WORLDWIDE NUCLEAR INDUSTRY'S VIEWS ON THE EVOLUTION OF INTERNATIONAL RADIOLOGICAL PROTECTION POLICIES PROPOSED BY THE ICRP

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ABSTRACT

For several years, international policy on radiological protection has been under discussion with a view to a significant revision (recently delayed until 2007). The focal point of this discussion has been an evolving draft proposal of the International Commission on Radiological Protection (ICRP). The current ICRP draft proposal, which is entitled: "2005 Recommendations of the International Commission on Radiological Protection", was presented in May 2004 at a key international conference called IRPA-11.

This paper presents the World Nuclear Association (WNA) views on this ICRP draft proposal. It reveals a few of the most fundamental 'Profound Changes' that this draft proposal includes as well as a few key factors that show that the general context in the area of radiological protection (RP) does not warrant such 'Profound Changes'. The WNA views are that the current RP system can and should be improved through consolidation and simplification with substantive changes being focused to correct specifically identified shortcomings or weaknesses. Our review of the ICRP draft proposal and related foundation documentation confirmed that they fall short especially in terms of an overall rationale for the proposed changes. In other words, they do not seem to clearly identify the shortcomings or weaknesses of the current RP system or explain how the proposed changes specifically help to address them. We believe that before considering moving forward, this step is essential in order to fully understand and carefully assess any substantive changes to the current RP system. Moreover, for a careful and smooth evolution of the current RP system, it is essential that any proposed changes do not unnecessarily disturb the current RP system for "Practices".

WNA therefore feels it important to first draw the attention of the international RP community to the WNA views about the ICRP draft proposal in the context of continuing to build an international consensus towards an improved draft proposal. In this paper, these views are presented in the following categories:

I. Areas that seem to be in line with the current international consensus
II. Areas that seem to have evolved but need to progress further
III. Areas that seem to depart from the current international consensus

In view of the upcoming ICRP deliberations, we hope that this information could be useful to a wide range of interested parties for the preparation of their own submissions to ICRP.

INTRODUCTION

For several years, international policy on radiological protection has been under discussion with a view to a significant revision (recently delayed until 2007). The focal point of this discussion has been an evolving draft proposal of the International Commission on Radiological Protection (ICRP). The ICRP's seminal role in its field is well-known. Generally,

ICRP recommendations are translated into the international and national standards that govern industry operations worldwide.

The current ICRP draft proposal, which is entitled: "2005 Recommendations of the International Commission on Radiological Protection", was presented in May 2004 at a key international conference called IRPA-11. This proposal emerged from two earlier forums jointly organized by ICRP and the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD). Moreover, following IRPA-11, ICRP launched an open consultation on its draft proposal that ended in December 2004.

This paper presents the international nuclear industry's perspective on this ICRP draft proposal and on related ICRP supporting documentation as a contribution to the on-going debate. This perspective has been developed through the activities of the WNA Working Group on Radiological Protection (RPWG). This working group consists of industry experts (policy-making and operations) from all sectors broadly representing the nuclear fuel cycle and the generation of nuclear power from all around the world. Currently, the RPWG comprises about 30 members – see Appendices II.

WORLD NUCLEAR ASSOCIATION (WNA) VIEWS

ICRP's openness in the development of its next ICRP recommendations has been widely appreciated by the international RP community and no doubt helped many parties further reflect on the current RP system and on its potential evolution. Further to this open consultation process, ICRP acknowledged the overall negative reaction its draft proposal provoked. The key reasons that seem to explain this negative reaction are that:

1. The ICRP proposal includes a number of 'Profound Changes' to the current RP system
2. The general context does not warrant such changes
3. The overall rationale of the ICRP proposal is insufficient in view of such changes

The most fundamental of these 'Profound Changes' (detailed in Appendix I) are:

1. The introduction of maximum dose constraints that are given a primary, broader and stricter role than the current dose constraints (defined as part of the current optimization procedure) and even than the current dose limits. The figure in Appendix III illustrates the potential magnitude of this issue for 'Practices'.
2. An RP system to be based on natural background radiation rather than on the well-developed health risk-based approach of the current RP system.
3. A series of subsequent steps, beyond the introduction of a broad policy on the RP of non-human species, are prematurely introduced as an integral part of the RP system when the current common position of the international community (IAEA meeting in Vienna, June 2004) is to first develop an international consensus on the need for such a new component to the RP system, and then, if necessary, to develop and define its form and content. This effort is to be carried out through an IAEA plan of activities (which has been approved in September 2005 by the Member States) that will coordinate, the input from many parties over the next few years, including that from IAEA, UNSCEAR, ICRP and many others. It would therefore seem more appropriate that ICRP puts forward its developmental work on non-human species for deliberation as part of this IAEA process before considering including it as an integral part of the RP system.

Key factors that show that the general RP context does not warrant such 'Profound Changes' include:

- There is widespread recognition of the need for stability in regulatory systems - many international and national regulations have only fairly recently been brought into line with the current RP system.
- The current RP system is working well for 'Practices'.
- ICRP's new scientific evidence that indicates that the overall risk from ionizing radiation is slightly lower than originally thought (ICRP60), is further confirmation of the adequacy of the current RP system.

Our views are that the current RP system can and should be improved through consolidation and simplification with substantive changes being focused to correct specifically identified shortcomings or weaknesses. For a careful and smooth evolution of the current RP system, it is essential that any proposed changes do not unnecessarily disturb the current RP system for "Practices" (e.g. see the figure in Appendix III). The ICRP draft proposal should clearly identify shortcomings or weaknesses and explain how it specifically helps to address them. It is precisely this overall rationale that is currently insufficient.

In March 2005, ICRP asserted that many comments on its draft proposal "arise because the Foundation Documents (FDs) have not yet been put out for consultation". The resulting expectation was that ICRP's five draft FDs[1] would complement its draft proposal (including the overall rationale of the proposal). ICRP's openness with regard to the consultation on these draft FDs is appreciated.

Our review of these draft FDs confirms that they fall short especially in terms of an overall rationale for the proposed changes. In other words, the FDs do not seem to clearly identify the shortcomings or weaknesses of the current RP system or explain how the proposed changes specifically help to address them. We believe that before considering moving forward, this step is essential in order to fully understand and carefully assess any substantive changes to the current RP system. Concerning the 'Profound Changes' highlighted in Appendix I, the FDs do not seem to bring explanations that would allow us to modify our position.

WNA therefore feels it important to first draw the attention of the international RP community to the WNA views about the ICRP draft proposal in the context of continuing to build an international consensus towards an improved draft proposal. In the next pages, these views are presented in the following categories:

I. Areas that seem to be in line with the current international consensus
II. Areas that seem to have evolved but need to progress further
III. Areas that seem to depart from the current international consensus

In view of the upcoming ICRP deliberations, we hope that this information could be useful to a wide range of interested parties for the preparation of their own submissions to ICRP.

[1] The ICRP five draft FDs are:
1. "The Optimization of Radiological Protection – Broadening the Process"
2. "Assessing Dose of the Representative Individual for the Purpose of Radiation Protection of the Public"
3. "Biological and Epidemiological Information on Health Risks Attributable to Ionizing Radiation: A Summary of Judgements for the Purpose of Radiological Protection of Humans"
4. "Basis for Dosimetry Quantities Used in Radiological Protection"
5. "The Concept and Use of Reference Animals and Plants for the Purposes of Environmental Protection"

WNA Views on the ICRP Draft Proposal (and FDs) in the Context of Continuing to Build an International Consensus towards an Improved Draft Proposal

I - Areas that seem to be in line with the current international consensus

1. "There is no hurry" – in terms of significant work that lies ahead for the development and completion of a suitable proposal for the next recommendations.

2. The overall intent to consolidate and simplify the current RP system with a view to making it easier to understand and comprehend.

3. The indications that the proposal "will consolidate and replace all the numerical advice included in and developed" since ICRP60 "(stand-alone document)".

II - Areas that seem to have evolved but need to progress further

1. The draft proposal shows progress in terms of the consolidation of information into a main stand-alone document. ICRP should consider further consolidating this information. Key suggestions for the main stand-alone document are:
   - Significantly expand (preferably at the beginning) the rationale that identifies the specific shortcomings or weaknesses of the current RP system and explain how the proposal specifically helps to address them, without unnecessarily disturbing the rest of the current RP system.
   - Significantly expand (preferably at the beginning) the core information about the ICRP itself (its mission, role, aim, scope, etc., including its relationships with other key international organisations) so that a non-familiar reader can have a broader view and understanding of ICRP and of its recommendations. This would be of great value to a broad range of stakeholders.
   - Group all policies together along with the key numerical values of protection (i.e. dose limits). Simply stating that some or all post-ICRP60 policies continue to be valid does not really address the current concern about consolidation, simplification and clarity and in fact appears to be in contradiction to this objective. A stand-alone document explaining which values hold would be better.
   - Simplify the number of key numerical values of protection. At the international level, numerical dose limits should be kept whereas numerical maximum dose constraints should not as the latter cannot possibly be integrated without raising important issues about the current RP system. (Though, the current concept of dose constraints should be kept.)
   - The supporting scientific information (such as the radiation weighting factors) could be integrated into separate more detailed documentation. This would facilitate updating this data without triggering a review of the main document.

2. It is well recognized that the RP system for 'Intervention' is causing some difficulties. Further ICRP guidance in this respect would be most welcome provided that it does not perturb the RP system for "Practices". Some progress has been made but further guidance is needed. For example, guidance on the specific context for using higher values than the current dose limits for the public is needed. The role and content of dose constraints in the context of 'Intervention' are unclear and warrant further explanations.

3. Extremely low doses – ICRP should consider recommending more clearly, for sound policy making, a practical dose level (which would theoretically bear some tiny risks) from which protection should be systematically applied – and in turn prevent applying the RP system

where it is unlikely to produce any substantive RP benefit. ICRP should consider incorporating this practical dose level in its guidance on estimating risk from ionising radiation and on the scope of application for "Collective Dose".

Such a practical dose level is key for the overall coherence of the current RP system and is currently notably missing. It would also serve to better introduce the concepts of "Exclusion" and "Exemption". These latter concepts are welcome but ICRP should consider further alignment with the international consensus reached by the IAEA in 2004.

III - Areas that seem to depart from the current international consensus

The 'Profound Changes' addressed earlier herein depart from the current international consensus:

1. The introduction of maximum dose constraints: see Appendix III

We suggest keeping the current concept of dose constraints intact without introducing the concept of maximum dose constraints – which unnecessarily introduce multi-layers of dose constraints.

2. The RP system is based on natural background radiation rather than on the well developed health risk-based approach of the current RP system

We suggest keeping the current health-risk approach for the basis of the RP system while allowing natural background radiation to be used as a useful comparator and for practical context.

3. A series of subsequent steps, beyond a broad policy on the RP of non-human species, are prematurely introduced as an integral part of the RP system

For the time being, we suggest keeping the on-going ICRP developmental work outside of the scope of the draft proposal and of the FDs and ensuring that it is an integral part of the IAEA joint international effort (AIEA plan of activities, approved in September 2005 by the Member States). Once it is internationally road-tested and understood, the ICRP model on Reference Animals and Plants (definition and dosimetry) together with the similar developmental work of other key organizations, may eventually prove to be a key component in the development and definition of an RP system for non-human species.

Other subsequent steps (e.g., a common approach, assessment of effects, derived consideration levels, etc.) on the potential use of this model that are proposed by the ICRP are even more premature at this stage. For such steps, the consensus of the RP community is that any consideration should proceed with great deliberation at the IAEA level – before reaching the stage of an adequate assessment framework that complements current tools commonly used to demonstrate protection of the environment.

4. Other "Profound Changes"

- Practices and Intervention

We suggest that the concepts of "Practices" and "Intervention" should be re-integrated as per the current RP system. Further developing the guidance on the concept of "Intervention" would be an improvement. The role and content of dose constraints in the context of 'Intervention' are unclear and warrant further explanations.

- Optimisation or ALARA

We suggest that the "Optimisation" Principle or As Low As Reasonable Achievable (ALARA, taking into account social and economic factors) should be kept as per the current RP system. Removing the new concept of maximum dose constraints should help to achieve this. It should be borne in mind that both quantitative aspects and qualitative aspects (the latter include "safety culture" and "stakeholder involvement") are integral parts of ALARA. This is already accounted for in the IAEA Basic Safety Standards (BSS). We therefore see no need to introduce a distinction between Optimisation and ALARA.

Best Available Technology (BAT), not entailing excessive costs, should be part of Optimisation with considerations for health-driven standards. This would be more consistent with the "Optimisation" Principle or ALARA and with the fundamental aim of the draft proposal which includes "the balancing of risks and benefits".

We are concerned about the implication of the ICRP proposal that ALARA may be an endless downward process; e.g. continue optimising exposures until all parties involved are in agreement as a way to move forward, BAT without considerations for health risk, and 0.01 mSv/y as the minimum dose constraint which implies applying ALARA somehow blindly at even lower doses! This clearly shows that the concept of a practical dose level mentioned earlier is key for the overall coherence of the current RP system and is currently notably missing.

APPENDIX I

ICRP Proposed 'Profound Changes' to the Current RP System

The highlights of our comments on the ICRP proposed 'Profound Changes' to the current RP system are presented below.

1. The introduction of maximum dose constraints – See Appendix III

By 'Profound Changes' to 'Practices', we mean moving from the current RP system (as applied by the nuclear industry) consisting of:
- "Justification",
- "Optimization" - with "Dose Constraint" which can, in some circumstances, translate into an "Authorized Level"
- "Limitation" ("Dose Limit");

to the proposed RP system for "Planned or Normal Situations" consisting of:
- Dose limit,
- Maximum Dose Constraints (for All Situations) that are given a primary, broader and stricter role than the Current Dose Constraints (defined as part of the current optimization procedure) and even than the Current Dose Limit,
- Maximum Dose Constraints (for normal situations multiple sources)
- Expanded "Optimization" - with Dose Constraints (for Specific Situations - as an upper bound to the Optimization process),
- "Authorized Level".

How could an RP system that includes dose limit, maximum dose constraints (two layers), dose constraints for specific situations (defined as upper bound to the optimization procedure) and authorized levels work better in practice? What are the differences between dose limit, maximum dose constraints, dose constraints for specific situations, and authorized level? How would this be simpler and easier to understand and comprehend? How could an RP system that makes dose limit secondary to more stringent maximum dose constraints be consistent with one of the main outcomes of the ICRP/NEA forum in April 2003 (Lanzarote, Spain) namely to "keep dose limit"? This implied that dose limit should remain the most stringent level of protection and that the concept of current dose constraints should stay intact as part of the optimization.

Concerning 'Intervention', the role and content of dose constraints are unclear and warrant further explanations. It would also be useful to further explain the relation between action levels and dose constraints in the context of 'Intervention'.

2. The RP system is based on natural background radiation rather than on the well developed health risk-based approach of the current RP system

We recognise that a reference to natural background (including radon!) and to its inherent variability is a useful comparator and gives practical context for appreciating the appropriateness of protection actions. We believe that it is important to retain this. However, assessment of dose limits must continue to be guided by the question of whether a significant health risk is posed. For example, linking the public dose limit to health risk evidence is extremely important even if this may involve accounting for some kind of a safety factor.
Current ICRP discussions seem to indicate that some connection is to be drawn between the world average natural background, which becomes 1 mSv/y if the contribution from radon is excluded, and the allowable public dose limit. The fact that this "without radon" level is

roughly the same as the current public dose limit of 1 mSv/y is purely coincidental and has no scientific significance regarding the question of the adequacy of the public dose limit.

Moreover, it is important to keep the system flexible in view of potential future health risk evidence that may trigger changes to the key values of protection (e.g.. dose limits). Irrespective of background, lower values may become appropriate should the risk from radiation be higher and vice-versa. The health risk assessment approach is fit for both human and non-human species. The case for moving away from a risk-based RP system to a RP system based on natural background radiation is not compelling.

3. A series of subsequent steps, beyond a broad policy on the RP of non-human species, are prematurely introduced as an integral part of the RP system

There is a wide agreement that the current RP system has in practice provided appropriate standards of environmental protection, but also wide acknowledgement that the system needs to be further developed for completeness in order to fill a conceptual gap (i.e., exposure of non-human species where human exposure is not the predominant concern) and to address some specific outstanding situations.

The IAEA, ICRP and UNSCEAR all have an important leadership role in ensuring a clear direction for future work and the co-ordination of activities to develop and implement a sound international framework for environmental RP. In exercising this leadership, the three organisations should collaborate on a joint "road map". This effort is to be carried out through an IAEA plan of activities (June 2004, IAEA Technical Meeting, Vienna, that has been approved in September 2005 by the Member States) that will coordinate, the input from many parties over the next few years, including that from IAEA, UNSCEAR, ICRP and many others. It would therefore seem more appropriate that ICRP puts forward its developmental work for deliberation as part of this IAEA process before considering including it as an integral part of the RP system.

For the time being, we therefore suggest keeping the on-going ICRP developmental work outside of the scope of the draft proposal and of the FDs and ensuring that it is an integral part of the IAEA joint international effort. Once it is internationally road-tested and understood, the ICRP model on Reference Animals and Plants (definition and dosimetry) together with the similar developmental work of other key organizations, may eventually prove to be a key component in the development and definition of an RP system for non-human species. Other subsequent steps (e.g., a common approach, assessment of effects, derived consideration levels, etc.) on the potential use of this model that are proposed by the ICRP are even more premature at this stage. For such steps, the consensus of the RP community is that any consideration should proceed with great deliberation at the IAEA level – before reaching the stage of an adequate assessment framework that complements current tools commonly used to demonstrate protection of the environment.

4. Other 'Profound Changes'

"Practices" and "Intervention"

- The key concepts of "Practices" and "Intervention" are replaced by the new concepts (not yet defined) of "normal operations" or "planned activities", "accident or emergency situations", and "controllable existing situations"; thus eliminating the important distinction between "Practices" and "Intervention". It should be borne in mind that the well advanced international consensus on the "Principles of Nuclear, Radiation,

Radioactive Waste and Transport Safety – DS298 – Safety Fundamentals" at the IAEA level, embraces the key concepts of "Practices" and "Intervention".

Optimization

- By definition, maximum dose constraints are substantially different from the current dose constraints. This would imply corresponding changes to "Optimization".

- Indicating that Best Available Technology (BAT) and "Optimization" complement each other, can possibly substantially modify the essence of the "Optimization" Principle. BAT not entailing excessive costs, should be part of Optimization with considerations for health-driven standards. This would be more consistent with the "Optimization" and with the fundamental aim of the proposal which includes: "the balancing of risks and benefits".

APPENDIX II

World Nuclear Association – WNA,
Radiological Protection Working Group – RPWG
(Official List – January 31, 2006)

AREVA (France)	Philippe Bosquet
BARC (India)	Ambika Shai Pradhan
BARC (India)	Shri Kushwaha
Barsebackkraft (Sweden)	Carl Göran Lindvall
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WNA (International)	Tetsuji Kishida, Mentor, WNA Board
Corresponding Members	
IAEA (International)	Didier Louvat
IAEA (International)	Khammar Mrabit

APPENDIX III

Figure