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

1. A Draft Nuclear Safety Review for the Year 2000 was discussed at the March 2001 session of the Board of Governors (GOV/2001/2). That document was in three parts: Part 1 described safety related events and developments worldwide in 2000; Part 2 was a very brief overview of the Agency's safety related activities during 2000; and Part 3 was a brief look ahead to some issues that are likely to be prominent in the coming year(s). The Nuclear Safety Review for the Year 2000 was subsequently modified on the basis of the discussion in the Board and other comments received from Member States, and published separately.[1] Accordingly, the text of the Nuclear Safety Review is not reproduced in this document.

2. This document presents an overview of recent measures taken by the Agency to strengthen international co-operation in nuclear, radiation, transport and waste safety, up to mid-2001. It is also intended in part to provide information requested in GC(44)/RES/11 on developments in a number of safety related areas.

3. The Attachments address the Agency's activities in the context of the three main elements of the global safety culture:

(a) Legally binding international instruments, such as safety related conventions are addressed in Attachment 1;

(b) Internationally accepted safety standards (Attachment 2); and

(c) Application of those safety standards (Attachments 3–7). This includes:

[1] See IAEA/NSR/2000, July 2001. The published version of the Nuclear Safety Review for the Year 2000 is also available on the Agency's Web site at www.iaea.org/ns/CoordiNet/documents/NSR2000_web.pdf.

— Providing direct safety related assistance to Member States (see Attachment 3 and GC(45)/INF/4);

— Fostering the exchange of safety related information (see Attachment 4);

— Encouraging education and training (see Attachment 5 and GOV/INF/2001/9-GC(45)/INF/6);

— Rendering a wide range of safety review services (see Attachment 6); and

— Co-ordinating and supporting safety related research and development (see Attachment 7).

Many of these activities are supported through the technical co-operation (TC) programme.

4. Separate documents submitted to the policy-making organs pursuant to their specific decisions or resolutions provide information on particular Secretariat actions on safety related subjects:

- GOV/2001/28-GC(45)/11 addresses issues related to the safety of nuclear installations, particularly the safety of research reactors;

- GOV/20001/29-GC(45)/12 covers issues in radiation safety, namely: the safety and security of radiation sources; the scope of radiation safety regulations; the radiological protection of patients; occupational radiation protection; and emergency preparedness and response;

- GOV/20001/30-GC(45)/13 covers the safe transport of radioactive materials;

- GOV/20001/31-GC(45)/14 covers the safety of radioactive waste management (including the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management) and the restoration of sites affected by residual radioactive material; and

- GOV/INF/2001/9-GC(45)/INF/6 addresses education and training in nuclear, radiation, transport and waste safety.

# ATTACHMENT 1

# STATUS OF SAFETY RELATED CONVENTIONS

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

- the *Convention on Early Notification of a Nuclear Accident* (which was opened for signature on 26 September 1986 and entered into force on 27 October 1986);
- the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency* (which was opened for signature on 26 September 1986 and entered into force on 26 February 1987);
- the *Convention on Nuclear Safety* (which was opened for signature on 20 September 1994 and entered into force on 24 October 1996); and
- the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (which was opened for signature on 29 September 1997 and entered into force on 18 June 2001).

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

3. The attached table shows a summary the status of each of the safety related conventions as of 30 June 2001, and relevant events since the last General Conference are described below. Up-to-date information on the status of the conventions is also available on the Agency's WorldAtom Web site, at www.iaea.org/worldatom/Documents/Legal/.

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

4. The Convention has not been formally invoked in the period since the last session of the General Conference. However, the Agency's emergency notification system was used to notify Member States about the discovery in November 2000 of wrist watches in France that contained components contaminated with cobalt-60.

5. Two States — the Islamic Republic of Iran and Luxembourg — have ratified or acceded to the Convention in the past year. As of 30 June 2001, there were 86 Contracting Parties to the Convention (83 States and three organizations).

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[1]. Three other safety related conventions for which the Director General performs depositary functions are the Convention on the Physical Protection of Nuclear Material, the Vienna Convention on Civil Liability for Nuclear Damage (and the Protocol to Amend the Vienna Convention) and the Convention on Supplementary Compensation for Nuclear Damage. These are outside the scope of this document.

6. The Agency, along with 55 States and five other organizations, participated in the Joint International Emergency Exercise JINEX 1 in May 2001. The exercise was jointly organized and co-ordinated through the Inter-Agency Committee on Response to Nuclear Accidents (IACRNA). The exercise served as an opportunity to test the IAEA's Emergency Response System, to train/retrain staff in their roles and responsibilities and to provide feedback on how the system can be improved. The overall conclusion about the exercise was that the IAEA's obligations were met and that its Emergency Response System was working well. Valuable lessons were drawn with regard to possible improvements in the area of procedures, logistics and equipment.

7. The Agency has adopted a new emergency response framework for fulfilling its obligations in relation to emergency preparedness and response. A meeting was organized in June 2001 for contact points designated by Member States in relation to the Early Notification and Assistance Conventions to provide feedback on their experience to date with the new framework and advice to the Agency on how to proceed. Further information on the outcome of this meeting is given in GOV/2001/29-GC(45)/12.

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

8. Since the last session of the General Conference, the Agency has received and responded to several requests for assistance. These included requests for urgent assistance in relation to: [2]

(a) the discovery of about 250 plutonium–americium sources by a customs officer in northern Greece; and

(b) the overexposure of 28 radiotherapy patients at a radiation oncology unit in Panama.

9. As of 30 June 2001, there were 82 Contracting Parties to the Convention (79 States and three organizations), three States — the Islamic Republic of Iran, Lithuania and Luxembourg — having ratified or acceded to the Convention in the past year.

**Convention on Nuclear Safety (INFCIRC/449)**

10. An Organizational Meeting will be held in Vienna beginning on 25 September 2001 to prepare for the second Review Meeting of the Contracting Parties to the Convention. The Organizational Meeting will, inter alia, allocate Contracting Parties to Country Groups for the Review Meeting, using an agreed process, and selected Co-ordinators and Rapporteurs for each of these Country Groups. The guidelines regarding the review process, the guidelines regarding national reports, and the rules of procedure and financial rules were

[2] In the interests of conciseness, only requests for urgent safety related assistance have been listed explicitly here.

issued on 15 October 1999 as INFCIRC/571/Rev. 1, INFCIRC/572/Rev. 1 and INFCIRC/573/Rev. 1 respectively.

11. The Review Meeting itself — to review the national reports by each of the Contracting Parties on the measures they have undertaken to implement their obligations under the Convention — will be held in Vienna beginning on 15 April 2002. The deadline for submission of national reports for the Review Meeting is 15 October 2001.

12. A total of 53 Contracting Parties (52 States plus EURATOM) had deposited instruments of ratification, accession or acceptance by the end of June 2001. Of the States that are not Contracting Parties, two — India and Kazakhstan — have at least one nuclear installation that has achieved criticality in a reactor core.

**Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (INFCIRC/546)**

13. The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was adopted on 5 September 1997 and opened for signature on 29 September 1997.

14. On 20 March 2001, Ireland deposited its instrument of ratification with the depositary, bringing the number of States that had adhered to the Convention to 25, of which 17 had at least one operational nuclear power plant. Article 40.1 states that: "The Convention shall enter into force on the ninetieth day after the date of deposit with the Depositary of the twenty-fifth instrument of ratification, acceptance or approval, including the instruments of fifteen States each having an operational nuclear power plant." The Joint Convention therefore entered into force on 18 June 2001. As of 30 June 2001, 26 States had adhered to the Convention.

15. A Preparatory Meeting will be held in Vienna, beginning on 10 December 2001. The meeting will, inter alia, adopt rules of procedure and financial rules, guidelines for the review process and guidelines for national reports. Further information on the Joint Convention's entry into force and implementation is given in GOV/2001/31-GC(45)/14.

# TABLE

## STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 2001

In the table below:

- a date in bold type indicates, for a Contracting Party, the year of the deposit of an expression of consent to be bound (i.e. an instrument of ratification, accession, acceptance, etc.) with the depositary;
- a date in parentheses indicates, for a signatory which is not a Contracting Party, the year of signature; and
- (ocp) indicates, for a State or organization which is not a signatory or a Contracting Party, that an official contact point for the purposes of the relevant convention has been made known to the Secretariat. Unless otherwise indicated, signatories of and Contracting Parties to the Early Notification and Assistance Conventions have notified the Agency of an official contact point.

**STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 2001**

| | Early Notification | Assistance | Nuclear Safety | Joint Convention |
|---|---|---|---|---|
| **IAEA Member States** | | | | |
| Afghanistan | (1986)[a] | (1986)[a] | | |
| Albania | | | | |
| Algeria | (1987) | (1987) | (1994) | |
| Angola | | | | |
| Argentina | **1990** | **1990** | **1997** | **2000** |
| Armenia | **1993** | **1993** | **1998** | |
| Australia | **1987** | **1987** | **1996** | (1998) |
| Austria | **1988** | **1989** | **1997** | **2001** |
| Azerbaijan | (ocp) | (ocp) | | |
| Bangladesh | **1988** | **1988** | **1995** | |
| Belarus | **1987** | **1987** | **1998** | (1999) |
| Belgium | **1999** | **1999** | **1997** | (1997) |
| Benin | | | | |
| Bolivia | (ocp) | (ocp) | | |
| Bosnia and Herzegovina | **1998** | **1998** | | |
| Brazil | **1990** | **1990** | **1997** | (1997) |
| Bulgaria | **1988** | **1988** | **1995** | **2000** |
| Burkina Faso | | | | |
| Cambodia | | | | |
| Cameroon | (1987) | (1987) | | |
| Canada | **1990** | (1986) | **1995** | **1998** |
| Central African Republic | | | | |
| Chile | (1986) | (1986) | **1996** | |

**STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 2001**

| | Early Notification | Assistance | Nuclear Safety | Joint Convention |
|---|---|---|---|---|
| China | **1987** | **1987** | **1996** | |
| Colombia | (ocp) | (ocp) | | |
| Costa Rica | **1991** | **1991** | | |
| Côte d'Ivoire | (1986) | (1986) | | |
| Croatia | **1992** | **1992** | **1996** | **1999** |
| Cuba | **1991** | **1991** | (1994) | |
| Cyprus | **1989** | **1989** | **1999** | |
| Czech Republic | **1993** | **1993** | **1995** | **1999** |
| Democratic Republic of the Congo | (1986) | (1986) | | |
| Denmark | **1986** | (1986) | **1998** | **1999** |
| Dominican Republic | | | | |
| Ecuador | (ocp) | (ocp) | | |
| Egypt | **1988** | **1988** | (1994) | |
| El Salvador | | | | |
| Estonia | **1994** | **1994** | | (2001) |
| Ethiopia | (ocp) | (ocp) | | |
| Finland | **1986** | **1990** | **1996** | **2000** |
| France | **1989** | **1989** | **1995** | **2000** |
| Gabon | (ocp) | (ocp) | | |
| Georgia | (ocp) | (ocp) | | |
| Germany | **1989** | **1989** | **1997** | **1998** |
| Ghana | (ocp) | (ocp) | (1995) | |
| Greece | **1991** | **1991** | **1997** | **2000** |
| Guatemala | **1988** | **1988** | | |
| Haiti | | | | |
| Holy See | (1986) | (1986) | | |
| Hungary | **1987** | **1987** | **1996** | **1998** |
| Iceland | **1989** | (1986) | (1995) | |
| India | **1988** | **1988** | (1994) | |
| Indonesia | **1993** | **1993** | (1994) | (1997) |
| Iran, Islamic Republic of | **2000** | **2000** | | |
| Iraq | **1988** | **1988** | | |
| Ireland | **1991** | **1991** | **1996** | **2001** |
| Israel | **1989** | **1989** | (1994) | |
| Italy | **1990** | **1990** | **1998** | (1998) |
| Jamaica | (ocp) | (ocp) | | |
| Japan | **1987** | **1987** | **1995** | |
| Jordan | **1987** | **1987** | (1994) | |
| Kazakhstan | (ocp) | (ocp) | (1996) | (1997) |
| Kenya | (ocp) | (ocp) | | |
| Korea, Republic of | **1990** | **1990** | **1995** | (1997) |
| Kuwait | (ocp) | (ocp) | | |
| Latvia | **1992** | **1992** | **1996** | **2000** |
| Lebanon | **1997** | **1997** | **1996** | (1997) |

**STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 2001**

| | Early Notification | Assistance | Nuclear Safety | Joint Convention |
|---|---|---|---|---|
| Liberia | | | | |
| Libyan Arab Jamahiriya | (ocp) | **1990** | | |
| Liechtenstein | **1994** | **1994** | | |
| Lithuania | **1994** | **2000** | **1996** | (1997) |
| Luxembourg | **2000** | **2000** | **1997** | (1997) |
| Madagascar | (ocp) | (ocp) | | |
| Malaysia | **1987** | **1987** | | |
| Mali | (1986)[a] | (1986)[a] | **1996** | |
| Malta | (ocp) | (ocp) | | |
| Marshall Islands | | | | |
| Mauritius | **1992** | **1992** | | |
| Mexico | **1988** | **1988** | **1996** | |
| Monaco | **1989** | **1989** | (1996) | |
| Mongolia | **1987** | **1987** | | |
| Morocco | **1993** | **1993** | (1994) | **1999** |
| Myanmar | **1997** | (ocp) | | |
| Namibia | | | | |
| Netherlands | **1991** | **1991** | **1996** | **2000** |
| New Zealand | **1987** | **1987** | | |
| Nicaragua | **1993** | **1993** | (1994) | |
| Niger | (1986) | (1986) | | |
| Nigeria | **1990** | **1990** | (1994) | |
| Norway | **1986** | **1986** | **1994** | **1998** |
| Pakistan | **1989** | **1989** | **1997** | |
| Panama | **1999**[a] | **1999**[a] | | |
| Paraguay | (1986) | (1986) | | |
| Peru | **1995** | **1995** | **1997** | (1998) |
| Philippines | **1997** | **1997** | (1994) | (1998) |
| Poland | **1988** | **1988** | **1995** | **2000** |
| Portugal | **1993** | (1986) | **1998** | |
| Qatar | (ocp) | (ocp) | | |
| Republic of Moldova | **1998** | **1998** | **1998** | |
| Romania | **1990** | **1990** | **1995** | **1999** |
| Russian Federation | **1986** | **1986** | **1996** | (1999) |
| Saudi Arabia | **1989** | **1989** | | |
| Senegal | (1987) | (1987) | | |
| Sierra Leone | (1987)[a] | (1987)[a] | | |
| Singapore | **1997** | **1997** | **1997** | |
| Slovakia | **1993** | **1993** | **1995** | **1998** |
| Slovenia | **1992** | **1992** | **1996** | **1999** |
| South Africa | **1987** | **1987** | **1996** | |
| Spain | **1989** | **1989** | **1995** | **1999** |
| Sri Lanka | **1991**[a] | **1991**[a] | **1999** | |
| Sudan | (1986) | (1986) | (1994) | |

**STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 2001**

| | Early Notification | Assistance | Nuclear Safety | Joint Convention |
|---|---|---|---|---|
| Sweden | **1987** | **1992** | **1995** | **1999** |
| Switzerland | **1988** | **1988** | **1996** | **2000** |
| Syrian Arab Republic | (1987) | (1987) | (1994) | |
| Thailand | **1989** | **1989** | | |
| The former Yugoslav Republic of Macedonia | **1996** | **1996** | | |
| Tunisia | **1989** | **1989** | (1994) | |
| Turkey | **1991** | **1991** | **1995** | |
| Uganda | | | | |
| Ukraine | **1987** | **1987** | **1998** | **2000** |
| United Arab Emirates | **1987** | **1987** | | |
| United Kingdom of Great Britain and Northern Ireland | **1990** | **1990** | **1996** | **2001** |
| United Republic of Tanzania | (ocp) | (ocp) | | |
| United States of America | **1988** | **1988** | **1999** | (1997) |
| Uruguay | **1989** | **1989** | (1996) | |
| Uzbekistan | | | | |
| Venezuela | | | | |
| Viet Nam | **1987** | **1987** | | |
| Yemen | (ocp) | (ocp) | | |
| Yugoslavia | **1989** | **1991** | | |
| Zambia | (ocp) | (ocp) | | |
| Zimbabwe | (1986)[a] | (1986)[a] | | |
| **Non-Member States**[b] | | | | |
| Belize | (ocp) | (ocp) | | |
| Cape Verde | (ocp) | (ocp) | | |
| Chad | (ocp) | (ocp) | | |
| Democratic People's Republic of Korea | (1986) | (1986) | | |
| Dominica | (ocp) | (ocp) | | |
| Grenada | (ocp) | (ocp) | | |
| Guinea | (ocp) | (ocp) | | |
| Guinea–Bissau | (ocp) | (ocp) | | |
| Kiribati | (ocp) | (ocp) | | |
| Kyrgyzstan | (ocp) | (ocp) | | |
| Malawi | (ocp) | (ocp) | | |
| Maldives | (ocp) | (ocp) | | |
| Nepal | (ocp) | (ocp) | | |
| Palau | (ocp) | (ocp) | | |
| Papua New Guinea | (ocp) | (ocp) | | |
| Saint Lucia | (ocp) | (ocp) | | |
| Samoa | (ocp) | (ocp) | | |
| Tonga | (ocp) | (ocp) | | |
| Trinidad and Tobago | (ocp) | (ocp) | | |

**STATUS OF SAFETY RELATED CONVENTIONS, 30 JUNE 2001**

| | Early Notification | Assistance | Nuclear Safety | Joint Convention |
|---|---|---|---|---|
| Turkmenistan | (ocp) | (ocp) | | |
| **International Organizations**[b] | | | | |
| Arab Atomic Energy Agency | (ocp) | (ocp) | | |
| European Atomic Energy Community | (ocp) | (ocp) | **2000** | |
| Food and Agriculture Organization | **1990** | **1990** | | |
| International Labour Organization | (ocp) | (ocp) | | |
| League of Arab States | (ocp) | (ocp) | | |
| United Nations Educational, Scientific and Cultural Organization | (ocp) | (ocp) | | |
| United Nations Environment Programme | (ocp) | (ocp) | | |
| United Nations Office for the Coordination of Humanitarian Affairs | (ocp) | (ocp) | | |
| World Health Organization | **1988** | **1988** | | |
| World Meteorological Organization | **1990** | **1990** | | |

[a] Signatories and Contracting Parties which have not notified the Agency of an official contact point.

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

# ATTACHMENT 2

# STATUS OF THE AGENCY'S SAFETY STANDARDS

## Background

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

2. Member States were informed in GOV/INF/2001/1 of recent developments in the safety standards programme, and of the current procedures for preparation and review of safety standards. The uniform preparation and review process adopted by the Agency for safety standards includes a set of standing review bodies with harmonized terms of reference, namely the Commission on Safety Standards, the Nuclear Safety Standards Committee (NUSSC), the Radiation Safety Standards Committee (RASSC), the Waste Safety Standards Committee (WASSC) and the Transport Safety Standards Committee (TRANSSC). Each of these bodies has a Scientific Secretary selected from the Agency's staff who co-ordinates the work of the body with the relevant Agency policies and programmes. A Technical Officer from the Agency's staff is responsible for the preparation of relevant documents in accordance with recommendations made.

## International basis for the Agency's safety standards

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

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

## The hierarchy of Agency safety standards documents

4. The Agency's safety standards fall into three categories:

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

5. **Safety Reports** give examples and descriptions of methods which can be applied in implementing both Safety Requirements and Safety Guides. These are not safety standards, but are documents for fostering information exchange.

## Availability of safety standards

6. A document outlining the current status of all of the Agency's safety standards is available from the Secretariat, or through the Agency's CoordiNet Web site at www.iaea.org/ns/CoordiNet/safetypubs/sftypub.htm. The full texts of safety standards issued since 1996 (in English) have recently been made available free of charge on the Agency's WorldAtom Web site (see www.iaea.org/worldatom/Books/), and links will be established to these standards from CoordiNet. The Department of Nuclear Safety also distributes, free of charge, about 500 copies of each new safety standard to selected contact points in Member States. Otherwise, hard copies of the safety standards continue to be priced publications.

## Activities of the advisory bodies

7. A brief summary is given below of the main activities of the Commission on Safety Standards and the four Safety Standards Committees since the last session of the General Conference.

8. Eleven safety standards have been published since the last session of the General Conference:

- Safety Requirements on legal and governmental infrastructure for safety;
- two Safety Requirements publications on the safety of nuclear power plants — on design and on operation — and three Safety Guides — on software for computer based systems important to safety, on fire safety in operation and on operational limits and conditions and operating procedures;
- a Safety Guide on building competence in radiation protection and the safe use of radiation sources, co-sponsored by the International Labour Office (ILO), Pan American Health Organization (PAHO) and World Health Organization (WHO);

- Safety Requirements on the predisposal management of radioactive waste, including decommissioning, and Safety Guides on regulatory control of discharges to the environment and on decommissioning of nuclear fuel cycle facilities; and
- the 1996 Edition of the IAEA Regulations for the Safe Transport of Radioactive Material was reissued (in English only), with a number of minor editorial corrections and with a new number consistent with the numbering system of the Safety Standards Series, TS-R-1 (ST-1, Revised). (Errata for the French, Russian and Spanish versions of the 1996 Edition will be available from the Agency's Web site.)

**Commission on Safety Standards**

9. The Commission on Safety Standards (hereafter referred to as "the Commission") is a standing body of senior government officials holding national responsibilities for establishing standards and other documents relevant to nuclear, radiation, waste and transport safety. The Commission 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.

10. The Commission, under the chairmanship of Mr. L. Williams (Health and Safety Executive, United Kingdom), met in November 2000 and May 2001.

11. At its meeting in November 2000, the Commission endorsed the following eight Safety Guides for publication:

- on radiation safety: Building Competence in Radiation Protection and Use of Radiation Sources, to be co-sponsored by the ILO, PAHO and WHO; and Radiation Protection in Medical Exposures, to be co-sponsored by PAHO and WHO;
- on the safety of nuclear power plants: Safety Assessment and Verification for NPPs; Instrumentation and Control for Systems Important to Safety in NPPs; External Person Induced Events in Relation to NPP Site Evaluation; Modification to NPPs; and the Operating Organization for NPPs; and
- on radioactive waste safety: Decommissioning of Nuclear Fuel Cycle Facilities.

12. The Commission agreed that drafting should begin on a Safety Fundamentals publication to cover the basic objectives, concepts and principles of nuclear, radiation, transport and waste safety. This would take account of the advice provided by INSAG in its 1999 report "The Safe Management of Sources of Radiation: Principles and Strategies" (INSAG-11). It is intended that such a publication would supersede the three existing Safety Fundamentals publications (Safety Series Nos 110, 111-F and 120). The Commission stressed the importance of ensuring that principles from the existing Safety Fundamentals are not lost or weakened as a result of the combination into a single publication.

13. In May 2001, the Commission endorsed (subject to some comments being addressed) the content of Safety Requirements on emergency preparedness and response and three Safety Guides:

- Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material;
- Safety Aspects of Core Management and Fuel Handling for NPPs; and
- Dispersion in Air and Water and Consideration of Population Distribution in site Evaluation for Nuclear Power Plants.

It is expected that the Safety Guides will be published in 2001. The Safety Requirements must be approved by the Board of Governors.

14. The Commission also approved the development of new Safety Guides on:

- quality management systems in radiation safety for Regulatory Authorities and users and for technical services in radiation safety;
- design aspects of radiation protection in NPPs; and
- objectives and strategies for monitoring radionuclides in the environment.

**Nuclear Safety Standards Committee (NUSSC),**
**Radiation Safety Standards Committee (RASSC),**
**Waste Safety Standards Committee (WASSC) and**
**Transport Safety Standards Committee (TRANSSC)**

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

16. All four of the committees are involved in reviewing draft Safety Requirements on **emergency preparedness and response**. These were approved by the Committees at their meetings in early 2001 and provisionally endorsed by the Commission in May 2001 (subject to final review and approval by the Chairman of the Commission). The Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (OECD/NEA), the Food and Agriculture Organization of the United Nations (FAO) and WHO have each indicated an interest in co-sponsoring these Safety Requirements.

17. In November 2000, the Commission agreed that a Safety Requirements publication and four Safety Guides should be developed on the **safety of nuclear fuel cycle facilities**. NUSSC will have the lead role in reviewing these standards, but RASSC and WASSC will also be involved in their development. In May 2001, the Commission endorsed the preparation of Safety Requirements for nuclear fuel cycle facilities and of two Safety Guides on fuel fabrication facilities, for uranium and mixed oxide (MOX) fuel respectively.

18. In April 2001, RASSC and WASSC held their second joint meeting to discuss issues of common interest to the two Committees, including the scope of radiation safety regulations and the cleanup of areas contaminated by past activities and accidents.

19. The discussion on the scope of radiation safety regulations followed a meeting of senior experts, organized by the Agency in the United Kingdom in February 2001. A number of interrelated issues have arisen in the context of the Agency's work to develop safety standards on the application of the principles of exclusion, exemption and clearance, on radiological criteria for long-lived radionuclides in commodities (especially foodstuffs and wood — as requested by the General Conference in GC(44)/RES/15) and on national regulatory infrastructures. The senior experts and the RASSC–WASSC meeting agreed that efforts should be made to resolve these issues together, and the RASSC–WASSC meeting therefore decided that further development of all the relevant draft Safety Guides should be delayed until they had been resolved.

20. **NUSSC**, under the chairmanship of Mr. P. Govaerts (Association Vinçotte Nuclear, Belgium), met twice during the past year, in October 2000 and in April 2001.

21. The four draft Safety Guides on legal and governmental infrastructure for the safety of nuclear facilities, for which NUSSC is the lead Committee, were issued to the Committees for final review prior to submission to the Commission at its November 2001 meeting.

22. NUSSC is also the lead Committee for the development of a new suite of safety standards for nuclear fuel cycle facilities. The discussion to date has related primarily to the scope of the standards to be developed and the timescales for their development. A Safety Requirements publication will cover all non-reactor nuclear facilities. The supporting Safety Guides will be written from a design perspective and will relate to specific types of facility.

23. The publication of three Safety Guides on the safety of research reactors is currently on hold, pending the completion of a Safety Requirements publication on design and operation of such reactors. The draft Safety Requirements are well advanced and were reviewed by NUSSC at its April 2001 meeting. NUSSC approved the circulation of the draft to Member States for comment, with a specific request for Member States to provide their views on the exact scope of the term "research reactor".

24. The issue of the independence of the regulatory body was discussed by NUSSC, and a paper was endorsed for inclusion in the draft Safety Guide on organization and staffing of the regulatory body. NUSSC also supported the Agency's circulation of the paper, prior to its formal inclusion in the guidance document, to disseminate the information it contains.

25. **RASSC**, chaired by Mr. G.C. Mason (Australian Radiation Protection and Nuclear Safety Agency) met in October 2000 and April 2001 (the latter meeting included a joint RASSC–WASSC session). Issues covered by the joint RASSC–WASSC session in April 2001 are discussed in paras 21–22 above. The following text describes some other issues discussed by RASSC.

26. At its meeting in October 2000, RASSC decided that the draft Safety Guides on the safety and security of radiation sources[2] should be merged into one. The scope of the Safety

[2] In this context, the safety of radiation sources refers to the safe management and use of sources, whereas security refers to measures to prevent the loss or theft of, or unauthorized access to sources.

Guide should include measures to guard against the theft of sources for reasons unconnected with their radioactive nature (e.g. for scrap metal), but should exclude consideration of deliberate criminal actions involving radiation sources or radioactive material in which the perpetrators are aware of the nature of the material.

27. At its April 2001 meeting, RASSC discussed the security screening of people using backscatter X ray devices, particularly in relation to the requirement in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources for practices involving radiation exposure to be justified. It was noted that the dose from a single scan is very low — of the order of 10 nSv — but that if the practice became widespread there could be potential for individuals to be scanned several times a day. Overall, RASSC's view was that the radiological arguments were not sufficiently compelling to provide a general recommendation on whether or not the practice was justified: the non-radiological issues on both sides would need to be considered in detail, and this would be a matter for national authorities.

28. **WASSC** has met twice since the last session of the General Conference. The meeting in October 2000 was chaired by Mr. P. Metcalf (then of the National Nuclear Regulator, South Africa), and Mr. L. Baekelandt (Federal Agency for Nuclear Control, Belgium) took over as Chairman with effect from the April 2001 meeting. Issues covered by the joint RASSC–WASSC session in April 2001 are discussed in paras 21–22 above. The following text describes some other issues discussed by WASSC.

29. Safety Requirements on predisposal management of radioactive waste were published in 2000, and four Safety Guides on different aspects of the topic are in preparation. WASSC noted that the decision to proceed with a new suite of safety standards on nuclear fuel cycle facilities might affect the scope and content of these Safety Guides. It was therefore agreed that development of the four existing draft Safety Guides should be delayed until the interfaces with the safety standards on fuel cycle facilities had been clarified and any necessary adjustments made.

30. The development of revised safety standards on geological disposal was initiated in 2000, and a first draft of Safety Requirements on this issues is scheduled for review by WASSC at its meeting in October 2001. This work is being supported by a number of information exchange activities aimed at building consensus on issues to be addressed in the standards. A Specialists' Meeting was hosted by the Agency in June 2001.

31. **TRANSSC** met in February 2001 under the chairmanship of Mr. C. Young (Department of Transport, Environment and the Regions, United Kingdom).

32. The requirements of the 1996 edition of the IAEA Transport Regulations (as reissued with errata, in English only, in 2000 as TS-R-1 (ST-1, Revised)) are being introduced into modal, regional and domestic regulations during 2001. An important objective of the TRANSSC meeting was therefore to finalize guidance material to help Member States and international organizations in managing the transition. Two working groups convened by TRANSSC reviewed the outstanding issues in relation to the two Safety Guides supporting the Transport Regulations: Advisory Material for the Regulations for the Safe Transport of Radioactive Material (to be TS-G-1.1) and Emergency Response Planning and Preparedness for Transport Accidents Involving Radioactive Material (to be TS-G-1.2). Subject to the

changes recommended by the working groups to address these issues, TRANSSC recommended that the Safety Guides be published as soon as possible.

33. In April 2000, TRANSSC approved a timetable for work on the next revision of the Transport Regulations. A revision panel met in September 2000 to review more than 200 proposals for change to the Regulations ("proposed changes" and "identified problems") provided by Member States and international organizations, as well as comments received on these proposals. The revision panel:

- accepted 42 proposed changes to the regulations, classifying 13 of them as "minor changes" (editorial or translation errors), 23 as "changes of detail" and six as "major changes";
- resolved 52 guidance issues for the advisory material; and
- prioritized and classified 33 identified problems, two of which required immediate attention.

34. Proposals for "changes of detail" were placed on the IAEA Web site in December 2000 for comment by Member States and international organizations within 90 days. TRANSSC reviewed and modified the output of the revision panel, particularly the proposals for "major changes" and the highest priority "identified problems". Three "changes of detail" were reclassified as "major changes" and TRANSSC proposed a further three "major changes". Proposals for "major changes" were submitted to Member States and international organizations in May 2001 for comment by 31 August 2001. A second revision panel will meet in November 2001 to review the comments received on all proposed changes.

**Membership of NUSSC, RASSC, WASSC and TRANSSC**

35. The current members of the four Committees were appointed for three-year terms which run until the end of 2001. Nominations of senior experts in the relevant fields for membership of the Committees for the 2002-2004 term are being sought from Member States. The Committees normally meet twice a year.

# ATTACHMENT 3

# PROVISION OF SAFETY RELATED ASSISTANCE TO MEMBER STATES

## Background

1. In addition to its Regular Budget activities the Agency helps Member States in their efforts to apply the Agency's safety standards, through technical co-operation (TC) programmes and extrabudgetary programmes (EBPs). In doing so, it attaches high priority to the establishment and strengthening of nuclear, radiation and waste safety infrastructures in Member States. Assistance is provided in the form of experts' services, equipment and training.

2. The current safety related TC programme includes about 160 national, regional and interregional projects (representing total resources of about US $16 million). The projects cover a very wide range of nuclear, radiation, transport and waste safety issues, from the establishment of basic legislative, regulatory and technical infrastructure for the use of radiation and radioactive materials in medicine, research and industry to assistance in further strengthening the much more complex and sophisticated safety infrastructure needed for the development and operation of nuclear reactors. In addition, in the past year about 100 national, regional and interregional workshops and training courses have been organized (the majority, though not all, through the TC Programme) and more than 300 applications for fellowships and scientific visits have been evaluated (see also Attachment 5 and GOV/INF/2001/9-GC(45)/INF/6).

3. Extrabudgetary programmes are currently under way on the safety of nuclear power plants (NPPs) in south-east Asia, the Pacific and the Far East, on RBMK accident analysis, and on intergranular stress corrosion cracking in stainless steel piping of RBMK reactors.

## Technical co-operation in nuclear safety

4. Following the completion of the extrabudgetary programme on the safety of WWER and RBMK NPPs at the end of 1998, several regional projects in the 2001–2002 TC Programme will continue to provide assistance in important areas of safety to the States in central and eastern Europe and the former Soviet Union operating these reactors. This assistance includes training courses, workshops, safety review missions and expert advice. Specific projects are aimed at:

- strengthening the effectiveness of nuclear safety regulatory authorities, so as to enhance their ability to respond to new regulatory challenges;
- strengthening the management of operational safety at NPPs and in utility organizations;

- assisting NPPs and regulatory authorities in harmonizing probabilistic safety assessment (PSA) practices;
- developing/adapting a system for the management of design basis documentation in WWER-1000 NPPs;
- strengthening the safety assessment capabilities of NPP operating and technical support organizations; and
- promoting a comprehensive approach to training in qualified accident analysis for NPPs.

5. Another regional TC project aims to support and strengthen management of operational safety at NPPs and utilities in the Asian region. Activities in this project are being closely co-ordinated with those in the extrabudgetary programme on nuclear safety in the region (see below).

6. Regional TC projects in the European and Latin American regions are aimed at improving the safety of research reactors. Activities in these projects are described in GOV/2001/28-GC(45)/11.

**Extrabudgetary programmes on nuclear safety**

7. The extrabudgetary programme on the **Safety of Nuclear Installations in South East Asia, Pacific and Far East Countries** has focused on enhancing the technical capabilities of regulatory authorities and support organizations, the nuclear safety infrastructure and human resources development. The participating countries are China, Indonesia, Malaysia, the Philippines, Thailand and Viet Nam, and extrabudgetary contributions towards the programme, in cash and/or in kind, are provided by France, Germany, Japan, the Republic of Korea, Spain and the United States of America.

8. An Advisory Group met in October–November 2000 to review the implementation of the programme to date, to discuss plans for Phase III (2001–2002) and to advise on activities and priorities for 2001. Specific activities were proposed on the basis of the Nuclear Safety Action Plans (NSAP), developed for each country to identify the safety improvements and remedial actions required, based on the results of IAEA expert missions (particularly IRRT and INSARR).

9. A regional training course on the safety of research reactors, focusing on operational safety, was held in Japan in November 2000. A regional workshop on safety analysis methodology and computer code utilization was held in the Republic of Korea in February 2001: the first of a series of four workshops to provide training on methods and practices of safety analysis and accident analysis including the use of computer codes. A six-week Basic Professional Training Course on nuclear safety was held at Argonne National Laboratory in the United States of America in March–April 2001. The course deals with IAEA safety standards and a broad range of technical issues relevant to nuclear installations, including site evaluation, design and operation. Selected lectures have been video recorded for distribution

to the participating countries to allow for a wider dissemination of the course lectures as slef-study materials.

10. A database has been developed to assist programme management and to share the information made available at workshops and training courses and the results of review missions. The database was initially distributed to programme participants on CD-ROM, and from April 2001 was made available via the Internet (in password-protected mode).

11. Over the past year, assistance activities carried out by the Agency under the extrabudgetary programme in specific States have focused on the following topics:

- **China**. An IRRT mission in November 2000 advised the regulatory body on specific areas including: the legal basis of the regulatory body; human and financial resources; co-ordination among authorities; and baseline for inspections. Missions relating to the Tianwan NPP reviewed the design of the instrumentation and control system and severe accident safety features. A workshop on the Tianwan reactor protection system was conducted to exchange international experience in the topic. A workshop on PSA was held to provide detailed information on perspectives for using PSA results in risk-informed regulation and inspection. Two missions were also conducted to review PSA studies on Tianwan and Daya Bay NPPs, including the responses to previous IAEA recommendations.
- **Indonesia**. A mission in August 2000 reviewed the upgrade of the Triga Mark II research reactor, and advised on several aspects including the reactor shielding and the seismic design of the modifications. A follow-up of the results of the mission is planned in 2001.
- **Philippines**. An expert mission in April 2001 advised on the enhancement of regulatory infrastructure and functions, and the feasibility of the conceptual design for rehabilitation of the research reactor PRR-1.
- **Thailand**. A mission was conducted to support the Office of Atomic Energy for Peace (OAEP) staff in reviewing the radiological consequence analysis for the ONRC research reactor. An IRRT mission was conducted in February 2001, and advised on regulatory organizations and functions, development of the legislative framework, and establishment of emergency arrangements for the research reactor.
- **Viet Nam**. A mission advised the staff of the Dalat Research Reactor (DRR) Centre on upgrading the Safety Analysis Report for DRR-1. A workshop was held to provide the staff of the regulatory authority with detailed information on different national practices and experiences with the licensing and regulatory inspections of research reactors and relevant IAEA safety standards.

12. An extrabudgetary programme on RBMK accident analysis was established in 1998, based on the Kursk-1 NPP in the Russian Federation. The primary objective of the programme is to verify the applicability of the IAEA's accident analysis methodology to RBMK reactors. The tasks involved include:

- assessing, verifying and validating the codes and models;
- applying the accident analysis methodology, with special attention being paid to beyond design basis accidents; and
- transferring relevant technology and experience.

These tasks, along with a draft technical report describing the work done, were completed in December 2000 as planned.

13. The main objective of the second phase of the project (2001–2002) is to establish the capability on the part of RBMK operators to perform accident analysis. Appropriate training and simulation system will be developed, including specialized training material,

14. Further work is planned for 2001 (subject to the availability of funding) to develop and verify models for graphite heat transfer and hydrodynamic loops, to review and verify existing critical heat flux correlations, to benchmark relevant codes, and to establish RBMK accident analysis training capabilities in the Russian Federation.

15. An extrabudgetary programme to assist countries operating RBMK reactors in establishing effective programmes to mitigate **intergranular stress corrosion cracking** (IGSCC) in austenitic stainless steel piping was initiated in May 2000. The programme activities are guided by a Steering Committee, and are implemented in four areas:

- improvements in in-service inspection performance and qualification;
- comprehensive assessment techniques;
- repair and mitigation; and
- water chemistry and decontamination.

The Steering Committee met in May 2000, December 2000 and May 2001. The final meeting of the Steering Committee is scheduled for May 2002 by which time the programme activities should be complete.

16. In the area of **improvements in in-service inspection performance and qualification**, three manual ultrasonic testing procedures (detection, sizing and weld overlay), sizing search units and calibration blocks were transferred to RBMK specialists. Plant operators have been provided with comprehensive training in the use of these procedures. The sizing procedure was adapted to RBMK reactors and is being used in the qualification pilot study under way, which will result in transfer of performance demonstration technology. The weld overlay procedure will be adapted by December 2001.

17. In the area of **comprehensive assessment techniques**, work is underway to compare various national flaw assessment procedures, to demonstrate examples of target crack sizes in connection with the inspection interval, on root cause analysis, to develop a technical basis

for RBMK pipe damage database and to formulate a risk based inspection pilot programme for an RBMK plant (in co-ordination with the Swedish SIP project at Ignalina).

18. In the area of **repair and mitigation**, a comprehensive information package on repair techniques developed and applied in the USA was transferred to RBMK plants. A training course on advanced repair welding technology, to be held at EPRI in the USA, is under preparation. Close co-ordination has been established with the US Department of Energy's International Nuclear Safety Program related to transfer of mechanical stress improvement process (MSIP) technology. Upon completion in 2002, the activities will facilitate transfer of technology in the areas of manual and automatic welding with minimum heat input, weld overlays, root protection techniques, heat sink welding, and MSIP.

19. In the area of **water chemistry and decontamination**, data are being compiled into a database to identify related issues, to propose optimization of the steam/water cycle chemistry and make-up water treatment, to propose improvements in monitoring of chemical parameters (in co-ordination with the Swedish SIP project at Ignalina), to adapt RBMK water chemistry guidelines and to optimize startup, shutdown and layup procedures as well as decontamination techniques at RBMKs. Plant chemists will receive hands-on training in water chemistry monitoring at a seminar planned to be held at two German BWRs in November 2001.

## Technical co-operation in radiation and waste safety

20. A large part of the TC work related to radiation and waste safety in recent years was carried out within the Model Project "Upgrading of Radiation Protection Infrastructure". For the 2001–2002 TC Programme, this has been replaced by two Model Projects: "Development of Technical Capabilities for Sustainable Radiation and Waste Safety Infrastructure" and "National Regulatory Control and Occupational Radiation Protection Programmes". The aim of these Model Projects is to establish effective national radiation protection and waste safety infrastructures complying with the International Basic Safety Standards. A description of the achievements of the Model Projects to date is provided in GC(45)/INF/4.

21. Under the RCA programme on Enhancement and Harmonization of Radiation Protection, peer review missions were carried out to China, Indonesia, Malaysia, Pakistan and Thailand to review the status of the national radiation safety infrastructure and to assess its effectiveness in implementing the requirements of the International Basic Safety Standards.

22. Other notable TC projects in the radiation and waste safety areas include:

- A regional project on enhancing occupational radiation protection in nuclear power plants in the European region and a regional model project on improving occupational radiation protection in nuclear power plants in the Asian region. These projects aim to improve the implementation of the optimization (ALARA) principle through, inter alia, information exchange meetings of senior health physicists from nuclear power plants and training courses on optimization;

- Projects on harmonizing radiation protection in Asia and Africa, including workshops, training courses, intercomparison studies covering topics such as standards and regulations, accident management and emergency response, radiation protection in medicine, occupational radiation protection and control of radiation sources;
- A project on harmonization and strengthening of regional preparedness and response for nuclear emergencies in central and eastern Europe, aimed at developing a common understanding of the appropriate response to a severe reactor accident. This includes the development of a system of early warning based on reactor conditions, and co-ordinating technical and public information responses;
- A Latin American regional project to provide guidance on the organization of medical response and treatment in cases of accidental overexposure;
- A project aimed at improving radiation protection in medicine in Latin America, through the implementation of the Basic Safety Standards in selected hospitals. A related model project in Cuba aims to establish a national system of radiation protection in diagnostic radiology. A national model project on radiation protection in medicine has also been started in Israel;
- A project on application of safety assessment methodologies for near surface waste disposal facilities in the European region; and
- A new project for the Latin American region on regulatory harmonization and QA programmes for the safe transport of nuclear material.

23. In the 15 years since the Chernobyl accident, the Agency has provided extensive assistance to the affected countries in dealing with the radiological consequences of the accident. With the closure of the last unit of Chernobyl on 15 December 2000, the Agency is attaching high priority to projects aimed at assisting Ukraine to safely take the plant out of service and manage its radioactive waste. One example of this is the inclusion of a new project, “Support for Decommissioning of Chernobyl NPP” in the TC Programme for 2001–2002. The project workplan includes:

- analysis of the organizational and management structure for decommissioning and expert recommendations on possible improvements; and
- review of current national policy documents and expert advice on the development of an overall strategy to decommission units 1 to 3.

24. Other ongoing technical co-operation related to Chernobyl includes a project on reducing external exposures doses in Chernobyl-affected villages in Belarus, the Russian Federation and Ukraine, aimed at demonstrating the potential for significant dose reduction in contaminated settlements and providing the necessary procedures and tools to implement these measures. Related national TC projects include model projects in Belarus — on rehabilitation of Chernobyl-affected territories to create favourable conditions for the

sustainable development of the area — and in Ukraine, on reducing radionuclides in human food and the environment.

25. The decommissioning of nuclear facilities is an increasingly important area of work for the Agency, and this trend is likely to continue in the coming years. For some time the Agency has been providing assistance to Kazakhstan (initially as a TC project and now with extrabudgetary funding from the USA and Japan) in planning the decommissioning of the BN-350 fast breeder reactor, which shut down in 1999, and this assistance is continuing. As described in para. 28 above, a new TC project aims to assist the Government of Ukraine in relation to the decommissioning of Chernobyl NPP. Another new TC project has been started to provide technical advice and training in connection with the decommissioning of Ignalina NPP in Lithuania, and specifically to review the provisions and resources for the planned decontamination and decommissioning activities.

**Legislative and regulatory assistance**

26. In order to foster the establishment of basic legislation as part of an overall safety infrastructure, legislative and regulatory assistance continued to be provided to Member States within the framework of various projects, and under the TC Programme, particularly the Model Project on National Regulatory Control and Occupational Radiation Protection Programmes, a European regional project on legislative assistance for the utilization of nuclear energy, an African project on legislative assistance for the safe and peaceful uses of nuclear energy and an Asian regional model project on legislation for safe and peaceful nuclear applications.

27. This assistance is co-ordinated by the Agency's Legal Division, and provided by teams of lawyers and safety Technical Officers, interacting with the recipient States. In particular, joint working sessions have been held, involving legal and technical specialists from the Agency and their counterparts from the recipient States, to review draft laws and regulations in the light of Member States' obligations under relevant international instruments and Agency safety standards. In particular, assistance during 2000 and up to mid-2001 was provided to 26 countries, namely: Belarus, Bulgaria, Cameroon, Costa Rica, Croatia, Cyprus, Democratic Republic of the Congo, El Salvador, Gabon, Guatemala, Islamic Republic of Iran, Latvia, Madagascar, Mauritius, Mali, Myanmar, Morocco, Namibia, Niger, Senegal, Slovakia, The Former Yugoslav Republic of Macedonia, Tunisia, Uganda, Ukraine and Viet Nam.

28. Such assistance, however, was not limited to the specific subject matter of nuclear safety but included bilateral legislative assistance in other areas such as safeguards, physical protection and liability for nuclear damage.

29. Regional activities included:

- a follow-up workshop on the establishment of a legal framework governing the safety of radioactive waste management and the safe transport of radioactive material for countries of the East Asia and Pacific region in Jakarta, Indonesia, from 10 to 14 April 2000;
- a workshop on developing national radiation safety capabilities for response to nuclear accidents or radiological emergencies and a legal framework governing emergency preparedness and response and civil liability for nuclear damage for countries of the Latin America region in Rio de Janeiro, Brazil, from 9 to 17 October 2000;
- a workshop on legal issues held as part of a training course on the safe transport of radioactive material for the countries of the Asia and Pacific region, in Sydney, Australia, from 4 to 6 December 2000; and
- a workshop on the establishment of a legal framework governing radiation protection, the safety of radiation sources and the safe management of radioactive waste for countries of the Africa region in Addis Ababa, Ethiopia, from 23 to 27 April 2001.

30. Further regional workshops for countries of the Latin America and Europe regions are scheduled for later in 2001.

# ATTACHMENT 4

# 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 activities aimed at providing for the application of the Agency's safety standards. Moreover, Article III.A.3 of the Agency's Statute authorizes the Agency to "foster the exchange of scientific and technical information on peaceful uses of atomic energy".

## Publications

2. All Agency publications issued in 2000 are listed in the Annual Report (GC(45)/4); a list of safety related publications issued so far in 2001 is provided below.

**AGENCY PUBLICATIONS ON NUCLEAR, RADIATION AND WASTE SAFETY JANUARY–JULY 2001**

| | |
|---|---|
| **Safety of Nuclear Installations** | |
| Quality Assurance for Safety in Nuclear Power Plants and Other Nuclear Installations (CD-ROM) | Safety Series No. 50-C/SG-Q |
| The International Nuclear Event Scale (INES) User's Manual 2001 Edition | |
| Mitigation of Hydrogen Hazards in Water Cooled Power Reactors | TECDOC-1196 |
| Assessment and Management of Ageing of Major Nuclear Power Plant Components Important to Safety: CANDU Reactor Assemblies | TECDOC-1197 |
| Applications of Probabilistic Safety Assessment (PSA) for Nuclear Power Plants | TECDOC-1200 |
| Seismic evaluation of existing nuclear facilities. Proceedings of the SMiRT-14 Post Conference Seminar No. 16 organized by the International Atomic Energy Agency and held in Vienna, 25-27 August 1997 | TECDOC-1202 |
| Safety Related Design and Economic Aspects of HTGRs | TECDOC-1210 |
| Safety of and Regulations for Nuclear Fuel Cycle Facilities | TECDOC-1221 |
| Managing Change in Nuclear Utilities | TECDOC-1226 |
| Regulatory Review of Probabilistic Safety Assessment (PSA) Level 2 | TECDOC-1229 |
| **Radiation and Waste Safety** | |
| Building Competence in Radiation Protection and the Safety of Radiation Sources: Safety Guide | Safety Standards Series No. RS-G-1.4 |
| Decommissioning of Nuclear Fuel Cycle Facilities: Safety Guide | Safety Standards Series No. WS-G-2.4 |
| International Conference on Radiological Protection of Patients in Diagnostic and Interventional Radiology, Nuclear Medicine and Radiotherapy, Málaga, Spain, 26–30 March 2001, Contributed Papers | IAEA-CSP-7/P |
| National Competent Authorities Responsible for Approvals and Authorizations in Respect of the Transport of Radioactive Material. List No. 32. 2001 Edition | IAEA-NCAL-32 |

| AGENCY PUBLICATIONS ON NUCLEAR, RADIATION AND WASTE SAFETY JANUARY–JULY 2001 | |
|---|---|
| An International Peer Review of the Biosphere Modelling Programme of the US Department of Energy' s Yucca Mountain Site Characterization Project | IAEA-YUCCA |
| The Criticality Accident in Sarov | STI/PUB/1106 |
| Arrangements for Transition from the 1985 Edition (as Amended 1990) to the 1996 Edition of the IAEA Transport Regulations | TECDOC-1194 Rev. 1 |
| Monitoring of Geological Repositories for High Level Radioactive Waste | TECDOC-1208 |
| Assessment by Peer Review of the Effectiveness of a Regulatory Programme for Radiation Safety | TECDOC-1217 |

## Electronic information systems

3. Detailed information on the Agency's safety related activities is available on the WorldAtom Web site www.iaea.org/ns/:

- NUSAFE (www.iaea.org/ns/nusafe/) covers the safety of nuclear installations;
- RasaNet (www.iaea.org/ns/rasanet/) covers radiation, radioactive waste and transport safety; and
- CoordiNet (www.iaea.org/ns/coordinet/) provides information on co-ordination of the Agency's safety related activities.

4. The Agency has published a CD-ROM, jointly sponsored by the International Labour Office, bringing together all of the current safety standards relevant to occupational radiation protection. This includes the full text of the Safety Fundamentals on Radiation Protection and the Safety of Radiation Sources (Safety Series No. 120, 1996), the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (Safety Series No. 115, 1996), and the three Safety Guides on occupational radiation protection issued in 1999. The CD-ROM also contains a keyword index and a full text search facility covering all five publications. Further CD-ROMs containing collections of related safety standards are planned.

5. The existing safety standards on quality assurance for safety in nuclear power plants have also been published on CD-ROM. The Safety Requirements and 14 Safety Guides were published in 1996 as a single volume, but the CD-ROM adds a full text search facility.

6. An important information exchange function of the Agency is to disseminate descriptions of the causes of radiological accidents and the lessons to be learned from them. Since the last session of the General Conference, reports have been published on four such accidents:

- a fatal criticality accident at a research facility in Sarov (formerly known as Arzamas-16), Russian Federation, in 1997;
- the discovery of abandoned radiation sources on a military base at Lilo, Georgia, in 1997;
- an accident involving a teletherapy source in Istanbul, Turkey, in 1999; and

- an accident with an industrial radiography source at Yanango, Peru, in 1999.

7. A database of generic safety issues for nuclear power plants (NPPs) with light water reactors (LWRs) and the measures that have been taken to resolve them is available to Member States, along with a TECDOC describing the main issues and measures taken. In order that the database can be kept up-to-date, Member States are encouraged to continue to provide the Secretariat with information on their national experiences with the identified safety issues, particularly with respect to the measures used in resolving them.

8. Work on the development of a database of generic safety issues for NPPs with pressurized heavy water reactors (PHWRs) is currently under way. A draft document, with a structure similar to that of the TECDOC for LWRs, was reviewed at a Technical Committee meeting in December 2000. At this meeting, it was agreed that the participants would review the revised document and provide the Agency with additional comments. It is expected that the TECDOC will be ready for publication by the end of 2001. A database, similar to that for NPPs with LWRs, will subsequently be created from the main body of the TECDOC.

9. The OSMIR (OSART Mission Results) database covers all OSART missions (see Attachment 6) since January 1991 for which the official report has been published, as well as the results of follow-up visits. A CD-ROM of the OSMIR database has been offered to nuclear power plants, utilities, regulators, research institutes and organizations directly involved in the fuel cycle, as a source of information that can help them strengthen nuclear safety performance.

10. The IAEA's database of safety issues and plant status of NPPs with WWER and RBMK reactors is updated periodically on the basis of information from Agency safety missions.

11. The Agency is the lead organization in relation to radioactive substances in developing an information clearing house mechanism for the UN's Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. One of the activities that will provide input to this programme has been the development of a DIRATA, a database of Discharges of Radionuclides to Atmosphere and the Aquatic Environment. This electronic database was completed in February 2001, and will be an important source of data for the clearing house system.

## Conferences, seminars and meetings

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

13. An International Conference on the Radiological Protection of Patients in Diagnostic and Interventional Radiology, Nuclear Medicine and Radiotherapy, co-sponsored by the IAEA, the European Commission, the Pan American Health Organization and the World Health Organization, was hosted by the Government of Spain in Torremolinos (Málaga) in March 2001. Well over 700 participants from more than 85 countries participated in the Conference. The organization of such a conference was requested in GC(43)/RES/12, for the purpose of an exchange of information and the development of recommendations, as appropriate, regarding the radiological protection of patients. The conference programme addressed protection in the various applications of radiation in different branches of medicine: the conclusions and recommendations of the Conference are summarized in GOV/2001/29-GC(45)/12.

14. An International Conference of National Regulatory Authorities with Competence in the Safety of Radiation Sources and the Security of Radioactive Materials was hosted by the Government of Argentina in Buenos Aires in December 2000. The conference was organized within the framework of the Agency's Action Plan on the Safety of Radiation Sources and the Security of Radioactive Materials and was intended to provide a forum for an exchange of information and experience regarding the development of regulatory systems for ensuring the safety of radiation sources and the security of radioactive materials. The conclusions and recommendations of the Conference are summarized in GOV/2001/29-GC(45)/12.

15. An International Conference entitled "Radiation Legacy of the 20$^{th}$ Century: Environmental Restoration" was organized by the Ministry of the Russian Federation for Atomic Energy in co-operation with the IAEA, in Moscow, Russian Federation, in October–November 2000. The conference was to some extent a follow-up to the Agency symposium on the restoration of environments with radioactive residues held in Arlington, USA, in 1999. However, the focus of the Moscow conference was on the radioactive legacy in the countries of the former Soviet Union and eastern Europe, and the issues arising from this legacy. A key observation from both meetings was that environmental restoration decisions continue to be made on the basis of radiological criteria established for the control of discharges from practices, despite international recommendations that intervention criteria are more appropriate for such situations.

16. An International Conference on Topical Issues in Nuclear Safety is scheduled to be held in Vienna from 3 to 6 September 2001. The issues covered by the conference are risk informed decision making, the influence of external factors on safety, the safety of fuel cycle facilities, the safety of research reactors, and safety performance indicators, as well as a panel session on maintaining competence. The results of the conference will be disseminated to Member States.

17. The International Conference on Management of Radioactive Waste from Non-Power Applications - Sharing the Experience, to be hosted by the Government of Malta from 5 to 9 November 2001, will include consideration of the safety issues relevant to the management of such wastes.

18. An International Conference on Occupational Radiation Protection, convened jointly with the ILO and co-sponsored by the European Commission (EC) in co-operation with the OECD/NEA and WHO, will be hosted by the Government of Switzerland at ILO Headquarters, Geneva, from 26 to 30 August 2002. The objective of the Conference is to

foster the exchange of information on current issues related to the exposure of workers to ionizing radiation in the course of their work and to formulate recommendations, as appropriate, regarding measures to strengthen international co-operation in occupational radiation protection. The Conference will address the issue of establishing occupational radiation protection standards and providing for their application. It will focus on a number of specific problems, inter alia, the complex issue of controlling occupational exposure to natural sources of radiation. Further information is given in GOV/2001/29-GC(45)/12.

**Incident Reporting System (IRS)**

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

20. All 31 of the States with operating nuclear power plants participate in the IRS. About 3000 event reports are now in the database, which is distributed to participants as a CD-ROM on a quarterly basis. The IAEA has been asked to make a detailed proposal for the Internet-based modification of IRS database.

**Review and analysis of reported events**

21. The IRS reports communicate the results of the analysis carried out and lessons to be drawn to experts of other countries. Thus, IRS provides a pre-processed set of data, easily transferable to situations in other countries allowing an efficient feedback process. In addition, the potential exists to include both licensee and regulator assessments of events. The IRS is an important source of information for regulators and their technical support organizations, providing insights on important international operational experience for oversight and licensing purposes.

22. In-depth discussion of recent events presented at the IRS annual meeting this year highlighted the following safety concerns: common cause events and pressure of work on NPP operators; electric equipment failures and station blackout; subcontractor issues; attitude towards safety systems and safety related systems; ageing issues, especially NPP hardware and software with short lifetimes (e.g. computer ageing); corrosion and cracks issues; thermal binding; human factors events; events resulting in fire; quality assurance in maintenance; small changes in the design of NPPs; and the role of regulators under new conditions in nuclear energy and safety business.

23. Two IRS topical studies — on incidents caused by loss of corporate knowledge and memory, and on events indicating non-compliance with operational limits and conditions — were completed in 2001 and relevant reports were issued. Two new topics were selected for IRS studies: electrical issues, including reliability of electrical supplies and ageing of relay; maintenance issues, including quality assurance, human factors and procedures aspects.

24. Detailed guidelines for describing human factors in IRS reports are being developed.

25. The next edition of the IRS periodic report "Nuclear Power Plant Operating Experiences from the IAEA/NEA Incident Reporting System" will be produced in 2002. This type of report provides general information for senior officials in the industry and government who have decision-making roles relating to the nuclear power industry. The first edition covers NPP operating experience for1996–1999.

**Incident Reporting System for Research Reactors (IRSRR)**

26. Following the 'relaunch' of the IRSRR, the total number of participating countries has increased to 29: Argentina; Austria; Belgium; Brazil; Canada; Chile; China; Egypt; Finland; France; Germany; Hungary; Islamic Republic of Iran; Iraq; Japan; Morocco; Netherlands; Pakistan; Portugal; Russian Federation; Slovenia; Sweden; Syrian Arab Republic; Tunisia; Turkey; Ukraine; United Kingdom; United States of America; and Yugoslavia.

27. In November 2000, the first meeting of IRSRR co-ordinators was held in Vienna, and was attended by 23 co-ordinators from 20 Member States. 22 events were presented and their root causes and lessons learned discussed. The meeting included training in event investigation based on the HPES (human performance evaluation system) methodology, and the contributed papers from the meeting were collected as working material for participants in the system. A proposal for a web-based reporting system was presented during the meeting as a possible means to improve the frequency of reporting. The meeting recommended continuing efforts in this direction, and a pilot version of the software based on the NEWS system is currently under development. The second meeting of co-ordinators is scheduled for November 2001 and will be held in Lisbon, Portugal.

**International Nuclear Event Scale (INES)**

28. INES is used by 60 countries for facilitating rapid communication to the media and the public regarding the significance of events at all nuclear installations associated with the civil nuclear industry, including events involving the use of radiation sources and the transport of radioactive materials.

29. Since the last session of the General Conference, 25 events were reported to the International Nuclear Event Scale (INES) information service. One event which involved a fire in a nuclear power plant was reported out of scale since it did not affect the operation of the plant or nuclear safety. Nine events were reported at level 0, 11 at level 1 and 4 were reported at level 2.

30. Of the level 2 events, one involved the discovery of a lost Ir-192 source. One 'event' was actually several lower level events at a nuclear power plant which were grouped together

and rated as level 2 because of the repetitive nature. Another involved recirculation valves at several NPPs in one country, which could have become jammed in emergency core cooling systems and containment spray systems. The other level 2 event involved incorrect calculation of an algorithm in overload protection devices for local power distribution at a nuclear power plant. This was rated level 1 but uprated to level 2 because of a common cause failure.

31. The 2001 Edition of the INES User's Manual has been published. This edition does not amend the technical basis of the INES rating procedure, but incorporates experience gained from applying the 1992 version of the scale and clarification of various issues raised during that period. The manual will also be available in Russian, French and Spanish.

32. In January 2001 an INES seminar was held in Bratislava, Slovakia. The Secretariat has also been invited to organize INES seminars in the Czech Republic and the United States of America; these are planned to place in October and November 2001 respectively.

**Nuclear Events Web-based System (NEWS)**

33. The Agency has developed, with the agreement of OECD/NEA and the World Association of Nuclear Operators (WANO), a Nuclear Events Web-based System (NEWS) to help make the dissemination of information on events to participants in Member States quicker and easier. The system is currently available for a one-year period of trial use, and is now expected to be put into operation early in 2002. The success of the system will ultimately depend upon the readiness of participants to disseminate information on events quickly.

**Information System on Occupational Exposure (ISOE)**

34. The Information System on Occupational Exposure (ISOE) database is the world's largest database on occupational exposure to ionizing radiation. The IAEA co-sponsors ISOE under an agreement with OECD/NEA pursuant to which the IAEA invites those countries with operating nuclear power plants which are Member States of the IAEA but not of OECD to participate in ISOE cost-free (through the IAEA's ISOE Technical Centre). Since the last session of the General Conference, the Russian Federation has joined ISOE, providing data for five nuclear power plants, representing 14 reactors in operation and four shut down reactors. Further information on ISOE activities is given in GOV/2001/29-GC(45)/12.

# ATTACHMENT 5

# EDUCATION AND TRAINING

## Background

1. Education and training are essential in providing for the application of the Agency's safety standards. The Agency's policy in education and training in this field is anchored in different resolutions of the General Conference, in particular resolution GC(44)/RES/13 of 2000. The Agency, through its Technical Co-operation (TC) and Nuclear Safety Departments and the Legal Division, promotes education and training to maintain competence in the nuclear field by organizing, in collaboration with organizations in host countries, education and training activities covering a broad range of nuclear, radiation and waste safety issues, and more specialized training courses and workshops covering specific subject areas. The Agency also promotes on-the-job training through other mechanisms, such as sponsoring fellowships and scientific visits and publishing educational and training materials.

2. A substantial amount of training is carried out by the Agency at the national/regional level (e.g. through the Model Project, TC and extrabudgetary projects) and safety related services (e.g. training aspects of OSART missions, seminars on safety culture or self-assessment methodologies). Evaluation of training is a major element that allows the IAEA to assess the impact of training in Member States.

3. In the past year, about 100 training courses and workshops on safety related topics were organized, the majority under the TC programme.

4. Annually the Agency receives and evaluates some 300 applications for fellowships and scientific visits related to nuclear, radiation and waste safety, from about 50 countries. After evaluation, placement of applicants can take up to several months. Past experience suggests that some 70% of applications result in placements.

5. In response to GC(44)/RES/13, the IAEA organized two Advisory Group Meetings (AGMs) in the first half of 2001 to obtain advice on its strategy for safety related training. Further information on the recommendations from these meetings can be found in document GOV/INF/2001/9-GC(45)/INF/6.

## Nuclear safety

### Courses and workshops

6. All of the training courses held in 2000 are listed in the Agency's Annual Report (GC(45)/4). Safety related regional training courses and workshops in the first half of 2001 are listed in the table at the end of this Attachment.

**Educational and training materials**

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

8. The Basic Professional Regional Training Course on Nuclear Safety and the Agency training course on Regulatory Control of Nuclear Power Plants have specific textbooks and workbooks containing questions and answers which have been compiled as working material. The aim is to make these materials available in 'e-learning' form through the Internet.

9. To support regulatory training activities, the Agency has prepared a TECDOC entitled "Training the Staff of the Regulatory Body for Nuclear Installations: a Competency Framework". The Agency is also developing guidelines and services for the review of nuclear safety related educational and training activities in the Member States.

10. To support training of NPP staff in accident management, the Agency has prepared two TECDOC entitled "Training Material and Technical Support for Accident Management Programme Courses and Accident Management Staff Training" and "Application of Simulation Techniques in Accident Management Training".

**Other mechanisms for education and training**

11. Distance learning tools continue to be prepared by the Agency for distribution to Member States via the Internet and in the form of CD-ROMs. In the area of nuclear safety, new developments include a tutorial on basic nuclear safety concepts; a video on safety requirements for legal and governmental infrastructure and tutorials on reactor physics and thermal hydraulics.

**<u>Radiation and waste safety</u>**

**Courses and workshops**

12. The standard syllabuses for specialized courses in radiation safety for diagnostic and interventional radiology, radiotherapy and nuclear medicine have been prepared in the same format as that of the Post-graduate Course syllabus to ensure harmonization and flexibility in the use of the material.

13. The specialized training events held in 2000 are listed in the Agency's Annual Report, GC(45)/4. Radiation safety training courses and workshops in the first half of 2001 are listed in the table at the end of this Attachment.

**Education and training material**

14. A Safety Guide on Building Competence in Radiation Protection and the Safe Use of Sources has been published in the Safety Standards Series. It provides guidance for

regulatory authorities on the establishment of training and qualification requirements and a strategy for building competence.

15. A Safety Report on Training in Radiation Protection and the Safe Use of Radiation Sources has been developed to support the aforementioned Safety Guide and will be published shortly. The document provides information and suggestions for trainers and training providers on how to set up training courses and establish training centres.

16. The standard syllabus for the Post-graduate Educational Course on Radiation Protection and the Safe Use of Radiation Sources was approved by the AGM on Education and Training in April 2001.

17. A training module on Radiation Safety in Industrial Radiography has been completed and reviewed internally.

**Other mechanisms for education and training**

18. Country Supervisors of the IAEA–RCA Distance Learning Project met in March 2001 to review the project status in participating countries, to receive an update on IAEA training initiatives and to consider their relevance to the distance learning project. They also discussed the feasibility of Web-based training in participating countries, and considered the effectiveness and future of the project.

**Legislative and regulatory assistance**

19. In addition to the legislative and regulatory assistance activities mentioned in paras 31–34 of Attachment 3, the Agency's Legal Division has developed a Handbook on Nuclear Energy Legislation as a tool to assist legislators, government officials, technical experts, lawyers and users in general, of nuclear technology to understand the basic requirements and procedures of nuclear energy law. The Handbook explains the overall character of nuclear energy law and the process by which it is developed and applied. It also offers a summary overview of specific areas involving the use of nuclear materials and techniques such as elements of nuclear energy legislation, radiation protection, nuclear and radiation safety, nuclear liability and coverage, non-proliferation and physical protection.

20. The Agency's Handbook on Nuclear Energy Legislation will be published in the course of 2001.

**TRAINING COURSES AND WORKSHOPS IN NUCLEAR SAFETY
JANUARY–JUNE 2001**

| Title | Host Country |
|---|---|
| **Technical Co-operation Programme** | |
| Basic Professional Training Course on Nuclear Safety | France |
| Regional Training Course on Regulatory Control of Nuclear Power Plants | Germany |
| Regional Training Course for Junior Operators and Regulators on Safety and Utilization of Research Reactors | Austria, Slovakia |
| Workshop on Challenges to the Operator–Regulator Interface | Germany |
| Seminar on Self-assessment of Operational Safety Performance | Russian Federation |
| Workshop on Regulatory Body Review and Assessment of SARs | Czech Republic |
| Workshop on Strengthening Management of Plant Operational Safety | Ukraine |
| Workshop for Middle and Senior Managers on Harmonization of PSA | Spain |
| WWER-1000 Design Basis Documentation Management System | Czech Republic |
| International Seminar on Horizontal Steam Generators | Finland |
| Workshop on Assessing and Assuring Plant Modification Safety | Slovenia |
| Strengthening Safety Assessment Capabilities of NPPs | Ukraine |
| Workshop on Periodic Safety Review | Bulgaria |
| Workshop on PSA - A Tool to Support Operational Decision Making | India |
| Workshop on Engineering Safety Assessment of Existing NPPs | Russian Federation |
| Management Workshop on Competencies for Competitive Environment | China |
| Regional Workshop on Safety Culture | China |
| National Workshop on Configuration Management | China |
| National Workshop on Self-assessment of Operational Safety | Pakistan |
| **Extrabudgetary Programme on the Safety of Nuclear Installations in the South East Asia, Pacific and Far East Countries** | |
| Basic Professional Training Course on Nuclear Safety | USA |
| Workshop on Safety Analysis Methodology and Computer Code Utilization | Republic of Korea |
| Workshop on Tianwan NPP Reactor Protection System and Validation and Verification of the Safety Software | Germany |
| Workshop on Check Criteria before Acceptance for 3 Categories of Fast Reactor Design Basis Accidents | China |
| Workshop on Establishment of Regulatory Bodies | Viet Nam |

**TRAINING COURSES AND WORKSHOPS IN RADIATION AND WASTE SAFETY
JANUARY–JUNE 2001**

| Title | Host Country |
|---|---|
| Post-graduate Educational Diploma Course on Radiation Protection | Syrian Arab Republic |
| Post-graduate Educational Course on Radiation Protection and Nuclear Safety | Argentina |
| Post-graduate Educational Course on Radiation Protection | South Africa |
| Post-graduate Group Training on Radiation Protection and the Safety of Radiation Sources | Malaysia |
| Regional Training Course on Organization and Implementation of a National Regulatory Programme for the Control of Radiation Sources | Slovenia |
| Regional Training Course on Assessment of Occupational Exposure Due to External Radiation Sources | Turkey |
| Regional Training Course on Radiation Protection in Diagnostic Radiology | Republic of Moldova |
| Regional Training Course on Sources, Assessment, Monitoring and Control of Public Exposure | Belarus |
| Regional Training Course on Developing National Capabilities for Response to Radiological Emergencies | Austria |
| Regional Workshop on Generic Procedures for Response to Radiological Emergencies | Slovenia |
| National Training Course on Radiation Protection in Industrial Radiography | Turkey |
| National Training Course on Regulatory Control of Radiation Sources | Malta |
| National Training Course on Radiation Protection in Diagnostic Radiology | Albania |
| National Training Course on Radiation Protection in Diagnostic Radiology | Republic of Moldova |
| National Training Course on Emergency Response and Preparedness for Radiological Emergencies | Guatemala |
| National Training Course on Health Surveillance and Medical Management of Overexposed Workers | Romania |
| National Training Course on Regulatory Control of Radiation Sources | Bosnia and Herzegovina |
| Workshop on Decommissioning Planning | Lithuania |
| Executive Seminar on the Decommissioning Process and Issues | Lithuania |

# ATTACHMENT 6

# RENDERING OF SAFETY RELATED SERVICES

## Background

1. In response to a request from a Member State, the Agency will render safety related services to address any safety topic. Each service can be tailored to meet the specific needs of the Member State. Some of the services have been rendered many times, and these are discussed in this Attachment. The provision of such services to developing countries is supported by the Agency's technical co-operation and extrabudgetary programmes; for services to developed countries, the costs are borne by the countries themselves.

2. The services related to nuclear installation safety are:

- operational safety review services, namely the Operational Safety Review Team (OSART) service, the Peer Review of Operational Safety Performance Experience (PROSPER) service[1] and the Safety Culture Enhancement Programme (SCEP) service[2];
- the Engineering Safety Review Services (ESRS), including services on design safety, seismic/site safety, fire safety, ageing management, and software safety;
- the International Probabilistic Safety Assessments Review Team (IPSART) service[3];
- the Review of Accident Management Programmes (RAMP) service; and
- the Integrated Safety of Research Reactors (INSARR) service.

3. The International Regulatory Review Team (IRRT) service originally focused on the regulation of nuclear installation safety. The scope of the service has since been expanded to include, as appropriate, review of the effectiveness of safety regulation in all areas: nuclear, radiation, transport and waste safety.

4. In addition to the inclusion of radiation, waste and transport safety in the scope of IRRT reviews, a number of safety review services in these areas of safety are offered, on request, to Member States, including:

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[1] This service is derived from, and replaces, the former ASSET (Assessment of Safety Significant Events Team) service.

[2] This service represents a development and extension of, and replaces, the former ASCOT (Assessment of Safety Culture in Organizations Team) service.

[3] This service was formerly called the IPERS (International Peer Review Service) for probabilistic safety assessments.

- the Radiation Safety Regulatory Infrastructure (RSRI) service to assist in the establishment and maintenance of an appropriate national regulatory infrastructure in accordance with the requirements of the International Basic Safety Standards;
- a range of review services relating to radioactive waste management (either dealing exclusively with safety issues or as part of broader advisory services on waste management);
- the Emergency Preparedness Review (EPREV) service, in which an international team of experts reviews a Member State's emergency preparedness programme;
- the Transport Safety Appraisal Service (TranSAS) to appraise national implementation of the IAEA Regulations for the Safe Transport of Radioactive Material (for further information, see GOV/2001/30-GC(45)/13);
- a new Occupational Radiation Protection Appraisal Service (ORPAS); and
- an International Review of Irradiator Safety (IRIS) service.

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

6. The Agency organizes international intercomparisons of radiation dose measurements for radiation protection purposes, to contribute towards harmonizing the use of dosimetric quantities and techniques in Member States.

**Operational safety review services**

7. The trend has continued for more requests from utilities and regulatory organizations to provide capability in methodologies for self-assessment of management processes and safety culture, and increased demand for assistance in areas identified by assessments as needing improvement.

8. The Agency's operational safety review services are being enhanced to better meet current and future challenges identified by the Member States using the services.

9. The Agency has continued to develop the safety culture services giving Member States support to initiate and continue on a long-term Safety Culture Enhancement Program (SCEP). The provision of such safety culture workshops, seminars and assistance visits has helped the utilities and plants develop their own programme in a self-sustaining manner. Experience with such missions and the subsequent requests for follow-up work indicate an improved understanding by management of safety culture and the management attributes, behaviour and processes necessary to foster and sustain it within their organizations.

10. The Agency has continued its collaboration with WANO. Self-assessment seminars have been conducted in Russia and Ukraine with co-operation with WANO Moscow Centre, and this trend of mutual support has been found to be very effective. Interface meetings are

held to ensure that there is no conflict or duplication between the activities of the two organizations.

11. Significant progress continues in the joint work by the Departments of Nuclear Safety and Nuclear Energy on management of safety and safety culture. For example, a joint management competence enhancement programme for the managers of Qinshan nuclear power plant in China has progressed and a joint publication on the management of change in nuclear utilities has been be published. Other areas of co-operative work included safety in the management of outages, safety during decommissioning after early closure and safety culture in maintenance.

**Operational Safety Review Team (OSART) service**

12. In the past 12 months, four OSART missions, one follow-up mission and six preparatory missions have been carried out. Increased emphasis has been placed on the promotion of effective self-assessment by operating organizations and, as part of the OSART service, seminars on the OSART methodology are held to assist plant staff or regulatory personnel in implementing and/or enhancing operational self-assessment. During the last year, seminars were held at Golfech, Belleville, Tricastin and Nogent NPPs in France, Santa Maria de Garoña NPP in Spain, Kalinin NPP in Russia and Paks NPP, Hungary.

13. The OSART process now typically includes a self-assessment seminar well in advance of the mission, which enables the operator to begin the improvement processes up to two years before the mission. With this advance seminar, preparatory meetings, the mission itself, and the follow-up mission, a plant is offered four to five years of support for operational safety improvements.

14. During the OSART process, some plants ask the Agency for assistance in developing activities to enhance the plant's operational safety capabilities. For example, following a pre-start-up OSART in 1999, three visits were made to Chashma nuclear power plant in Pakistan to assist in enhancing the competence of their managers to safely operate the plant following turnover by the Chinese suppliers and initial operators. The Chashma unit has now been started up and taken over by the Pakistani operators. A joint Pakistani–IAEA advisory committee has been established to oversee the effectiveness of the management of plant operation from a safety perspective.

**OSART missions**

15. The four OSART missions referred to in para. 12 were to the NPPs at Belleville in France, Muhleberg in Switzerland, Temelin in the Czech Republic and Ling Ao in China. In addition to the normal reporting procedure, the Agency made a presentation on the results of the Temelin mission to a meeting under the 'trilateral protocol' involving representatives of the Czech Republic, Austria and the European Commission. An OSART mission to Santa Maria de Garoña NPP, Spain, had to be postponed due to shortage of staff.

16. A common feature from these missions was the commitment of managers to improving the operational safety and reliability of their plant. Several examples of good practice were

identified, together with recommendations and suggestions to improve operational safety. The results of each mission will be made available to the nuclear industry through the OSMIR database.

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

- not enough presence of managers and supervisors at the work place to enforce management expectations,
- deficiencies in plant configuration control, e.g., modifications in the plant are not always analysed and approved to ensure that plant configuration is maintained,
- self-assessment of operational safety not always sufficiently developed and implemented to ensure that actions and activities are challenged from a safety perspective as a matter of routine.

18. Preparatory visits were made to six NPPs scheduled to receive OSART reviews in the second half of 2001 and 2002: Santa Maria de Garoña in Spain; Tricastin and Nogent in France; Paks in Hungary; Dukovany in the Czech Republic; and Ling Ao in China[4].

19. One OSART follow-up visit has been made in the past year, to Kozloduy, Bulgaria. The OSART follow-up missions in recent years confirm that operational safety services such as OSART are helping Member States achieve and maintain a high level of safety performance. On average, the rate of resolution of and compliance with the Agency's recommendations has improved over the last five years from 80% to over 90%.

**Development of the OSART programme**

20. Apart from the international review programmes — IAEA's OSART missions and WANO's peer reviews — various countries have national or utility review programmes. The Agency has developed guidelines for assessment of national/corporate review systems, with the aim of guiding Agency review teams, supporting of countries/utilities to self-assess this activity in the country and also setting up national peer review systems. Pilot assessments using these guidelines have been performed in the United Kingdom and France.

21. As part of the enhancement efforts for the operational safety services, the Agency continues to review the adequacy of the information contained in the OSART guidance, with particular emphasis on the management of operational safety and safety culture. Also, to further the benefits to the Member States, the OSART service is continuing its efforts to integrate capabilities from the different operational safety services. For example, increased attention to reviewing the safety culture of an organization is facilitated by providing initial team training on the subject and by holding daily team review meetings during the mission to maintain focus on this important aspect of facility safety.

[4] As Ling Ao will not be in service at the time of the mission, it will be classified as a 'pre-OSART'.

**Peer Review of Operational Safety Performance Experience (PROSPER) service**

22. Recently the IAEA in consultation with the Member States has developed a revised programme to replace the previous ASSET service. This is the **P**eer **R**eview of the effectiveness of **O**perational **S**afety **P**erformance and **E**xperience **R**eview processes, known as PROSPER. Good design, manufacture and construction are prerequisites to safety, but safety also depends on the ability and competence of the personnel responsible for all the functions associated with operating the plant; together with their conscientiousness in discharging their responsibilities. The PROSPER programme assists Member States in enhancing the safe operation of their nuclear power plants by encouraging the use of self-assessment to ensure that plant operational experience programme is used as effectively as possible in learning the lessons to prevent recurring problems. Through this service, the IAEA facilitates the exchange of knowledge and experience between team members drawn from different Member States and plant personnel. It is intended that such advice and assistance should be used to enhance nuclear safety performance in all countries that operate nuclear power plants.

23. A PROSPER mission can be tailored to the particular needs of a plant. A full scope review covers the complete process: identification and reporting of deficiencies, events, degradation of performance etc., analysis of the information and the implementation of corrective actions to prevent recurrence. Depending on individual needs, the PROSPER review can also be directed to review specific individual problem areas or significant events.

24. Essential features of the work of the PROSPER team members and their plant counterparts are the comparison of a plant's operational experience process with expected international practices and the joint search for ways in which operational safety performance can be enhanced. The PROSPER methods involve not only the review of the Plant Self Assessment Report and discussions with staff but also a review of the quality of performance through observations. In the PROSPER process it is always recognized that different approaches are available to an operating organization for achieving its safety objectives. Proposals from the PROSPER mission for the further enhancement of operational safety performance may reflect good practices observed at other nuclear power plants.

25. Guidelines for the PROSPER service have been established and are to be finalized by the end of 2001. A pilot PROSPER mission was conducted at Hartlepool NPP in the United Kingdom in September 2000. Several PROSPER seminars have been conducted to explain the focus and aims of this new Agency service in Pakistan, Russia, Lithuania and the Ukraine. Assistant missions and preparatory meetings for future missions have been conducted in Romania and Pakistan and similar activities are under preparation for nuclear power plants in Armenia and Pakistan.

**Management of safety and safety culture**

26. The management of safety and safety culture is an important focus area in the programme to develop the operational safety services. The development programme reflects an initiative launched as a result of requests by Member States for processes that corporate and plant management, as well as government and regulatory executives, could use in

overseeing operational safety aspects of NPP management within the suite of all management process indicators.

27. Documents have been developed to provide guidance and/or information on a number of specific issues, including:

- management of organizational changes in nuclear utilities;
- advancing the management of safety and safety culture
- experiences and good practices in strengthening safety culture in maintenance, and their contribution to the development of safety culture in the NPP organization;
- the role of governments and regulatory bodies in promoting a sound safety culture in nuclear installations; and
- a compilation of safety culture self-assessment highlights and good national practices.
- a Safety Culture information reference document for use in the SCEP services.

**Safety culture services**

28. The Agency's new programme of services, the Safety Culture Enhancement Programme (SCEP), has been developed to support Member States in their efforts to develop a sound safety culture in their organizations. In this service the Agency gives support through the whole enhancement process starting with corporate management and the management team, self-assessment, development and implementation of improvement program and later on a renewed self-assessment. The support is given in the form of workshops, seminars and assistance visits. After a completed SCEP cycle the Agency performs a safety culture peer-review by a team of experts, the Safety Culture Assessment Review Team (SCART). The SCEP services can also be tailored to the particular needs of a plant, where they may want support in certain steps in the process.

29. The ongoing SCEP support to Eletronuclear, Brazil, has served as a basis for the continued development of these services and, based on the experiences gained, guidance is being developed on how to implement a safety culture enhancement programme. Full-scope SCEP support have also been initiated for Laguna Verde NPP, Mexico, and for the fuel-cycle facilities in Indústrias Nucleares do Brazil (INB), Brazil. A total of six missions have been carried out so far.

30. In the last twelve months, seminars and workshops have also been held in China, Slovakia and France for representatives of nuclear power plants, regulators, regional co-operative organizations and research reactors.

**Engineering safety review services**

31. The various services rendered under the generic heading of Engineering Safety Review Services (ESRS) are discussed below in the context of more specific headings, namely:

- design safety;
- site and seismic safety;
- fire safety;
- ageing management; and
- software safety.

32. Documents on the organization and conduct of the seismic and software services have now been published in the IAEA Safety Services Series, completing the set of five documents covering all of the ESRS services.

**Design safety**

33. Design safety review services have gained momentum recently, both in relation to new designs and existing nuclear power plants. A number of projects are under way within which such reviews have been conducted: the following provides some highlights of this activity.

34. Under a TC project, the Preliminary Safety Analysis Report (PSAR) for the Bushehr NPP in the Islamic Republic of Iran is being reviewed. The design of this plant is unique: the civil engineering structures from a partially built PWR plant are being used to house a WWER-1000 reactor. The structures have also suffered war damage and been repaired, which makes the project more challenging. In September 2000, two Agency review teams visited Tehran and the NPP site, the former to review several chapters of the PSAR, and the latter to conducted a design safety review. Additional missions visited the regulatory body in April and May 2001 and provided further advice on reviewing the PSAR in relation to the Agency's safety standards, on conditions to be applied to the construction licence when it is issued and on the PSAR and on the corresponding changes to the PSAR.

35. Another major review effort (also through the TC programme) relates to the Korean Next Generation Reactor (KNGR). A review of safety and regulatory requirements and guidance for the KNGR design was conducted in August–September 2000.

36. A design safety review of the light water reactor project for the Democratic People's Republic of Korea was conducted by the Agency in June 2001 at the request of the Korean Peninsula Energy Development Organization (KEDO).

37. An Agency mission visited the Krško NPP in Slovenia in April 2001, to provide advice and support to the operator and regulator in relation to the first periodic safety review of the plant.

38. A preparatory meeting was held at Temelin NPP, Czech Republic, in June 2001 for an expert review mission to review the resolution of safety issues identified when the Agency conducted a similar review in 1996. The expert mission is scheduled for November 2001, and will address both the IAEA issues and issues raised in recent years by non-IAEA sources. Because of the recent OSART mission to Temelin, the review will not include the issues related to operational safety.

39. A number of engineering review services were also provided as part of the extrabudgetary programme on nuclear safety in Asia. These are described in Attachment 3.

**Site and seismic safety**

40. Seismic safety review services have in recent years extended from the traditional field of application of the seismic re-evaluation of existing NPPs to more general siting projects and to facilities other than NPPs. Moreover, such services have often been combined with general reviews of NPP siting in relation to all external events, where the correlation between seismic action and the other potential events had to be carefully reviewed in a global context of risk evaluation.

41. In September 2000, an Agency mission visited the Armenia NPP to participate in the latter stages of a seismic walkdown by plant specialists supported by a team from the United States Department of Energy, and to conduct a follow-up review of the conclusions from the walkdown. The same mission reviewed the seismic monitoring system that has been installed on and around the site. A second mission in May 2001 provided advice on phase II of the seismic re-evaluation programme for the plant, including the possible role of PSA in the programme.

42. A preparatory mission for a site safety review of the Rooppur site in Bangladesh was conducted in December 2000. A preliminary site review mission was conducted in June 2001 to examine the existing documentation, and a number of recommendations were made. This was not considered to be a full site safety review because the comprehensive site safety report was not yet available.

**Software safety**

43. In the framework of the Extrabudgetary Programme on the Safety of Nuclear Installations in the South East Asia, Pacific and Far East Countries (see also Attachment 3), a safety review was conducted in November 2000 of the conceptual design for instrumentation and control (I&C) systems for the Tianwan NPP in China. A workshop on the reactor protection system and validation and verification of the safety software for Tianwan was also held in Germany, in May 2001. This workshop was for representatives of the Chinese organizations involved and of the Russian and German companies which are designing the I&C systems.

## Services on the conduct and application of probabilistic safety assessment (PSA)

### International Probabilistic Safety Assessments Review Team (IPSART) service

44. The former IPERS (International Peer Review Service) for probabilistic safety assessments (PSAs) was renamed the International Probabilistic Safety Assessments Review Team (IPSART) service in 2000.

### Missions

45. Six IPSART missions were carried out to review PSAs and to provide guidance on the use of PSA results. A review of the risk scoping study for the HFR research reactor at Petten, the Netherlands, was conducted in September 2000. A follow-up expert mission visited St. Petersburg, Russian Federation to review the PSA work being conducted in relation to the Tianwan NPP in China in November 2000. In March 2001, an IPSART mission reviewed the Level 1 PSA for Karachi NPP in Pakistan. An expert mission provided technical and methodological assistance in relation to the PSA for shutdown conditions for units 3 and 4 of Kozloduy NPP, Bulgaria (April 2001). An IPSART review of the Level 1 PSA (internal initiating events) for Zaporozhe NPP, Ukraine, was conducted in June 2001. An IPSART mission also reviewed the PSA for unit 5 of Novovoronezh NPP, Russian Federation: this PSA has been extended since an Agency review in 1998 to include internal floods and fires and a Level 2 analysis.

46. Though the results of these reviews are dependent on the individual study, in general the weak areas relate to the estimation of frequencies for initiating events, the definition of system success criteria for loss of coolant events, and the identification and modelling of human errors and common cause failures. Weaknesses have often been identified in the quality assurance process for the PSA and the preparation of the supporting documentation.

47. The overall trend observed in recent IPSART missions is, however, positive. Comparison with the findings of missions in previous years shows a clear trend of improvement in the quality of PSAs. The reasons for this include the greater experience of PSA teams, more mature technology and the existence of better standards and guidance for PSA. Operators have clearly put considerable effort into training staff in PSA, and safety engineers are increasingly involved in the development of PSAs as plant managers become more aware of their importance. More plants are implementing a component reliability data collection system, highlighting their awareness of the importance of plant specific data for PSA. Significant progress is also being made in the development of plant specific ‘best estimate’ accident analysis to support system success criteria and accident sequence progression.

### Related activities

48. Recently issued safety standards have placed greater emphasis on the use of PSA. The two new Safety Requirements publications on NPP safety issued in the past year — on design and on operation — both require the use of probabilistic analysis. The accompanying Safety

Guides (some already published, others in preparation) provide guidance on the application of PSA methods in particular areas. These standards reflect an emerging consensus that an integrated approach using deterministic engineering principles and probabilistic methods and results is a powerful approach to decision making.

49. A TECDOC was prepared to compile the status of PSA applications in Member States and experience in its use. This report demonstrates that in the design area most use of PSA is made in identifying and prioritizing safety upgrades. However, PSAs are also performed to support new designs in identifying plant vulnerabilities and important intersystem dependencies. PSAs now generally form part of the Safety Analysis Report of a new plant or of a Periodic Safety Review of an existing plant. In the operational safety area PSAs are used to optimize technical specifications and maintenance schedules, to control the plant configuration, and to analyse the safety significance of incidents. Increasing use is also being made of PSAs by regulatory bodies. The Agency's activities in this area are therefore concentrated on promoting the quality and consistency of PSAs as a prerequisite for their application in decision making.

50. Following the publication in 2000 of a TECDOC on regulatory review of Level 1 PSAs, a second TECDOC, on regulatory review of Level 2 PSAs, was published in 2001.

51. Several workshops on PSA related topics have been held in the past year: in China, on PSA applications (as part of the extrabudgetary programme — see Attachment 3); in Belgium, on probabilistic and deterministic approaches in regulatory decision making; in the Czech Republic, on risk monitors; in Spain, on harmonization of PSA policies (for middle and senior managers); in Ukraine, on the use of PSA in prioritizing safety upgrades and modernization, risk monitors and periodic safety reviews; and in India, on "PSA - A tool to support operational decision making", in India.

## Review of accident management programmes

52. The Agency launched a new service in 2000 to review, on request, a nuclear power plant's accident management programme. A pilot review mission has been scheduled for November 2001 at Krško, Slovenia.

## Safety of research reactors

### Integrated Safety Assessment of Research Reactors (INSARR) service

53. In the past year, two missions have been conducted with a modified methodology incorporating some features from the OSART service. On the basis of experience gathered from follow-up to these two missions, and from further INSARR missions, any necessary revisions to the new approach will be made in 2002. Increased emphasis is also being placed, both in review missions and in the safety standards and guidance for research reactors, on the adequacy of regulatory supervision of research reactors and associated facilities.

54. The number of requests to conduct INSARR missions is increasing. In the first half of 2001, pre-INSARR missions have been conducted in Greece, Bangladesh, the Islamic

Republic of Iran, and Chile, in preparation for INSARR missions later in 2001 or in 2002. Further pre-INSARR missions are scheduled for the second half of 2001, to the Syrian Arab Republic and to Romania, and pre-INSARR missions to the Czech Republic and Hungary are planned but not yet scheduled. A follow-up mission to the Netherlands is also scheduled for the second half of 2001.

55. In this context of an increasing number of missions, the willingness of experts from Member States to participate in mission teams has been a very positive feature, indicating the interest of experts in increasing national capabilities to perform self-assessment of research reactor safety.

**Other missions to research reactors**

56. In addition to providing the INSARR service at the request of Member States, the Agency has a responsibility to monitor the safety of research reactors under Project and Supply Agreements. Twenty-two letters were sent in late 2000 to all countries with research reactors provided pursuant to such agreements, requesting them to report to the Agency on the present status of the facilities, the application of the safety standards and measures defined in INFCIRC/18 or INFCIRC/18/Rev. 1 at the facilities and the regulatory framework being applied with respect to them. To date, ten countries — Colombia, Islamic Republic of Iran, Finland, Pakistan, Peru, Slovenia, Spain, Syrian Arab Republic, Turkey and Venezuela — have responded to the letters. The reports received did not indicate any special concerns about the safety of the facilities.

57. Spain (INFCIRC/99) informed the Agency that the reactor in question had been dismantled and the nuclear material had been transferred to the French company CERCA[5], while the radioactive material generated from dismantling the facility had been properly disposed of.

58. Colombia (INFCIRC/460) reported that the reactor is under extended shutdown, and will eventually be put into operation again following implementation of the required maintenance. **(**An IAEA mission in 2000 found the facility in good condition and made some recommendations regarding regulatory supervision, organization, training and qualification, and core management.**)**

59. Turkey (INFCIRC/212) reported that the reactor in question has not been in regular operation since 1995 and that there are sufficient staff to maintain and operate the reactor, including health physics personnel. Irradiated fuel elements are stored and maintained in the reactor pool and fresh fuel elements in a fresh fuel storage room.

60. Venezuela (INFCIRC/238) informed the Agency that the reactor has not operated since 1991: the number of fuel elements which are currently in the facility is not sufficient to reach

[5] Compagnie pour l'étude et la réalisation de combustibles atomiques.

criticality. The authorities have decided to convert the installations into an industrial irradiation facility.

61. Since the last session of the General Conference, 12 missions to facilities under Project and Supply Agreements have been carried out to monitor the adequacy of the applied safety measures in accordance with the Agreements at those facilities and to provide advice and assistance in this regard to the regulatory authorities and operating organizations:

- Democratic Republic of Congo (INFCIRC/389). The Agency conducted several activities during 2000 which enhanced the safety of the facility. Improvements include: the establishment of a Safety Committee; inspection and calibration of the safety systems, with active local participation; visual inspection and repairs of reactor internals including all reactor core components (fuel elements, control rods and reflectors); establishment of an emergency plan; and improvement of the radiation protection service. An Agency mission will be sent to the facility again in December 2001.
- Nigeria (INFCIRC/358). The Agency participated in February 2001 in a National Seminar for the establishment of a regulatory body. The regulatory body has recently been appointed and will be assessed by the Agency. The original Safety Analysis Report was upgraded by the operating organization with assistance from the Agency in order to meet IAEA standards. The reactor has not yet received the fuel elements for the core.
- Philippines (INFCIRC/88). The reactor is under extended shutdown condition with the fuel elements unloaded from the core and stored in a temporary stainless steel tank in the reactor hall. The operating organization is willing to reconstruct the reactor but the resources allocated are insufficient. Among the recommendations made by the Agency's mission, special mention should be given to the need for the establishment of an emergency plan and a nuclear safety regulatory body.
- Greece (INFCIRC/163). A pre-INSARR mission was conducted in April 2001 and the INSARR mission is scheduled for November 2001. According to the preliminary observations of the mission, the facility is operating and in good condition, but the regulatory body needs to be further strengthened.
- Islamic Republic of Iran (INFCIRC/97). A pre-INSARR mission was conducted in June 2001 and the INSARR mission is scheduled for January 2002. An expert mission was also sent to establish a Strategic Utilization Plan for the reactor. These activities have been performed in close co-operation with the Department of Nuclear Sciences and Applications.
- Indonesia (INFCIRC/454). In the first quarter of 2001 an additional report was received from Indonesia in relation to recommendations made by an Agency mission in 2000. The Secretariat responded with a request for further safety related information on seismic issues, and offered to send another Agency mission.
- Viet Nam (INFCIRC/308). The Agency assisted the holding of a workshop on the establishment of the regulatory body in June 2001, and a follow-up mission with

a view to helping with the finalization of a new Safety Analysis Report is scheduled for November 2001.

- Morocco (INFCIRC/313). The reactor is under construction. A mission in 1999 evaluated the safety design and the project as a whole. A follow-up mission was conducted in June 2001 and included an evaluation of the commissioning programme and the emergency plan.
- Malaysia (INFCIRC/287). A workshop on regulatory supervision of the research reactor and a training event for the staff of the regulatory body on safety assessment of the reactor are scheduled for October 2001.
- In addition to the above inspection missions, pre-INSARR missions pursuant to the relevant Agreements have been sent in 2001 to Chile, the Syrian Arab Republic and Romania, with the primary purpose of preparing for the forthcoming INSARR missions to the research reactors in question, due to take place in 2001 and 2002.

## Services to regulatory bodies

### International Regulatory Review Team (IRRT) service

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

63. Since the last session of the General Conference, IRRT missions have visited the National Nuclear Safety Administration, China, the National Commission on Nuclear Safety and Safeguards, Mexico, the Office for Atomic Energy for Peace, Thailand[6] and the State Office of Nuclear Safety, Czech Republic. Preparatory visits were also conducted ahead of IRRT reviews scheduled for September 2001 in Lithuania and December 2001 in Ukraine. The demand for the IRRT service continues to be high, with several requests for missions in 2002. Preparatory visits have been arranged for September 2001 for an IRRT review in Armenia (scheduled for April/May 2002) and October 2001 for an IRRT review in Romania (scheduled for May 2002). The Agency has also been invited to carry out follow-up IRRT reviews in Hungary and Slovakia, in the second half of 2002.

[6] As Thailand has no nuclear power programme, the mission was conducted as a pre-IRRT review but with the scope equivalent to a full-scope IRRT.

64. Many of the recommendations for improvement made during the IRRT missions are specific to the particular national circumstances. However, some issues of more general interest were raised, such as:

- the need for legislation to provide clear definition of the roles and responsibilities of all governmental bodies involved in the regulatory process, and to give the bodies the appropriate authority to meet these responsibilities;
- the need to ensure that the resources allocated to the regulatory body are adequate for it to function effectively; and
- the importance of effective co-ordination between different regulatory bodies responsible for different aspects of a facility or activity.

**Radiation Safety Regulatory Infrastructure (RSRI) service**

65. The Radiation Safety Regulatory Infrastructure (RSRI) service has been established to review, on request, a Member State's radiation safety regulatory infrastructure. This service is available to all Member States and is intended to complement the IRRT service, but may be of particular interest to States that do not have nuclear power programmes. The first review as part of this service was conducted in 2000, in Ireland. (A large number of peer reviews of the effectiveness of national radiation safety infrastructure have also been conducted through TC programmes in recent years.)

**Safety review services on radiation and transport safety**

66. The Agency has established an Occupational Radiation Protection Appraisal Service (ORPAS), and the first such mission visited Slovenia in July 2001. The objectives of the appraisal were to provide an objective assessment of the provisions for occupational radiation protection, to identify strengths that can be brought to the attention of others, areas where performance should be improved to meet international standards and actions to achieve this, and to promote self-assessment. The scope of the appraisal mission included the bodies with regulatory responsibilities, providers of relevant services (e.g. dosimetry) and the practices giving rise to occupational exposure.

67. The Transport Safety Appraisal Service (TranSAS) was established by the Agency in 1999 at the request of the General Conference (GC(42)/RES/13). To date, only one such mission has been conducted. Three other requests — from Brazil, Turkey and the United Kingdom — have been accepted, but the missions have not yet been completed, primarily due to a lack of funding, and a few preliminary enquiries have also been received.

**Safety review services on radioactive waste management**

68. At the request of the US Department of Energy (DOE), the Agency conducted an independent expert review of the assessment methodology being used in the DOE's biosphere modelling programme for the total system performance assessment of the potential disposal facility at Yucca Mountain, Nevada. The main purpose of the review was to analyse critically the proposed rationale and methodology and to identify consistencies and

inconsistencies between methods being used in the DOE project and those established in international standards or in international programmes such as the IAEA's Biosphere Modelling Assessment Programme (BIOMASS) (see Attachment 7).

69. The review was carried out between September 2000 and January 2001. The review included examination of DOE contractor documents, presentation by the DOE of their work, and a visit to the Yucca Mountain and Amargosa Valley region. The report of the review team has been published by the Agency. The team concluded, inter alia, that by commissioning this international peer review of its biosphere assessment programme, the DOE has demonstrated a commendable openness and commitment to improving confidence in future iterations of its Total System Performance Assessment.

70. The Agency is also, at the request of the DOE, co-operating with the OECD/NEA in conducting a peer review of the Yucca Mountain performance assessment as a whole.

71. In response to a request from the national Atomic Energy Commission (PAEC), an Agency mission visited Pakistan in November 2000. The original request was to provide advice on the safety of radioactive waste management at the Karachi NPP, as part of an ongoing project focused on the continued safe operation of the plant, but was expanded to include a review of the recently commissioned waste management facility at Chashma NPP and discussion of possible improvements in the national waste management plan. The team, comprising experts from the IAEA and Germany, visited the facilities and held discussions with management and staff. As well as providing a mission report, the team made a presentation of their findings and recommendations to senior PAEC officials.

72. In May 2001, at the request of the Lithuanian Nuclear Power Safety Inspectorate, the Agency sent a mission to review two Safety Analysis Reports (SARs) relating to several waste management facilities at the Ignalina nuclear power plant. SARs are normally prepared before a facility is constructed, but this had not been done in this case. The mission team, including experts from the IAEA, Germany, the United Kingdom and Lithuania, visited the facilities and evaluated the content of the reports. During the mission and in their report, the experts provided suggestions for improving the SARs and on ways to cope with residual uncertainties through conservative operations and contingency plans.

**Radiological assessments**

73. In recent years, the Agency has carried out several radiological assessments of sites affected by residual radioactive material from accidents, from past waste management practices and from past nuclear explosions.

74. Over the past year, the Agency has participated in a number of activities related to areas affected by residual depleted uranium (DU) from the firing of DU-tipped ammunition. In November 2000, two Agency staff members participated in a UNEP-led mission to Kosovo, Yugoslavia. The report by UNEP concluded that no widespread ground contamination had been found in the investigated areas and, therefore, that the corresponding radiological and chemical risks were insignificant. Although UNEP's findings showed no cause for alarm, the report described specific situations (e.g. high radiation doses as a result of prolonged contact with DU ammunition, or ingestion of small amounts of contaminated

soil) where risks could not be excluded, and the possible DU intake might be somewhat higher than the applicable standards. In addition, according to the report, some uncertainties still existed relating to the longer term behaviour of DU in the environment. For these reasons, the report called for certain precautionary actions.

75. The Agency and other relevant United Nations organizations had received requests for similar assessments in other regions, including the Balkans, as well as in the Gulf and the Middle East, where it is known or believed that DU in ammunition has been used in the past. A mission to Kuwait is scheduled for September 2001. The Agency intends to respond to other requests in a timely manner.

# ATTACHMENT 7

# SUPPORT FOR SAFETY RELATED RESEARCH AND DEVELOPMENT

## Background

1. The Agency supports research and development related to nuclear, radiation and waste safety mainly through Co-ordinated Research Projects (CRPs). The CRPs are intended to optimize the use of research and development resources by bringing together researchers working in common areas. Each CRP includes a number of contracts and agreements (typically about 7–20) with individual institutions in Member States, and typically runs for 3–5 years. Research Co-ordination Meetings (RCMs) between the participating institutions are held at the beginning of, during, and at the end of the CRP to plan the work, discuss progress and report on results achieved.

2. At the time of writing (mid-2001), there were 12 CRPs active, involving more than 90 individual contracts and agreements. The number of CRPs has declined significantly in recent years, primarily as a result of a shortage of funding. The following table lists the CRPs in progress, indicating the planned completion dates, and the number of countries participating.

**CO-ORDINATED RESEARCH PROJECTS IN PROGRESS (as of 2001-06-30)**

| Project title | Start–End | Countries participating |
|---|---|---|
| **Radiation and Waste Safety** | | |
| Limitations of radioepidemiological assessments for stochastic radiation effects in relation to radiation protection | 1994–2001 | 2 |
| Development of radiological basis for the transport safety requirements for low specific activity material and surface contaminated objects | 1997–2002 | 7 |
| Accident severity during air transport of radioactive material | 1998–2002 | 7 |
| Cytogenetic biodosimetry | 1998–2001 | 19 |
| Use of selected safety indicators (concentrations, fluxes) in the assessment of radioactive waste disposal | 1999–2003 | |
| Image quality and patient dose optimization in mammography in eastern European countries | 1999–2003 | 8 |
| Appropriate methods and procedures to apply probabilistic safety assessment (PSA) techniques in the safety of large radiation sources | 2000–2003 | 7 |
| Radiological aspects of package and conveyance non-fixed contamination | 2001– | |
| **Safety of Nuclear Installations** | | |
| Round-robin exercise on WWER-440 reactor pressure vessel weld metal irradiation embrittlement and annealing | 1996–2004 | 7 |

| CO-ORDINATED RESEARCH PROJECTS IN PROGRESS (as of 2001-06-30) | | |
|---|---|---|
| Project title | Start–End | Countries participating |
| Safety of RBMK nuclear power plants in relation to external events | 1997–2002 | 8 |
| Development and application of indicators to monitor operational safety performance at nuclear power plants | 1999–2003 | 10 |
| Updating and expansion of reliability data for research reactor PSAs | 2001–2004 | 11 |

3. The results of CRPs are disseminated to Member States by the Agency, usually in the form of TECDOCs. Researchers also prepare scientific papers for publication in a variety of technical journals and for presentation at meetings and conferences. A brief outline is given below of the four CRPs that have come to an end since the last session of the General Conference.

4. The CRP on biosphere modelling and assessment methods (BIOMASS) involved participants from 12 countries. The project aimed to promote international harmonization on a range of issues: the use of 'reference biospheres' — stylized representations of hypothetical future environments — for long term safety assessments of geological repositories; modelling the impact of environmental remediation at sites affected by residual radioactive material; reconstruction of radiation doses from past releases; the transfer of radionuclides in forest ecosystems and fruit trees; and the environmental behaviour of tritium. An international symposium to present the results of the programme will be held in 2002.

5. The CRP on improvement of safety assessment methodologies for near surface disposal facilities for radioactive waste (ISAM) included participants from 23 countries. The project led to the development and documentation of agreed procedures for the safety assessment of several types of near surface facility, including earth trenches, concrete vaults and boreholes. The ISAM methodologies have been disseminated in missions to requesting Member States and through regional training courses.

6. The CRP on formulation of approaches to compare the potential impacts of wastes from electricity generation technologies (FACTS) involved researchers from 11 countries. Three reports have been prepared, on the following issues: solid waste amounts, characteristics and disposal practices of the nuclear and the non-nuclear fuel chains; modelling releases of radioactive and non-radioactive substances from disposal facilities and subsequent environmental transport; and the assessment of the effects of radioactive and non-radioactive substances. Taken together, these documents provide a detailed methodology to estimate safety related information on the wastes from different energy generation systems, and enable the development of an international approach to standards and procedures for the comparative assessment of waste safety aspects.

7. The CRP on investigation of methodologies for incident analysis involved participants from 14 countries. The final report on the CRP has three main sections, covering: characteristics of appropriate event investigation methodologies; a review of event root cause analysis methodologies; and examination of the effectiveness of operating experience

feedback from events subject to thorough investigation. All of the participating institutions have made substantial progress in developing and implementing effective event assessment and corrective action programmes.

8. Only one new CRP has started since the last session of the General Conference, on radiological aspects of package and conveyance non-fixed contamination. The project aims to research the levels and sources of, and methods for controlling, non-fixed contamination on packages and conveyances during the transport of radioactive material, to assess the radiological consequences of the current regulatory requirements and to define the potential costs and benefits of modifying the regulatory requirements.