Future Radiological Protection System in Harmony with the New ICRP Recommendations
(Results of the OECD-NEA 4th Asian Regional Conference on the Evolution of the System of Radiological Protection and Future Prospects)

Shinichiro MIYAZAKI*1

(Received on February 28, 2008)
(Accepted on March 13, 2008)

Previous meetings of the OECD/NEA-CRPPH Asian Regional Conferences have contributed to the development of the radiological protection system, primarily through discussion of the new ICRP recommendations as viewed by Asian countries and Australia. In addition, other issues regarding the development of the radiological protection system have been clearly defined. It is our critical mission to find solutions for these remaining issues for the benefit of future development of the radiological protection system. This paper summarizes the results of the 4th Asian Regional Conference, with an emphasis on the current situation following the completion of the new ICRP recommendations and their correlation with the IAEA BSS.

KEY WORDS: Radiological Protection, ICRP Recommendations, OECD/NEA, IAEA BSS, Asia, Optimisation, Dose Constraints.

I INTRODUCTION

The 4th Asian Regional Conference on the Evolution of the System of Radiological Protection, sponsored by the OECD/NEA-CRPPH, was held in Tokyo December 13 - 14, 2007. The conference was held just before the new ICRP recommendations were issued on December 18, 2007, following the announcement of their finalization in March 2007. Therefore, the conference provided a good forum for discussing the trends that contributed to the development of the new recommendations and for highlighting the advantages of holding a regional meeting in Asia. In addition, representatives at the conference from the IAEA and NCRP made presentations, providing an opportunity to discuss the harmonization of the radiological protection system with the new ICRP recommendations and IAEA documents. The benefits gained from conducting a regional conference in Asia are expected to contribute significantly to the development of the future radiological protection system.

II THE ICRP CONSULTATION PROCESS

The new ICRP recommendations differ from previous versions in several aspects, including their development. For the new recommendations, comments were invited after the draft recommendations had been disclosed. In addition, many opportunities were provided for exchanging views and opinions on the draft in varying regions, including the Asian Regional Conference.

At the conference, ICRP Chairman Dr. Lars-Erik Holm described the contents of the new recommendations and stated that the ICRP had completed preparatory work for officially launching the recommendations in the near future. In 1999, then-chairman of the ICRP, Dr. Roger H. Clarke, first proposed the revision of the ICRP recommendations 1990. In 2004, the ICRP draft was disclosed and the consultation process was followed to collect opinions and comments through the ICRP website. Though many comments were accepted, the ICRP did not respond to the comments individually, but issued a revised draft of the recommendations in June 2006 instead. Following the issuance of second version of draft recommendations in January 2007, the ICRP continued to elicit views and comments from several parties. The Expert Group on the Implications of ICRP Recommendations (EGIR) of CRPPH prepared their own comments on the draft during a meeting held in February 2007. However, the ICRP neither responded to those comments nor included any significant changes in the final version of the draft recommendations.

One criticism of the evolving draft process is that it has been described as somewhat “cyclical.” That is, some initial ideas removed from earlier versions of the recommendations inexplicably reappeared in subsequent drafts. In general, the openness of the ICRP, in which draft revisions are disclosed
and comments are elicited from several parties, is widely appreciated. However, the draft process itself has not remained transparent because explanations as to why specific changes to the draft recommendations have or have not been made are insufficient. In addition, it seemed that the ICRP pushed for the completion of the recommendations during the final stage. It is unclear what drove the push for completion, especially in light of the fact that many concerned parties expected to be included in a final consultation on the recommendations. However, the ICRP has officially announced the completion of the new recommendations, even though omitting the final consultation in the last stage led to the retention of some under-developed portions of the recommendations. Consequently, there remain some areas for improvement, although the experimental new drafting process has been appreciated. In addition, the worldwide regional meetings provided opportunities for interested parties to exchange opinions and complement the consultation process, even though they could not fully participate in the final drafting stage.

III NEW ICRP RECOMMENDATIONS

In essence, governmental RP representatives are comfortable interpreting general concepts included in the new ICRP recommendations (e.g., definitions of planned, emergency and existing exposure situations). However, they seem less comfortable interpreting several key concepts required for practical application of the recommendations. Dose constraints (DCs) remain the primary issue of concern, followed by reference levels (RLs).

In the future, the focus of discussion will shift from the new ICRP recommendations (radiological protection principles for RP experts) via the IAEA Basic Safety Standards (application of RP principles) to the regulatory texts for RP users (e.g., regulators and operators) in individual member countries. It is recognized that the process of reviewing safety standards and regulations presents challenges and will require close consultation with the industry. Compared to the new ICRP recommendations, reviews of the IAEA BSS and other regulatory texts pose extra challenges because they necessarily involve a decision (policy) making process driven by the line management of governments that must account for broader issues in setting sound RP policies and standards.

IV REMAINING ISSUES

4.1 Current RP system

The industry has confirmed the statement made by the ICRP Chairman on several occasions (e.g., the OECD/NEA Asian conference in July 2006) in that the new ICRP recommendations do not trigger any practical change for the nuclear industry. In other words, current industry practices (e.g., nuclear power plant normal operations and emergency response) and related regulations already provide adequate completeness and the current radiological protection system is being implemented in a stable manner based on a thorough understanding of how the recommendations should be put into practice. In addition, the industry has successfully demonstrated its understanding through the application of key concepts addressed in the recommendations. Depending on the situation, industry can implement or consider how to apply key concepts in the field on an international scale (e.g., through World Nuclear Association/Radiological Protection Working Group (WNA/RPWG)) or on a case-by-case basis, as appropriate. This can complement the generic RP system as appropriate in a flexible manner.

Through discussions held during the Asian Regional Conference, four key areas regarding the new ICRP recommendations were identified as areas where governments need to make improvements in setting sound international and national RP policies and standards.

4.2 Four key areas for improvement

1) Clarify policies and provide information that can help the public better understand the health risk from human exposure to ionizing radiation.

2) Clarify policies on methods for optimizing radiological protection, with sufficient flexibility to allow adaptation to the prevailing conditions.

3) Clarify policies on radiological protection of the environment. The ICRP has essentially reduced this key topic to merely include non-human species as opposed to the general environment and public health. Since radiological protection of the environment is a key subject, intense discussion is still necessary to further refine the new recommendations in this area.

4) Promote discussions on medical exposures to the public. As the NCRP representative stated at the meeting, doses to the public have significantly increased, primarily due to an increase in medical exposures. Discussions on medical exposures should be strongly encouraged since these doses are not negligible from the perspective of public exposure.

4.3 A publicly accessible RP system

Regarding item 1, the ICRP recommendations were written primarily for RP experts and thus remain difficult to understand for non-RP experts. Some improvements have been made in the interpretation of collective doses and the associated risks (e.g., calculating risk for a large population exposed to extremely low levels of radiation is inappropriate), but such improvements have not been extended to individual doses. For example, the new ICRP recommendations still lack an explanation of the differences between the extremely low levels of exposure due to normal radioactive discharges from nuclear sites and many common activities that incur much higher public exposures, such as air flights and a myriad of medical procedures. The general public remains ignorant of the fact that the exposure received from a single overseas flight or from a single chest X-ray is higher than that which the most exposed person living near a nuclear site may receive over an entire year. This presents a compelling case for addressing these discrepancies in clear and reliable international and national RP policies and standards.

4.4 A flexible radiological protection system

Regarding item 2, it should be emphasized that flexibility in applying the optimization principle has led to steadily
improved RP performance in the nuclear industry (e.g., reduction of radiation exposure dose) over the last decade or so. Considering this achievement, it is clear that maintaining flexibility in the optimization process is essential. The concept of dose constraints can only be one of the many available tools used as part of the optimization process. Dose constraints cannot become more restrictive than dose limits and the optimization process itself. This is one of the reasons why the discussion over dose constraints has not come to a conclusion in spite of the ICRP’s intention. In this new era where the use of nuclear energy is expected to rapidly expand worldwide, a more flexible approach to applying RP principles based on past experience can help power producers safely and quickly reach design capacity when building new nuclear plants. In addition, the Asian countries will need to examine the concept of “equity,” which is often coupled with the concept of dose constraints. In this regard, it is essential to examine the implications of setting radiation exposure limits well below natural background levels.

4.5 Environmental radiological protection in Asia

Regarding item 3, the new ICRP recommendations do not fully address radiological protection of the environment. Specifically, the concept of reference animals and plants introduced by the ICRP as a new policy tool will only play a trivial role in real environmental protection, including its demonstration. For example, radiological effects on plants and animals do not prevail over other factors widely known to adversely impact marine environments (e.g., fish health and public health related to fish consumption), such as overfishing, oil spills, climate change from CO2 emissions, chemical releases, etc. Since radiological protection of the environment is a relatively new concept, and one in which the Asian countries are not entirely familiar, further discussion over its necessity and policies is essential. In January 2008, following the Asian Conference, the ICRP elicited comments regarding reference plants and animals.

4.6 Medical exposures

Regarding item 4, medical exposure, it has become increasingly important to reduce unnecessary medical exposures to patients and health professionals. This can be better achieved through an understanding of actual records of medical exposure, which have not yet been fully recognized.

V ON-GOING REVISION OF THE IAEA BSS AND THE HARMONIZATION OF THE GLOBAL SAFETY REGIME

One of the major topics of the 4th Asian Conference was the process of ongoing revisions to the IAEA Basic Safety Standards (BSS), as discussed by Dr. Czarwinski of the IAEA. When the previous ICRP recommendations were issued in 1991, national regulations and the IAEA BSS (1996) were subsequently developed more or less independently from each other. Moreover, the IAEA BSS existed independently within the scope of the IAEA safety standards (i.e., other fields of safety were not incorporated into the BSS). Countries with fully developed regulatory systems established national regulations based directly on ICRP Pub. 60. On the other hand, countries with less developed systems established national regulations based on the IAEA BSS (1996), at times directly incorporating the IAEA BSS into the national regulations.

With this in mind, it is clear that governments must first clarify key concepts within the IAEA BSS before new or modified national regulations based on the new ICRP recommendations are developed and issued. The BSS drafting process will mark the beginning of the next step to better integrate RP in a global safety scheme that includes all fields of safety. Integrating radiological protection with other fields of safety is a primary challenge in the on-going revision of all IAEA Safety Standards (SS), but is a necessary change when considering the harmonization of standards within a global safety regime.

During his discussion, Dr. Czarwinski focused on explaining revisions to the BSS, but she spent very little time discussing a review of all IAEA SSs. However, any discussion concerning revisions to the BSS should include the prospect for possible changes to the entire SS series. Participation by the IAEA in discussions about the new ICRP recommendations is significant when the harmonization between the new ICRP recommendations and IAEA Fundamental Safety Principles (Safety Fundamentals: SF-1) is considered. In this regard, the IAEA is expected to make an utmost effort to reflect the standpoint from the Asian countries when reviewing its documents.

Throughout the process of developing RP standards as part of the harmonization of the global safety regime, governments cannot ignore the global challenge of growing energy needs and environmental protection issues. For example, it is inappropriate to continue to penalize nuclear energy by addressing radiological protection of public health and/or the environment as a single controversial issue when alternative large-scale energy sources impart dire consequences to human health and the environment over the long term. Fulfilling this key responsibility and duty will be a major challenge for this century in the coming decades.

Given the increasing global challenges governments are facing regarding energy and the environment (including public health), the time is ripe for leading governmental organizations like the IAEA and the OECD:

1) To clarify top-level policies on energy and the environment (as these issues can no longer be considered independently), and
2) To implement these policies throughout the activities of the IAEA and of the OECD organizations (such as the NEA).

VI SIGNIFICANT ROLE OF THE ASIAN REGION

During the 4th Asian Regional Conference, ideas and opinions specific to Asian countries concerning the definition of dose constraints and radiological protection of the environment were discussed in detail. Given that the current radiological protection system was primarily developed by European countries, it was interesting to note that the views expressed by Asian countries seemed to reflect established concepts of radiological protection in Asia, where the use nuclear energy
has been significantly increasing as field experiences have been accumulated. Fully addressing the viewpoints of Asian countries will lead to the improvement of RP programs in countries that have had few occasions to present findings and exchange opinions due to geographical separation, among other reasons. Another key issue is to determine methods for incorporating the many beneficial comments and opinions expressed during the conference. Direction for future meetings of the Asian Regional Conference will come from the continued need to address issues raised by Asian countries and incorporate observations on these issues into the global safety regime.

In the future, documents complementing the new ICRP recommendations will be issued even though the recommendations have been finalized. Asian countries, in which the number of ICRP members is increasing, will need to consider how to proceed with discussions over the new recommendation and the documents issued to supplement them. Discussions over the new ICRP recommendations have also provided guidance as to how documents issued by the ICRP after the publication of the 1990 recommendations should be addressed. Since the new recommendations and upcoming documents to be issued by the ICRP could play a key role in the future radiological protection system, the involvement of ICRP members and concerned parties over a range of specialties is required in future discussions.

The revised BSS based on the new ICRP recommendations will be directly incorporated by some Asian countries into their national regulations, particularly by countries intending to develop their nuclear programs on a full-scale. The ICRP has yet to achieve its original goal of drafting simplified and easy-to-understand recommendations. When making revisions to the BSS, the IAEA is expected to address this goal while considering the fact that the BSS are directly linked to the national regulations in Asian countries (i.e., there will be harmonization between the IAEA BSS and the new ICRP recommendations). On the other hand, the OECD-NEA is required to continuously work on IAEA-related activities, placing an emphasis on the consistency and coherence of the radiological protection system. Under such circumstances, the WNA/RPWG and OECD/NEA's activities in Asia will increase in significance and contribute to the necessity of the continued development of the Asian Regional Conference.

### VII CONCLUSION

The OECD/NEA Asian Regional Conference has marked its 4th meeting. Unlike the previous three meetings, which were held while the new ICRP recommendations were undergoing draft revisions, the 4th conference was held while the official launch of the new recommendations was imminent. Since future discussions on the radiological protection system will be dominated by the BSS drafting process and further discussions are expected within individual member countries, it is necessary to pursue the continued development of the radiological protection system. The number of operating nuclear power plants in Asia has been significantly increasing, with the promise of surging numbers when newly built plants are brought online. Consequently, a greater emphasis should be placed on incorporating findings and experiences obtained through practical application into the radiological protection system. Thus it is important to provide as many opportunities as possible where representatives from Asian countries can meet to discuss pending issues.

Organization of the Asian Regional Conference entails inviting many representatives from the Asian region and Australia in a timely manner, and involves many difficulties. The untiring efforts of those involved in the organization of the Asian Regional Conference are vital to its continued growth and success.

Shinichiro Miyazaki
Chair of WNA/RPWG, Office of Nuclear Fuel Cycle The Kansai Electric Power Co., Inc.