

# **International Conference on the Safety and Security of Radioactive Sources: Maintaining Continuous Control of Sources throughout Their Life Cycle**

**27-31 October 2013 – Abu Dhabi, United Arab Emirates**

## **Findings of the President of the Conference**

### *Introduction*

This Conference, held in Abu Dhabi 27-31 October 2013, was organized by the International Atomic Energy Agency (IAEA) and was hosted by the Government of the United Arab Emirates (UAE) through the Federal Authority for Nuclear Regulation (FANR) in cooperation with the International Criminal Police Organization (INTERPOL), the International Commission on Radiological Protection (ICRP), the International Source Suppliers and Producers Association (ISSPA) and the World Institute for Nuclear Security (WINS). It was attended by over 320 participants from 87 IAEA Member States, 1 non-Member State and 6 International Organizations. Its purpose was to review current success and challenges in ensuring the safety and security of radioactive sources, and to identify means to maintain the highest level of safety and security throughout their lifecycle, from manufacture to disposal.

The timing of the Conference coincided with the 10<sup>th</sup> anniversary of the endorsement of the Code of Conduct on the Safety and Security of Radioactive Sources by the IAEA General Conference. To celebrate this anniversary, the first and second sessions of the Conference provided a review of the history of events which led to the development of the Code, discussed the current status of its implementation and looked at the ongoing challenges relating to the safety and security of sources.

### *Background to the development of The Code of Conduct on the Safety and Security of Radioactive Sources*

Radioactive sources are used extensively throughout the world for a wide range of beneficial purposes, particularly in medicine, general industry, agricultural research and educational applications. The need to ensure the safety and security of these sources has been recognized for many years, and many Member States established regulatory infrastructures for that purpose. Even so, the occurrence of a number of serious accidents in the 1980s and 1990s led the international community to question the effectiveness of these controls. Consequently, the International Atomic Energy Agency (IAEA) organized a number of specific international conferences to examine the issues and make recommendations. These included:

- The International Conference on the Safety of Radiation Sources and the Security of Radioactive Materials held in Dijon in 1998;

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- The International Conference of National Regulatory Authorities with Competence in the Safety of Radiation Sources and the Security of Radioactive Material, held in Buenos Aires in 2000;
- The International Conference on Security of Radioactive Sources, held in Vienna in 2003;
- The International Conference on the Safety and Security of Radioactive Sources: Towards a Global System for the Continuous Control of Sources throughout their Life Cycle, held in Bordeaux in 2005, and
- The International Conference on Control and Management of Radioactive Material Inadvertently Incorporated into Scrap Metal, held in Tarragona in 2009.

The first two conferences listed above took place primarily in response to the growing realization that inadequate controls over radioactive sources had led to some significant radiological accidents, some of which had caused serious injuries, even death, and/or severe economic disruption. These accidents had their origins in a breakdown or absence of proper regulatory control and were not a result of malicious intent. After 2001, concerns regarding the possible use of radioactive sources for malicious purposes led the international community to broaden the focus of discussions to consider also the need to strengthen controls over the security of radioactive sources.

The safety and security of radioactive sources was also included as an Agenda Item at:

- The International Conference on National Infrastructures for Radiation Safety, held in Rabat in 2003;
- The International Conference on Nuclear Security: Global Directions for the Future, held in London in 2005;
- The International Conference on Effective Nuclear Regulatory Systems, held in Ottawa in 2013, and
- The International Conference on Nuclear Security: Enhancing Global Efforts, held in Vienna in 2013.

Other international initiatives, such as the Nuclear Security Summit held in Seoul in 2012, also emphasized the importance of safety and security of radioactive sources.

A major finding of the Conference held in Dijon in 1998 was that the IAEA should investigate whether international undertakings concerned with an effective operation of national systems for ensuring the safety of radiation sources and the security of radioactive materials, and attracting

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broad adherence, could be formulated. The 1998 General Conference of the Agency, held immediately after the Conference in Dijon, requested the Secretariat to prepare a report for the Board of Governors on the matter.

The Action Plan on the Safety of Radiation Sources and Security of Radioactive Materials, adopted by the Board of Governors in September 1999<sup>1</sup>, requested the Secretariat to initiate a meeting of technical and legal experts for exploratory discussions relating to an international undertaking in the area of the safety of radiation sources and the security of radioactive materials. This undertaking would address the establishment of regulatory infrastructures, national arrangements for prompt reporting of missing sources, national systems for ensuring appropriate training of personnel, national arrangements for management and disposal of disused sources, and arrangements for a response to the detection of orphan sources.

The meetings of technical and legal experts held in March and July 2000 resulted in the production of The Code of Conduct on the Safety and Security of Radioactive Sources. As a result of decisions taken at those meetings, the Code focused on sealed radioactive sources, was addressed to States and national regulators, and was non-legally binding. A range of provisions of the 2000 Code were relevant to maintaining control over sources, and some of those provisions explicitly referred to the needs of “security”. However, in reality the focus was very much on incidents such as persons stealing shiny objects for scrap metal resale, with no consideration given at that time to possible use of sources for malicious purposes.

The IAEA’s Board of Governors approved the Code of Conduct in September 2000. The subsequent General Conference endorsed the Code of Conduct and invited Member States to take note of it and to consider, as appropriate, means of ensuring its wide application.

Following the events of 11 September 2001 and a questionnaire sent out to Member States in May 2002, it was agreed that the Code of Conduct should be revised to strengthen a number of security-related and other provisions and to specifically address intentional, or malicious, misuse of radioactive sources. An open-ended group of technical and legal experts was convened for the purpose, and met three times in 2002-03. The resulting revised Code was approved by the Board of Governors in September 2003<sup>2</sup>, and later that month the General Conference welcomed the Board’s approval of the revised Code of Conduct and urged “each State to write to the Director General stating that it fully supports and endorses the IAEA’s efforts to enhance the safety and security of radioactive sources; that it is working toward following the guidance contained in the IAEA Code of Conduct on the Safety and Security of Radioactive Sources; and that it

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1 Document GC(43)/10 and Corr.1

2 Document GC(47)/9

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encourages other countries to do the same”<sup>3</sup>. In effect, this comprised an invitation to Member States to make a political commitment indicating their intention to implement the Code.

When the text of the Code was approved by the Board of Governors, it was agreed that additional guidance on the provisions in the Code relating to the import and export of radioactive sources was needed. The supplementary Guidance on the Import and Export of Radioactive Sources was drafted by an open-ended group of technical and legal experts over the course of two meetings, approved by the Board of Governors and endorsed by the General Conference in 2004. Again, the General Conference encouraged States to act in accordance with the Guidance on a harmonized basis and to notify the Director General of their intention to do so as supplementary information to the Code of Conduct<sup>4</sup>. The supplementary Guidance was revised in 2011; the revised Guidance was subsequently endorsed by the Board of Governors and the General Conference<sup>5</sup>.

In response to a recommendation from the Bordeaux Conference in 2005, a formalized process for the exchange of information between States on implementation of the Code and the supplementary Guidance was established in 2006. This process calls for international meetings every three years where States are invited to prepare and submit national reports on their efforts to implement the provisions in the Code. Two such meetings have been held to date, in 2007 and in 2010, and this Conference in Abu Dhabi in 2013 represents the third such meeting. Participation at each successive review meeting has increased. The reports of those information exchange meetings are available on the IAEA web site<sup>6</sup>.

The Code of Conduct on the Safety and Security of Radioactive Sources is the principal international instrument for both the safety and the security of radioactive sources. The Code of Conduct and the Guidance complement the existing Safety Standards Series, specifically the Basic Safety Standards which were first published in 1962 and which have been regularly updated since then. Since 2004, with the growing awareness of the need for security, the IAEA has established the Nuclear Security Series (NSS) and has published the Nuclear Security Fundamentals, nuclear security recommendations including NSS No. 14 (Nuclear Security Recommendations on Radioactive Material and Associated Facilities) and NSS No. 15 (Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control) as well as several guides. These guides include two documents specifically related to radioactive sources: NSS No. 11 (Implementing Guide on Security of Radioactive Sources) and NSS No. 5 (Reference Manual on Identification of Radioactive Sources and Devices).

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<sup>3</sup> Resolution GC(47)/RES/7

<sup>4</sup> Resolution GC(48)/RES/10

<sup>5</sup> Resolution GC(55)/RES/9

<sup>6</sup> <http://www-ns.iaea.org/tech-areas/radiation-safety/code-conduct-info-exchange.asp?s=3>.

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### *Achievements in the safety and security of radioactive sources*

The Conference enabled States to share a number of significant achievements since the approval of the Code of Conduct in 2003:

- To date, 119 States have made a political commitment with regard to the Code of Conduct on the Safety and Security of Radioactive Sources, thereby reflecting a wide acceptance of the Code as the primary instrument for the safety and security of radioactive sources. 84 States have made a political commitment to the supplementary Guidance on the Import and Export of Radioactive Sources;
- National regulatory infrastructures have been strengthened and, in many cases where they previously did not exist, they have now been developed. As a result, the number of accidents leading to serious radiation exposure has notably declined;
- The formalized process, established in 2006, for States to report their progress in implementing the principles in the Code is a useful mechanism for States to assess their continuing progress in implementing the provisions of the Code, to identify further needs and to benefit from the experiences of others. According to this process, a total of 68 Member States submitted national reports for the Conference. The Conference noted that the process of preparing national reports constituted a valuable self-assessment opportunity;
- Bilateral, regional and multilateral cooperation programmes have been established to assist in the establishment of regulatory infrastructures; to share experiences; to assist in the improvement of both the physical protection and security management of radioactive sources throughout their life cycle; and to build capacity for radiological emergency preparedness and response. The latter includes building an effective response capacity for dealing with radiological accidents, situations in which radioactive sources are out of regulatory control, and malicious acts involving radioactive material.
- Many States have implemented strategies for regaining control over orphan sources;
- Post-graduate educational programmes on the safety of radioactive sources and on nuclear security now exist in a number of States in different regions of the world, and training programmes for various professional groups involved in safety and security have been established with the aim of developing and maintaining the appropriate competences;
- Some States have established bilateral administrative arrangements to exchange information consistent with the supplementary Guidance on the Import and Export of Radioactive Sources;
- The IAEA's role in supporting States' efforts to improve the safety and security of radioactive sources was commended. Specifically, a number of States have availed themselves of the peer review and advisory services provided by the IAEA. These peer reviews have been particularly helpful in identifying the strengths and weaknesses of national infrastructures for safety and security of radioactive sources. Nuclear Security Series No. 11

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was cited by many participants as being useful in the development of national radioactive source security requirements.

### *Future challenges*

The Conference noted that a number of important areas remain to be addressed:

- Not all States have made a political commitment to the Code, and some States which have done so have made little progress in implementing its provisions. Further, some States support the Code but not the Guidance. Having committed to the Code of Conduct and to the supplementary Guidance, progress in implementing the provisions in these documents will only be achieved if commitment is translated into action;
- While the legal and regulatory framework addresses safety in many States, there are – despite some progress – often inadequate controls to ensure the security of radioactive sources.
- National infrastructures for safety and security of radioactive sources can exhibit weaknesses in the following areas:
  - The empowerment, competence and effective independence of the regulatory body;
  - The clarification of responsibilities in cases where there is more than one regulatory body with responsibilities for the safety and security of radioactive sources, and the establishment of arrangements to avoid or resolve potential conflicts where there is an overlap of responsibilities;
  - The provision of resources for the regulatory body, ensuring in particular that arrangements with regard to funding, staff numbers and competence, training and equipment, are sufficient for the regulatory body to carry out its duties effectively;
  - An appropriate national policy and strategy for the management of radioactive waste including disused radioactive sources;
  - An appropriate national policy and strategy for the education and training of professionals involved in the safety and security of radioactive sources.
- Management of scrap metal contaminated with radioactive material continues to be a problem. Despite some progress in the area, the fact remains that a high proportion of the incidents reported to the Conference involved orphan sources mixed with scrap metal;
- Transport of disused radioactive sources to the country of origin or to a storage facility may be difficult because of the absence of certified Type “B” transport containers that are consistent with the requirements of the current Transport Regulations. The Conference was informed about development with regard to design and licensing of suitable containers;
- Financial and other liabilities have not yet been widely established for dealing with disused and orphan sources, and also with incidents and accidents involving radioactive sources.

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### *Recommendations*

- *The need for a legally binding international instrument?*

Looking to the future, the Conference discussed at some length whether, based on the Code of Conduct and supplementary Guidance, a legally binding international instrument, i.e. a convention, should be developed on the safety and security of radioactive sources. Whilst recognizing the many advantages which might accrue from having a convention (particularly in terms of provision of resources by governments), participants nevertheless acknowledged that the existing voluntary arrangements had been recognized by 119 Member States and that significant progress had been made in improving the safety and security of radioactive sources as a result of those Member States following the recommendations of the extant Code of Conduct and supplementary Guidance. Many participants considered that this achievement should not be undermined, particularly since there was no guarantee that a convention would include the same detailed provisions as the current Code of Conduct; or that it would attract a similar number of Member States to those currently supporting the Code of Conduct. Furthermore, it was felt that the development and eventual ratification of such a convention and the implementation of its requirements would take much more time than had been the case with the Code of Conduct. Participants also expressed concern about how a convention might be introduced in parallel with the ongoing implementation of the existing Code of Conduct. There could also be conflicts in requirements which could dilute the effectiveness of existing safety and security provisions. Finally, it was noted that the issue of potential overlap with the Joint Convention would need to be carefully negotiated.

Throughout the discussion, participants acknowledged that a global system of protection was required whereby the priority would be to promote the levels of consistency and sustainability in the management of the safety and security of radioactive sources. They recognized that whilst much had been achieved, more was needed. It was a matter of judgment as to whether these further improvements might be achieved through the ‘Code of Conduct’ or whether a legally binding ‘Convention’ should be the platform for this. One solution might be for the negotiation of a legally binding ‘Convention’ with the same level of detail as the ‘Code’, and with no diminution or diversion of resources currently allocated to implementing the ‘Code’ whilst the ‘Convention’ is negotiated and then subject to the lengthy process of ratification by States.

**Recommendation:** The Conference recommended that the IAEA should convene a working group to assess the merits of developing a Convention on the safety and security of radioactive sources, and to make recommendations. This would enable an informed decision to be made with

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regard to whether the Secretariat should seek Member State support for the development of a legally binding ‘Convention’.

- *Long-term management of disused sources*

The Conference discussed various options for the management of radioactive sources at the end of their useful lives. These include: increasing the recommended working life<sup>7</sup>; return to supplier/manufacturer<sup>8</sup>; reuse or recycling; long-term storage; or disposal. Participants accepted that a source does not become waste until it reaches the point when final disposal becomes the only viable option<sup>9</sup>.

Participants agreed that returning a source to its supplier is the preferred, baseline management option for a source which has reached the end of its useful life. However, implementing this option requires the establishment of a safe and secure national interim storage facility, in the framework of a national policy for the management of disused sources. Returns also require funding to cover costs such as prior packaging and transport. When a disused source is replaced by a new source, this funding is generally included within the framework of the sale contract. This funding is also provided through the establishment of financial provision when purchasing radioactive sources, particularly those in Categories 1 and 2, as defined by the IAEA. However, there are uncertainties on the adequacy of these provisions with the actual costs that might be needed at the time of returning the source which may occur several years or decades after the purchase. Identifying the supplier to whom a disused source can be returned is also not always straightforward, due to the age of the source and the possibility that the manufacturer may no longer be in business: a back-up option in the form of a storage or disposal facility should be available on either a regional or national basis. Importantly, any solution relating to disused or orphan sources must guarantee continuity of regulatory control. A significant challenge in enabling the use of such a facility will lie in overcoming any potential conflicts in regulations relating to transport, radiation, waste safety and security.

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<sup>7</sup> Recommended working life is a concept defined in ‘Radiological protection—Sealed radioactive sources—General requirements and classification’, ISO 2919:2012.

<sup>8</sup> It was noted that in some cases particularly with older radioactive sources, the original supplier may no longer exist.

<sup>9</sup> The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management defines radioactive waste as ‘radioactive material in gaseous, liquid or solid form for which no further use is foreseen by the Contracting Party or by a natural or legal person whose decision is accepted by the Contracting Party...’ Further, Article 28 of that Convention obliges each Contracting Party to ‘allow for reentry into [its] territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources’.



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**Recommendation:** Additional guidance at the international level for the long-term management of disused radioactive sources should be developed. That guidance should make recommendations with regard to, at a minimum, the development of a national policy (including the establishment of interim storage facilities), the organization of the return to suppliers (including related financial arrangements) and the interface with transport and waste regulations. That guidance may form supplementary guidance to the Code of Conduct. The Conference therefore recommended that the IAEA set up exploratory discussions to determine the appropriate way in which to address the issues.

**Recommendation:** As part of the baseline strategy of returning sources to suppliers, supplier States are encouraged to strengthen their cooperation with recipient States and each other. Data on manufacturers and exported radioactive sources should be collected and shared.

**Recommendation:** The importance of providing pre-shipment notifications to the regulator(s) in the importing State (as recommended by the supplementary Guidance on the import/export of radioactive sources) should be reinforced by exporting States to facilitate transboundary movement of disused sources by harmonizing regulatory requirements worldwide.

**Recommendation:** Member States which have not yet done so are strongly encouraged to ratify the Joint Convention, as it addresses the management of disused sources. The IAEA is further encouraged to continue efforts to promote the ratification of the Joint Convention by every Member State.

- *Inter-relationship of safety and security*

The fact that safety and security measures have in common the aim of protecting people, society and the environment has been explicitly recognized by the General Conference, the Nuclear Safety Fundamentals and the Nuclear Security Fundamentals. The Conference called upon the IAEA's Secretariat to continue its efforts to ensure coordination of its activities in nuclear safety and nuclear security and to encourage the implementation of a process to reconcile the interfaces between the publications of the Nuclear Security Series and the IAEA Safety Standards.

Before the current emphasis on the need to protect radioactive sources from being used for malicious purposes, security measures were generally considered to be a part of the safety measures to prevent accidental misuse. However, there has since been general acceptance that this view is no longer sufficient, although support for this revised thinking is not unanimous. For this reason, it has become eminently clear that neither term is sufficient in itself for the purpose of defining functions. National authorities and international organizations have struggled over the last decade or more with varying degrees of success to find ways whereby the need for both safety and security of radioactive sources can be addressed. Liaison and coordination between

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those involved are essential but they are not always sufficient; there must also be a willingness for a professional to work in an integrated approach with emphasis on taking sensible, informed judgments appropriate to the situation. This is particularly important where safety and security approaches may conflict, for example, when safety calls for openness while security demands confidentiality.

The Conference noted recent developments at the IAEA which have significantly raised the profile of nuclear security. In particular, the formation of the Nuclear Security Guidance Committee (NSGC) had provided a forum for all Member States to contribute to the development of guidance through the Nuclear Security Series; and the establishment of the associated Interface Group had provided a formal mechanism whereby potential conflicts between nuclear safety and nuclear security could be resolved by the appropriate experts from each discipline. Similarly, the approval of the Nuclear Security Fundamentals document (Nuclear Security Series Number 20) by the Board of Governors and the upgrade of the Office of Nuclear Security to a Division confirmed that nuclear security was now recognized as a discrete and permanent function of the IAEA.

Participants acknowledged these recent positive changes within the IAEA with regard to the relationship between nuclear security and nuclear safety. There was an implicit expectation that these changes would apply equally to matters relating to the safety and security of radioactive sources.

**Recommendation:** In well-established practices where there is no confusion over the responsibilities and obligations for safety and security, for example industrial radiography, nuclear gauges and well logging, the IAEA should consider publishing integrated guidance which addresses both safety and security.

- *Information exchange*

The Conference discussed how the voluntary mechanism for reporting on the implementation of the Code and the supplementary Guidance might be improved. The Conference concluded that there was merit in developing guidance for States in the preparation of their national reports. Such guidance would contribute to consistency in describing activity against all areas of the Code in the national reports, thereby encouraging more comprehensive national reports. These, in turn, would increase the effectiveness of the next review meeting and facilitate the in-depth exchange of information, knowledge and experience. Another benefit would be a more precise identification of progress, challenges, gaps and needs for further assistance and cooperation. The self-assessment methodology and tools developed by the IAEA provides a good framework for developing this guidance. At the same time, the guidance for national reports should not be so onerous as to discourage States from submitting national reports, which is after all voluntary.

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**Recommendation:** The IAEA, within the existing formalized process and in association with States, should develop more prescriptive guidance for States to self-assess their level of implementation of all provisions of the Code and to prepare their national reports. In addition, all States that have committed to following the principles in the Code should fully complete their national reports in preparation for each review meeting.

In addition to these four main recommendations, the conference also discussed and made recommendations as follows.

- *Adherence to the Code of Conduct and supplementary Guidance*

The Conference considered that the IAEA and all States who have made a commitment to follow the Code of Conduct should encourage those States who have not made such a commitment to do so. In addition, the Conference recommended that all States should persevere with their efforts to implement the principles given in the Code and the supplementary Guidance. With a view to this, the Conference recommended that the IAEA continue to arrange meetings, both regional and international, to review progress and encourage further development of national arrangements to implement those principles.

- *Regional cooperation*

The Conference considered that the regional cooperation programmes that had taken place over the last years had been highly successful in helping States develop their infrastructures for the safety and security of radioactive sources. It therefore felt that these should, where feasible, continue although it recognized the current difficulties due to the global economic situation.

- *Scrap metal inadvertently containing radioactive material*

The Conference noted that the recommendation of the Tarragona Conference that an international agreement between governments to unify the approach to trans-border issues concerning scrap metal containing radioactive material had not been realized, and recommended that further attempts should be made to act on this recommendation.

- *Orphan source search programmes*

Noting that many States had successfully undertaken search programmes for orphan sources, the Conference recommended that such programmes should be continued. Those States that had not

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already started such programmes were encouraged to do so, drawing on the experience of other States.

- *Sustainability*

- Infrastructure. Many States have benefited from the technical support provided by the IAEA and others over many years. The purpose of these support programmes has been to build up the infrastructures within States, with the ultimate goal of the States becoming self-sufficient in dealing with radiation safety, and more recently, nuclear security. The Conference recommended that the States which had been recipients of this support should work towards this goal, and the IAEA should increasingly focus on providing peer review services in order to identify strengths and areas for improvement. States are recommended to make use of these peer review services for improving their safety and security infrastructure.
- Facilities and equipment. The Conference recommended that States should ensure that the physical protection upgrades undertaken over the last decade or so at facilities in which category 1 and 2 sources are located, including those for disused sources, are appropriately maintained.
- Education and training. Post-graduate courses in radiation safety and nuclear security have now been established throughout the world, and the support for these provided by the IAEA should be maintained. States should ensure that training programmes for professionals should continue to be developed, with the support, as necessary, of the IAEA, and consideration should be given to the formal recognition of experts for radiation safety and nuclear security specialists working with radioactive sources. These human resource development initiatives might also be complemented by the establishment of national professional associations, recognized by the State, for radiation safety and nuclear security specialists.

- *Events involving radioactive sources*

The Conference noted that the IAEA had historically produced many reports of accidents that had occurred with radioactive sources with the purpose of sharing the lessons to be drawn from them. Accidents continue to occur (albeit at a lower rate), and the Conference therefore recommended that the IAEA should continue to produce such reports.

- *Liabilities and financial issues*

The existing international legal framework surrounding nuclear third party liability expressly excludes radioactive sources from its scope. Liability with respect to incidents and accidents

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involving radioactive sources, as well as management of legacy sources, is therefore unclear. Even if, at the national level, legal liability for an incident is clear, there are generally no provisions which ensure that funds are available to cover all associated costs. It is clear that further consideration of this complex issue is required, and the Conference recommended that it should be examined further by the IAEA. One possible solution would be for the IAEA to request the International Expert Group on Nuclear Liability (INLEX) to take up this issue.

- *Further guidance on security*

Participants recognized the importance of the guidance included in Nuclear Security Series No. 11 for the development of national regulations and requirements for the security of radioactive sources. The view was that NSS No. 11 remained broadly current, but guidance on insider threats and trustworthiness were identified as gaps needing further development. Participants recommended that the IAEA give appropriate priority to the process to address them.