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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(39)/INF/8 issued last September and to 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.

2. There has been growing intergovernmental co-operation in strengthening nuclear, radiation and waste safety worldwide, and in the Nuclear Safety Review 1996 (issued as part of the IAEA Yearbook 1996) the Secretariat reports on this trend towards a "global nuclear safety culture", which involves at least three distinct elements:

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.

These three elements form the basis for reporting in the Attachment to this document on recent Agency activities aimed at strengthening international co-operation in nuclear, radiation and waste safety.

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 preparations for implementation activities following the entry into force of the *Convention on Nuclear Safety*; and

- the work under way on developing a *convention on the safety of radioactive waste management*.

4. Part B of the Attachment concerns the *establishment of non-binding international safety standards* by the Agency, mostly in collaboration with specialized agencies of the United Nations and with other international bodies, and describes the Secretariat's strengthened 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* to - inter alia - its own operations and, at the request of a State, any of that State's activities in the field of atomic energy 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; 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 a particular aspect of the provision of safety-related assistance - the *provision of assistance related to the safety of nuclear power plants in Eastern Europe and the former Soviet Union*. Annex C-3 describes recent efforts to *foster safety-related information exchange*, while Annex C-4 deals with a particular aspect of such information exchange - the *promotion of education and training in nuclear, radiation and waste safety*. Annex C-5 describes the status of a number of *safety-related services* rendered by the Agency to Member States, while Annex C-6 summarizes the findings of a number of *safety assessments* which have recently been or are being carried out by the Secretariat in rendering such services.

7. In support of the Agency's efforts to strengthen international co-operation in nuclear, radiation and waste safety, the Secretariat has strengthened its organizational structure - inter alia through the establishment of a Department of Nuclear Safety. Also, a detailed review of the Agency's safety-related activities has been carried out by senior experts from Member States within the framework of the Agency's Programme Performance Assessment System (PPAS). The recommendations of the senior experts are reflected in the Agency safety programme for 1997-98 being submitted to the General Conference. A second detailed peer review of the Agency's safety-related activities will be carried out in January 1997 (the first one was carried out in July 1995). It will cover all Agency projects relating to nuclear, radiation and waste safety, particular attention being paid to their impact (the benefits to Member States), their cost-effectiveness and their continuing relevance in the Agency context.

8. There have been three safety-related developments which deserve to be particularly highlighted:

- The Moscow Summit on Nuclear Safety and Security;
- The establishment of a Contact Expert Group for international co-operation, in radioactive waste management with the Russian Federation; and
- An increase in intergovernmental collaboration relating to the security of nuclear materials and other radioactive sources, with special emphasis on illicit trafficking.

9. In April 1996, in the declaration of the Moscow Summit on Nuclear Safety and Security, the G-7 leaders and the Russian President called for a strengthening of international co-operation in a number of areas ranging from the safety of power reactors to the security of nuclear material.[1] The declaration referred to the importance of enhancing the international regime of liability for nuclear damage and called for the early finalization and adoption of the convention on the safety of radioactive waste management currently under preparation. All countries were urged to sign and complete internal procedures so that the Convention on Nuclear Safety could be brought into force before the end of 1996.[2] Also, the declaration called for the promotion of an effective nuclear safety culture and for greater international transparency in nuclear power activities (to be achieved particularly through peer reviews).

10. The Contact Expert Group (CEG) for international co-operation in radioactive waste management with the Russian Federation was established in Stockholm in September 1995 and held its first meeting on 13-15 March 1996 in Moscow, with the participation of representatives of 12 countries, the European Union and three international organizations. In April 1996, the Director General appointed - for a period of two years - an executive secretary whose task is to support the CEG in identifying co-operation priorities, projects and partners, the aim being to facilitate the effective use of financial resources and avoid duplication.[3] About 100 projects (20 of them considered by the Russian Federation to be of high priority) have been identified. Most of the projects are directed towards resolving practical waste management technology issues in the Russian Federation, while others relate to standard-setting, regulatory and radiological safety issues.

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[1] The text of the declaration has been circulated in document INFCIRC/509.

[2] The required number of instruments of ratification, approval or acceptance have now been deposited with the Depositary of the Convention (the Director General) and the Convention will enter into force on 24 October 1996.

[3] The CEG's activities are being supported this year entirely from extrabudgetary contributions. It is envisaged that next year they will be supported from extrabudgetary contributions (primarily) and from the Regular Budget.

11. With the increased governmental interest in strengthening international co-operative efforts to combat illicit trafficking in nuclear materials and other radioactive sources, the Secretariat has launched a programme of measures designed to help combat such trafficking. The measures are reported on by the Director General in document GC(40)/15.

PART A

LEGALLY BINDING INTERNATIONAL SAFETY AGREEMENTS

Background

1. Three legally binding international safety agreements aimed at strengthening international co-operation in nuclear, radiation and waste safety and conferring depositary functions on the Director General and various other functions on the Agency have been developed and adopted by the international community and are now being implemented, with the support of the Agency: 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) and 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).

2. A further such agreement has been developed and adopted, but implementation is awaiting its entry into force: the *Convention on Nuclear Safety* (which was opened for signature on 20 September 1994 and will enter into force on 24 October 1996). Lastly, work is under way on developing yet a further such agreement: a *convention on the safety of radioactive waste management*.[1] The present situation regarding these various conventions is described below.

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

3. As of 31 July 1996, there were 54 parties (53 States and EURATOM) to the Convention - see the following table, which also shows the parties to the Convention (and the non-parties) that have made known to the Secretariat their contact points for the purposes of the Convention.[2]

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[1] Another convention for which the Director General performs depositary functions is the Vienna Convention on Civil Liability for Nuclear Damage. It is expected that the subject of liability for nuclear damage will be dealt with in another General Conference document.

[2] Tajikistan (not an Agency Member State) deposited an instrument of accession to the Convention on 11 July 1996. It became a party to the Convention on 10 August 1996.

CONVENTION ON THE PHYSICAL PROTECTION OF NUCLEAR MATERIAL

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Antigua and Barbuda[2]		04-08-93	03-09-93	No
Argentina	28-02-86	06-04-89	06-05-89	Yes
Armenia		24-08-93	23-09-93	Yes
Australia	22-02-84	22-09-87	22-10-87	Yes
Austria	03-03-80	22-12-88	21-01-89	Yes
Bangladesh[3]				Yes
Belarus		09-09-93	effective from 14-06-93	Yes
Belgium	13-06-80	06-09-91	06-10-91	Yes
Brazil	15-05-81	17-10-85	08-02-87	Yes
Brunei Darussalam[2, 3]				Yes
Bulgaria	23-06-81	10-04-84	08-02-87	Yes
Canada	23-09-80	21-03-86	08-02-87	Yes
Cape Verde[2, 3]				Yes
Chile		27-04-94	27-05-94	Yes
China		10-01-89	09-02-89	Yes
Colombia[3]				Yes
Croatia		29-09-92	effective from 08-10-91	Yes
Czech Republic		24-03-93	effective from 01-01-93	Yes
Denmark	13-06-80	06-09-91	06-10-91	Yes

[1] Instrument of ratification, accession, acceptance, etc.

[2] Not an Agency Member State

[3] Not a party to the Convention

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Dominican Republic[3]	03-03-80			No
Ecuador	26-06-86	17-01-96	16-02-96	Yes
Estonia		09-05-94	08-06-94	No
Finland	25-06-81	22-09-89	22-10-89	Yes
France	13-06-80	06-09-91	06-10-91	Yes
Germany	13-06-80	06-09-91	06-10-91	Yes
Greece	03-03-80	06-09-91	06-10-91	Yes
Guatemala	12-03-80	23-04-85	08-02-87	No
Haiti[3]	09-04-80			No
Holy See[3]				Yes
Hungary	17-06-80	04-05-84	08-02-87	Yes
Indonesia	03-07-86	05-11-86	08-02-87	Yes
Iran, Islamic Republic of[3]				Yes
Ireland	13-06-80	06-09-91	06-10-91	Yes
Israel[3]	17-06-83			No
Italy	13-06-80	06-09-91	06-10-91	Yes
Japan		28-10-88	27-11-88	Yes
Kazakstan[3]				Yes
Kenya[3]				Yes
Korea, Republic of	29-12-81	07-04-82	08-02-87	Yes
Liechtenstein	13-01-86	25-11-86	08-02-87	Yes
Lithuania		07-12-93	06-01-94	Yes
Luxembourg	13-06-80	06-09-91	06-10-91	Yes
Malta[2, 3]				Yes
Mexico		04-04-88	04-05-88	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Monaco[3]				Yes
Mongolia	23-01-86	28-05-86	08-02-87	No
Morocco[3]	25-07-80			No
Netherlands	13-06-80	06-09-91	06-10-91	Yes
Niger[3]	07-01-85			Yes
Norway	26-01-83	15-08-85	08-02-87	Yes
Panama[3]	18-03-80			No
Papua New Guinea[2, 3]				Yes
Paraguay	21-05-80	06-02-85	08-02-87	Yes
Peru		11-01-95	10-02-95	Yes
Philippines	19-05-80	22-09-81	08-02-87	Yes
Poland	06-08-80	05-10-83	08-02-87	Yes
Portugal	19-09-84	06-09-91	06-10-91	Yes
Romania	15-01-81	23-11-93	23-12-93	Yes
Russian Federation	22-05-80	25-05-83	08-02-87	Yes
Slovakia		10-02-93	effective from 01-01-93	Yes
Slovenia		07-07-92	effective from 25-06-91	Yes
South Africa[3]	18-05-81			No
Spain	07-04-86	06-09-91	06-10-91	Yes
Sweden	02-07-80	01-08-80	08-02-87	Yes
Switzerland	09-01-87	09-01-87	08-02-87	Yes
Tunisia		08-04-93	08-05-93	No
Turkey	23-08-83	27-02-85	08-02-87	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Ukraine		06-07-93	05-08-93	Yes
United Kingdom	13-06-80	06-09-91	06-10-91	Yes
United States	03-03-80	13-12-82	08-02-87	Yes
Uruguay[3]				Yes
Yugoslavia	15-07-80	14-05-86	08-02-87	No
EURATOM/CEC	13-06-80	06-09-91	06-10-91	Yes

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

4. As of 31 July 1996, there were 75 parties (72 States and three organizations) to the Convention - see the following table, which also shows the parties to the Convention (and the non-parties) that have made known to the Secretariat their contact points for the purposes of the Convention.

EARLY NOTIFICATION CONVENTION

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Afghanistan[3]	26-09-86			No
Albania[3]				Yes/U[4]
Algeria[3]	24-09-87			Yes
Argentina		17-01-90	17-02-90	Yes
Armenia		24-08-93	24-09-93	Yes
Australia	26-09-86	22-09-87	23-10-87	Yes
Austria	26-09-86	18-02-88	20-03-88	Yes
Azerbaijan[2, 3]				Yes/U[4]
Bangladesh		07-01-88	07-02-88	Yes
Belarus	26-09-86	26-01-87	26-02-87	Yes
Belgium[3]	26-09-86			Yes
Belize[2, 3]				Yes
Bolivia[3]				Yes
Bosnia and Herzegovina[3]				Yes/U[4]
Brazil	26-09-86	04-12-90	04-01-91	Yes
Brunei Darussalam[2, 3]				Yes

1 Instrument of ratification, accession, acceptance, etc.

2 Not an Agency Member State

3 Not a party to the Convention

4 Yes/U: Yes/Unofficially and/or unspecifically - notification unofficial and/or unspecific as to the convention in question (the Early Notification Convention or the Assistance Convention)

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Bulgaria	26-09-86	24-02-88	26-03-88	Yes
Cameroon[3]	25-09-87			No
Canada	26-09-86	18-01-90	18-02-90	Yes
Cape Verde[2, 3]				Yes
Chile[3]	26-09-86			Yes
China	26-09-86	10-09-87	11-10-87	Yes
Colombia[3]				Yes
Costa Rica	26-09-86	16-09-91	17-10-91	Yes/U[4]
Côte d'Ivoire[3]	26-09-86			Yes
Croatia		29-09-92	effective from 08-10-91	Yes
Cuba	26-09-86	08-01-91	08-02-91	Yes
Cyprus		04-01-89	04-02-89	Yes
Czech Republic		24-03-93	effective from 01-01-93	Yes
DPR Korea[2, 3]	29-09-86			Yes
Denmark	26-09-86	26-09-86	27-10-86	Yes
Dominica[2, 3]				Yes
Dominican Republic[3]				Yes/U[4]
Ecuador[3]				Yes
Egypt	26-09-86	06-07-88	06-08-88	Yes
Estonia		09-05-94	09-06-94	Yes
Ethiopia[3]				Yes
Finland	26-09-86	11-12-86	11-01-87	Yes
France	26-09-86	06-03-89	06-04-89	Yes
Gabon[3]				Yes
Georgia[3]				Yes/U[4]
Germany	26-09-86	14-09-89	15-10-89	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Ghana[3]				Yes
Greece	26-09-86	06-06-91	07-07-91	Yes
Grenada[2, 3]				Yes
Guatemala	26-09-86	08-08-88	08-09-88	Yes
Guinea-Bissau[2, 3]				Yes
Haiti[3]				Yes/U[4]
Holy See[3]	26-09-86			Yes
Hungary	26-09-86	10-03-87	10-04-87	Yes
Iceland	26-09-86	27-09-89	28-10-89	Yes
India	29-09-86	28-01-88	28-02-88	Yes
Indonesia	26-09-86	12-11-93	13-12-93	Yes
Iran, Islamic Rep.[3]	26-09-86			Yes
Iraq	12-08-87	21-07-88	21-08-88	Yes
Ireland	26-09-86	13-09-91	14-10-91	Yes
Israel	26-09-86	25-05-89	25-06-89	Yes
Italy	26-09-86	08-02-90	11-03-90	Yes
Jamaica[3]				Yes/U[4]
Japan	06-03-87	09-06-87	10-07-87	Yes
Jordan	02-10-86	11-12-87	11-01-88	Yes
Kazakstan[3]				Yes
Kenya[3]				Yes
Korea, Republic of		08-06-90	09-07-90	Yes
Kuwait[3]				Yes
Kyrgyzstan[2, 3]				Yes
Latvia[2]		28-12-92	28-01-93	Yes
Lebanon[3]	26-09-86			Yes/U[4]
Libyan Arab Jamahiriya[3]				Yes/U[4]
Liechtenstein	26-09-86	19-04-94	20-05-94	Yes
Lithuania		16-11-94	17-12-94	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Luxembourg[3]	29-09-86			Yes
Madagascar[3]				Yes/U[4]
Malawi[2, 3]				Yes
Malaysia	01-09-87	01-09-87	02-10-87	Yes
Maldives[2, 3]				Yes
Mali[3]	02-10-86			Yes/U[4]
Malta[2, 3]				Yes
Mauritius		17-08-92	17-09-92	Yes
Mexico	26-09-86	10-05-88	10-06-884	Yes
Moldova[2, 3]				Yes/U[4]
Monaco	26-09-86	19-07-89	19-08-89	Yes
Mongolia	08-01-87	11-06-87	12-07-87	Yes
Morocco	26-09-86	07-10-93	07-11-93	Yes/U[4]
Mozambique[2, 3]				Yes/U[4]
Myanmar[3]				Yes/U[4]
Namibia[3]				Yes/U[4]
Netherlands	26-09-86	23-09-91	24-10-91	Yes
New Zealand		11-03-87	11-04-87	Yes
Nicaragua		11-11-93	12-12-93	Yes
Niger[3]	26-09-86			Yes
Nigeria	21-01-87	10-08-90	10-09-90	Yes
Norway	26-09-86	26-09-86	27-10-86	Yes
Pakistan		11-09-89	12-10-89	Yes
Panama[3]	26-09-86			Yes/U[4]
Papua New Guinea[2, 3]				Yes
Paraguay[3]	02-10-86			Yes
Peru		17-07-95	17-08-95	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Philippines[3]				Yes
Poland	26-09-86	24-03-88	24-04-88	Yes
Portugal	26-09-86	30-04-93	31-05-93	Yes
Qatar[3]				Yes
Romania		12-06-90	13-07-90	Yes
Russian Federation	26-09-86	23-12-86	24-01-87	Yes
Saudi Arabia		03-11-89	04-12-89	Yes
Senegal[3]	15-06-87			Yes
Sierra Leone[3]	25-03-87			No
Singapore[3]				Yes
Slovakia		10-02-93	effective from 01-01-93	Yes
Slovenia		07-07-92	effective from 25-06-91	Yes
South Africa	10-08-87	10-08-87	10-09-87	Yes
Spain	26-09-86	13-09-89	14-10-89	Yes
Sri Lanka		11-01-91	11-02-91	Yes/U[4]
Sudan[3]	26-09-86			Yes
Sweden	26-09-86	27-02-87	30-03-87	Yes
Switzerland	26-09-86	31-05-88	01-07-88	Yes
Syrian Arab Republic[3]	02-07-87			Yes
Tanzania[3]				Yes
Thailand	25-09-87	21-03-89	21-04-89	Yes
Tunisia	24-02-87	24-02-89	27-03-89	Yes
Turkey	26-09-86	03-01-91	03-02-91	Yes
Turkmenistan[2, 3]				Yes
Uganda[3]				Yes/U[4]
Ukraine	26-09-86	26-01-87	26-02-87	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
United Arab Emirates		02-10-87	02-11-87	Yes
United Kingdom	26-09-86	09-02-90	12-03-90	Yes
United States	26-09-86	19-09-88	20-10-88	Yes
Uruguay		21-12-89	21-01-90	Yes
Uzbekistan[3]				Yes/U[4]
Venezuela[3]				Yes/U[4]
Viet Nam		29-09-87	30-10-87	Yes
Western Samoa[2, 3]				Yes
Yemen[3]				Yes
Yugoslavia	27-05-87	08-02-89	11-03-89	Yes
Zaire[3]	30-09-86			Yes
Zambia[3]				Yes
Zimbabwe[3]	26-09-86			Yes/U[4]
FAO		19-10-90	19-11-90	Yes
WHO		10-08-88	10-09-88	Yes
WMO		17-04-90	18-05-90	Yes
ILO[3]				Yes
IMO[3]				Yes
UN-DHA[3]				Yes
UNEP[3]				Yes
UNESCO[3]				Yes
CEC[3]				Yes
Arab Atomic Energy Agency[3]				Yes

5. Since the General Conference's 1995 session, there have been no notifications of accidents of the type specified in Article 1 of the Early Notification Convention.

6. The Secretariat recently revised the procedures of the Agency's Emergency Response Unit, the unit within the Secretariat responsible for responding to a notification of an accident or to a request for assistance (whether or not made under the terms of the

Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency) and introduced a number of improvements. In particular,

- the Emergency Response Unit's communications facilities have been enhanced, so that there are now dedicated facilities for communications between the Emergency Response Unit, the State where the accident has occurred (the accident State) and the States which have been or may be physically affected by the accident; and

- a standard Notification Form has been circulated to States with a request that it be used in future by the accident State for notifying the Agency in the event of an accident.

7. In response to a Secretariat request, the following States have provided the Emergency Response Unit with E-mail addresses of contact points for the Early Notification Convention: Armenia, Australia, Austria, Canada, Croatia, the Czech Republic, Egypt, Ethiopia, Greece, Kazakstan, the Republic of Korea, Latvia, Lithuania, Malaysia, Mexico, Mozambique, Nicaragua, Poland, the Russian Federation, Slovenia, Switzerland, Tanzania, Thailand, Ukraine and the United States of America.

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

8. As of 31 July 1996, there were 71 parties (68 States and three organizations) to the Convention - see the following table, which also shows the parties to the Convention (and the non-parties) that have made known to the Secretariat their contact points for the purposes of the Convention.

ASSISTANCE CONVENTION

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Afghanistan[3]	26-09-86			No
Albania[3]				Yes/U[4]
Algeria[3]	24-09-87			Yes
Argentina		17-01-90	17-02-90	Yes
Armenia		24-08-93	24-09-93	Yes
Australia	26-09-86	22-09-87	23-10-87	Yes
Austria	26-09-86	21-11-89	22-12-89	Yes
Azerbaijan[2, 3]				Yes/U[4]
Bangladesh		07-01-88	07-02-88	Yes
Belarus	26-09-86	26-01-87	26-02-87	Yes
Belgium[3]	26-09-86			Yes
Bolivia[3]				Yes
Bosnia and Herzegovina[3]				Yes/U[4]
Brazil	26-09-86	04-12-90	04-01-91	Yes
Brunei Darussalam[2, 3]				Yes
Bulgaria	26-09-86	24-02-88	26-03-88	Yes
Cameroon[3]	25-09-87			Yes
Canada[3]	26-09-86			Yes
Chile[3]	26-09-86			No
China	26-09-86	10-09-87	11-10-87	Yes
Colombia[3]				Yes
Costa Rica	26-09-86	16-09-91	17-10-91	Yes/U[4]

1 Instrument of ratification, accession, acceptance, etc.

2 Not an Agency Member State

3 Not a party to the Convention

4 Yes/U: Yes/Unofficially and/or unspecifically - notification unofficial and/or unspecific as to the convention in question (the Early Notification Convention or the Assistance Convention)

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Côte d'Ivoire[3]	26-09-86			No
Croatia		29-09-92	effective from 08-10-91	Yes
Cuba	26-09-86	08-01-91	08-02-91	Yes
Cyprus		04-01-89	04-02-89	No
Czech Republic		24-03-93	effective from 01-01-93	Yes
DPR Korea[2, 3]	29-09-86			Yes
Denmark[3]	26-09-86			Yes
Dominica[2, 3]				Yes
Dominican Republic[3]				Yes/U[4]
Ecuador[3]				Yes
Egypt	26-09-86	17-10-88	17-11-88	Yes
Estonia		09-05-94	09-06-94	No
Ethiopia[3]				Yes
Finland	26-09-86	27-11-90	28-12-90	Yes
France	26-09-86	06-03-89	06-04-89	Yes
Gabon[3]				Yes
Georgia[3]				Yes/U[4]
Germany	26-09-86	14-09-89	15-10-89	Yes
Ghana[3]				Yes
Greece	26-09-86	06-06-91	07-07-91	Yes
Haiti[3]				Yes/U[4]
Holy See[3]	26-09-86			No
Hungary	26-09-86	10-03-87	10-04-87	Yes
Iceland[3]	26-09-86			No
India	29-09-86	28-01-88	28-02-88	Yes
Indonesia	26-09-86	12-11-93	13-12-93	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Iran, Islamic Rep.[3]	26-09-86			No
Iraq	12-08-87	21-07-88	21-08-88	No
Ireland	26-09-86	13-09-91	14-10-91	Yes
Israel	26-09-86	25-05-89	25-06-89	Yes
Italy	26-09-86	25-10-90	25-11-90	Yes
Jamaica[3]				Yes/U[4]
Japan	06-03-87	09-06-87	10-07-87	Yes
Jordan	02-10-86	11-12-87	11-01-88	Yes
Kazakstan[3]				Yes
Kenya[3]				Yes
Korea, Republic of		08-06-90	09-07-90	Yes
Kyrgyzstan[2, 3]				Yes
Latvia[2]		28-12-92	28-01-93	Yes
Lebanon[3]	26-09-86			Yes/U[4]
Libyan Arab Jamahiriya		27-06-90	28-07-90	Yes/U[4]
Liechtenstein	26-09-86	19-04-94	20-05-94	No
Lithuania[3]				Yes
Madagascar[3]				Yes/U[4]
Malawi[2, 3]				Yes
Malaysia	01-09-87	01-09-87	02-10-87	Yes
Mali[3]	02-10-86			Yes/U[4]
Malta[2, 3]				Yes
Mauritius		17-08-92	17-09-92	Yes
Mexico	26-09-86	10-05-88	10-06-88	Yes
Moldova[2, 3]				Yes/U[4]
Monaco	26-09-86	19-07-89	19-08-89	Yes
Mongolia	08-01-87	11-06-87	12-07-87	No
Morocco	26-09-86	07-10-93	07-11-93	Yes/U[4]

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Mozambique[2, 3]				Yes/U[4]
Myanmar[3]				Yes/U[4]
Namibia[3]				Yes/U[4]
Netherlands	26-09-86	23-09-91	24-10-91	Yes
New Zealand		11-03-87	11-04-87	Yes
Nicaragua		11-11-93	12-12-93	Yes
Niger[3]	26-09-86			No
Nigeria	21-01-87	10-08-90	10-09-90	No
Norway	26-09-86	26-09-86	26-02-87	Yes
Pakistan		11-09-89	12-10-89	Yes
Panama[3]	26-09-86			Yes/U[4]
Papua New Guinea[2, 3]				Yes
Paraguay[3]	02-10-86			Yes
Peru		17-07-95	17-08-95	Yes
Philippines[3]				Yes
Poland	26-09-86	24-03-88	24-04-88	Yes
Portugal[3]	26-09-86			No
Romania		12-06-90	13-07-90	Yes
Russian Federation	26-09-86	23-12-86	26-02-87	Yes
Saudi Arabia		03-11-89	04-12-89	Yes
Senegal[3]	15-06-87			No
Sierra Leone[3]	25-03-87			No
Singapore[3]				Yes
Slovakia		10-02-93	effective from 01-01-93	Yes
Slovenia		07-07-92	effective from 25-06-91	Yes
South Africa	10-08-87	10-08-87	10-09-87	Yes

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
Spain	26-09-86	13-09-89	14-10-89	Yes
Sri Lanka		11-01-91	11-02-91	Yes/U[4]
Sudan[3]	26-09-86			Yes
Sweden	26-09-86	24-06-92	25-07-92	Yes
Switzerland	26-09-86	31-05-88	01-07-88	Yes
Syrian Arab Republic[3]	02-07-87			Yes
Tanzania[3]				Yes
Thailand	25-09-87	21-03-89	21-04-89	No
Tunisia	24-02-87	24-02-89	27-03-89	No
Turkey	26-09-86	03-01-91	03-02-91	Yes
Turkmenistan[2, 3]				Yes
Uganda[3]				Yes/U[4]
Ukraine	26-09-86	26-01-87	26-02-87	Yes
United Arab Emirates		02-10-87	02-11-87	Yes
United Kingdom	26-09-86	09-02-90	12-03-90	Yes
United States	26-09-86	19-09-88	20-10-88	Yes
Uruguay		21-12-89	21-01-90	Yes
Uzbekistan[3]				Yes/U[4]
Venezuela[3]				Yes/U[4]
Viet Nam		29-09-87	30-10-87	Yes
Western Samoa[2, 3]				Yes
Yemen[3]				Yes
Yugoslavia		09-04-91	10-05-91	No
Zaire[3]	30-09-86			Yes
Zambia[3]				Yes
Zimbabwe[3]	26-09-86			Yes/U[4]

	SIGNATURE	DEPOSIT OF EXPRESSION OF CONSENT TO BE BOUND[1]	ENTRY INTO FORCE	CONTACT POINT MADE KNOWN
FAO		19-10-90	19-11-90	Yes
WHO		10-08-88	10-09-88	Yes
WMO		17-04-90	18-05-90	No
ILO[3]				Yes
IMO[3]				Yes
CEC[3]				Yes
Arab Atomic Energy Agency[3]				Yes

9. Since the General Conference's 1995 session there have been no requests for assistance under the terms of the Assistance Convention.

10. The Secretariat has circulated to States standard forms for use in making future requests for assistance under the terms of the Convention. Also, the Secretariat is in the process of:

- designing a questionnaire which States could use in informing the Agency more exhaustively about the assistance they could provide;
- looking into the question of how to co-ordinate the assistance provided to States which could be affected by a significant accident at a given nuclear facility but do not have the emergency response infrastructure necessary for co-ordinating that assistance; and
- revising the Agency's Emergency Notification and Assistance Technical Operations Manual (ENATOM).

11. In response to a Secretariat request, the following States have provided the Emergency Response Unit with E-mail addresses of contact points for the Assistance Convention: Armenia, Australia, Austria, Canada, Croatia, the Czech Republic, Egypt, Ethiopia, Greece, Kazakstan, the Republic of Korea, Latvia, Lithuania, Malaysia, Mexico, Mozambique, Nicaragua, Poland, the Russian Federation, Slovenia, Switzerland, Tanzania, Ukraine and the United States of America.

Convention on Nuclear Safety - INFCIRC/449

12. Paragraph 1 of Article 31 ("Entry into Force") of the Convention states that the "Convention shall enter into force on the ninetieth day after the date of deposit with the Depositary of the twenty-second instrument of ratification, acceptance or approval, including the instruments of seventeen States, each having at least one nuclear installation which has achieved criticality in a reactor core." On 26 July 1996, the Director General received the twenth-fifth instrument of ratification, acceptance or approval, that instrument being the seventeenth from a State having at least one nuclear installation which has achieved criticality in a reactor core. Accordingly, the Convention will enter into force on 24 October 1996.

13. As of 31 July 1996, instruments of ratification, acceptance or approval of the Convention had been deposited by the following 25 States (an asterisk indicates a State with at least one nuclear installation which has achieved criticality in a reactor core):

Bangladesh	Ireland	Romania*
Bulgaria*	Japan*	Russian Federation*
Canada*	Republic of Korea*	Slovakia*
China*	Lebanon	Spain*
Croatia	Lithuania*	Sweden*
Czech Republic*	Mali	Turkey
Finland*	Mexico*	United Kingdom*
France*	Norway	
Hungary*	Poland	

14. Not later than six months after the date of the Convention's entry into force a preparatory meeting of the Contracting Parties has to be held, and the Agency's Secretariat is assisting with preparations for that meeting, as recognized last year by the General Conference, which, in resolution GC(39)/RES/13, requested the Secretariat to continue with its support to signatory and other interested States in preparing for implementation of the Convention. The Secretariat has provided support for three open-ended informal meetings of signatory and other interested States (held in March 1995, November 1995 and June 1996) at which draft "Provisional Rules of Procedure" for the preparatory meeting of the Contracting Parties were prepared together with draft "Guidelines for National Reports" and draft "Guidelines for the Conduct of the Review Process" for consideration at the preparatory meeting.

Convention on the safety of radioactive waste management

15. An open-ended group of legal and technical experts has met four times in Vienna to identify the main legal and technical elements necessary in an "incentive convention" on the safety of radioactive waste management. Participants from the following 61 countries and

observers from the Commission of the European Communities, OECD/NEA, UNEP (Secretariat of the Basel Convention) and WHO have attended at least one meeting of the group:

Algeria	Germany	Paraguay
Argentina	Greece	Philippines
Australia	Holy See	Poland
Austria	Hungary	Romania
Bangladesh	India	Russian Federation
Belarus	Indonesia	Saudi Arabia
Belgium	Iran, Islamic Republic of	Slovakia
Brazil	Ireland	Slovenia
Bulgaria	Israel	South Africa
Canada	Italy	Spain
Chile	Japan	Sudan
China	Kenya	Sweden
Colombia	Republic of Korea	Switzerland
Croatia	Kuwait	Thailand
Cuba	Malaysia	Tunisia
Czech Republic	Mexico	Turkey
Denmark	Morocco	Ukraine
Egypt	Netherlands	United Kingdom
Estonia	New Zealand	United States of America
Finland	Norway	
France	Pakistan	

16. Using the structure of the Convention on Nuclear Safety as a model, the group - under the chairmanship of Professor A.J. Baer, former Deputy Director of Switzerland's Office fédéral de l'énergie - has made good progress, agreeing on many provisions which would be included in the envisaged convention. Among the questions requiring further discussion are: whether the convention should cover the safety of spent fuel management (notably when the spent fuel has been removed from the reactor site and designated for reprocessing or it has been removed from the reactor site but no decision as to its further use has been taken); how the convention should cover radioactive waste resulting from military operations; and the safety of transboundary movements of radioactive waste.

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 standards of safety in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, and since soon after the Agency's inception the Secretariat has been involved in developing and setting such standards.

2. The Board of Governors first approved radiation protection and safety measures in March 1960.[1] Those measures were subsequently revised on the basis of the experience gained from applying them to projects carried out by Member States under agreements concluded with the Agency, the revised version being approved by the Board in 1976.[2]

3. Important early Agency safety standards were the "Regulations for the Safe Transport of Radioactive Material" (the Transport Regulations), the first version of which was published in 1961 (IAEA Safety Series No. 6). The Transport Regulations underwent comprehensive revision in 1964, 1967, 1973 and 1985 - and most recently in 1995.[3]

4. The Board of Governors first approved basic radiation protection and safety standards in 1962 ("Basic Safety Standards for Radiation Protection", IAEA Safety Series No. 9). Revised versions of those standards were issued in 1967 and 1982, and in 1994 the Board approved the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (the so-called Basic Safety Standards), which had

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[1] "The Agency's Health and Safety Measures", INFCIRC/18.

[2] "The Agency's Safety Standards and Measures", INFCIRC/18/Rev.1.

[3] Following the latest revision exercise, a draft revised version of the Transport Regulations has been prepared for submission to the Board of Governors for consideration and approval in September 1996.

been sponsored jointly by - in addition to the Agency - FAO, ILO, OECD/NEA, PAHO and WHO.[4, 5]

5. In 1974, the Agency launched a Nuclear Safety Standards (NUSS) programme for the purpose of establishing internationally agreed nuclear safety standards for land-based thermal-neutron power reactors. Over a period of about ten years, a set of five Safety Standards documents (known as Codes) and 55 Safety Guides was produced on (i) Governmental Organization, (ii) Siting, (iii) Design, (iv) Operation and (v) Quality Assurance. All five Codes and some of the Safety Guides have since been revised.

6. In 1991, the Agency established a Radioactive Waste Safety Standards (RADWASS) programme for the preparation of standards in the following subject areas: (i) Planning, (ii) Pre-disposal, (iii) Near-surface disposal, (iv) Geological disposal, (v) Uranium/thorium mining and milling waste and (vi) Decommissioning.

International basis for the Agency's safety standards

7. The Agency establishes its safety standards on the basis of advice provided by its International Nuclear Safety Advisory Group (INSAG), of estimates made 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).[6]

The hierarchy of Agency safety standards documents

8. 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 are

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[4] IAEA Safety Series No. 115. The Board approved the Basic Safety Standards on 12 September 1994; for PAHO, the Pan American Sanitary Conference endorsed them on 28 September 1994; the Director General of FAO confirmed the FAO's technical endorsement of the Basic Safety Standards on 14 November 1994; WHO completed its adoption process for the Basic Safety Standards on 27 January 1995; the ILO's Governing Body approved publication of the Basic Safety Standards on 17 November 1994; and the OECD/NEA Steering Committee approved them on 2 May 1995.

[5] Following the approval of the Basic Safety Standards by the Board, new radiation protection rules and procedures established by the Secretariat and incorporated into the Agency's Administrative Manual (Part X).

[6] 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)".

now divided into: **Safety Fundamentals, Safety Standards**[7], **Safety Guides** and **Safety Practices**.

Safety Fundamentals

9. Publications in the Safety Fundamentals category, which are primary texts for other IAEA Safety Series publications, state the basic objectives, concepts and principles involved in ensuring protection and safety in the development and application of atomic energy for peaceful purposes. They thereby provide the rationale for such activities having to fulfil certain requirements, but do not state what those requirements are or provide technical details and generally do not discuss the application of principles.

10. The fundamental aspects of protection and safety relevant to the safety of nuclear installations, to the safe management of radioactive waste and to radiation protection and the safety of radiation sources are discussed in the three Safety Fundamentals publications issued since 1993: "The Safety of Nuclear Installations", "The Principles of Radioactive Waste Management" and "Radiation Protection and the Safety of Radiation Sources".[8]

11. In response to suggestions made in the Board of Governors, the Secretariat has initiated a process of revision of these three publications with a view to their amalgamation into a single Safety Fundamentals document covering all aspects.

Safety Standards

12. Publications in the Safety Standards category specify basic requirements that must be satisfied in order to ensure safety for particular activities or application areas. These requirements are governed by the basic objectives, concepts and principles that are stated in Safety Fundamentals. The publications in this category do not contain recommendations on, or explanations of, how to meet the requirements.

13. The written style used in Safety Standards accords with that of regulatory documents since the requirements which they establish - and which are mandatory as far as the Agency's own operations are concerned - may be adopted by Member States, at their own discretion,

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[7] The term "Safety Standards" (with initial capitals) used in the context of the hierarchical structure of IAEA Safety Series publications is more restricted in meaning than the term "safety standards" used in this document in phrases like "the Agency's safety standards", which covers Safety Standards and also Safety Fundamentals, Safety Guides and Safety Practices. Safety Standards are regulatory documents - such as standards proper, regulations, rules or codes of practice - issued under the authority of the Board of Governors.

[8] "The Safety of Nuclear Installations", IAEA Safety Series No. 110, 1993 (or GOV/2664); "The Principles of Radioactive Waste Management", IAEA Safety Series No. 111-F, 1995 (or GOV/2783); and "Radiation Protection and the Safety of Radiation Sources", IAEA Safety Series No. 120, 1996 (or GOV/2798).

for use in national regulations to be applied in respect of their own activities. Regulatory requirements are expressed as "shall" statements.

Safety Guides

14. Publications in the Safety Guides category supplement Safety Standards by presenting recommendations, based on international experience, regarding measures to ensure the observance of safety standards.

15. Also, Safety Guides may establish specific requirements that are consequential to a basic requirement of a Safety Standard. In addition, they may provide recommendations on measures to fulfil such subsidiary requirements, the recommendations being presented as "should" statements.

16. Safety Guides may be less formal in written style than Safety Standards and may contain more explanatory and background information. They may consist largely of such information when this is necessary for the interpretation of a Safety Standard.

Safety Practices

17. Safety Practices documents give examples and descriptions of methods which can be applied in implementing both Safety Standards and Safety Guides. They are not strictly regulatory documents but rather documents for fostering information exchange, and the Secretariat is considering the possibility of separating them from the Agency's safety standards (see paragraph 42 below).

Preparation, approval and publication of the Agency's safety standards

18. In the past, there were different processes for the preparation and review of Safety Series publications in the different safety-related areas in which the Agency is involved. Safety Fundamentals and Safety Standards have required the approval of the Board of Governors. Safety Guides and Safety Practices documents have been issued under the authority of the Director General. The Agency's safety standards have been published in the IAEA Safety Series.[9]

Strengthening the preparation and review process

19. The process of preparation and review of the Agency's safety standards has resulted in a lack of compatibility between some IAEA Safety Series publications. Since 1 January 1996, however, the recently established Department of Nuclear Safety has had full

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[9] The IAEA Safety Series currently contains over 200 publications covering essentially nuclear, radiation and waste safety.

responsibility for the preparation and review of all IAEA Safety Series publications, although, for programmatic reasons, IAEA Safety Series publications relating to the safety of fuel cycle facilities and to quality assurance are being prepared with major involvement of the Department of Nuclear Energy.

20. The Secretariat has introduced a uniform preparation and review process covering all areas.[10] To this end, it has 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, the Nuclear Safety Standards Advisory Committee, the Radiation Safety Standards Advisory Committee, the Waste Safety Standards Advisory Committee and the Transport Safety Standards Advisory Committee.[11] It has 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 it appoints a Technical Officer for the preparation of each document in accordance with recommendations made by the Advisory Commission for Safety Standards and the relevant Advisory Committee.[12]

Description of the advisory bodies

- **Advisory Commission for Safety Standards (ACSS)**

21. The Advisory Commission for Safety Standards (ACSS) is a standing body of senior government officials holding national responsibilities for establishing standards and other regulatory documents relevant to nuclear, radiation, waste and transport safety.

22. 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.

23. The functions of the ACSS are:

- to provide guidance on the approach and strategy for establishing the Agency's safety standards, particularly in order to ensure coherence and consistency between them;

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[10] The process is illustrated on page 11. See document GOV/INF/772 in this connection.

[11] See the organizational chart on page 12.

[12] The Technical Officers, together with the Scientific Secretaries, are responsible for ensuring that documents intended for publication in the IAEA Safety Series are prepared and reviewed expeditiously and that they are technically sound. They are also responsible for ensuring that all documents requiring approval by the Board of Governors are circulated to Member States for comment at an early stage of preparation or review.

- to resolve outstanding issues referred to it by any advisory committee involved in the Agency's safety standards preparation and review process;

- to endorse, in accordance with the Agency's safety standards preparation and review process, the texts of the Fundamentals and Standards to be submitted to the Board of Governors for approval and determine the suitability of Guides and Practices to be issued under the responsibility of the Director General; and

- to provide general advice and guidance on safety standards issues, relevant regulatory issues and the Agency's safety standards activities and related programmes, including those for promoting the worldwide application of the standards.

- **Nuclear Safety Standards Advisory Committee (NUSSAC** - formerly NUSSAG)

24. The Nuclear Safety Standards Advisory Committee (NUSSAC) is a standing body of senior regulatory officials with technical expertise in nuclear safety.

25. NUSSAC provides advice to the Secretariat on the overall nuclear safety programme and has the primary role in the development and revision of the Agency's nuclear safety standards.

26. The functions of NUSSAC are:

- to recommend the terms of reference of all safety documents in the Agency's Nuclear Safety Standards (NUSS) programme and of the groups involved in the development and revision of those documents in order to promote coherence and consistency among the documents and between them and the other Agency Safety Series documents;

- to agree on the texts both of Standards to be submitted to the Board of Governors for approval and of Guides and Practices to be issued under the responsibility of the Director General and to make recommendations to the ACSS, in accordance with the Agency's safety standards preparation and review process;

- to provide advice and guidance on a continuous programme for reviewing and revising the NUSS documents;

- to provide advice and guidance on nuclear safety standards, relevant regulatory issues, and activities for supporting the worldwide application of the Agency's nuclear safety standards; and

- to identify and advise on any necessary activities in support of the nuclear safety programme.

- **Radiation Safety Standards Advisory Committee (RASSAC)**

27. The Radiation Safety Standards Advisory Committee (RASSAC) is a standing body of senior regulatory officials with technical expertise in radiation safety.

28. RASSAC provides advice to the Secretariat on the overall radiation safety programme and has the primary role in the development and revision of the Agency's radiation safety standards.

29. The functions of RASSAC are:

- to recommend the terms of reference of all radiation safety documents in the Agency's Radiation Safety Standards (RASS) programme and of the groups involved in the development and revision of those documents in order to promote coherence and consistency among the documents and between them and the other Agency Safety Series documents;

- to agree on the texts both of Standards to be submitted to the Board of Governors for approval and of Guides and Practices to be issued under the responsibility of the Director General and to make recommendations to the ACSS, in accordance with the Agency's safety standards preparation and review process;

- to provide advice and guidance on a continuous programme for reviewing and revising the RASS documents;

- to provide advice and guidance on radiation safety standards, relevant regulatory issues, and activities for supporting the worldwide application of radiation safety standards; and

- to identify and advise on any necessary activities in support of the radiation safety programme.

- **Waste Safety Standards Advisory Committee (WASSAC** - formerly the "extended INWAC")

30. The Waste Safety Standards Advisory Committee (WASSAC) is a standing body of senior regulatory officials with technical expertise in radioactive waste safety.

31. WASSAC provides advice to the Secretariat on the overall radioactive waste safety programme and has the primary role in the development and revision of the Agency's radioactive waste safety standards.

32. The functions of WASSAC are:

- to recommend the terms of reference of all radioactive waste safety documents in the Agency's Radioactive Waste Safety Standards (RADWASS) programme and of the groups involved in the development and revision of those documents in order to promote coherence and consistency among the documents and between them and the other Agency Safety Series documents;

- to agree on the texts both of Standards to be submitted to the Board of Governors for approval and of Guides and Practices to be issued under the responsibility of the Director General and to make recommendations to the ACSS, in accordance with the Agency's safety standards preparation and review process;

- to provide advice and guidance on a continuous programme for reviewing and revising the RADWASS documents;

- to provide advice and guidance on radioactive waste safety standards, relevant regulatory issues, and activities for supporting the worldwide application of the radioactive waste safety standards; and

- to identify and advise on any necessary activities in support of the radioactive waste safety programme.

- **Transport Safety Standards Advisory Committee (TRANSSAC - formerly SAGSTRAM)**

33. The Transport Safety Standards Advisory Committee (TRANSSAC) is a standing body of senior regulatory officials with technical expertise in radioactive materials transport safety.

34. TRANSSAC provides advice to the Secretariat on the overall transport safety programme and has the primary role in the development and revision of the Agency's transport safety standards.

35. The functions of TRANSSAC are:

- to recommend the terms of reference of all documents in the Agency's radioactive materials transport safety standards and supporting documents programme and of the groups involved in the development and revision of

those documents in order to promote coherence and consistency among the documents and between them and the other Agency Safety Series documents;

- to agree on the texts both of Standards to be submitted to the Board of Governors for approval and of Guides and Practices to be issued under the responsibility of the Director General and to make recommendations to the ACSS, in accordance with the Agency's safety standards preparation and review process;

- to provide advice and guidance on a continuous programme for reviewing and revising the Agency's radioactive materials transport safety standards and supporting documents;

- to provide advice and guidance on radioactive materials transport standards, relevant regulatory issues, and activities for supporting the worldwide application of the transport standards; and

- to identify and advise on any necessary activities in support of the transport safety programme.

Initial activities of the advisory bodies

36. The **Nuclear Safety Standards Advisory Committee (NUSSAC)** held its first session in February 1996 - under the chairmanship of Mr. P. Govaerts, from Belgium's regulatory body AIB Vincotte-Nucléaire - and drew up a programme for future work. It considered the status of the NUSS programme, concurring with the priorities previously agreed upon by NUSSAG for the revision of NUSS documents (first priority - the Safety Standards document and the Safety Guides on Operation; equal second priority - the Safety Standards documents and the Safety Guides on Governmental Organization and Design). As regards the Governmental Organization documents, deemed to fall within the terms of reference of all four advisory committees, it referred to the ACSS the question of which advisory committee should take the lead in the revision exercise (it did the same also with regard to the Quality Assurance documents). A sub-group was formed to look into the subject of safety evaluations of operating nuclear power plants built to earlier standards.

37. The **Radiation Safety Standards Advisory Committee (RASSAC)** held its first session in January 1996 - under the chairmanship of Mr. L.S. Creswell, from the United Kingdom's Nuclear Installations Inspectorate - and drew up a programme for future work. It reviewed and endorsed the Secretariat's plans for preparing and reviewing radiation safety standards. At its second session, in July 1996, it began examining the drafts of new and revised Safety Guides to be issued in support of the Basic Safety Standards (Safety Series No. 115).

38. The **Waste Safety Standards Advisory Committee (WASSAC)** held its first session in February 1996 - under the chairmanship of Mr. P. Metcalf, from South Africa's Council for Nuclear Safety - and drew up a programme for future work. It examined the report on a Secretariat review of the RADWASS programme carried out in the second half of 1995 and made proposals for restructuring the programme and the related publication plan. A sub-group was formed to look into the subject of very low-level waste.

39. The **Transport Safety Standards Advisory Committee (TRANSSAC)** held its first session in February-March 1996 - under the chairmanship of Mr. W. Collin, from Germany's Bundesamt für Strahlenschutz (Federal Office for Radiation Protection) - and drew up a programme of future work. It examined a draft of the latest revised version of the Agency's Transport Regulations and recommended that it be submitted, through the ACSS, to the Board for approval. Also, it made recommendations concerning the Secretariat's plans for the development of documents in support of the Transport Regulations.

40. The **Advisory Commission for Safety Standards (ACSS)** held its first session in March 1996, under the chairmanship of Ms. A. Bishop, from Canada's Atomic Energy Control Board. It reviewed the work programmes of NUSSAC, RASSAC, WASSAC and TRANSSAC and made recommendations regarding - inter alia - which advisory committees should take the lead in the preparation and review of safety standards relating to more than one topical area. Also, following consultations it endorsed the draft of the latest revised version of the Regulations for the Safe Transport of Radioactive Material for submission to the Board for approval. In addition, it endorsed, after minor changes had been made, WASSAC's proposals for restructuring the RADWASS programme and the related publication plan.

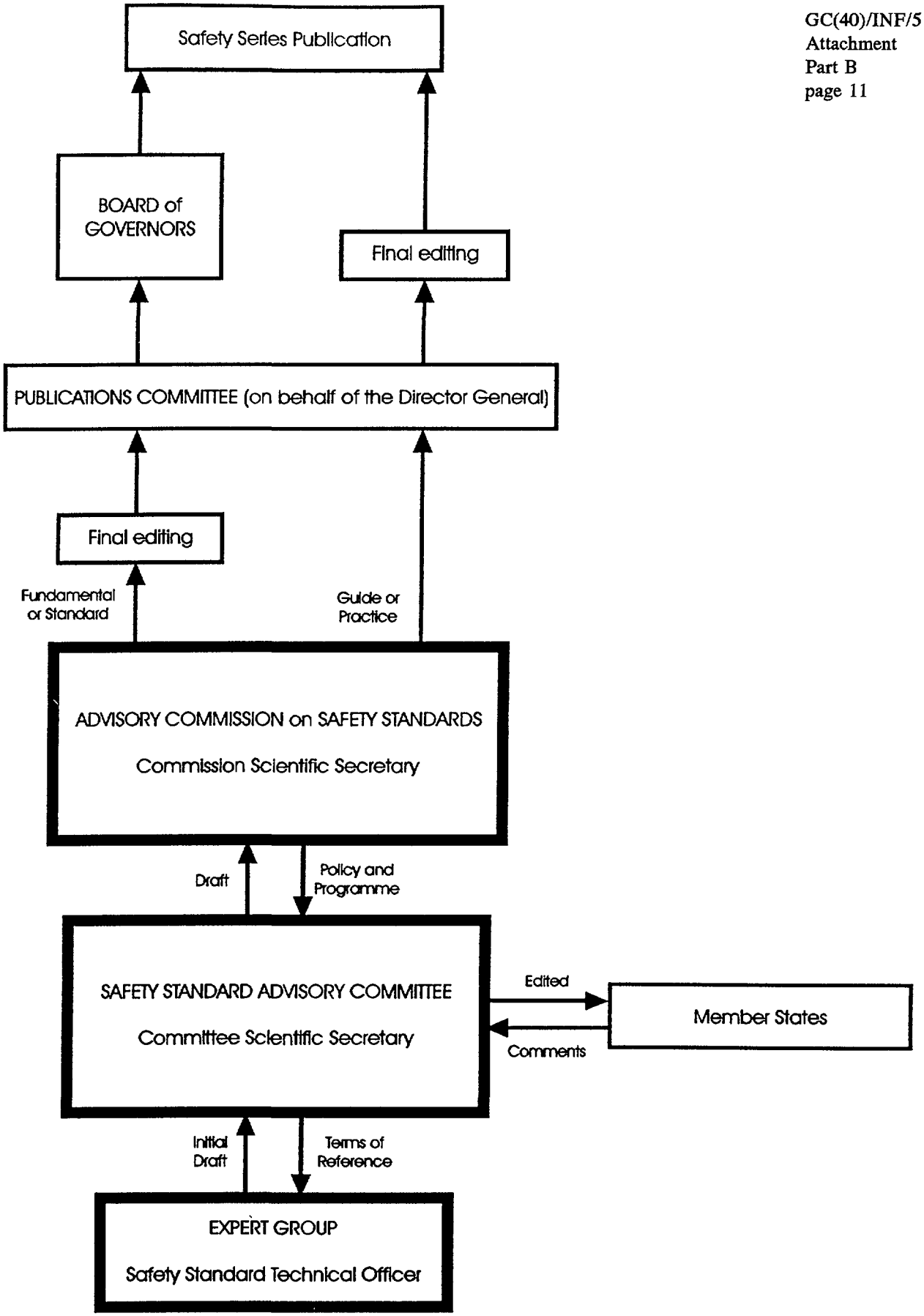
Plans for the preparation, review and publication of safety-related documents

41. The tentative document preparation, review and publication plans resulting from the initial activities of the ACSS and the four advisory committees are presented on pages 13-18.

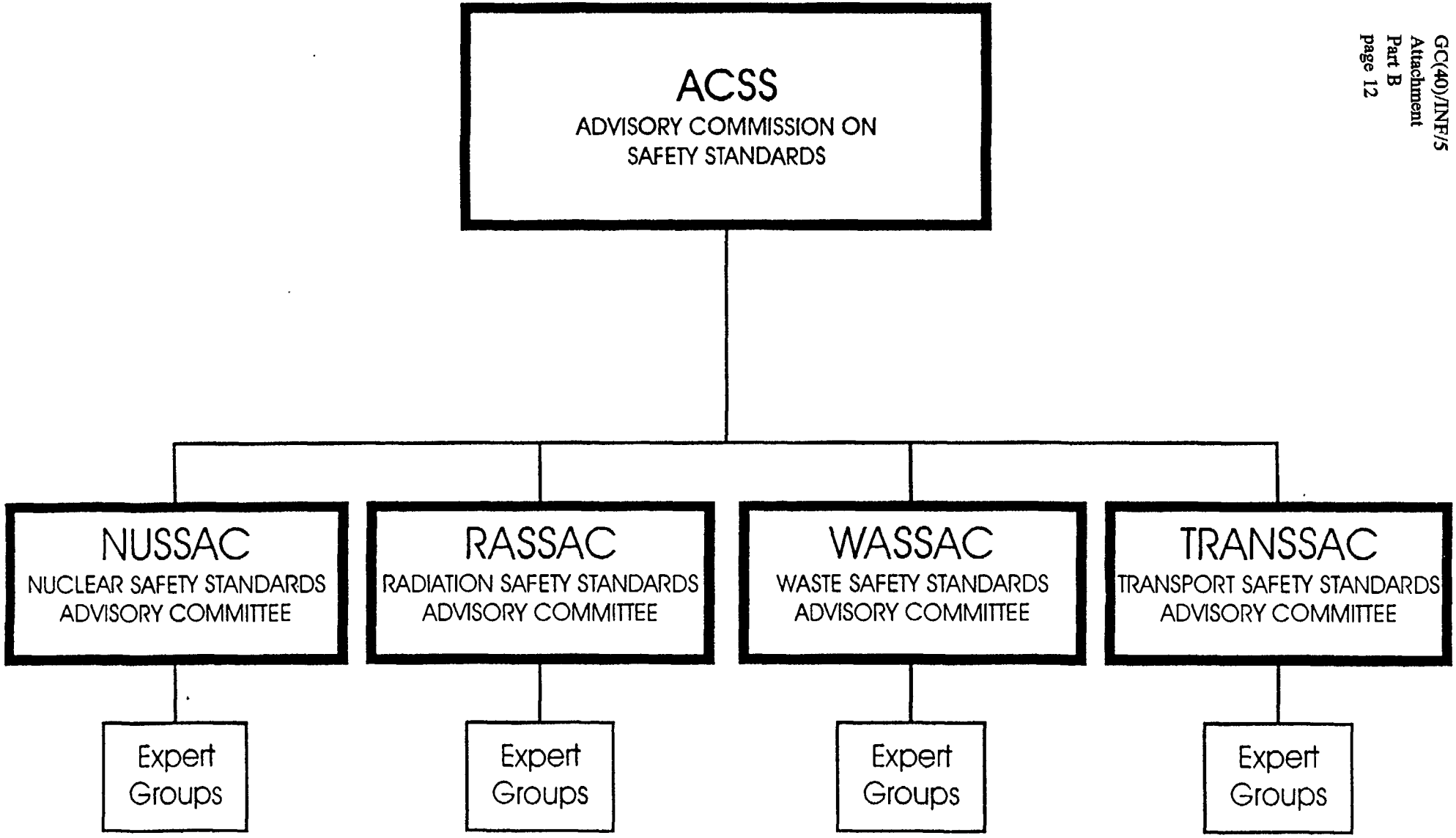
Outlook

42. The Secretariat is looking into the possibility of creating an IAEA Safety Standards Series that would embrace all documents issued by the Agency pursuant to Article III.A.6 of its Statute - i.e. safety standards in the broader sense (see footnote 7 above), which are currently being issued, together with other types of document, in the IAEA Safety Series. The other types of document - for example, documents that are descriptive rather than prescriptive or regulatory - would be issued in a separate series devoted to the fostering of the exchange of information on safety-related matters.

43. The Secretariat is also looking into ways of facilitating the access of interested parties to the Agency's safety standards.



SAFETY STANDARDS PREPARATION PROCESS



SAFETY STANDARDS PREPARATION PROCESS

Nuclear Safety Standards Document Structure

Fundamentals

Safety of Nuclear Installations SS110

Standards

Code on the Safety of NPPs: Operation, 50-C-O (Rev. 1, 1988)

Guides

Staffing of NPPs & Recruitment, Training & Authorization of Operating Personnel

In-service Inspection for NPPs

Operational Limits & Conditions for NPPs

Commissioning Procedures

Radiation Protection during Operation of NPPs

Preparedness of Operating Organization (Licensee) for Emergencies at NPPs

Maintenance of NPPs

Surveillance of Items Important to Safety in NPPs

Management of NPPs for Safe Operation

Safety Aspects of Core Management & Fuel Handling for NPPs

Code on the Safety of NPPs: Design, 50-C-D (Rev. 1, 1988)

Safety Function & Component Classification of BWRs, PWRs & PTRs

Fire Protection in NPPs

Protection System & Related Features in NPPs

Protection against Internal Missiles

External Man-induced Events in Relation to NPP Design

Ultimate Heat Sink & Directly Associated Heat Transport Systems for NPPs

Emergency Power Systems at NPPs

Safety-related Instrumentation & Control Systems for NPPs

Design Aspects of Radiation Protection for NPPs

Fuel Handling & Storage Systems in NPPs

Code on the Safety of NPPs: Siting, 50-C-S (Rev. 1, 1988)

Earthquakes & Associated Topics in Relation to NPP Siting

50-SG-S2 (obsolete)

Atmospheric Dispersion in NPP Siting

Site Selection & Evaluation

External Man-induced Events in Relation to NPP Siting

Hydrological Dispersion of Radioactive Material in Relation to NPP Siting

NPP Siting: Hydrogeological Aspects

Safety Aspects of Foundations of NPPs

Site Survey for NPPs

Design Basis Flood for NPPs on River Sites

Code on the Safety of Research Reactors: Design

Safety Assessment & Safety Analysis Report for Research Reactors

Utilization & Modification of Research Reactors

Emergency Planning & Preparedness of Research Reactors

Operational Limits & Conditions for Research Reactors

Design, Operation & Safety Assessment of Spent Fuel Storage for Research Reactors

Maintenance & Periodic Testing for Research Reactors

Safety in Decommissioning of Research Reactors

Code on the Safety of Research Reactors: Operation

Note: All these Standards & Safety Guides are under review by NUSSAC and the Secretariat with the overall aim of having a new set of documents ready by the year 2000.

Nuclear Safety Standards Document Structure (Continued)

Fundamentals

Safety of Nuclear Installations SS110

Standards

Code on the Safety of NPPs: Operation, 50-C-O (Rev. 1, 1988)

Code on the Safety of NPPs: Design, 50-C-D (Rev. 1, 1988)

Code on the Safety of NPPs: Siting, 50-C-S (Rev. 1, 1988)

Guides

Operational Management for Radioactive Effluents & Wastes Arising in NPPs

Periodic Safety Review of Operational NPPs

General Design Safety Principles for NPPs

Design of the Reactor Containment Systems in NPPs

Reactor Coolant and Associated Systems in NPPs

Design for Reactor Core Safety in NPPs

Seismic Design & Qualification for NPPs

Design Basis Flood for NPPs on Coastal Sites

Extreme Meteorological Events in NPP Siting, Excluding Tropical Cyclones

Design Basis Tropical Cyclone for NPPs

Note: All these Standards & Safety Guides are under review by NUSSAC and the Secretariat with an overall aim of having a new set of documents ready by the year 2000

Nuclear Safety Standards Document Structure

Fundamentals

Safety of Nuclear Installations SS110

Standards

Code on the Safety of NPPs: Governmental Organization, 50-C-G (Rev. 1, 1988)**

Standard on QA for the Safety of NPPs & Other Installations***

Guides

Qualification & Training of Staff of Regulatory Body for NPPs

Information to be Submitted in Support of Licensing Applications for NPPs

Conduct of Regulatory Review & Assessment During the Licensing Process for NPPs

Inspection & Enforcement by the Regulatory Body

Preparedness of Public Authorities for Emergencies at NPPs

Licenses for NPPs: Content, Format & Legal Considerations

Regulations & Rules for NPPs

Establishing of the Quality Assurance Programme for a NPP Project

Quality Assurance Records System for NPPs

Quality Assurance in the Procurement of Items & Services for NPPs

Quality Assurance in the Procurement of Items & Services for NPPs

Quality Assurance During Commissioning & Operation of NPPs

Quality Assurance in the Design of NPPs

Quality Assurance Organization for NPPs

Quality Assurance in the Manufacture of Items for NPPs

Quality Assurance during Siting

Quality Assurance Auditing for NPPs

Quality Assurance in the Procurement, Design & Manufacture of Nuclear Fuel Assemblies

Non-Conformance Control & Corrective Actions

Inspection & Testing for Acceptance

Commissioning

Decommissioning

Research & Development

** Agreement in principle by the ACSS to remove to a general safety category covering all areas, not just nuclear power plants

*** Standard and all 16 Safety Guides due for imminent publication. Under consideration by ACSS as a general safety topic.

Radiation Safety Standards Document Structure

FUNDAMENTALS

Radiation Safety Fundamentals SS120

STANDARDS

International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, SS115

	GENERAL TOPICS	PRACTICES			INTERVENTIONS	
		Occupational	Public	Medical	Emergencies	Chronic
GUIDES	Extension of the Principles of Radiation Protection to Sources of Potential Exposure SS104	Occupational Radiation Protection SS (new)	Environmental and Effluent Monitoring SS (new)	Radiation Protection in the Medical Exposure of Patients SS (new)	Intervention Criteria in a Nuclear or Radiation Emergency SS109	Application of the Principles of Radiation Protection to Chronic Exposure Situations SS (new)
	Principles for the Exemption of Radiation Sources and Practices from Regulatory Control SS89	Assessment of Internal Radiation Exposure for Occupational Protection SS (new)	Regulatory Requirements for Consumer Products SS (new)	Medical Handling of Accidentally Exposed Individuals SS88	Operational Levels for Intervention in a Nuclear Accident or Radiological Emergency SS81	
	Operational Radiation Protection: A Guide to Optimization SS101	Assessment of External Radiation Exposure for Occupational Protection SS (new)			Planning for Response to Radiation Accidents SS (new)	
	Safety of Radiation Sources SS (new)	Control of Exposure to Natural Radiation at Work SS (new)				
	Prevention of Illicit Trafficking in Radioactive Sources SS (new)	Radiation Protection of Workers in the Mining and Milling of Radioactive Ores SS26				
	Training Requirements and Programmes for Post-Graduate Education SS (new)	Radiation Protection in Occupational Health: Manual for Occupational Physicians SS83				

Radiation Safety Standards Document Structure (Continued)

FUNDAMENTALS

Radiation Safety Fundamentals, SS120

STANDARDS

Regulations for the Safe Transport of Radioactive Material, SS6

GUIDES

Advisory & Explanatory Material for the IAEA Regulations for the Safe Transport of Radioactive Material

Emergency Response Planning & Preparedness for Transport Accidents Involving Radioactive Material

Radioactive Waste Safety Standards Document Structure

The Principles of Radioactive Waste Management - SS111-F

FUNDAMENTALS

[GENERAL TOPICS]

[PRACTICES]

Dischargeable Waste

Disposable Waste

[INTERVENTIONS]

Residual Waste

STANDARDS

Establishing a National System for Radioactive Waste Management SS111-S1

Discharges of Radionuclides into the Environment

Predisposal Management of Radioactive Waste

Near Surface Disposal

Geological Disposal

Rehabilitation of the Environment

GUIDES

Classification of Radioactive Waste SS111-G1-1

Regulatory Control of Radioactive Discharges into the Environment

Predisposal Management of Low and Intermediate Level Waste from Nuclear Fuel Cycle Facilities

Predisposal Management of High Level Waste

Predisposal Management of Radioactive Waste from Medicine, Industry and Research

Decommissioning of Nuclear Power and Large Research Reactors

Decommissioning of Nuclear Fuel Cycle Facilities

Decommissioning of Medical, Industrial and Research Facilities

Siting of Near Surface Disposal Facilities (111-G-3.1)

Design, Construction, Operation and Closure of Near Surface Repositories

Siting of Geological Disposal Facilities (111-G-4.1)

Design, Construction, Operation and Closure of Geological Repositories

Siting, Design, Construction, Operation and Closeout of Facilities for the Management of Waste from Mining and Milling of U/Th Ores

Rehabilitation of Contaminated Areas from Past Practices and Accidents

Remediation and Rehabilitation of Mining and Milling and Abandoned Facilities

Recommended Cleanup Levels for Contaminated Land Areas

Safety Assessment for Predisposal Waste Management

Clearance Levels for Radionuclides in Solid Materials: Application of Exemption Principles -

Safety Assessment for Near Surface Disposal

Safety Assessment for Geological Disposal

Safety Assessment for the Management of Waste from Mining and Milling of U/Th Ores

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 - inter alia - its own operations and, at the request of a State, any of that State's activities in the field of atomic energy.

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

(a) by providing safety-related assistance;

(b) by fostering safety-related information exchange; and

(c) 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 a particular aspect of the provision of safety-related assistance - the *provision of assistance related to the safety of nuclear power plants in Eastern Europe and the former Soviet Union*. Annex C-3 describes recent efforts to *foster safety-related information exchange*, while Annex C-4 deals with a particular aspect of such information exchange - the *promotion of education and training in nuclear, radiation and waste safety*. Annex C-5 describes the status of a number of *safety-related services* rendered by the Agency to Member States, while Annex C-6 summarizes the findings of a number of *safety assessments* which have recently been or are being carried out by the Secretariat in rendering such services.

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, and 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 150 national, regional and interregional projects (representing total resources of approximately US $14 million), of which about one third are devoted to nuclear safety and two thirds to radiation and waste safety. In addition, a large number of national, regional and interregional workshops and training courses are organized and fellowships granted through TC funding (see Annex C-4).

3. The projects relate - inter alia - to:

- the adoption and updating of radiation protection legislation, regulations and codes of practice on the basis of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (the Basic Safety Standards, Safety Series No. 115) and on the basis of other safety-related documents;

- the establishment and strengthening of regulatory bodies;

- the establishment of systems for the notification, registration and licensing of radiation sources;

- the control and safe use of radiation sources, including their safe disposal;

- the enhancement of radiation dosimetry services;

- the protection of workers exposed to ionizing radiation in medical and industrial applications;

- the strengthening of programmes for radiation protection of the public (including persons being exposed to radiation for medical diagnosis and treatment purposes) and the environment;

- the establishment of emergency planning and preparedness programmes and procedures;

- the strengthening of programmes for the safe management of radioactive waste;

- the improvement of national capabilities in the areas of siting, severe accident management, fire safety, safety-related ageing management, probabilistic safety assessment, and human-machine interface management;

- the enhancement of research reactor safety; and

- the provision of nuclear safety services.

Nuclear safety

4. The main effort relates to the safety of nuclear power plants in countries of Eastern Europe and the former Soviet Union, and it is dealt with separately in Annex C-2.

5. Among the other technical co-operation projects in the nuclear safety area, the following three warrant special mention:

(a) a project for strengthening nuclear safety regulatory bodies, with nine training courses attended by more than 160 participants from 12 countries of Eastern Europe and the former Soviet Union, on - inter alia - the regulatory control of nuclear power plants, the provision of regulatory information to the public, safety culture and periodic safety reviews (duplication with other international assistance was avoided through close co-operation with the G-24 Nuclear Safety Assistance Co-ordination and major donor countries);

(b) a project through which ten countries of Eastern Europe benefited from the OSART, the ASSET and other services and received assistance with nuclear power plant safety assessments, the promotion of technical information exchange in the region, the preparation of safety guidelines, the organization of peer reviews and the evaluation of plant safety improvements;

(c) a Model Project for "Strengthening the nuclear regulatory body" in Slovakia.

Radiation and waste safety

6. An awareness of the importance of radiation and waste safety has been achieved in most of the countries where the Agency, pursuant to its Statute, has helped to ensure the "adequacy of proposed health and safety standards for handling and storing materials and for operating facilities".

7. Generally, however, in the absence of systematic follow-up, that awareness has not led to the establishment of adequate national radiation and waste safety infrastructures - i.e. infrastructures in line with the requirements derived from the Basic Safety Standards.

8. Consequently, the Secretariat has developed a strategy - endorsed by the 1994 Technical Co-operation Policy Review Seminar - for establishing and assessing such infrastructures. For the individual Member State, the strategy is being implemented on the basis of data contained in a Country Safety Profile[1] and involves the preparation - in co-operation with the State - of an action plan.

9. In parallel with the development of that strategy, two interregional Model Projects for infrastructure upgrading (project INT/9/143, "Upgrading radiation protection infrastructure", and project INT/9/144, "Upgrading waste management infrastructure") were launched by the Department of Technical Co-operation in 1993. They were subsequently approved by the Board for inclusion in the Agency's TC programme. At the time, it was envisaged that a a fairly small number of countries would benefit each year from each of the Model Projects.

10. However, as described last year in document GOV/INF/777, material subsequently gathered by the Secretariat indicated that a large number of countries (about 50 more than originally estimated), including some new Member States of the Agency, needed to improve their radiation protection and radioactive waste management safety infrastructures. The Department of Technical Co-operation therefore decided to accelerate the implementation of the two aforementioned interregional Model Projects, with a target date of the year 2000 for basic infrastructure upgrading.

11. Currently, 53 countries are being targeted by interregional Model Project INT/9/143, now entitled "Upgrading radiation and waste safety infrastructure". The Secretariat is dealing with them in four groups: an African group, a West and East Asian group, a Latin American group and a European group.

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[1] A Country Safety Profile describes the radiation and waste safety infrastructures of the country in question (a recipient or potential recipient of Agency technical assistance), the purpose being to assist in evaluating compliance with the Basic Safety Standards).

12. With a view to expediting the implementation of interregional Model Project INT/9/143 in its expanded form, the Secretariat has appointed four "regional experts" who report to the Department of Technical Co-operation and will operate from "regional offices" located in: Addis Ababa, Ethiopia (for the African group); Beirut, Lebanon (for the West and East Asian group); San José, Costa Rica (for the Latin American Group); and Bratislava, Slovakia (for the European group). The "regional office" in Bratislava is already operational, and it is expected that the other three will be operational by the end of September.

13. For almost all the participating countries, assessments have been made by the regional experts and by technical officers in the Division of Radiation and Waste Safety to identify infrastructural weaknesses (for example, inadequate information - or even a complete lack of information - on the radiation sources in the country, on radiation and waste safety legislation and regulations, and on personnel dosimetry services, and poor calibration and state of repair of equipment) and draft work plans prepared in the light of the assessments. In most cases, after consultations with national counterparts the Secretariat has submitted the draft action plans to the countries' appropriate authorities for approval - and in many cases the proposed action plans have already been approved.

14. Generally, the main priority is the establishment of States' systems for the control of radiation sources (including inventories of such sources) - especially sources which might cause injuries due to accidental exposure. To this end, the Secretariat has devised a generic system - adaptable to the conditions in different States - for the notification, registration and licensing of radiation sources and for follow-up inspections of the sources. Also, the Secretariat has issued a manual (IAEA-TECDOC-804, entitled "Methods to identify and locate spent radiation sources") providing guidance for the identification and location of spent radiation sources not properly accounted for.

15. As regards radiation and waste safety regulations, a "model" radiation safety legislation and "model" regulations for protection against ionizing radiation have been prepared by the Division of Radiation and Waste Safety and the regional experts for use in the States targeted by Model Project INT/9/143 and subsequently in other States with infrastructural weaknesses of the kind in question.

ANNEX C-2

PROVISION OF ASSISTANCE RELATED TO THE SAFETY OF NUCLEAR POWER PLANTS IN COUNTRIES OF EASTERN EUROPE AND THE FORMER SOVIET UNION*

Introduction

1. The Agency has been providing nuclear power plant (NPP) safety assistance to countries of Eastern Europe and the former Soviet Union under subprogramme I.7.03 ("Safety of WWER and RBMK plants") of its programme for 1995-96, a subprogramme which includes the provision of technical support to interregional, regional and national TC projects.[1] The activities in question have been funded from the Agency's Regular Budget, from technical co-operation resources and from extrabudgetary contributions.

2. In December 1995, an Advisory Group reviewed project implementation and concluded that the 1995 project objectives had been achieved.[2]

3. Besides the assistance being provided under subprogramme I.7.03, at the request of WWER and RBMK operating countries the Secretariat has been providing site-specific assistance and advice through - for example - the Operational Safety Review Team (OSART) service, the Assessment of Safety Significant Events Team (ASSET) service and the International Peer Review Service (IPERS) for Probabilistic Safety Assessments.

Safety issues and safety improvement programmes

4. On the basis of - inter alia - the findings of Agency safety review missions to WWER-440/213 NPPs, a list of safety issues has been drawn up; it includes 87 design and operational issues. At some plants, many of the safety issues have been resolved and much

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* See Annex B-3 of the Attachment to document GC(39)/INF/8.

1 See document GC(XXXVIII)/5.

2 The Advisory Group is scheduled to meet again in December 1996 in order to review the work done in 1996 and consider the scope of and priorities for activities to be carried out with extrabudgetary resources in 1997-98.

of the backfitting and upgrading work recognized as being necessary has been or is being done.

5. Eighty-four safety issues relating to WWER-1000/320 NPPs have been identified on the basis of - inter alia - the results of Agency safety review missions to the Zaporozhe and Kola NPPs and the results of safety studies carried out by WWER-1000/320 operators and by organizations involved in WWER-1000/320 safety upgrading programmes. These safety issues suggest that the basic safety concept of WWER-1000/320s is similar to that of the PWR units designed at the same time, but that differences in engineering design stage, manufacturing quality and equipment reliability are reasons for WWER-1000/320 safety shortcomings. The stage reached in WWER-1000/320 backfitting varies from country to country, depending on national regulatory requirements and the available financial resources.

6. Using the list of 84 WWER-1000 safety issues, an Agency-organized team has reviewed the safety modernization programme for the Czech Republic's Temelin NPP and concluded that all issues have been addressed, many of them through the adoption of Western technology, but that some of them have not yet been completely resolved.

7. The Secretariat has been requested to review the generic reference programme for WWER-1000/320 modernization prepared by a Russian consortium (MOHT) and Electricité de France. The programme addresses the WWER-1000/320 safety issues identified by the Agency, and its plant-specific implementation could make a major contribution to plant safety.

8. In the light of review missions to the South Ukraine and Khmelnitsky NPPs, the Secretariat has started to compile a list of safety issues for WWER-1000s of earlier design.

9. The results of technical visits to the Novovoronezh, Kozloduy and Bohunice NPPs for the purpose of reviewing plant-specific safety enhancement actions have been included in the Agency's database on WWER safety issues.

10. RBMK safety issues were examined in April at an international forum organized by the Agency and reported on at the International Conference "One decade after Chernobyl: Summing up the consequences of the accident". It was concluded at the forum: that, although there were still some gaps in knowledge relating to details of some phenomena involved in the Chernobyl accident, the knowledge acquired in the meantime was sufficient for identifying the causes and taking effective measures to prevent a repetition of such an event; and that measures to stabilize the "sarcophagus" built to confine the destroyed Chernobyl Unit 4 were a high priority.

11. The Secretariat has established a database for technical findings and recommendations relating to WWER and RBMK safety issues, and plant-specific information on backfitting programmes and measures is being entered into the database. Workshops on the use of this

database and of the G-24 Project Data Bank have been held in the Russian Federation, Germany and the United States.

12. The Secretariat has participated as a technical adviser to the G-24 Nuclear Safety Assistance Co-ordination in G-24 reviews at the Ignalina and Bohunice NPPs, carried out for the purpose of identifying gaps and overlaps in assistance activities.

Addressing high-priority safety issues

13. In order to assist countries of Eastern Europe in addressing high-priority safety issues, the Secretariat has published guidelines for WWER accident analysis and is preparing guidelines on pressurized thermal shock assessment, containment evaluation, the best estimate approach in accident analysis, accidents during shutdown conditions and the qualification of non-destructive testing.

14. At a topical meeting on thermohydraulic analysis and radiological consequences of primary-to-secondary leakages (a very significant issue associated with WWERs), it was concluded that further assistance was necessary in order to enable countries with operating WWERs to perform additional analyses, carry out plant modifications on the basis of the analytical results, develop emergency operating procedures and prepare evaluations of the radiological hazards associated with steam generator leaks.

15. Reviews carried out at the Bohunice, Dukovany and Mochovce NPPs confirmed that the bubbler condensers require mechanical strengthening, but it was recommended that further thermohydraulic and structural mechanics calculations be performed in order to determine the necessary extent of such strengthening.

16. At meetings on WWER-1000 control rod insertion problems and steam generator integrity, it was concluded that work on these two high-priority safety issues should continue and that the compensatory measures taken should be monitored closely.

17. Modernization of the shutdown system is a high-priority safety issue for RBMKs, and in October 1995 the various conceptual design options for shutdown systems were discussed at a meeting where it was agreed that further work was needed on the design of the second shutdown system.

18. It has been found that the scope and technical quality of PSAs performed for WWERs vary considerably, which limits the sharing of insights among the operators of WWERs - even when these are of the same type. Consequently, safety measures and priorities determined on the basis of some PSA results should be carefully evaluated before adoption.

Workshops

19. In May 1996, a workshop on fuel channel integrity in RBMKs provided a forum for an exchange of experience relating to the mechanical integrity, the embrittlement and the geometrical degradation of fuel channels, to graphite behaviour and to fuel channel interactions with the graphite block.

20. At five workshops, information was exchanged on the licensing of plant modifications, preventive maintenance, human reliability analysis and in-service inspection techniques. The results of the workshops were distributed to WWER operators and regulators.

21. At a workshop held in May it was concluded that RBMK core damage can be defined in the same way as core damage in the case of vessel-type LWRs, including all sequences of events which are beyond the design basis limits. However, it was recognized that for channel-type reactors (e.g. RBMKs) "core damage" does not necessarily mean a meltdown of the entire reactor core and that Level 2 PSA studies are required in order to define the extent of core damage scenarios.

Outlook

22. It is expected that, following the identification and ranking of WWER and RBMK safety issues, the Agency's activities will focus on assistance with safety upgrading actions - including, upon request, technical visits, peer reviews of safety studies and improvement programme evaluations. Topical meetings and workshops will be organized and the preparation of guidelines will continue with a view to helping WWER and RBMK operators and regulators to address high-priority safety issues. The Agency databases on safety issues will be kept updated in the light of the results of these activities. Extrabudgetary funding will be required in 1997 if the subprogramme objectives are to be met.

23. Three regional safety-related technical co-operation projects - on operational safety, safety assessments and the strengthening of regulatory bodies - have been proposed for the 1997-98 TC cycle.

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.

Meetings and publications

2. 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 - for example, conference proceedings - or in unpriced ones - for example, technical documents (IAEA-TECDOCs).

3. A subject on which the Agency has been involved in an intensive exchange of information is the health and environmental effects of the Chernobyl accident. In order to achieve a scientific consensus on the accident's consequences, the Agency, the European Commission and WHO held an international conference entitled "One Decade after Chernobyl: Summing up the Consequences of the Accident" from 8 to 12 April 1996 in Vienna; five other organizations belonging to the United Nations family (the United Nations Department of Humanitarian Affairs, UNESCO, UNEP, UNSCEAR and FAO) and the Nuclear Energy Agency of OECD co-operated in the preparation and organization of the conference. The conference was presided over by Germany's Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Ms. Angela Merkel, and attended by other high-level political figures, including the President of Belarus, the Prime Minister of Ukraine and Ministers from Russia and France. More than 800 experts from 71 countries participated, nearly half of the experts coming from developing countries. Also, the conference was attended by 208 journalists from 31 countries, the level of media coverage

being unusual for technical meetings of the Agency. A summary of the conference results is contained in the Attachment to document INFCIRC/510.

4. The safe management of radioactive waste is another subject on which the Agency has been involved in an intensive exchange of information, holding an international seminar from 28 to 31 August 1995 in Vienna with the participation of more than 160 experts from 52 Member States and six international organizations. The paper presentations covered a wide spectrum of radioactive waste management issues, and the panel discussions may prove useful in the elaboration of a convention on the safe management of radioactive waste. The proceedings of the seminar were published in December 1995 as IAEA-TECDOC-853.

5. From 20 to 24 November 1995, radiation protection specialists and regulators participated in an Agency-organized "International Seminar on Advancements in the Implementation of New Basic Safety Standards (Experience in Applying the 1990 Recommendations of the ICRP)". The discussions focused on practices that give rise to - or could give rise to - radiation exposures, and there were technical sessions on: the protection of workers, patients and the public; potential exposure situations; emergency and chronic exposure situations; administrative requirements; exemptions; interventions; and national infrastructures for implementation of the Basic Safety Standards. Over 110 experts from 59 countries and five international organizations (72 experts from 44 developing countries) participated in the seminar. The contributed papers are available (in document IAEA-SR-193) from the Agency's Division of Radiation and Waste Safety; the proceedings of a seminar are in preparation.

6. In order to promote the dissemination of safety-related scientific and technical information generated by experts from Latin American countries, the Agency co-sponsored a Regional Congress on Radiological and Nuclear Safety held in Cusco, Peru, from 23 to 27 October 1995 - the third such congress held in Latin America with Agency support. Over 300 experts from 24 countries (six experts from four countries outside Latin America) participated in the congress, the participation of 47 of them being supported by the Agency under the ARCAL programme. The next congress in this series (to be held in Havana, Cuba) is scheduled for 1998.

7. Information on a number of topical issues and policy matters relating to safety was last year once again brought together by the Secretariat in an annual "Nuclear Safety Review", which was issued as Part D of the IAEA Yearbook 1995.

8. The titles and publication codes of recent Agency publications intended for fostering the exchange of information on nuclear, radiation and waste safety are listed in the Appendix.

Electronic network systems

9. An "Advisory Group for Peer Reviewing the Agency Safety Related Programme" concluded in July 1995 that it was "worth reviewing the current availability of network systems, such as Internet, to be used as a main vehicle for the future fostering of information exchange by the Agency."

10. The Secretariat has for some time been using electronic network systems (especially e-mail) to communicate with Member States. Owing to the limitations of e-mail as a means of exchanging scientific and technical information, however, the Secretariat is exploring other electronic communication systems, the principal aim being to make available to Member States - especially those which are developing countries - direct access to nuclear, radiation and waste safety information. In particular, it is developing pages for the Internet in order to make information on safety available to Member States via an Internet browser.[1] It is expected that the pages will be operational by early 1997. Also, a file transfer server has been established to facilitate the exchange of large files with Member States.

Outlook

11. It is expected that an interesting exchange of information on health effects attributable to low ionizing radiation doses will take place at a large Agency conference scheduled for the end of 1997.

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[1] With the recent development of Internet browsers, the ability to access and exchange information has been greatly enhanced. Such browsers have reduced the need for many of the former tools used for exchanging information.

RECENT AGENCY PUBLICATIONS ON NUCLEAR, RADIATION AND WASTE SAFETY

Safety of Nuclear Installations

Priced:

Treatment of external hazards in PSA for nuclear power plants	Safety Series No. 50-P-7
Procedures for conducting probabilistic safety assessment of nuclear power plants (level 2)	Safety Series No. 50-P-8
Evaluation of fire hazard analyses for nuclear power plants	Safety Series No. 50-P-9
Human reliability analysis in probabilistic safety assessment for nuclear power plants (NUSS Programme)	Safety Series 50-P-10
Assessment of the overall fire safety arrangements at nuclear power plants	Safety Series 50-P-11
A common basis for judging the safety of reactors built to earlier standards	INSAG-8
Potential exposure in nuclear reactor safety	INSAG-9
Selected safety aspects of WWER-440 Model 213 nuclear power plants	STI-PUB-1012

Unpriced:

Safety assessment of computerized control and protection systems	IAEA-TECDOC-780
Reliability of computerized safety systems at nuclear power plants	IAEA-TECDOC-790

Management of research reactor ageing	IAEA-TECDOC-792
OSART mission highlights 1991-1992	IAEA-TECDOC-797
Development of safety principles for the design of future nuclear power plants	IAEA-TECDOC-801
Strength analysis of the bubbler condenser structure of WWER-440 Model 213 nuclear power plants	IAEA-TECDOC-803
Experimental design verification of WWER-440 model 213 nuclear power plants - Reference plant: Bohunice V2 (Slovakia)	IAEA-TECDOC-810
Experience from operation of WWER-440 model 213 nuclear power plants - Reference plant: Bohunice V2 (Slovakia)	IAEA-TECDOC-811
Experience with strengthening safety culture in nuclear power plants	IAEA-TECDOC-821
Policy for setting and assessing regulatory safety goals. Peer discussions on regulatory practices	IAEA-TECDOC-831
IPERS guidelines for the international peer review service. Second edition	IAEA-TECDOC-832
Simulation of a loss of coolant accident without high pressure injection but with secondary side bleed and feed	IAEA-TECDOC-848
Development of safety related expert systems. Final report of a co-ordinated research programme 1991-1994	IAEA-TECDOC-856
ASCOT guidelines. Revised 1996 Edition	IAEA-TECDOC-860
Application and development of probabilistic safety assessment for nuclear power plant operations	IAEA-TECDOC-873

OSART programme highlights 1993-1994	IAEA-TECDOC-874
PSAPACK 4.2. A code for probabilistic safety assessment level 1	IAEA-CMS-06
RBMK shutdown systems	IAEA-EBP-RBMK-01
Multiple pressure tube rupture in channel type reactors	IAEA-EBP-RBMK-02
Safety assessment of proposed modifications for the Ignalina nuclear power plant	IAEA-EBP-RBMK-03
Databases on safety issues for WWER and RBMK reactors. User's Manual	IAEA-EBP-WWER-04
Safety issues and their ranking for WWER-1000 model 320 nuclear power plants	IAEA-EBP-WWER-05

Radiation and Waste Safety

Priced:

Direct methods for measuring radionuclides in the human body	Safety Series No. 114
An electron accelerator accident in Hanoi, Viet Nam	STI-PUB-1008

Unpriced:

Radiation doses in diagnostic radiology and methods for dose reduction	IAEA-TECDOC-796
Developments in the transport of radioactive waste	IAEA-TECDOC-802
Directory of national competent authorities' approval certificates for package design, special form material and shipment of radioactive material - 1995 edition	IAEA-TECDOC-826

Clearance levels for radionuclides in solid materials. Application of exemption principles	IAEA-TECDOC-855
Modelling of radionuclide interception and loss processes in vegetation and of transfer in semi-natural ecosystems	IAEA-TECDOC-857
Assessment and treatment of external and internal radionuclide contamination	IAEA-TECDOC-869
Methods for estimating the probability of cancer from occupational radiation exposure	IAEA-TECDOC-870
Establishment and use of national registries for actinide elements in humans	IAEA-TECDOC-879
The PACKTRAM database on national competent authorities' approval certificates for package design, special form material and shipment of radioactive material	IAEA-CMS-07
National competent authorities responsible for approvals and authorizations in respect of the transport of radioactive material. List No. 27. 1996 Edition	IAEA-NCAL-27
Manual on gamma radiography (Rev. 1)	IAEA-PRSM-1
Manual on shielded enclosures (Rev. 1)	IAEA-PRSM-2
Manual on nuclear gauges (Rev. 1)	IAEA-PRSM-3
Manual on high energy teletherapy (Rev. 1)	IAEA-PRSM-4
Manual on brachytherapy (Rev. 1)	IAEA-PRSM-5
Manual on therapeutic uses of iodine-131 (Rev. 1)	IAEA-PRSM-6

Manual on gamma self-contained irradiators (Categories I and III) (Rev. 1)	IAEA-PRSM-7
Manual on panoramic gamma irradiators (Categories II and IV) (Rev. 1)	IAEA-PRSM-8
Practical radiation technical manual: Workplace monitoring for radiation and contamination	IAEA-PRTM-1
Practical radiation technical manual: Personal monitoring	IAEA-PRTM-2
Radiation research abstracts No.1	IAEA-RSRA-01
Standard syllabus of post-graduate educational courses in radiation protection	IAEA-SYL-01
Cours post-universitaire de radioprotection. Volume 1, Volume 2	IAEA-TCS-05

ANNEX C-4

PROMOTION OF EDUCATION AND TRAINING

Background

1. This Annex describes Agency measures to promote education and training in - primarily - the radiation protection area. The education and training activities in question are funded from technical co-operation resources, and the information provided below should be viewed as an expansion of information provided in document GC(40)/INF/3 ("Technical co-operation report for 1995").

2. Education and training are essential in providing for the application of the Agency's safety standards, and in 1992 the General Conference - in resolution GC(XXXVI)/RES/584 - requested the Director General to prepare a report on "a possible programme of activities on education and training in radiological protection and nuclear safety". The report prepared in response to that request and outlining an education and training programme was submitted to the General Conference in 1993. The report included a draft Standard Syllabus of Post-Graduate Educational Courses in Radiation Protection.

3. The Secretariat reported to the General Conference last year on activities relating to the promotion of education and training in Annex B-4 of the Attachment to document GC(39)/INF/8. Activities since the Conference's 1995 regular session are described below.

Educational courses

4. The three post-graduate courses (one each in English, French and Spanish) planned for 1995 and the first half of 1996 were held, with a total of 57 graduates participating. The courses were designed to provide multidisciplinary theoretical and practical training related to existing international recommendations and safety standards and to their implementation for young professionals from developing countries who need to acquire a sound basis in radiation protection and a knowledge of related nuclear safety fundamentals in order to become, in the course of time, qualified experts (decision-makers and/or trainers) in their home countries.

5. The courses still being held during 1996 are:

- a Regional Post-Graduate Educational Course in Radiation Protection and Nuclear Safety (in Spanish) being held in Buenos Aires, Argentina, from 9 April to 1 November (15 Agency-sponsored participants)[1]; and

- a Regional Post-Graduate Educational Course in Radiation Protection and Nuclear Safety (in Russian) being held at Dubna and Obninsk, Russian Federation, from 19 August to 8 November (20 Agency-sponsored participants)[2].

6. Meeting in Vienna from 6 to 10 November 1995, an Advisory Group on Policy in Radiation Protection Training considered - inter alia - a working paper and reference material on the Secretariat's radiation protection training efforts over the past 15 years and made recommendations concerning the development of a policy for ensuring the coherence of radiation protection training programmes. The Group recommended that in assessing needs and planning long-range programmes the Secretariat bear in mind all the mechanisms employed for the provision of training and aim for an appropriate relationship between "basic professional training" and "specialized training".[3]

Specialized training courses/workshops

7. Listed in the table on pages 5-7 are the interregional/regional training courses and workshops held within the framework of the Agency's technical co-operation programme during the period 1 July 1995-30 June 1996. In addition, a number of national training courses, seminars and workshops took place within the framework of technical co-operation projects.[4]

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[1] Of these 15 participants, 11 attended only that part of the course which dealt with radiation protection (from 9 April to 23 August).

[2] Of these 20 participants, six are attending only that part of the course which deals with radiation protection (from 19 August to 17 October; hosted by the Joint Institute for Nuclear Research, Dubna).

[3] The term "basic professional training" was used by the Group - in preference to "education" - to denote the systematic conveying of the core knowledge necessary in the many different areas of radiation protection. The term "specialized training" was used to denote the teaching of skills required in specific areas.

[4] A forecast of interregional and regional training courses to be given during the period 1996-2000 was presented by the Secretariat last year in document GOV/INF/774.

Other mechanisms

8. In addition to organizing courses and workshops, the Agency arranges for scientists and engineers from Member States to receive training through fellowships and scientific visits, organizes seminars and produces educational and training material.

Seminars

9. An "International Seminar on Advancements in the Implementation of New Basic Safety Standards (Experience in Applying the 1990 Recommendations of the ICRP)" held in Vienna from 20 to 24 November 1995 (see Annex C-3, paragraph 5) was attended by 114 radiation protection and safety specialists and regulators from 59 countries (including 72 from 44 developing countries) and five international organizations. The discussions focused on practices that give rise to - or could give rise to - radiation exposures, and there were technical sessions on: the protection of workers; the protection of patients; the protection of the public; potential exposure situations; emergency and chronic exposure situations; administrative requirements; exemptions; interventions; and national infrastructures.

10. A regional (Africa) "Seminar on the Conditions Necessary for the Radiation Protection Infrastructure and the Legislative Framework" was held in Lusaka, Zambia, from 13 to 22 November 1995. The purpose of the seminar, attended by 35 senior specialists from 15 African Member States, was to help countries in the region as they endeavour to meet the requirements of the Basic Safety Standards.

11. A regional (East Asia and the Pacific) "Seminar on Education and Training in Radiation Protection and Nuclear Safety" was held in Melbourne, Australia, from 27 November to 1 December 1995. The seminar was attended by 16 participants from 12 Member States (including 11 developing countries) - persons involved at the decision-making and the managerial level in the organization of relevant manpower development in their countries. It provided a comprehensive overview and in-depth information relating both to the general status of education and training in radiation protection and nuclear safety and to the regional activities in that field.

Educational and training material

12. The training material prepared for one of the 1994 post-graduate courses referred to in paragraph 4 above (held in French) was published in the Agency's Training Course Series in 1995 (reference number IAEA-TCS-5), and a re-run was issued in 1996.

13. The training manual on "The Safe Use of Radiation Sources" was published in the Agency's Training Course Series in 1995 (IAEA-TCS-6).

14. A technical report on "Programmes for Post-Graduate Educational Courses" was finalized for publication in the Agency's Training Course Series. The report - with model course contents, lecture outlines, a description of practical work and exercises, and guidelines for review/examination sessions and the evaluation of courses - is designed to facilitate integration of the Standard Syllabus into the curricula of educational institutions in Member States.

15. Safety-related Agency publications - including the Basic Safety Standards (Safety Series No. 115) - and guides, technical reports, training and other practical manuals, and technical documents have continued to be used extensively, together with visual aids, at educational courses and specialized training events.

Outlook

16. In the light of recommendations made by the Advisory Group on Policy in Radiation Training (see paragraph 6 above) and discussions at the regional (East Asia and the Pacific) "Seminar on Education and Training in Radiation Protection and Nuclear Safety" (see paragraph 11 above), plans are being made for a Technical Committee to prepare a Safety Guide on qualification and training requirements for radiation safety. The Safety Guide will include revised standard syllabi for specialized radiation protection training (a revision of Technical Report Series No. 280 published in 1988) in line with the requirements of the Basic Safety Standards.

Interregional/regional training events held during the period 1 July 1995 - 30 June 1996

Title	Host country (project number)	Date
Radiation and Waste Safety		
Interregional Post-Graduate Educational Course on Radiation Protection	USA (INT/9/150)	September/November 1995
Interregional Training Course on Management of Radiological Accidents Involving Radiation Sources	Brazil (INT/9/149)	December 1995
Interregional Training Course on Planning, Organization and Implementation of Radiation Protection at the National Level	USA (INT/9/156)	April/May 1996
Regional Training Course on System of Notification, Registration, Licensing and Control of Radiation Sources and Installations	Iran, Islamic Republic of (RAW/9/002)	August 1995
Regional Workshop on Implementation of the ICRP-60 and BSS Recommendations	Peru (RLA/9/016)	October 1995
Sub-Regional Workshop on the Safe Transport of Radioactive Material	Panama (RLA/9/017)	October 1995
Regional Training Course on Notification, Registration, Licensing and Control of Radiation Sources	Madagascar (RAF/9/014)	October/November 1995
Regional Training Course for Radiation Protection Officers	Ghana (RAF/9/016)	January/February 1996
Regional Workshop on Adoption and Harmonization of Safety Regulations in Radioactive Waste Management	Morocco (RAF/9/007)	January 1996
Regional Post-Graduate Educational Course on Radiation Protection	France (RAF/9/017)	April/June 1996

Title	Host country (project number)	Date
Regional Training Workshop on Radiation Protection Infrastructure	Yemen (RAW/9/003)	May 1996
Radiation Protection and Nuclear Safety		
Regional Post-Graduate Educational Course on Radiation Protection and Nuclear Safety	Argentina (RLA/9/022)	April/October 1995
Third Regional Congress on Radiological and Nuclear Safety	Peru (RLA/9/016)	October 1995
Regional Congress on Radiological and Nuclear Safety for Central America and the Caribbean Region	Peru (RLA/9/017)	October 1995
Regional Post-Graduate Educational Course on Radiation Protection and Nuclear Safety	Argentina (RLA/9/024)	April/November 1996
Nuclear Safety		
Interregional Training Course on Fire Safety in Nuclear Power Plants	India (INT/9/148)	November/December 1995
Interregional Training Course on Safety Review and Upgrading of Nuclear Power Plants	USA (INT/9/154)	January/February 1996
Interregional Training Course on Operator/Regulatory Interface for Nuclear Power Plants	USA (INT/9/153)	March 1996
Interregional Training Course on Fire Safety and Environmental Qualification of Equipment Important to Safety in Nuclear Power Plants	USA/Canada (INT/9/155)	May/June 1996
Regional Training Course on General Approach to Nuclear Safety (Principles and Fundamentals)	Slovak Republic (RER/9/023)	October 1995

Title	Host country (project number)	Date
Regional Training Course on Assessment and Upgrading of Nuclear Power Plants in Relation to External Events	Turkey (RER/9/033)	October 1995
Regional Training Course on Assessment Techniques for Operational Safety of Nuclear Power Plants	Spain (RER/9/039)	March 1996
Regional Training Course on Safety Documentation for Research Reactors	Egypt (RAF/4/012)	March 1996
Regional Training Course on General Approach to Nuclear Safety (Principles and Fundamentals)	Finland (RER/9/023)	June 1996

ANNEX C-5

RENDERING OF SAFETY-RELATED SERVICES

1. A major purpose of the Agency's safety review and advisory services is to assist national authorities with the proper application of safety standards. The services are funded on a cost-sharing basis - i.e. Member States provide experts cost-free to recipient countries, which cover the costs of accommodation or full board and of internal travel, and the Agency (from technical co-operation resources) meets the international travel costs of the experts and a certain percentage of the applicable daily subsistence allowance.

2. With a view to strengthening national capabilities in the safety area on the basis of international experience, the Agency renders a wide range of safety-related services to Member States. The Secretariat has plans for reorienting some of the Agency's safety-related services, the objective being to provide for greater flexibility and for greater emphasis on self-assessment.

3. A peer review of the Agency's safety-related services is being held at the end of August within the framework of the Programme Performance Assessment System (PPAS).

4. Information on the following services is provided in the Appendices hereto:

- The Operational Safety Review Team (OSART) service, Appendix C-5-1;
- The Assessment of Safety Significant Events Team (ASSET) service, Appendix C-5-2;
- The Engineering Safety Review Service (ESRS), Appendix C-5-3;
- The International Peer Review Service (IPERS) for Probabilistic Safety Assessments, Appendix C-5-4;
- The Integrated Safety Assessment of Research Reactors (INSARR) service, Appendix C-5-5;
- The Assessment of Safety Culture in Organizations Team (ASCOT) service, Appendix C-5-6;
- The Incident Reporting System (IRS), Appendix C-5-7; and
- The International Nuclear Event Scale (INES), Appendix C-5-8.

APPENDIX C-5-1

THE OPERATIONAL SAFETY REVIEW TEAM (OSART) SERVICE*

Missions and follow-up visits

1. In the past twelve months, three full OSART missions have been carried out (in the second half of 1995). Also, Agency staff participated in reviews of upgrading measures being taken on the basis of Agency guidance at the Kozloduy NPP (Bulgaria), the Rovenskaya and Khmelnitsky NPPs (Ukraine) and the Dukovany and Temelin NPPs (Czech Republic). In addition, there were safety review follow-up visits to the Novovoronezh NPP (Ukraine), the Kozloduy NPP and the Bohunice NPP (Slovakia).

Mission findings

2. The three full OSART missions were to the Ignalina NPP (Lithuania), the Khmelnitsky NPP and the Beznau NPP (Switzerland). It was found that at the Ignalina and Khmelnitsky NPPs excellence was judged in terms of meeting regulatory requirements, whereas the Beznau NPP staff aimed to exceed regulatory requirements (see in this connection "OSART programme highlights, 1993-1994, Operational safety practices in nuclear power plants", IAEA-TECDOC-874, April 1996, Part 1).

3. Other findings of these OSART missions may be summarized as follows:

- at all three NPPs, the staff were well qualified and keen to achieve the expectations of management with regard to safe plant operation, although those expectations needed - to differing degrees - to be expressed more clearly;

- at the Ignalina and Khmelnitsky NPPs, there was, in addition, a significant need for the managers to establish more challenging safety expectations and give the staff better guidance for improving safety performance;

- at the Beznau NPP, there was a need to strengthen parts of the management policies and procedures in order to help ensure continued safe operation.

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* See Annex C-1 of the Attachment to document GC(39)/INF/8 for background information on the OSART service.

4. The Ignalina and Khmelnitsky NPPs were not receiving incomes that matched their production costs, so that the funding of repairs and long-term safety improvements was unpredictable - with consequent delays. Also, staff motivation was being weakened by the late payment of salaries. The cumulative effect of these and other problems could adversely affect safety at the two NPPs.

5. At the Beznau NPP it appeared that the threshold for the in-depth analysis of events should be lower and that management was failing to learn some lessons from experience; in particular, there was a reluctance to thoroughly assess human performance contributions to events. In addition, there was a need for more careful examination of the performance of systems following reactor trips so as to ensure that they are operating properly.

OSART follow-up visits

6. OSART follow-up visits to the Cattenom and Flamanville NPPs (France), the Hunterston B NPP (United Kingdom) and the Hamaoka NPP (Japan) demonstrated the effectiveness of the OSART service; operational safety enhancements have occurred at all four NPPs. By the time of the follow-up visits (on average some 16 months after the original OSART mission) 60% of the OSART-identified issues had been fully resolved, 39% were satisfactorily close to being resolved and only 1% (two issues) had apparently received too little attention. The follow-up teams reported that there had been a willingness on the part of the NPP staff not only to look at the specific issues, but also to analyse the OSART findings in greater depth and to develop improvements going beyond those originally foreseen.

Changes in the OSART process

7. Over the past year and a half, significant changes have been made in the OSART process so as to enhance its value to Member States and NPP operators. The training of OSART members has been strengthened, and review methods and the content of OSART reports have been modified so that OSART members can focus more clearly on identifying worthwhile improvement opportunities. The accessibility of the OSART Missions Results (OSMIR) database has been increased through the provision of a user-friendly interface.

Self-assessment

8. Considerable interest has been shown by Member States in the self-assessment of operational safety performance, and the Secretariat has begun helping Member States to develop and implement self-assessment programmes. It has begun considering what role, if any, self-assessments with subsequent peer reviews could play in the implementation of the Convention on Nuclear Safety, and utilities in Canada, France and the United Kingdom have expressed an interest in hosting international reviews of their peer review programmes.

APPENDIX C-5-2

THE ASSESSMENT OF SAFETY SIGNIFICANT EVENTS TEAM (ASSET) SERVICE*

Recent developments

1. As of the end of July 1996, there had been three ASSET missions (to the Russian Federation and Sweden) and six ASSET seminars (held in the Russian Federation, Slovakia, Slovenia, Switzerland and Ukraine) since the 1995 session of the General Conference. The purpose of the seminars was to prepare plant staff to perform self-assessments, and that of two of the three missions was to carry out peer reviews of the first two self-assessments to be performed - one at the Forsmark NPP in Sweden and the other at the Leningrad NPP in the Russian Federation.

2. Some of the mission findings are set out below:

- among the safety problems identified were deficiencies in control rod manoeuvring systems, problems in setting torques and limits for isolation valves, circuit-breaker failures caused by lubrication problems, and failures of fire isolation valves;

- in order that there may be a larger population of events from which lessons can be learned by plant management, the event reporting criteria should be broadened and the event reporting thresholds lowered;

- the most important safety culture problems are connected with learning from events such as recurrent operating personnel failures, failures in reactor emergency protection systems, and emergency core cooling and primary piping failures.

3. In June, at the 1996 annual workshop on ASSET experience, it was recommended that the Secretariat continue to promote self-assessments by NPP personnel and provide further guidance on evaluating the significance of events and prioritizing the safety problems reflected in events.

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* See Annex C-2 of the Attachment to document GC(39)/INF/8 for background information on the ASSET service.

4. Training in ASSET methodology was given in March 1996 at a regional course on operational safety assessment techniques held in Spain within the framework of the Agency's technical co-operation programme.

Outlook

5. The Secretariat plans to include within the scope of the ASSET service assessments of NPP safety performance based not only on records of reportable operating events but also on safety system unavailability records and on equipment maintenance, testing, inspection, replacement and modification records. It is developing guidance for such assessments.

6. A computerized database is being prepared as a source of information for Member States on the operational events at NPPs which have received ASSET missions, the safety problems identified and the response actions proposed.

APPENDIX C-5-3

THE ENGINEERING SAFETY REVIEW SERVICE (ESRS)*

1. ESRS reviews covering the siting and seismic aspects of nuclear installations and possible external events were performed during the past year.

Siting aspects

2. In Morocco, an ESRS team reviewed the qualification studies for the Sidi Boulbra NPP site carried out by the Moroccan Office National de l'Electricité and French consultants Sofratome.

3. In Indonesia, a study by the National Atomic Energy Agency (BATAN) and Japanese consultants NEWJEC for an NPP site on the Muria peninsula and the ESRS review of that study continued. Although some key issues (relating to tectonics, volcanology and geotechnical engineering) require further work, it is expected that the study and the review will be completed this year.

4. In Thailand, the electrical utility company EGAT is in the process of starting an NPP site qualification study for which an ESRS team reviewed the terms of reference.

5. In the Czech Republic, an ESRS team reviewed site studies carried out by the utility ČEZ and local consultants for a central interim spent fuel storage facility to be constructed at Skalka, about 60 km north-west of Brno. The main focus of the review was on geological and hydrogeological issues.

Seismic aspects

6. In the Islamic Republic of Iran, where the Bushehr NPP project was recently reactivated with a view to the construction of two WWERs, an ESRS team reviewed the original seismic design basis parameter values and recommended that they be checked and, if necessary, modified along the lines proposed by Atomenergoproekt, Moscow.

7. In Hungary, an ESRS team reviewed studies carried out by consultants Ove Arup in connection with the upgrading of the Paks NPP. The team agreed that there were no fault

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* See Annex C-3 of the Attachment to document GC(39)/INF/8 for background information on the ESRS.

capability problems at the site and that the proposed new review level earthquake of 0.25g associated with a site-specific design response spectrum was sufficiently conservative.

8. ESRS teams which carried out several missions to Armenia agreed with the conclusion of the utility Armatomenergo that there were no fault capability problems in the vicinity of the Armenia NPP site. The new review level earthquake of 0.35g associated with a site-specific response spectrum was found to be adequate. It was recommended that a comprehensive programme for re-evaluation of the plant be established with two phases - the original design and the upgrades to 0.2g already carried out to be properly confirmed and documented during the first phase, before reopening of the plant, and the plant re-evaluation itself and upgrading to 0.35g to be carried out during the second phase, after reopening of the plant.[1]

9. In Slovenia, an ESRS team reviewed the interim results of a fault capability re-evaluation being carried out at the Krško NPP and the work plans for future work in the areas of geology, seismology and geophysics.

10. A review of the seismic design of the Chashma NPP in Pakistan was carried out during two ESRS missions which involved meetings with the main Chinese contractor, SNERDI, and a brief walkdown of the reference facility, the Qinshan NPP.

11. Terms of reference documents were prepared for ESRS reviews of seismic capacity and seismic upgrading to be carried out at the Bohunice NPP in Slovakia and the Medzamor NPP in Armenia.

External events

12. An external event PSA for the Krško NPP, Slovenia, performed by Westinghouse and EQE International was reviewed by an ESRS team which made several recommendations, particularly relating to floods, winds and man-induced hazards.

Workshop

13. A workshop on seismic hazard analysis methodology, held in Taejon, Republic of Korea, was attended by participants from China, Indonesia, Japan, the Republic of Korea, Pakistan and Thailand.

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[1] The Medzamor NPP was reopened in November 1995, during the first phase.

APPENDIX C-5-4

THE INTERNATIONAL PEER REVIEW SERVICE (IPERS) FOR PROBABILISTIC SAFETY ASSESSMENTS*

Recent developments

1. Since the 1995 session of the General Conference there have been (as of end of July 1996) two IPERS missions, requested by the Czech Republic and Argentina. By the end of July 1996, the Secretariat had organized 37 international peer reviews of 18 probabilistic safety assessments (PSAs).

2. The two latest international peer reviews were conducted in accordance with the revised guidelines in technical document IAEA-TECDOC-832, published in October 1995.

3. As previous reviews had shown human reliability assessment to be a difficult aspect of PSAs, a human reliability assessment specialist was included in the teams which conducted these reviews.

Mission findings

4. The IPERS team which visited the Czech Republic concluded that, at the NPP in question, specific features of the particular containment design could provide pathways for large and early releases of radioactive material during severe accidents and that such features should be taken into account in the PSA.

5. More generally, IPERS activities have highlighted numerous problems, including problems due to inadequate quality assurance during the conduct of PSAs. The Secretariat has therefore initiated work on the preparation of guidelines for an effective PSA quality assurance programme.

6. IPERS mission findings are now being stored in a computerized database that permits queries to be made by PSA topic and by reactor type.

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* See Annex C-4 of the Attachment to document GC(39)/INF/8 for background information on IPERS.

APPENDIX C-5-5

THE INTEGRATED SAFETY ASSESSMENT OF RESEARCH REACTORS (INSARR) SERVICE*

1. As can be seen from the table at the end of this Appendix, INSARR missions are increasingly taking place at the request of Member States rather than pursuant to project or supply agreements between Member States and the Agency.

2. The purpose of requested INSARR missions is usually to assist the regulatory authority in reviewing the safety of a research reactor or to assist an operating organization with the safety upgrading of a research reactor.

Mission findings

3. Most of the research reactors visited have been found to be in fairly good (often very good) condition and to be manned by experienced and knowledgeable staff. However, at many older reactors at least some of the instrumentation and control equipment - including equipment for radiation protection monitoring - has been found to be in need of renewal. Often, renewal projects had already been initiated by the operating organizations in question, and the INSARR team's task was essentially to assist the operating organization's staff in assessing the adequacy of the renewal projects.

4. On the other hand, INSARR missions have quite often revealed that reactor safety reports are not updated (documents relating to modifications not being integrated into them) and that procedures for reactor operation, reactor maintenance, periodic testing of the reactor, radiation protection and emergency situations are incomplete or have not been updated. Also, in many cases it has been found that quality assurance programmes are not enforced or are lacking altogether and that record-keeping is poor.

5. As a rule, the findings are discussed extensively with the staff during the mission and then presented to the management at a formal "exit meeting". Subsequently, a detailed report is prepared by the Secretariat and sent to the government of the visited Member State.

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* See Annex C-5 of the Attachment to document GC(39)/INF/8 for background information on the INSARR services.

Missions within the technical co-operation framework

6. In addition to INSARR missions as described above, the Secretariat has organized INSARR-type missions to several Member States for the purpose of helping them to license and commission new research reactors. Such missions are carried out within the framework of the Agency's technical co-operation programme, and there have been two this year - to Colombia and the Syrian Arab Republic.

New safety documents

7. Three new Safety Practices documents are being developed, on: (i) the provision of radiation protection services for research reactors; (ii) the training and qualification of operating personnel for research reactors; and (iii) safety instrumentation for research reactors. It is expected that they will be ready for publication early next year.

8. Also, detailed guidance (to be published as an IAEA-TECDOC) on the conduct of research reactor safety reviews has been developed in the light of the experience gained during INSARR missions. The guidance is intended for INSARR teams, but it could be very useful to regulatory authorities, operating organization managements and the like.

INSARR MISSIONS

	1972-1976	1977-1981	1982-1986	1987-1991	1992-1996
(INSARR missions pursuant to project or supply agreements with the Agency)					
Argentina	1973 (2)	1978 (2)			1992(2)
Chile	1973	1977	1986	1991	
Finland	1976	1981		1987	
Greece	1972, 1976		1982, 1986		1993
Indonesia	1972, 1974	1978, 1979	1982, 1986		1994
Iran, Islamic Rep. of	1972, 1976			1990	
Jamaica			1986		1994
Japan	1976				
Malaysia		1977	1982, 1986		
Mexico	1972, 1973 (3)	1977(4),1981(4)	1986 (4)		1994
Norway				1987, 1988	
Pakistan	1976		1985		
Peru		1978, 1981		1987	1992
Philippines	1972, 1973, 1975	1978	1983		
Romania			1983		1992
Spain			1982, 1986		
Thailand	1974	1978	1982	1987	
Turkey		1977	1986		1992
Uruguay	1974	1978, 1979	1984		
Viet Nam			1985	1989	1995
Venezuela	1975	1979	1984	1988	
Yugoslavia (Slovenia)	1976		1985		1992
Zaire		1979	1984		1996
(INSARR missions at the request of Member States)					
Bangladesh					1995
Bulgaria				1990	
Brazil	1993	1977		1991	
Chile				1991	
Colombia		1977	1983	1987	
Egypt			1985		
Hungary			1983	1989	1993
Indonesia		1979	1982, 1986		
Iraq				1988(2)	
Korea, Rep. of	1976		1982(2)	1988(2)	
Peru					1992
Portugal					1992
Turkey					1998
Ukrainian SSR				1991	
USSR				1990(2)	
Yugoslavia (Serbia)			1985		
Kazakstan					1993
Uzbekistan					1993
No. of missions in period	25	27	32	21	19

APPENDIX C-5-6

THE ASSESSMENT OF SAFETY CULTURE IN ORGANIZATIONS TEAM (ASCOT) SERVICE*

1. During the past year ASCOT seminars have been conducted in Hungary (with 22 participants) and Mexico (with 70 participants).

2. Increasingly, ASCOT seminars are being attended not only by staff from nuclear power plant operating organizations but also by representatives of regulatory bodies, utility corporate headquarters and supporting organizations. This trend is being encouraged by the Secretariat.

3. As it is felt that safety culture can be fully comprehended only in the context of the relevant national conditions, a presentation on national experience with strengthening safety culture has become an established feature of ASCOT seminars.

4. The indicators of safety culture now found in most operating organizations include: awareness of safety culture issues; commitment to good safety performance and to continuous safety performance evaluation and improvement; commitment to good safety performance as an end in itself and not merely as a means of satisfying regulatory requirements; investigation of the fundamental causes of events or "near misses"; the examination of activities with potential safety impacts; a co-ordinated programme of regular safety audits; and efforts to learn from the safety performance of other organizations.

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* See Annex C-8 of the Attachment to document GC(39)/INF/8 for background information on the ASCOT service.

APPENDIX C-5-7

THE INCIDENT REPORTING SYSTEM (IRS)*

Reporting to the IRS

1. During the one-year period ending June 1996, the Agency's Secretariat received 110 IRS reports.

Joint IAEA-NEA Advisory Committee

2. In August 1995, the Agency and OECD/NEA formally approved the constitution of a Joint IAEA-NEA Advisory Committee with the task of helping the two organizations to make the best use of the IRS and to ensure that its high level of efficiency is maintained. The Committee - comprising three members from OECD countries, two from non-OECD countries and one representative of each of the two organizations - will meet at least once a year. The first meeting took place in Vienna in March 1996. One of the conclusions reached by the Advisory Committee at that meeting was that the Secretariat should develop a network version of the Advanced Incident Reporting System (AIRS), which already contains over 2400 reports.

3. On the recommendation of the Joint IAEA-NEA Advisory Committee, work has started on the development of joint OECD/NEA-Agency guidelines regarding the operation of the IRS. The existing separate OECD/NEA guidelines and Agency guidelines (the latter contained in Part II of Safety Series No. 93), and also suggestions which have been made by IRS participating countries, are serving as input into this work.

Release of the AIRS database

4. A test version of the AIRS database - containing full report texts with illustrations and annotations - was distributed (on CD-ROM) to the National Co-ordinators of the IRS participating countries in October 1995, and in November a group of consultants examined the test results. In October 1995 and May 1996 training workshops were held for AIRS database users. Improvements were made to the test version on the basis of feedback from the users, and the resulting version (Version 1.0) was released at the end of June 1996.

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* See Annex D-3 of the Attachment to document GC(39)/INF/8 for background information on the IRS.

Joint OECD/NEA-Agency meeting

5. The 1996 joint OECD/NEA-Agency meeting on the exchange of information about recent events at NPPs was held (together with the 1996 meeting of IRS National Co-ordinators) in Paris from 22 to 26 April 1996. There were 50 participants from 22 countries and three international organizations.

6. The national presentations indicated that problems with batteries, valves, fuel and control rods, pressure tubes and signal systems had been the main causes of recent events at NPPs, that foreign material intrusion and corrosion had also caused some events and that events occurring during shutdown were still a source of concern.

Other recent developments

7. Since the 1995 session of the General Conference, groups of consultants have carried out studies on the following topics: "Operational experience feedback: national topical/generic studies"; "The better reporting of causes (including human performance) and learning points for events reported to the IRS"; "Single human failures in nuclear power plants: a human factors approach to event analysis"; and "IRS events connected with activities of vendors and contractors at NPPs".

8. In December 1995, the Agency published a report on IRS highlights during the period 1994-95.[1] Also, the Secretariat has begun preparing a general leaflet about the IRS, its mode of operation and the benefits to be expected from it - for distribution to the public - and an IAEA-TECDOC on operational safety experience feedback through the use of reports on unusual events.

Peer review

9. At the request of Slovakia, a peer review of the national incident reporting system was carried out in July 1995, the objective being to provide the regulatory authority with an independent opinion regarding the operational experience feedback process.

Outlook

10. The Secretariat intends to collaborate more closely with OECD/NEA

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[1] The report briefly describes five of the most significant events which occurred during the period 1994-95, identifies certain generic issues, identifies new problems and contains recommendations for future international studies.

- in endeavouring to increase the reporting rate, so that all events of interest to the international community from the point of view of lessons to be learned are reported, and

- in examining the quality of IRS reports with a view to increasing their usability in the evaluations and analyses performed by IRS national co-ordinators.

APPENDIX C-5-8

THE INTERNATIONAL NUCLEAR EVENT SCALE (INES)*

1. INES is now used by 59 countries for facilitating rapid communication between the nuclear community, the media and the public regarding the significance of nuclear events.

Information on events

2. During the period July 1995-June 1996, the Agency received and disseminated information relating to 73 events - 64 at NPPs and nine at other nuclear facilities. Of those 73 events, 32 were stated to be "below scale" (i.e. safety-relevant but of no safety significance) and three to be "out of scale" (i.e. of no safety relevance). Of the remaining 38 events, three were rated at INES level 3 and eight at level 2 (i.e. as "incidents"), and 27 at level 1 (i.e. as "anomalies").

Recent developments

3. Since the 1995 session of the General Conference, the following INES-related activities have taken place:

- INES seminars have been held in Bulgaria, Kazakhstan and Romania;
- an annual meeting of INES National Officers has been held (in October 1995), with the emphasis on national communication policies and practices;
- progress has been made in developing an INES computerized rating procedure based on defence-in-depth criteria; and
- work has started on preparing an information leaflet and video designed to give the media and the public a better understanding of INES.

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* See Annex D-4 of the Attachment to document GC(39)/INF/8 for background information on INES.

ANNEX C-6

RADIOLOGICAL ASSESSMENTS

1. At the request of Member States and pursuant to its statutory obligation to provide for the application of its safety standards, the Agency has in recent years organized a wide variety of international radiological assessments. Three such radiological assessments are described below. The first two are related to radioactive residues from nuclear weapons testing, the other to radioactive residues from the nuclear propulsion of submarines and icebreakers. An additional assessment, a study of the radiological situation at the Atolls of Mururoa and Fangataufa, is dealt with in a separate information document prepared for the General Conference (GC(40)/INF/4).

Bikini Atoll

2. At the end of last year, pursuant to a request made by the Republic of the Marshall Islands, which became an Agency Member State in January 1994, the Agency organized an international assessment of the radiological situation at Bikini Atoll. For that purpose it convened an advisory group of experts from Australia, France, Japan, New Zealand, Russia, the United Kingdom, the United States, WHO, UNSCEAR and the Agency itself to assess the habitability of Bikini Atoll with a view in particular to answering - once and for all - the question whether the Bikini people, who had been evacuated from the atoll before the start of nuclear testing, could return safely to it and resume living there. In the light of a meeting of the advisory group held at the Agency's Headquarters in December 1995 and attended by a delegation of the Bikini people, the Secretariat is preparing a technical report on the radiological situation at Bikini Atoll and a companion version for the non-scientific public.

3. The following account of the assessment of the radiological situation at Bikini Atoll draws on material which will serve as a basis for those reports.

Historical context

4. Between 1946 and 1958, Bikini Atoll was used for atmospheric tests of nuclear weapons. It was the site of 23 of the 66 underwater, ground-level and above-ground tests conducted in the Marshall Islands. The yield of the tests at Bikini Atoll was about 72% of the total 1.1×10^5 kilotonnes TNT equivalent. As a result of the above-ground tests, and in particular the high-yield CASTLE series of tests, the land surfaces and the lagoon became extensively contaminated with radionuclides, of which caesium-137 subsequently proved to be the most radiologically important.

5. The inhabitants of Bikini Atoll were voluntarily relocated to Kili, a small island remote from the testing, but some of them returned after a preliminary radiological survey of the atoll in 1970.

6. Measurements carried out between 1975 and 1978, however, revealed that the caesium-137 body contents of the resettled people had increased by factors of about ten since their return to the atoll. The increase was attributed to high caesium uptake from the soil by coconut trees, producing high caesium concentrations in the coconut milk and flesh consumed by the Bikini islanders, so that in 1978 the population was again relocated. Scientific studies of the radiological conditions at Bikini Atoll have continued, but the population has not so far been able to return.

The present radiological situation

7. It is considered that, without remedial action or restrictions on their behaviour, returnees to Bikini Atoll would on average receive an annual dose of 4 mSv from the remaining contamination. The highest plausible doses to individuals who might consume only locally grown foods rather than the more typical mix of local and imported foods are estimated to be about 15 mSv/year.

8. The projected doses are largely from caesium-137 in foods and the soil. As regards the other radionuclides still present at significant levels, strontium-90 uptake in foods is low because of strong competition from high levels of (chemically similar) calcium, while plutonium and americium isotopes are largely "trapped" in lagoon sediments, uptake into fish and other forms of seafood being extremely low.

Relevant radiological protection criteria

9. In radiological protection terms, the contamination of Bikini Atoll represents a chronic exposure situation in which one form of intervention (evacuation of the population) has already occurred and other forms of intervention (remedial measures) are being considered in order to allow the population to return. International radiological protection guidance on intervention in a range of chronic exposure situations suggests that some form of intervention to reduce or avert exposure is normally necessary if doses to the most exposed people would otherwise exceed about 10 mSv/year.

Remedial measures

10. The remedial strategy preferred by the advisory group is soil removal in residential areas and potassium treatment of the existing soil in crop-growing areas. Soil removal would reduce doses from external exposure, and from inhalation and inadvertent ingestion of soil, in the areas where islanders spend most time. The potassium treatment would reduce doses from intakes of caesium in food, the main contributor to the overall projected doses.

11. The Bikini soils are deficient in potassium, so that caesium - which is chemically similar - is readily taken up by plants. Experiments have shown that if potassium, in the form of fertilizer or potassium chloride, is added to soils so that there is much more potassium than caesium available to plants, the uptake of caesium can be reduced dramatically. On the basis of extensive trials, it has been estimated that a programme of potassium treatment, repeated every 4-5 years, would reduce caesium-137 concentrations in typical Bikini foods to well below the Agency-endorsed FAO/WHO Codex Alimentarius guidelines for international trade in foodstuffs. Projected doses would be reduced to about 0.4 mSv/year from the normal mix of local and imported foods, or to 1.2 mSv/year from a diet of exclusively local produce.

12. An alternative option would be to remove the topsoil from the crop-growing areas as well as the residential ones. This would undoubtedly be effective in reducing exposures, perhaps more so than the potassium treatment. However, it would generate very large volumes of soil requiring safe disposal. Furthermore, replacement soil would need to be imported. The financial, environmental and social costs of this option would probably be much greater than what is normally considered to be justified by the benefit in terms of reduced radiation exposures.

Conclusions

13. On the basis of the advisory group's deliberations, it has been concluded that:

(a) there are technically and financially feasible remedial measures which would allow Bikini Atoll to be reinhabited in accordance with international radiological protection principles;

(b) if the preferred remedial strategy is adopted, regular foodstuff monitoring should be instituted in order to ensure that the strategy is effective (a local whole-body monitor might enable the Bikini residents to reassure themselves that caesium uptake remains low); and

(c) a technical co-operation project should be prepared with a view to helping the Republic of the Marshall Islands to resolve any remaining problems associated with the radiological situation at Bikini Atoll.

The Semipalatinsk test site

14. In 1994, at the request of the Government of Kazakstan, the Agency initiated a radiological assessment of the former nuclear test site to the east of the Kazakh city of Semipalatinsk (the Semipalatinsk test site). The site, with an area of some 19 000 km^2, is located in the north-eastern part of Kazakstan, about 800 km north of the capital Almaty.

Historical background

15. At this site, 467 nuclear tests with a total yield of about 2×10^4 kilotonnes TNT equivalent were carried out during the period 1949-89, for military and peaceful purposes.

16. The earliest tests were carried out above ground (atmospheric and surface tests), 124 above-ground tests being carried out between 1949 and 1962. The above-ground tests released significant amounts of caesium-137, strontium-90 and plutonium into the atmosphere. Much of the plutonium was released in the course of five failed tests.

17. The other 343 tests were carried out underground. In one of them, carried out in 1965 for the purpose of building a dam across a small river, venting resulted in the release of radioactivity into the atmosphere and in the formation of a lake (which became known as "Lake Balapan").

The Agency expert survey and review team

18. According to records made available to the expert team assembled by the Agency's Secretariat, most of the radioactivity released into the atmosphere (the "radioactive plumes") travelled south to beyond the southern boundary of the test site and then veered sharply east and soon after that sharply north. There are now some 30-40 000 people living in settlements, close to - but outside - the test site boundary, above which radioactive plumes passed. It is the radiological situations at these settlements which constitute the principal concern of the Government of Kazakstan.

19. The expert team visited some of the settlements in order to assess the current radiological situations in the areas in question. The experts measured external gamma dose rates and radionuclide concentrations in food (such as meat, milk and vegetables) and environmental samples (such as grass, soil and moss) and studied the use which people were making of the environment.

20. In view of the fact that the estimated average annual exposure of persons outside the test site due to the residual radioactive material is less than 0.1 mSv[1], or around one twentieth of the average natural background, the expert group has concluded that a more detailed radiological assessment should not be regarded as a priority task.

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[1] This estimate is deliberately conservative; actual exposures are likely to be lower and close to the global average from fallout.

On-site radiological conditions

21. There are fewer measurement data available from within the test site. However, there is sufficient evidence to indicate that most of the test site is no different from the surrounding region. Clear exceptions are the Ground Zero and Lake Balapan areas, which are heavily contaminated. The measurements carried out in the Ground Zero area are sufficient for determining the contamination pattern; they indicate, in particular, that the contamination is relatively localized. The expert group has recommended a similar type of survey for the Lake Balapan area in order to determine whether the same conclusion applies.

22. There is no restriction of access to the test site, and limited reoccupation has already begun. An assessment of the exposure of a critical group of settlers who visit the Ground Zero and Lake Balapan areas on a daily basis has been undertaken. It indicates annual exposures of about 10 mSv, due predominantly to external radiation. There are not yet any permanent settlements within the Ground Zero and Lake Balapan areas. Should permanent settlements be established there in the future, the estimated annual exposures would be approximately 140 mSv/year. This is well in excess of the intervention level for chronic exposure situations given in paragraph 9 above, and restriction of public access to these areas is recommended as the most feasible and effective protective action.

The International Arctic Seas Assessment Project

Background

23. An International Arctic Seas Assessment Project (IASAP) was launched in 1993 to address concerns over the potential health and environmental impacts of radioactive waste (including spent fuel in six submarine reactors and in a fuel assembly from an icebreaker reactor) dumped in shallow waters of the Kara and Barents Seas, near the Novaya Zemlya nuclear test site. The IASAP is being executed in connection with the Agency's responsibilities under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention 1972), and the progress of the IASAP has been reviewed each year by a group of senior scientists who are responsible for preparing the final IASAP report with recommendations for presentation to the Contracting Parties to the London Convention by the end of 1996.

24. A report on the IASAP was submitted to the General Conference last year in Attachment 3 to document GC(39)/11. As indicated in that report, the dumped waste does not involve a significant environmental risk at present.

25. Since the General Conference's 1995 session, possible time patterns for future releases of long-lived radionuclides from the dumped waste have been worked out on the basis of analyses of the weak points of protective barriers and assessments of protective barrier and spent fuel corrosion.

Predicted future radiological impact

26. The results of critical group dose and collective dose calculations performed on the basis of predicted radionuclide releases are still being analysed. They indicate, however, that on the global and regional scale the future risks to human health and the environment associated with the dumped waste are extremely low. Also, the calculations show that the future radiation doses to members of the indigenous population groups living on the northern coast of Russia are likely to be trivial. The future doses to one of the potentially critical groups, soldiers patrolling the shores of the bays of Novaya Semlya (the actual dumping sites), are expected to be somewhat higher - but not dissimilar to general background levels.

Remedial actions

27. The feasibility and costs of potential remedial actions, such as the in situ capping or the retrieval of the major dumped objects, have been assessed for on test case, as have the associated doses to the workforce carrying out the remediation. The costs would be very high relative to the possible avertable doses. On the other hand, if the remedial actions were taken for reasons other than radiological protection ones, the associated exposure of the workforce would probably not be significant.