

Joint Convention Lessons Learned and Avoidance of Future Legacies- 10370

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Abstract:

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (hereafter called the Joint Convention) is an international convention, conducted under the auspices of the International Atomic Energy Agency (IAEA). It is one of a suite of international instruments dealing with nuclear safety and physical security. Unlike other safety or security conventions, the Joint Convention deals exclusively with the tail end of the nuclear fuel cycle. The Joint Convention focuses on the lessons learned from past experiences and existing facility operations, which can be implemented in the current designs for future operating facilities in the nuclear fuel cycle.

It is expected that the current list of 52 Contracting Parties, who have ratified this convention, will continue to increase to include nations which have been reluctant, in the past, to present their current status of radioactive waste and spent fuel management policies and operations. The Joint Convention is an effective tool by which past practices can be peer reviewed and suggested improvements can be shared amongst the Contracting Parties.

The peer review process has resulted in the identification of good practices and future challenges that all Contracting Parties should consider in the evolution and use of radioactive materials with concern for the exposed individuals and the environment in which these materials are used, stored, and disposed. The peer reviews concentrate on improving safety and not in assigning fault; the context is one of encouragement, consensus and information exchange rather than criticism.

The U.S. has participated fully in the Joint Convention review process by preparing a National Report and reviewing other Contracting Parties' National Reports, as well as by setting forth initiatives to sponsor increased ratification. Because of the important benefits associated with active participation, the U.S. has strongly supported a Regional Conference Initiative outreach program to increase membership. To launch the Initiative, the U.S. provided extra-budgetary contributions to fund conferences in Africa, the Americas, Southeast Asia, and Europe. The U.S. also provided an expert for each of the conferences to assist in advancing the message to non-IAEA Member States, in particular developing nations considering ratification. The U.S. has contributed \$230,000 in voluntary contributions over the past three years and allocated another \$80,000 for 2009 for this initiative, which is an effective outreach mechanism to those IAEA Member States who have not yet come to terms with their existing radioactive waste legacies or

their needs for future access to nuclear materials for peaceful uses. Contracting Parties to the Joint Convention need not be IAEA Member States.

The clearest example of how industry and others can benefit from the lessons learned from the Joint Convention process is in the area of decommissioning and its current and past practices. Identifying problem areas in the actual decontamination, demolition and dismantling of nuclear facilities can influence regulators, designers, constructors, and operators approaches so they will make choices and decisions that avoid duplicating problems in the future.

Introduction:

The Joint Convention on the *Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (hereafter called the Joint Convention) is an international convention, conducted under the auspices of the International Atomic Energy Agency (IAEA). It is one of a suite of international instruments dealing with nuclear safety and physical security. Unlike other safety or security conventions, however, the Joint Convention deals exclusively with the back end of the nuclear fuel cycle; specifically, radioactive waste, spent fuel, and disused sealed sources.

The primary focus of the Joint Convention is to foster a global effort to improve safety in the tail end of nuclear applications. In this the Joint Convention is a companion to the Convention on Nuclear Safety, but serves the same purpose for nuclear reactor facilities. In fact, the Joint Convention was suggested in the pre-amble of the Convention on Nuclear Safety, which preceded the Joint Convention by 7 years.

Both conventions can be traced to a singular event in the nuclear energy sector: Chernobyl. However, since the events of September 11, 2001, the Joint Convention has taken on new importance as a mechanism to focus on the security of spent fuel and sealed radioactive sources, which have the greatest potential to be diverted for malicious purposes. The Joint Convention provides a framework through which the secure management of these materials internationally can be emphasized, tracked, and improved.

The Joint Convention requires Contracting Parties to commit to three activities, which are performed on a three-year cycle (the most recent cycle culminated in May 2009). First, the Contracting Party must prepare a report detailing its national program for the management of spent fuel and radioactive waste, addressing aspects such as the statutory and regulatory framework, inventories of facilities and materials, and programmatic safety requirements. The Contracting Party must then submit its report for review and respond, in sufficient detail, to questions from the other Contracting Parties. Finally, the Contracting Party must give a presentation at a Review Meeting, highlighting aspects of its program, with particular focus on those elements that provoked questions. Questions after the presentation are also encouraged.

This process itself represents an important lesson by requiring each Contracting Party to scrutinize its own program to catalog and explain the required elements. Many smaller or less-developed countries have found that their programs were not developed under a systematic legislative or regulatory framework, or may retain legacies of previous eras in which safe management of radioactive materials was not emphasized in efforts to achieve rapid industrialization (as has been seen with some of the former Soviet

republics and other Soviet-bloc nations). Even highly-developed countries, however, such as the United States, have found it challenging to describe programs developed over many years and involving multiple authorizing statutes and regulatory authorities. It is equally challenging to provide detailed responses to questions regarding aspects of policies and practices that may have existed for years without such questions being asked (language barriers often contribute to this challenge). It may be considered then that the first lesson learned for each Contracting Party is a more complete understanding of its own program, its technical and policy bases, and its strengths and weaknesses.

Further, because of the nature of the peer review process in both conventions, there has been ample opportunity to review other Contracting Parties' national safety programs. From these reviews, some fairly basic lessons can be learned and incorporated into national safety programs.

Current Status – Lessons Learned

Conduct of the Review Meetings

The Joint Convention is an effective tool by which past practices can be peer reviewed and suggested improvements can be shared amongst the participating countries. Since 2001, the number of Contracting Parties has steadily increased from the 25 original ratifiers to 33 at the First Review Meeting, 41 at the Second Review Meeting, 45 at the Third Review Meeting and currently 52 Contracting Parties.¹ At the beginning, there was reluctance on the part of many countries to subscribe to the Joint Convention, because of the relatively transparent peer review of national safety programs. Twenty-six of the Contracting Parties at the First Review Meeting were European nations; in the subsequent review cycles, participation from other regions has expanded noticeably, to include both large and small nations. There is the expectation that the current list of Contracting Parties, who have ratified this convention, will continue to increase to include nations which have been reluctant, in the past, to present their current status of radioactive waste and spent fuel management policies and operations. The Joint Convention's approach has been more focused on recognition of good radioactive waste, spent fuel, and radioactive source management practices, accompanied by an encouragement to keep improving in those areas in which a Contracting Party had serious challenges in national safety programs. This has been the practice in the first three review cycles, and it has been received as a more positive and productive approach:

It was agreed that it was not useful to aim at overall judgments on how well Contracting Parties met their obligations. It was for each Contracting Party, through its National Report, to carry out a self assessment and for the other members of the Country Group to ask questions in order to seek confidence in that self assessment, identify improvements, and share good practices, so as to further the objectives of the Convention.²

¹ Dates of ratification and the complete list of signatories and Contracting Parties is available by using the URL http://www.iaea.org/Publications/Documents/Conventions/jointconv_status.pdf

² Summary Report. First Review Meeting of the Contracting Parties 3 to 14 November 2003 Vienna, Austria.

The peer review process has resulted in the identification of good practices and future challenges that all Contracting Parties should consider in the evolution and use of radioactive materials with concern for the exposed individuals and the environment in which these materials are used, stored, and disposed. The peer reviews concentrate on improving safety and not in assigning fault; the context is one of encouragement, consensus, and information exchange rather than criticism.

Perhaps, this was really the first lesson learned from the First Joint Convention Review Meeting.

Promotional Activities for Active Membership

Another important point of the Joint Convention is the concept of actively promoting ratification. The U.S. has been very prominent and has taken a strong leadership role in advancing the cause of greater participation in the Joint Convention process. Specifically, the U.S. has strongly supported an IAEA-conducted program referred to as the Regional Conference Initiative. It consists of an outreach program to increase membership.

To launch the Initiative, the U.S. provided extra-budgetary contributions to fund conferences in Africa, the Americas, Southeast Asia, and Europe. We also provided an expert for each of the conferences to assist in advancing the message to non-IAEA Member States, in particular developing nations considering ratification. The U.S. has contributed \$230,000 in voluntary contributions over the cycle of the past 3 years and has allocated another \$80,000 for this initiative, which is also an effective outreach mechanism to those IAEA Member States who have not yet come to terms with their existing radioactive waste legacies or their needs for future access to nuclear materials for peaceful uses.

This could be seen as a second lesson learned, providing financing as well as information and encouragement to enhance enrollment. A third lesson learned is a well-established one--familiarity increases the participants' comfort factor. When Member States see others who have preceded them have not only suffered no deleterious experience from this process, but have benefited noticeably, there may be more willingness to sign up.

Learning by Example

The clearest example of how industry and others can benefit from the lessons learned from the Joint Convention process is in the area of decommissioning and its current and past practices. Identifying problem areas in the actual decontamination, demolition, and dismantling of nuclear facilities can influence regulators, designers, constructors, and operators approaches so they make choices and decisions that avoid duplicating these problems in the future.

From the very First Review Meeting in 2003, there was a growing recognition of the need for the development and implementation of integrated decommissioning and radioactive waste management plans. One of the strong messages was that Contracting Parties should account for all radioactive waste streams, which include wastes arising from decommissioning. In approaching this problem in an integrated fashion, it would be possible to better identify possible gaps in the current practices and

to better prepare and enable effective decisions on the ultimate management solutions for all waste streams. At this First Review Meeting, several Contracting Parties reported on progress in this area and regarded such integrated approaches as crucial to successful decommissioning of nuclear sites, thus making them safer for future generations.

One of the areas associated with decommissioning, which numerous Contracting Parties were not addressing, was the importance of financing and financial assurance. When facilities are productive, whether in terms of profit or addressing a national need, financial resources are provided whether they consist of portions of the profit or by governmental support. However, at the end of the nuclear fuel cycle, facilities and activities are no longer profitable or desirable. Unless some long-term financial mechanism was established at an early stage of operation, a situation arises in which no one wishes to own the liability.

Again, from the First Review Meeting, all Contracting Parties agreed that the safe and effective management of spent fuel and radioactive waste required planning, coordination, and adequate financing. Although some examples of good practices were observed, it was agreed that this was a subject which was still under development in many countries. Some examples of these good practices from the First Review Meeting include:

- Public consultation on radioactive waste management strategies, discharge control, options for decommissioning, siting of radioactive waste facilities.
- Setting up central organizations to manage spent fuel and radioactive waste.
- Establishing a rigorous schedule of emergency exercises.

Some Contracting Parties had opted for the use of segregated funds to finance decommissioning and the consequential management of radioactive waste. Others did not have provisions for such segregated funds and opted to fund their activities through general taxation or fees charged by the regulatory body.

In terms of decommissioning lessons learned from the first meeting, there were:

- The need to make adequate financial provision to cover the costs.
- The need to ensure that adequate records of inventories and activities were kept by the operators throughout the operating period of the facility.
- The need to think about, and to build in, decommissioning requirements into the design of a nuclear facility.
- The need to ensure good planning for decommissioning.
- The need to make provisions for the disposal of waste produced in the decommissioning process.

Over the three review cycles, some actions have been taken in recognition of these lessons. For example, as a result of the Third Review Meeting held in May 2009, many Contracting Parties, especially those having nuclear power plants, have established funding mechanisms for decommissioning. However, there is still more work to be done, because for some Contracting Parties, the issue of funding for decommissioning of research reactors remains unresolved.

Successive Review Meetings and Lessons Implemented

The second review meeting noted that despite the progress made since the First Review Meeting, there remained significant challenges. One of the primary observations from the Second Review Meeting was that Contracting Parties needed to place greater emphasis, in their national reports and the oral presentations, on the lessons learned and feedback sections, demonstrating the implementation of concrete actions on the main issues that were raised during this Second Review Meeting.

Progress was needed to address such challenges as:

- the implementation of national policies for the long-term management of spent fuel,
- disposal of high level wastes,
- management of historic wastes,
- recovery of orphan sources,
- knowledge management, and
- human resources.

The need to ensure that Contracting Parties' financial commitments are consistent with the extent of liabilities was also recognized.³

The Third Review Meeting held in May 2009 resulted in a number of lessons learned:

- Although the global nuclear community has achieved high levels of safety and security performance, the Contracting Parties should be vigilant in the face of complacency.
- The Joint Convention should continue to serve as a catalyst for innovative thinking and ideas.
- A number of former Soviet Union countries have taken the initiative to deal with their legacy wastes from the pre-Perestroika period internally, because of the delays in the progress for regional solutions.⁴
- Many have developed electronic tracking systems and software to better track radioactive sealed sources throughout their lifetime.⁵

³ Summary Report. Joint Convention - Second Review Meeting of the Contracting Parties 15 to 24 May 2006, Vienna, Austria.

⁴ Report of the President of the Review Meeting. Joint Convention- Third Review Meeting of the Contracting Parties 11 to 20 May 2009, Vienna, Austria

⁵ IAEA's Nuclear Security Report 2008 estimates that there is an excess of 100,000 Category 1 and 2 and a far greater number of Category 3 radioactive sources worldwide. This report also acknowledges that there is no worldwide central repository of information on radioactive sources in IAEA Member States. See

http://www.iaea.org/About/Policy/GC/GC52/GC52Documents/English/gc52-12_en.pdf.

- There has been a concerted effort by a number of Contracting Parties to give public and other stakeholders a voice in the licensing process for siting and selection of radioactive waste and spent fuel disposal and centralized storage facilities.

Several of these themes warrant more attention, given their prominence at the Third Review Meeting and their potential impacts on further program development or maintenance of current capabilities by Contracting Parties at all levels of development. The increased emphasis on the tracking, control, and recovery of sealed radioactive sources reflects the growing awareness of the potential misuse of these materials. The U.S. is among those countries in the process of implementing a tracking and registry system for at least some sources (those falling into IAEA categories 1 and 2). Manufacturer take-back programs are being encouraged and supported at the governmental level. In addition, some countries are implementing more rigorous inspection systems and levying financial penalties if disused sources are not promptly returned to the manufacturer or otherwise dispositioned.

It has also become apparent that permanent disposal of spent fuel and radioactive waste will be problematic without considerable public support. Reports from the Third Review Meeting indicate that siting processes in several countries have been unsuccessful because of an inability to gain the support of local communities.⁶ This is the case for two reasons; first, governments are increasingly emphasizing that such local support is necessary for a facility to be sited, in addition to meeting technical criteria; second, stakeholders are increasingly aware of the issues surrounding the siting of such facilities and are more active in pressing government agencies for complete and accurate information. Some countries are now designing siting processes that will emphasize stakeholder involvement. Those that have been successful most recently have worked with potential host communities over a period of years, in some cases providing incentives for their approval. This is a lesson that the U.S. may need to learn as it considers alternatives to a repository at Yucca Mountain.

Yet another challenge is presented by the need to maintain a knowledgeable and capable work force in programs whose implementation spans decades or even centuries. Many of those who first developed programs in the more developed countries are nearing retirement, and the difficulty in replacing them while maintaining institutional knowledge cannot be underestimated. In addition, countries that are planning to invest in nuclear power are also realizing that they do not have sufficient expertise to implement expanded programs. A number of Contracting Parties noted that additional workforce training and aggressive recruitment of university graduates will be necessary, but question whether available resources will be sufficient to meet demand.

As a cumulative lesson learned from the first three review meetings, expanding and exploring innovative electronic communications methods, including improvements to the Joint Convention website for web-based meetings, and enhanced sharing of information and lessons learned has provided a facilitated and improved means for the peer review

⁶ The rapporteur's reports on the results of the peer review of each Contracting Party are maintained as confidential by the IAEA under the provisions of the Joint Convention; however, 24 of the Contracting Parties have allowed posting of their National Reports, including their siting experiences, on the IAEA's website at <http://www-ns.iaea.org/conventions/waste-jointconvention.htm>.

process. These improved communication methods make information exchange easier to accomplish and lessons learned more readily available to the Contracting Parties.

Collaboration Among Contracting Parties

Another important lesson for Contracting Parties is that, while they may face challenges, they are not necessarily left to face those challenges alone. Several Contracting Parties at the Third Review Meeting cited support by the United States in efforts related to the tracking of radioactive sealed sources, upgrading of waste management facilities, and repatriation of spent research reactor fuel to Russia. In addition to taking such spent fuel, Russia has also provided some support to former Soviet republics in addressing the problem of unwanted sealed sources remaining from Soviet-era operations. The Review Meetings provide an opportunity for Contracting Parties to seek advice from those with similar experiences and to initiate formal or informal collaborative agreements.