LOOKING AHEAD

ISSUES SHAPING THE INTERNATIONAL SAFETY AGENDA

What issues are shaping the global safety agenda, and how are they being addressed? From 31 August to 4 September 1998, leading national and international experts will examine that question and others at the IAEA's International Conference on Topical Issues in Nuclear, Radiation, and Radioactive Waste Safety in Vienna, Austria. Among issues on the table are topics featured in this report, which is drawn from the IAEA's *Nuclear Safety Review for 1997*.

Chronic Exposures to Radiation. The pursuit of radiological criteria for the rehabilitation of areas affected by residual radioactivity from past practices, and for other chronic exposure situations, has raised a number of questions about the system of protection enshrined in the 1990 Recommendations of the International Commission on Radiological Protection (ICRP) and in the *International Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources*. For example, the principles for intervening in the event of a nuclear accident are well established, but the criteria for determining when an intervention situation can be considered to have returned to "normal" are less well developed. These latter situations can often, quite reasonably, be compared to those in areas of high natural background radiation, where quite different standards seem to be applied.

Another area of confusion arises from the fact that the existing system of protection concentrates largely on the increment of dose added by a practice or averted by an intervention, with relatively little attention being given to the total dose.

An Agency discussion document *(Application of Radiation Protection Principles to the Cleanup of Contaminated Areas — Interim Report for Comment)* and a number of reports on radiological assessments of such areas are due to be published in 1998. The ICRP has established a Task Group that is preparing a document covering the whole range of chronic exposure situations. Clearly this is an area where the principles will continue to develop in the coming years.

Regulating Low Doses of Radiation. The regulation of low doses of radiation is a matter of perennial interest, but has been particularly prominent of late. At one level, there has been renewed debate as to whether the fundamental basis for the regulation of low doses — the linear-no threshold (LNT) hypothesis — is valid. At another, the practical issues of managing low-dose activities within the existing radiation protection framework continued to cause much discussion.

The LNT hypothesis of radiation risk, on which modern radiation protection philosophy is based, has come under attack in the past few years from both sides of the argument. Many individuals and some organizations — notably the French National Academy of Science and the US Health Physics Society — have argued in favour of a threshold below which individual doses should not be considered for radiation protection purposes. Some have argued this as a matter of principle, claiming radiobiological and/or epidemiological evidence that there are no adverse health effects from low doses; others suggest it as a pragmatic approach in the absence of direct evidence for such effects.

Meanwhile, some researchers have interpreted experimental results and epidemiological findings as providing evidence that low doses of radiation are

This report is based on information from the IAEA's Nuclear Safety Review for 1997. See the IAEA Books section in this edition for ordering information.

MEMBER STATES PARTICIPATING IN THE MODEL PROJECT "UPGRADING RADIATION AND WASTE SAFETY INFRASTRUCTURE"

Africa
Cameroon
Côte d'Ivoire
Democratic Republic of the Congo
Ethiopia
Gabon
Ghana
Madagascar
Mali
Mauritius
Namibia
Niger

Nigeria
Senegal
Sierra Leone
Sudan
Uganda
Zimbabwe

West Asia/East Asia
Bangladesh
Jordan

Kazakhstan
Lebanon
Mongolia
Myanmar
Qatar
Saudi Arabia
Sri Lanka
Syrian Arab Republic
United Arab Emirates

Uzbekistan
Viet Nam
Yemen

Latin America
Bolivia
Costa Rica

Dominican Republic
El Salvador
Guatemala
Haiti
Jamaica
Nicaragua
Panama
Paraguay

Europe
Albania
Armenia

Belarus
Bosnia and Herzegovina
Cyprus
Estonia
Georgia
Latvia
Lithuania
Republic of Moldova
The Former Yugoslav Republic of Macedonia

much more harmful than the LNT hypothesis implies. A number of mechanisms have been proposed by which this might occur, a recent example being the phenomenon of genomic instability.

The renewed debate on the subject was evidenced by the number of national and international conferences and symposia at which the matter was discussed, culminating in an international conference in Seville, Spain in November 1997 sponsored by the IAEA and the World Health Organization, in co-operation with the United Nations Scientific Committee on the Effects of Atomic Radiation. Among other things, the Conference highlighted areas of radiobiological and epidemiological research that are likely to provide important new information on the effects of low doses in the coming years; there was particular optimism concerning epidemiological studies of workers and members of the public in and around the Mayak facility in the Russian Federation.

From the evidence available at the present time, however, the LNT hypothesis continues to seem the most radiobiologically defensible basis for radiation protection recommendations. It is also a workable hypothesis that can underpin systems of regulation which, when applied reasonably, provide sound and sensible management of the risks from radiation.

■ **Exclusion and Exemption.** A related issue, that of exclusion and exemption (along with the related concept of clearance) continued to attract much discussion, particularly in European Union countries, where the exemption levels specified in the Euratom Directive on Basic Safety Standards — which are numerically the same as those specified in the *International Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources* — will soon become mandatory (Member States have until May 2000 to implement the Directive in national legislation).

A series of incidents in which slightly radioactive materials were transported from one State to another showed the potential for controversy. An international Specialists' Meeting at the IAEA in May 1998 highlighted many of the issues that remain to be resolved, the question of terminology being among the most prominent. International agreement on these issues is very important, as the purpose of exemption and clearance is to allow the free use of materials that do not warrant regulation. This

INTERNATIONAL CONFERENCES EXAMINING SAFETY ISSUES

The IAEA is convening two international conferences in 1998 where experts from Member States and international organizations are examining safety issues. They are the:

■ **International Conference on Topical Issues in Nuclear, Radiation, and Radioactive Waste Safety, 31 August to 4 September 1998, in Vienna, Austria.** Six key issues are being addressed related to improving safety at nuclear power plants; safety regulation; radiation protection; exposure to radiation; and the safety of radioactive waste management. The Conference aims to consolidate international consensus on the present status of issues; priorities for future work; and the needs for strengthening global co-operation.

■ **International Conference on the Safety of Radiation Sources and the Security of Radioactive Materials, 14-18 September 1998, Dijon, France.** Two distinct but interrelated subjects are being addressed — the prevention of accidents involving radiation sources, and the prevention of theft or any unauthorized use of radioactive materials and the measures for detecting and responding to the illicit trafficking of these materials. The Conference is co-sponsored by the IAEA, European Commission, International Criminal Police Organization, and World Customs Organization.

cannot happen if material considered exempt in one State is regarded as a significant radiological hazard in another.

■ **Management of Safety at Nuclear Installations.** A number of the main events related to nuclear safety in 1997 suggested a common theme of deficiencies in the management of operational safety, even in States with long-established nuclear programmes. The specific problems and their direct causes differed from case to case, but the underlying causes seemed to be consistently linked to the absence of key elements of safety culture. Different possible reasons for this have been postulated — complacency bred by past successes, cost cutting in a competitive energy market, and authoritarian management, among others — but whatever the reasons there is significant room for improvement.

The principles of safety are well known and widely implemented. To go beyond the present level of nuclear safety, management of safety and safety culture will be the means for achieving progress. *(See related article, page 27.)* This means a commitment to safety from the top management down, a working environment in which communication is encouraged, staff concerns are listened to, and warning signs are noticed and acted upon. It also means constant vigilance to ensure that good safety performance is maintained, and is not taken for granted. Peer reviews can help in this regard, as can a continuing programme of self assessment. Regulatory inspection and enforcement are, of course, essential elements for monitoring safety at nuclear installations, but the primary responsibility for safety rests with the operating organization.

■ **Safety of Radiation Sources and Security of Radioactive Materials.** The possibility of illicit trafficking in nuclear materials has attracted great interest. While the interest started because of reports of nuclear material smuggling, it is also recognized that more mundane failures in the security of radiation sources and radioactive materials represent a substantial risk to human health. Incidents involving lost, abandoned or stolen radiation sources continue to occur.

Numerous incidents have occurred in recent years — particularly since 1992 — involving the illegal procurement and movement across national borders of nuclear materials and other radioactive sources. The vast majority of cases detected involved very small quantities of radioactive material, but in some incidents highly active

sources emitting dangerous radiation levels were found. A frequent problem of particular importance is contamination of scrap metal due to careless or fraudulent disposal of industrial or medical radiation sources.

Concerns remain as to whether larger scale trafficking, perhaps even involving weapon-grade materials, is a real possibility. Many European States have taken action to improve their ability to prevent or detect such actions, and to ensure that any incidents that occur are handled in such a way that staff involved — principally customs and law enforcement officers — and the public are not put at risk.

Meanwhile, incidents continue to occur around the world in which radiation sources being used for medical, industrial and military applications are lost, abandoned, damaged, stolen, or misused, sometimes with serious or even fatal consequences.

For example, fatal radiation accidents — in nuclear facilities and non-nuclear industry, research and medicine — have been reported in the past 15 years; the number of accidents involving significant radiation exposure is several times greater. Improvements recommended and implemented on an ad hoc basis — typically after an incident has occurred — are being supplemented by a more systematic programme of improvements to regulatory control systems for sources. *(See box on page 32 listing IAEA Member States participating in a Model Project to upgrade infrastructures for radiation and waste safety.)* Nevertheless, further improvements and continued vigilance are needed to minimize the number and severity of such incidents.

An International Conference on the Safety of Radiation Sources and the Security of Radioactive Materials — co-sponsored by the IAEA, the European Commission, Interpol and the World Customs Organization — will be held in Dijon, France, from 14-18 September 1998, and will cover both of the areas of "security" discussed above. *(See box, page 33.)*

■ **Communicating Nuclear, Radiation, and Waste Safety Issues.** Proponents and opponents of the use of nuclear technologies both devote considerable attention to communicating with decision-makers, opinion-formers, the media and the general public in order to convey their 'message'.

The communication challenge for regulatory authorities and their technical support organizations is somewhat less straightforward. They have a responsibility to communicate with a wide range of audiences in such a way that unfounded fears are allayed, but real risks, concerns or problems are not understated. Furthermore, this needs to be achieved both on a routine, day-to-day basis and in circumstances of a real or perceived crisis.

This need to provide accurate and timely information on nuclear, radiation, transport, and waste safety issues, in a form that the relevant audience(s) can readily understand, applies to regulatory organizations in all States, not only those with nuclear power programmes.

To help authorities in this task, the Agency is issuing a document, entitled *Communication of Nuclear, Radiation, Transport and Waste Safety: A Practical Handbook*. It is intended that it will serve as both a practical guide for regulators and the basis for material on safety related communication in training courses. It may also be used as a basis for future documents in this topical area.

■ The Convention on Nuclear Safety — National Reports, International Scrutiny. An Organizational Meeting of the Contracting Parties to the Convention on Nuclear Safety is scheduled 29 September-2 October 1998 in Vienna. The starting date of this meeting is also the deadline for Contracting Parties to submit national reports for discussion at the first Review Meeting of the Convention, which will begin on 12 April 1999. The international scrutiny of these detailed national reports is a novel and important feature of the Convention. Each report will describe the measures taken by the Contracting Party to fulfil the nuclear safety obligations set out in the text of the Convention. The national reports will be circulated to all of the Contracting Parties, who then have the opportunity to submit comments and questions. At the Review Meeting, each report — along with comments and questions submitted in advance by other Contracting Parties — will be reviewed by one of five Country Groups, who will then report their conclusions back to a plenary session of the meeting. The main tasks of the

Organizational Meeting will include the establishment of these Country Groups — by a pseudo-random process designed to ensure that each Group has a mixture of nuclear experience — and the selection of coordinators, rapporteurs and working language for each Group. Many Contracting Parties are known to already be in the process of preparing national reports, and some regional groups have emerged, exchanging views and experience on the preparation process.

The meeting of Contracting Parties to the Convention on Nuclear Safety will result in a degree of transparency in safety matters that will be substantially higher than has existed in the past. While the conclusion is likely to be that, in general, nuclear safety has improved worldwide, the Parties will probably focus on some areas that require further attention.

Contracting Parties are likely to address situations where the independence of regulatory authorities is in question or the authorities have not effectively discharged their licensing duties.

Openness in the exchange of information on safety issues and operating events is also a likely area for discussion. Contracting Parties that have not been open to international reviews will be faced with increased skepticism about the safety of their nuclear activities. Overall, an increase in international activities and transparency will be necessary if concerns about the level of safety actually being achieved are to be counteracted.

■ **Transboundary Movement of Radioactive Materials.** The transport of radioactive materials, and radioactive waste in particular, has attracted considerable attention. Shipments that had been operating routinely in the past have been increasingly highlighted by pressure groups, and have attracted increased expressions of concern from some States along the route. Some have raised their concerns at international forums, such as the International Maritime Organization (IMO), the Diplomatic Conference on the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, and the IAEA's General Conference and Board of Governors. Both the Diplomatic Conference and the IAEA General Conference adopted resolutions on the issue; the latter requested the Agency "to prepare ... a report on legally binding and non-binding international instruments and regulations concerning the safe transport of radioactive materials and their implementation".

The IAEA Secretariat has begun work on such a report, and is also taking the lead — as part of an informal working group with the IMO and the United Nations Environment Programme (UNEP) — in carrying out a literature review on the potential consequences of severe maritime accident scenarios involving shipments of irradiated nuclear fuel, high-level waste and plutonium.

Some States have raised questions of safety and emergency preparedness; for example, a Joint Declaration on the Transport of Radioactive Waste issued by the Governments of Argentina, Brazil, Chile and Uruguay (reproduced in the Attachment to IAEA document INFCIRC/533) declared, *inter alia* "their grave concern at the risks associated with the transit through the region [of the Cape Horn route] of ships transporting radioactive waste". However, the focus of concerns has often been more on issues such as prior notification of shipments and consent of transited States. The present indications are that these issues must be resolved internationally so that the rights of shipping States and transit States reach an appropriate balance.

■ **Economic Deregulation of Energy Markets.** National energy markets are increasingly being opened up to competition between generators, bringing a greater degree of privatization of operating organizations. In some States, this is already a reality, and there are strong indications that it will spread to many others in the near future. This process imposes new pressures on operators to cut costs — and often, therefore, to cut staff numbers — and to find more efficient working practices.

It is incumbent on regulators and operators alike to ensure that the measures through which nuclear operators strive to compete do not lead to safety being compromised. Regulators are increasingly aware that this is an issue that needs to be addressed, and that vigilance is needed to detect, and if necessary reverse, any negative trends in safety performance. ❐