but will be expanded to cover the complete operating experience programme now being utilized by most utilities and NPPs. First trials are expected next year.

Safety Culture Services

16. The services in the area of safety culture have been enhanced in order to meet the requests from Member States. The main purpose is to promote and support safety culture self-assessment and improvement by organizations in Member States. The following service options are offered to Member States:

(a) Safety Culture Seminars, giving a general overview of the concept of safety culture, the stages of development of safety culture, methods for assessing safety culture, safety culture indicators and ways to improve safety culture;

(b) support to organizations in implementing a Safety Culture Enhancement Programme. Included in this is support to senior utility managers, training of utility assessment team in how to perform a self-assessment, peer review of self-assessment results, assistance in improvement efforts, and safety culture evaluation missions, performed by the Agency at a time when the improvement efforts are expected to show results. Support can be given in all these steps of a safety culture enhancement process or in parts of it;

(c) support in self-assessment of safety culture as part of an OSART mission: support in performing a self-assessment will be given prior to the OSART mission and the results reviewed during the OSART mission; and

(d) Safety Culture Evaluation: evaluation of an organization's safety culture performed by an Agency expert team, either as a stand-alone mission or as part of an OSART.

Safety Culture Missions

17. Safety Culture Seminars have been performed since mid-1998 at Ignalina NPP, Lithuania; for regulator, utilities and technical support organizations at the National Nuclear Safety Administration, China; at Karachi NPP, Pakistan; and at KEPCO, Korea.

18. Support has been given to Eletronuclear, Brazil, in launching a safety culture enhancement programme. Assistance included support to senior management, assistance and training of assessment teams in developing self-assessment tools and performing a self-assessment. A follow-up mission is planned for August 1999, to review the results of the self-assessment. The experiences gained from the support to Eletronuclear will form the basis for further development of the enhanced services in the area of safety culture.

The Management of Operational Safety

19. The management of operational safety is a newly emerging focus area that has been incorporated into the operational safety services development programme to be implemented over the next couple of years.

20. An IAEA working group, including senior utility and regulatory participants with significant experience in recent examples of performance degradation in operational safety at NPPs, provided their insights in a paper to the International Conference on Topical Issues in Nuclear, Radiation, and Radioactive Waste Safety held at the Agency in September 1998 (see GC(42)/INF/14). The conference recommended that the Agency foster continuous improvement in safety at NPPs by providing guidance and services for senior utility and regulatory management to assist them with the management of operational safety within their suite of management responsibilities, particularly in times of change.

21. To further the development of this program, a Technical Committee Meeting was held in August 1999 in Quebec, Canada, on the subject of integrating the management of safety and successful business management of NPPs. Attendees included staff at the executive level from utilities, governmental, national and international organizations.

The Engineering Safety Review Service (ESRS)

IAEA Safety Service Series Publications on Organization and Conduct of Services

22. Five specific services are included under the general heading of Engineering Safety Review Services; these relate to fire safety, ageing management, design safety, seismic safety and software important to safety. Documents on the organization and conduct of each of these services have been prepared. The document for fire safety, ageing management and design safety have already been published in the new IAEA Safety Services Series. Documents for the conduct of services for seismic safety and software important to safety are almost ready for publication.

Seismic Safety Review Services

23. This service includes missions and workshops related to site safety and safety of nuclear installations in relation to all external hazards.

24. A workshop was held in Beijing, China, on External Events Probabilistic Safety Assessment, related to the Liangyungang NPP. Besides preparation of workshop notes, this involved substantial preparation work responding to questions regarding the IAEA Safety Guides, particularly Safety Series 50-SG-D5 on external events. The main benefit was that evaluation of external hazards for the Liangyungang NPP will be in line with good international practice and the recommendations in the IAEA Safety Guides.

25. A preparatory review mission was performed and a workshop was held in Almaty, Kazakhstan, in relation to the site investigation for the proposed Balkash NPP. Presentations were made on the IAEA Code and Safety Guides on Siting, as references for the review of the site reports. On the basis of the reports, discussions and a site visit were held, to advise the Kazakhstan Atomic Energy Agency regarding the suitability of the site for the construction of an NPP. On the basis of information received, it was concluded that the Balkash site does not have any negative characteristics.

26. A safety mission visited Medzamor NPP in Armenia to assess the results of the first tasks of the seismic re-evaluation programme. The seismic safety related equipment list and

the geotechnical data were reviewed, and some recommendations made for further improvement.

27. A seismic safety mission was held to Istanbul, Turkey, on the TR-2 research reactor, as a follow up to a planning mission held two months earlier. After a review of the existing documentation and a detailed walkdown on safety related equipment, a guideline document was prepared as a reference for the seismic re-evaluation programme of the plant. A detailed methodology was suggested in order to identify the items required for evaluation of the feasibility of the upgrading of the structure.

Design Safety Review Services

28. A Design Safety Review for the China Experimental Fast Reactor (CEFR) was carried out in Beijing, to advise the National Nuclear Safety Administration (NNSA) with the purpose of addressing the important technical issues for the safety design before licensing. The review was based on the Preliminary Safety Analysis Report (PSAR). The IAEA team provided more than fifty recommendations and suggestions. A follow-up of this mission will be conducted in the near future.

29. A safety mission visited Chasma, Pakistan, dealing with the assessment of the design of the internals of the reactor vessel subjected to flow-induced vibrations. A very detailed review of the design, test and inspection programmes was carried out as a basis for recommendations about the next steps in licensing the reactor.

30. A mission was held in Casablanca, Morocco, to review safety aspects of the pre-project study report on the Chinese Nuclear Desalination Demonstration Plant planned for Tantan, Morocco. The revised report and the recommendations of the Agency will be used by the Governments of China and Morocco in their decisions on the continuation of the project.

31. A safety mission to Ljubljana, Slovenia, dealt with the modernization programme for Kr©ko NPP. All the crucial tasks of the programme are connected with the result of the seismic analysis of the plant, which was therefore reviewed in depth in relation to the new activities. The general requirements, for improvement of the plant efficiency without any reduction of the existing safety margins, were clarified.

32. A preparatory mission visited Pretoria to plan the design safety review requested by the Government of South Africa for the Pebble Bed Modular Reactor (PBMR). The mission will be conducted after receiving the Safety Analysis Report, which is under preparation and will be ready before the end of the year.

33. A preparatory review mission was performed in Iran in order to organize the Design Safety Review of Bushehr NPP, and to discuss with the Atomic Energy Organization of Iran the actions to be taken at the regulatory and plant levels.

Ageing Management Safety Services

34. An interregional training course on Environmental Qualification of Equipment in NPPs was held in Madrid, Spain, from 31 May to 11 June 1999. 26 professionals from 17 Member States participated in this training course, the objective of which was to provide information needed in the implementation of environmental qualification of equipment important to safety in new and operational NPPs.

35. A detailed review of the ageing management requirements issued by the Lithuanian Safety Authority for Ignalina NPP was held in Vilnius, as a 'first of the kind' safety mission on this topic. The critical connections between safety, operation, maintenance and technological problems were analysed.

The International Peer Review Service (IPERS) for Probabilistic Safety Assessments

Missions

36. Five IPERS missions and two PSA Expert Review Missions have been conducted since the last session of the General Conference. In November 1998 IPERS review missions were performed for the Dukovany NPP Level 1 PSA (which included Level 1 internal event, fire and flood initiators) in the Czech Republic and for the Novovoronezh-5 NPP in Russia. In December 1998 an IPERS mission to review the Level 1 Internal Events PSA for the Daya Bay NPP in China was performed. IPERS missions to review the shutdown and low power PSAs for the Paks NPP in Hungary and the Bohunice V2 NPP in Slovakia are being performed in September 1999.

37. An expert mission to Bulgaria was conducted in April 1999 to review the improvement and upgrade of the Kozloduy NPP PSA (internal events, fire and seismic analyses at power) as a follow-up to the IPERS mission in December 1997. The team concluded that most of the 1997 IPERS recommendations had been addressed thus the PSA had been significantly improved, but noted a few issues which need further attention. An expert review mission was conducted in July 1999 to review the KANUPP PSA in Pakistan and to determine the status of completion of the PSA for scheduling of a future IPERS review mission.

38. The IPERS reviews at Dukovany, Novovoronezh and Daya Bay found that the techniques and methods being used were generally sound. Areas in which improvements were recommended at one or more of the plants included the following:

- treatment of human errors (at all three plants), e.g. additional analysis of particular types of error, improved documentation, estimation of error rates and dependencies;
- handling of common cause failures;
- estimation of frequencies and failure rates (e.g. for fires, and for electrical, instrumentation and control components);
- at one plant, there was no systematic approach for the control of project documentation and revisions to the PSA model;
- at one plant, the reviewers recommended more detailed plant-specific assessment in areas such as initiating events, sequence, system and human reliability analyses.

Related Activities

39. Two Consultants Meetings were held in October and December 1998 to review and upgrade the IPERS database software program developed at the CITON Institute in Romania. The IPERS database software is designed to assist in the preparation of materials for IPERS review missions, to facilitate issue definition and resolution during IPERS missions, to ease the process of generation mission reports and to provide for systematic centralized storage, management and retrieval of IPERS mission information.

40. A draft TECDOC “Probabilistic safety assessments for low power and shutdown modes” was developed during a Consultant’s Meeting in February 1999. The guidance in

this TECDOC will be used in support of the IPERS review mission for low power and shutdown PSAs.

The Integrated Safety Assessment of Research Reactors (INSARR) Service

41. Since the last session of the General Conference, INSARR missions have visited the BR-2 reactor in Belgium (in April–May 1999) and the Triga reactor in Finland (August 1999). These missions are indicative of a recent increase in the number of developed countries requesting the INSARR service. A mission to Indonesia is planned for later in 1999.

Other Missions to Research Reactors

42. Several other missions to research reactors have been conducted since the last session of the General Conference:

- to assess the safety of the Dalat reactor in Viet Nam (February 1999);
- to Nigeria, to assess safety aspects of a new reactor, the licensing of the facility and personnel and the commissioning programme (May 1999);
- to Thailand, to assist the regulatory body and operating organization in the licensing process and in preparing the safety assessment report for a new facility to be constructed; and
- through a regional TC project, to research reactors in Ukraine, Belarus, the Russian Federation, Bulgaria and Poland.

The International Regulatory Review Team (IRRT) Service

43. The last two years have seen a significant increase in the number of IRRT missions completed and in the demand for the service. During this period missions to Bulgaria, Romania, Slovakia, Ukraine and Switzerland were completed, the mission to Switzerland being the first to a developed country. Pre-IRRT missions to Viet Nam and Indonesia have also been completed in 1999. There is now a very high demand for the service, with full missions planned for Slovenia, Finland, Hungary and China during the next year. A number

of other Member States have indicated that they wish to invite a mission during the next two years and others have expressed an interest in the service. The scope of the service has also expanded, with an increasing number of missions including review of regulation in the areas of radiation, radioactive waste and transport safety.

44. The purpose of the IRRT service is to review the effectiveness of the relevant regulatory bodies and to exchange information and experience in appropriate, predetermined areas, such as: legislative and governmental responsibilities; authority, responsibilities and functions of the regulatory body; organization of the regulatory body; the authorization process; review and assessment; inspection and enforcement; development of regulations and guides; emergency preparedness; radioactive waste management and decommissioning; radiation protection; and transport safety. The report prepared by the team contains specific recommendations to the Government or the regulatory body which will enhance regulatory effectiveness.

45. The experience gained during the completed missions and the new Safety Requirements document on legal and governmental infrastructure have been used to revise and update the IRRT guidelines. In the last year work has concentrated on developing the guidelines for the review of radiation safety, radioactive waste management and the interface between the regulatory body and the operator.

Radiological Assessments

46. In recent years, the Agency has carried out several radiological assessments of sites affected by residual radioactive material from accidents, from past waste management practices and from past nuclear explosions. One of these was a preliminary assessment, carried out at the request of the Government of Kazakhstan, of radiological conditions at the Semipalatinsk test site. A report of the assessment and recommendations for future study was published in the IAEA's Radiological Assessment Reports Series in January 1999.

47. In November 1998, the UN General Assembly, in resolution A/RES/53/1 H, welcomed a report of the UN Secretary-General on "International Cooperation and Coordination for the Human and Ecological Rehabilitation and Economic Development of the Semipalatinsk Region of Kazakhstan" (document A/53/424) and, inter alia, invited "all Member States, in particular donor States, relevant organs and organizations of the United Nations system,…to participate in the rehabilitation of the Semipalatinsk region". An international conference,

organized by the Japanese Government and the UN Development Programme, on the programme for the human and ecological rehabilitation and economic development of the Semipalatinsk region is scheduled to be held Tokyo on 6–7 September 1999.

48. In November 1998, the Board of Governors approved, as part of the Agency's TC Programme, a project entitled "Radiological assessment of nuclear test sites in Algeria". Discussions subsequently took place between representatives of the Algerian Government and the Secretariat regarding implementation of the project. A team of experts will carry out a fact-finding mission to Algeria later in 1999.

PART D

PEER REVIEW OF THE AGENCY'S SAFETY PROGRAMME

Background

1. The Agency convened a meeting of a group of experts — who represented the views of their governments — to perform the third biennial Peer Review of the Agency's safety programme. The meeting was held at the IAEA's Headquarters in Vienna, Austria, from 15 to 19 March 1999, with the participation of representatives from twenty of the Member States of the IAEA Board of Governors. The meeting was chaired by Dr. Gail de Planque.

Objective

2. The overall objective of the Peer Review was to assess the value of the Agency's safety programme and activities in terms of their usefulness and benefit to Member States and their responsiveness to Member States' needs, as well as to recommend orientation and priorities for the future.

General Conclusions and Recommendations

3. The Peer Review Group (PRG) confirmed the positive opinion of the 1997 Peer Review on the validity of the PPAS process for reviewing the effectiveness of the Agency's programmes, and suggested that the present Peer Review mechanism should be maintained while recommending some adjustments to improve its effectiveness.

4. The PRG noted that the large majority of the recommendations of the 1997 Peer Review had been implemented, thereby improving the focus and effectiveness of the programme. The Group reiterated, however, the recommendation that efforts should be made by the Agency to resolve the difficulties resulting from the current separation and lack of synchronism between the NS and TC programmes in terms of programme formulation and budgetary cycles.

5. The PRG also recommended that further efforts should be made to improve the co-ordination and allocation of responsibilities between the Nuclear Safety and Nuclear Energy programmes.

Conclusions and Recommendations on Specific Programmes

6. The PRG expressed support for the general orientation of the safety programme for the 2001–2002 cycle, and put forward a number of recommendations on where priorities should be adjusted. The major conclusions and recommendations of the PRG are summarized in the following.

7. In the area of Safety Co-ordination, the PRG expressed their agreement with the objectives of the Programme. In addition, they made recommendations on facilitating the use and accessibility of the Agency's safety standards by Member States. They also recommended that INSAG continue with its current terms of reference, considering its crucial role in providing guidance on safety issues. They expressed their strong support for the objectives of the Model Project on Upgrading Radiation Protection Infrastructure and the Integrated Strategy for Assisting Member States in Establishing/Strengthening their Nuclear Safety Infrastructure which provide a comprehensive and systematic approach to the provision of assistance to Member States.

8. In the area of Nuclear Safety, the PRG fully supported the objectives of the Programme and made additional recommendations concerning:

- the need to develop the use of risk informed approaches in decision making;
- the importance of continuing to investigate safety management and safety culture, including human factors considerations; and
- the need to increase the resources devoted to research reactor safety.

The PRG expressed their strong support for the Agency's activities in providing operational safety services, and developing integrated assessment tools and self-assessment tools. They stressed the importance of feedback in this area. The PRG also gave full support to the new subprogramme on regulatory activities related to nuclear safety.

9. In the area of Radiation Safety, there was full support for the general orientation of the Programme, which corresponds to Member States' needs, and the PRG stressed, inter alia, the following aspects:

- in view of the forthcoming completion of a coherent set of radiation safety standards, the current high priority attached to this area of work should be progressively shifted towards activities aimed at assisting Member States in the practical application of these safety standards, including education and training;
- priority should continue to be attached to the execution and proper follow-up of the Model Project on Upgrading Radiation and Waste Safety Infrastructure in a number of Member States, carried out by the TC Department with the technical input of the NS Department. and a technical evaluation of the results and successes of the Project should be carried out;
- technical and institutional activities in the area of safety of radiation sources and security of radioactive materials should be seen as a priority, with particular emphasis on the need to assist Member States in establishing and improving the control of sources and radioactive materials, in order to address the current growing trend of radiological accidents involving such sources.

10. In the area of Radioactive Waste Safety, the general lines of the programme were supported by the PRG. However, in view of the continuing lack of international consensus on criteria for the disposal of long lived and high level waste, some concern was expressed about the difficulties currently being experienced by the Agency, as well by other international organizations and by national authorities, in developing a coherent set of waste safety standards. The main recommendations by the PRG in the area of waste safety were that:

- priority should continue to be attached to efforts to develop international guidance for establishing the long term safety of waste repositories, with due attention being paid to the consideration of the safety issues associated with any planned retrieval of the waste and to the potential future accessibility of waste due to human intrusion or to the effects of natural phenomena;
- the problems raised by the existence of numerous areas and installations with long lived contamination from previous operations or accidents call for a continuing effort towards developing internationally agreed criteria for the rehabilitation of those areas and installations, and high priority should be attached to the development of such criteria to deal with residual waste tailings from mining and milling operations.