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A Stakeholder Dialogue on the Implications of the ICRP Proposals

Summary Report
Lanzarote, Spain
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NUCLEAR ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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- to achieve the highest sustainable economic growth and employment and a rising standard of living in member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996); Korea (12th December 1996) and the Slovak Republic (14th December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full member. NEA membership today consists of 28 OECD member countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Republic of Korea, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information. The NEA Data Bank provides nuclear data and computer program services for participating countries.

In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

FOREWORD

At the end of the 1990s, the International Commission on Radiological Protection (ICRP) launched a process for establishing new recommendations, which are expected to serve as guidelines for national systems of radiological protection. The ICRP is to be congratulated that, for the first time, these recommendations are being subjected to extensive stakeholder comment and modifications.

The NEA Committee on Radiation Protection and Public Health (CRPPH) has built an extensive programme to contribute to this process, including several expert groups and open workshops, and has developed its own views regarding how to improve the international system of radiological protection. The recent products of CRPPH work in this area include five reports:

- *A Critical Review of the System of Radiation Protection: First Reflections of the OECD Nuclear Energy Agency's Committee on Radiation Protection and Public Health* (NEA, 2000);
- *Policy Issues in Radiological Protection Decision Making: Summary of the 2nd Villigen (Switzerland) Workshop, January 2001* (NEA, 2001);
- *The Way Forward in Radiological Protection: An Expert Group Report* (NEA, 2002);
- *A New Approach to Authorisation in the Field of Radiological Protection: The Road Test Report* (NEA, 2003);
- *Possible Implications of Draft ICRP Recommendations* (NEA, 2003).

In addition to the development of these independent views, the CRPPH undertook collaborative efforts with the ICRP through the organisation of broad stakeholder forums. The first of these, held in Taormina (Italy) and hosted by the Italian *Agenzia Nazionale per la Protezione dell'Ambiente* (ANPA), focused on assisting NEA member countries and the ICRP in

developing a policy basis for the radiological protection of the environment. The NEA published the resulting documents:

- *Radiological Protection of the Environment: Summary Report of the Issues* (NEA, 2003);
- *Radiological Protection of the Environment: The Path Forward to a New Policy?* Workshop Proceedings, Taormina, Sicily, Italy, 12-14 February 2002 (NEA, 2003).

The second forum, which was held in Lanzarote (Spain) and hosted by the Spanish Nuclear Safety Commission (CSN), followed the work of the NEA Expert Group on the Implications of ICRP Recommendations (EGIR). A broad spectrum of stakeholders, including representatives from the NEA standing technical committees and radiological protection specialists participated in this forum.

Based on the discussions that took place during this second forum, this summary report, by the CRPPH and the ICRP, identifies the forum's key issues. The CRPPH is grateful to the ICRP for the open discussions held during this forum, and for the acceptance by the ICRP of the comments made by various stakeholders at the forum, including regulators, industry and non-governmental organisations (NGOs). This very positive discussion was the last open discussion to be held outside of the ICRP family, before the presentation of the first formal draft of new ICRP recommendations at the quadrennial meeting of the International Radiological Protection Association (IRPA) in Madrid in May 2004.

Acknowledgement

The CRPPH and ICRP would like to thank Professor Henri Metivier for preparation of this report.

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EXECUTIVE SUMMARY

In support of the new ICRP's new openness, the 2nd NEA/ICRP forum "The Future Policy for Radiological Protection: A Stakeholder Dialogue on the Implications of ICRP Proposals" was held in Lanzarote, Spain, 2-4 April 2003, hosted by the Spanish Consejo de Seguridad Nuclear (CSN).

The objectives of this second forum were to;

- Evaluate and discuss the implications on policy, regulation, industry, the workforce, the public and the protection of non-human species in progressing in the development of draft ICRP recommendations.

- Discuss how new ICRP recommendations could best serve the needs of national and international radiological protection policy makers, regulators, operators, workers, and the public.

- Continue the open and broad dialogue between stakeholders to reach a common level of understanding of the issues at stake, and to contribute to the evolution of new ICRP recommendations.

A broad group of stakeholders participated in the forum, and discussions resulted in several key conclusions and areas of agreement.

With regard to the process of new recommendation development, the forum participants were encouraged by the open ICRP approach. Several specific positive aspects were noted.

- In developing new recommendations, ICRP has involved a broad spectrum of the radiological protection community, through National Health Physics societies, IRPA, NEA/CRPPH, IAEA, EC, etc. The Commission's desire for broad involvement has been actively pursued, through open discussion during several meetings, and through the frequent publication of ICRP views and new draft materials in professional, scientific journals. All stakeholders have very much appreciated these efforts by the ICRP, more so in that the

results of the dialogues have been taken into consideration by the ICRP in its subsequent drafts.

- This new process of active stakeholder involvement in the development of new ICRP recommendations seems to be definitively irreversible. Some level of active stakeholder involvement will be required for most, if not all, future ICRP recommendations.
- The new approach taken by the ICRP seems to be driven more by social and political forces than by the scientific need for change. The goals of consolidation and simplification of the Commission's recommendations were strongly endorsed as being important for implementation, as was the Commission's clarity on its limited role in social issues (justification) and regulatory issues (optimisation and authorisation).
- International harmonisation was endorsed as necessary and desirable, but at an appropriate level. For those aspects of its recommendations with strong social underpinning (e.g. numerical values of dose constraints), the ICRP was encouraged to continue basing its development of recommendations on broad and open dialogue.
- Particularly with regards to the radiological protection of the environment, the forum participants noted that the proposed ICRP approach is scientifically based on the assessment of detriment, in a parallel fashion to the ICRP approach for human protection. It was further recognised that another, socially and politically driven approach is the desire for a "clean environment". The Commission was strongly encouraged to be realistic in the development of its scientific input to decision-making to avoid the duplication of conservatism.

In terms of the content of the ICRP draft recommendations that were reviewed, the forum was cautious, although it did encourage further progress.

- In parallel with the general desire for recommendations that are simplified and consolidated, the forum strongly endorsed the need for clear expression of the Commission's concepts. The development of a coherent, common understanding of concepts such as exclusion, exemption, and dose constraints was seen as essential to their appropriate application in regulation and practice. The forum endorsed taking the time necessary to develop clear and

unambiguous text explaining these and other concepts, how they apply to various "common" radiological protection circumstances (e.g. natural and artificial radioactivity; controllable, uncontrolled and *de facto* situations), and providing guidance on how to develop their application to new circumstances unforeseen at this point.

- While appreciating the discussion of key ICRP concepts, many forum participants did not agree with the proposed ICRP definitions and approaches, and clear consensus was not reached. As such, many forum participants favoured an in-depth discussion of some key issues, and "building blocks" as a support for the later development of general recommendations. The development of concepts in these "building blocks" could further be based on their testing in practice. As a procedural example, the INEX series of nuclear emergency exercises was noted. These practical exercises, organised by NEA/CRPPH, identified several operational areas needing fuller discussion to reach a common understanding, and follow-up workshops were organised to address important issues.

Finally, the forum participants agreed that the continued, active involvement of stakeholders will be essential for the successful finalisation of new ICRP general recommendations and "building blocks". The collaboration between the NEA and the ICRP was, in this context, very much appreciated. To improve these stakeholder discussions, the Forum made several specific suggestions.

- In order to develop common understandings of key concepts, the methodology suggested above must be organised by an international organisation. A historical appreciation suggests an active if not leadership role for the NEA/CRPPH. However, the CRPPH must continue to invite the IAEA to such meetings to capture the voice of the radiological protection community beyond the NEA's member countries.
- Other international organisations, such as the WHO and ILO, could also be invited for discussions regarding specific points, e.g. the sensitivity of individuals, or worker-public risk transfer issues.
- If the broader implications of ICRP recommendations in the society are discussed, the group of stakeholders to be included in the discussion should be enlarged to include, for example, the world of insurance, moral and religious associations, or political representatives.

1. INTRODUCTION

In recent years, the International Commission on Radiological Protection (ICRP) has conducted an open process to enhance the current set of radiological protection recommendations. The ICRP is presenting new draft proposals and recommendations to the broad radiological protection community seeking a dialogue with all interested parties or stakeholders. The latest draft version of the Commission's recommendations was recently published in the Journal of Radiological Protection (JRP, 2003). The objective of this open process is to develop a new generation of ICRP recommendations that are broadly understood and accepted as realistic so that they can be efficiently implemented.

The preliminary focus of the ICRP development has been on new general recommendations, which will replace Publication 60 (ICRP, 1991). As part of this process, the ICRP has also identified that there is a need to review its views on the radiological protection of non-human species.

At an early stage, the NEA Committee on Radiation Protection and Public Health (CRPPH) focused on how the system of radiological protection could be made more responsive to decision makers, regulators, practitioners and the public. The first CRPPH publication in this area was *A Critical Review of the System on Radiation Protection* which was issued in May 2000 (OECD/NEA, 2000), and was provided directly to the ICRP and the international community for consideration. This work identified several specific areas of ICRP Publication 60 that could usefully be revisited.

To further refine this work, the CRPPH commissioned the Expert Group on the Evolution of the System of Radiation Protection (EGRP) to proceed by suggesting specific modifications to the current system which would result in improvement and simplification. Results include such key aspects as:

- the implementation of an umbrella concept of "Authorisation", which will cover, and perhaps replace, the concepts of exemption, exclusion, clearance, and triviality;
- clear recognition of the boundaries between the scientific, social and regulatory aspects of risk;

- clear recognition of the need for flexibility within the system to allow for stakeholder input in reaching solutions.

The results of this work *The Way Forward in Radiological Protection*, (OECD/NEA, 2002) have been synthesised and published for consideration by the ICRP and the international community, and have contributed to the ICRP's development of draft recommendations.

Continuing along these pragmatic lines, the CRPPH established the Expert Group on Implications of ICRP Recommendations for a System for Radiological Protection (EGIR) to identify the possible implications of the ICRP's new draft recommendations concerning the overall framework of the system of radiological protection, and the radiological protection of non-human species. This Group examined the implications of ICRP proposals, and suggested ways that the final ICRP Recommendations could better serve the needs of national and international policy makers, regulators, implementers, and other stakeholders. The final report of EGIR was presented to the CRPPH and endorsed for publication: Possible Implications of Draft ICRP Recommendations, (OECD/NEA, 2003).

In support of this work, the NEA proposed to contribute to the debate on radiological protection of non-human species, by promoting and establishing a broadly informed recommendation. This approach was also designed to foster information exchange between various initiatives.

To this end, the first NEA forum in collaboration with the ICRP: *Radiological Protection of the Environment, The Path Forward to a New Policy?*, was held 12-14 February 2002 in Taormina, Italy and kindly hosted by the Italian Agenzia Nazionale per la Protezione dell' Ambiente (ANPA). The forum was seen as a significant step for building consensus on major issues requiring attention in defining a new radiological protection policy for non-human species. These included defining an international rationale in this area; assessing the availability of scientific information to develop a broadly accepted recommendation; and evaluating the socio-political dynamics of this endeavour.

The results of the forum have been synthesised and published for consideration by the ICRP and the international community, and have contributed to the ICRP's development of draft recommendations.

- *Radiological Protection of the Environment: Summary Report of the Issues* (OECD/NEA, Paris, France, 2003).

- *Radiological Protection of the Environment: The Path Forward to a New Policy? Workshop Proceedings*, Taormina, Sicily, Italy, 12–14 February 2002 (OECD/NEA, Paris, France, 2003).

The 2nd NEA / ICRP forum, the culmination of the work of the EGRP, EGIR and the results of the 1st forum, focused on the implications of draft ICRP recommendations. This second forum was held in Lanzarote, Canary Islands, Spain, 2-4 April 2003, and was kindly hosted by the Spanish *Consejo de Seguridad Nuclear* (CSN). The forum was attended by 80 participants, which included decision makers, regulators, operators, radiological protection professionals, scientists, politicians, individuals from intergovernmental organisations, unions and other non-governmental organisations (i.e. WANO, WNA, environmental NGOs).

The objectives of this second forum were:

a) To evaluate and to discuss the implications on policy, regulation, industry, the workforce, the public and the protection of non-human species in progressing in the development of draft ICRP recommendations.

b) To discuss how new ICRP recommendations could best serve the needs of national and international radiological protection policy makers, regulators, operators, workers, and the public.

c) To continue the open and broad dialogue between stakeholders to reach a common level of understanding of the issues at stake, and to contribute to the evolution of new ICRP recommendations.

In order to facilitate a broad stakeholder dialogue, the forum included two sets of breakout sessions. These allowed detailed discussions, each including diverse stakeholder groups, to focus on the key concepts of the new ICRP General Recommendations to facilitate common understanding as a basis for the discussion of implications. Both the draft ICRP general recommendations, and recommendations for the protection of non-human species, were discussed in this fashion.

This report summarises the views presented by the participants during the Lanzarote forum, in invited presentations, in plenary discussions, and in the breakout sessions.

To complete this process, it is envisioned that a 3rd forum, will be organised following the publication of new ICRP recommendations, focusing on the best methods for their efficient and cost effective implementation.

2. MOTIVATION AND JUSTIFICATION FOR THE EVOLUTION

The dialogue with the ICRP

The current efforts of the ICRP to clarify its framework and principles, and to consolidate the recommendations it has made since the issuance of Publication 60, are strongly supported. Forum participants expressed unanimous appreciation of the process that the ICRP has initiated for the development of new recommendations. Compared to the development of the 1990 ICRP recommendations, the open discussion launched by the current Commission is new in ICRP history. Today, the dialogue is open, positive, and appreciated by all communities involved.

The importance that the ICRP attributes to this dialogue, to assist in this simplification, was illustrated by the involvement of four members of the Main Commission, who participated actively in the debates during the Forum. In addition four other members of the ICRP technical committees, who are working on detailed "building blocks" to support the next recommendations, presented the progress of their work. The discussion of these key subjects, in breakout sessions, assisted Forum participants to understand the ICRP proposals, and assisted the ICRP to refine its proposals based on stakeholder feedback.

The CRPPH also played an important role in this forum in several ways:

i. by developing and distributing a document on the implications of ICRP recommendations;

ii. by offering eight breakout sessions chaired by non-ICRP members, facilitating the free expression of participants' points of views; and

iii. by inviting a broad spectrum of representatives including regulators, international organisations such as the IAEA, the EC, and the ILO, industrial representatives such as the WNA, representatives of scientific societies, and other international experts.

The previous forum in Taormina, which discussed the radiological protection of the environment, was also a platform for open discussions. As a result of input from this Forum, the Main Commission reviewed and somewhat redrafted its report and reissued it in January 2003. Discussions on this subject continue, and there is still time for further evolution of the general recommendation which will clearly include, for the first time, objectives for the protection of the environment.

Forum participants are pleased to note that the ICRP has received the different messages coming from various stakeholders, and committed to take them into account. This very positive attitude is strongly encouraging for the future. It also encourages the CRPPH to continue to collaborate with ICRP in organising another forum after the publication of new ICRP recommendations.

Motivation for change

Given the complex construction of the current recommendations, there is broad support for the development of a coherent, unified set of radiological protection concepts that can be simply expressed, explained and understood.

The 1990 system of protection was developed over a period of 30 years, during which the system became increasingly complex, involving dose constraints and individual dose limits, and defining concepts such as practices and interventions, occupational, medical and public exposures. While the various aspects of the system each follow clear logic, it has been difficult to clearly explain how these different approaches fit logically into a coherent system. Moreover, since the 1990 recommendations, the ICRP has published nine additional recommendations that also include various other "dose constraints" for the control of exposures from radiation sources. Including the dose constraints recommended in ICRP 60, there are nearly 30 different numerical values for these "constraints", and they are justified in six different ways. As such, simplification would be greatly appreciated by all parties.

However, while recognising the need for simplification, many stakeholder groups have pointed out the need for a solid, scientific rationale for any significant changes proposed. In its earlier survey of the status of radiological health science (NEA, 1998) the CRPPH found that there was no significant clarification of scientific questions foreseen in the near future, and to date this has proven to be correct. This being the case, the ICRP is suggesting no major, scientifically-based modifications to its recommendations, but is proposing an evolution of the system rather than a "revolution". ICRP is planning to publish new recommendations in 2005.

In presenting the rationale for its proposed changes, the ICRP has focused on providing increased support of the radiological protection aspects in decision making. Consistent with the ideas developed by the CRPPH (NEA, 2002), the ICRP has hinted at including in the framework of their recommendations the distinction between the scientific aspects of risk assessment, the social aspects of risk evaluation and management, and the regulatory aspects of risk management. This distinction is seen as important in understanding the evolving role of ICRP recommendations in the broader context of risk governance.

The forum would like ICRP to be clear about the reasons for change, and to provide detailed rationale with regard to simplification of the system, consolidation of existing recommendations, and other drivers for changes. The goal of the ICRP to publish new recommendations by 2005 is seen as being ambitious, and not absolutely necessary.

Scientific justification for change

Some scientifically based changes have, however, been proposed. Early in the dialogue between ICRP and various international organisations, the need to change the basis for dose calculations was presented. Today, once more as the result of discussions with its Committees and outside, the Commission has decided not to modify the way in which effective dose is calculated. The ICRP has, however, proposed a few changes for W_R values. New values of W_R are proposed following a review of RBE[1] data. The most significant proposed changes are for fast protons, where W_R is reduced from 5 to 2 and for neutrons where the revised values are recommended in the form of a continuous curve. These new values for neutrons take into account the degradation of neutron spectra in humans, confirming the difficulties, for risk assessment, when extrapolating data from rodents to large species, including humans. These two changes do not, however, affect the overall estimates of risk from exposure to radiation.

A related area of possible change that has been discussed by the ICRP has to do with one, specific tissue-weighting factor. Based on findings in the UNSCEAR 2001 report on hereditary effects from radiation, ICRP is now assuming that W_T for the gonads is probably overestimated. For the moment,

1. RBE : The relative biological effectiveness of a particular type of radiation (e.g. alpha, beta, gamma, neutron, etc.) is the measure of the effectiveness of the radiation being considered to produce a particular, scorable cellular effect, relative to the amount of gamma radiation needed to produce the same effect.

however, the ICRP is recommending to continue using the current W_T, awaiting a thorough review of the epidemiological data.

Another area, where the need for some scientifically based changes has been discussed, concerns the choice of units to express radiological quantities. Several groups have recommended using the concept of "equivalent dose", measured in Sieverts, only to express detriment at the whole-body level. This would continue to represent the sum, over the entire body, of all doses to an individual, weighted by tissue weighting factors and radiation-type weighting factors. Dose to organs, it has been suggested, should be expressed as absorbed dose, and should continue to include radiation-weighting factors. These would be measured in Grays. This change could solve the current problem that the unit name Sievert is given to two different dose concepts.

Another scientifically based change that has been proposed by some senior radiobiologists, or more specifically radiotoxicologists, concerns the assessment of low dose and low dose-rate effects. For such situations, it is suggested to introduce a third weighting factor into the effective dose calculation. This suggestion would be a revolutionary change, probably leading to a difficult controversy. However, these experts increasingly feel that for low doses and low dose rates, a numerical value of 3 or 4 for the DDREF[2] would be more realistic than the current value of 2, which is considered as too cautious and too conservative. It is therefore suggested that, prior to the issuing of any new ICRP recommendations, an open and transparent dialogue should be undertaken to discuss the use of the current DDREF value of 2.

Previous work by the NEA could be used as a starting point for discussions of new approaches to the DDREF question. The NEA stated, in its report on radiation health sciences (NEA, 1998), that expert scientific knowledge of specific disciplines should be applied to specific radiological protection decisions if it is sufficiently supported by scientific evidence. For example, the existence of "threshold-like" effects was discussed in the report for several very specific cases, including exhibited in radium-dial painters, in bone cancers in some internally exposed dogs, and in inhaled plutonium dioxide in

2. DDREF : Experimental estimates of the probability of stochastic detriment (i.e. cancer or leukaemia) occurring are based primarily on human exposures at high doses and dose rates (the Hiroshima and Nagasaka bomb survivors). At lower doses and dose rates, the probability of a stochastic effect occurring is not only lower, but follows a curve of a different slope than for high doses and dose rates. The ratio of these two slopes is called the dose and dose-rate effectiveness factor, and it is used as a reduction factor to extrapolate from the probability of stochastic detriment at high doses and dose rates to that at low doses and dose rates.

rats and dogs. As such, the use of a DDREF higher than 2 could be discussed for certain, specific situations, such as very-low doses or dose rates in chronic exposure situations.

Finally, ICRP has suggested that the debate on the linearity of the dose response relationship needs clarification, and has proposed addressing the field of interest, i.e., above a few mSv/a. This issue was not, however, raised by the ICRP or by stakeholders during the forum.

With very few exceptions, there is no strong scientific rationale for changing recommendations. However, some experts are convinced that the advancement of science offers evidence for the refinement of the DDREF-factor applicable for low doses and low dose rates, especially regarding the management of long live radionuclides in nuclear waste.

"Building blocks" should be discussed before a general document

The two ICRP draft recommendations, which were discussed at Lanzarote, are both "framework" documents. While they provide ICRP proposals for the broad lines of the guiding principles and concepts, the details that would be necessary to fully understand the implications and ramifications of the new recommendations were not presented. These details will be elaborated by ICRP in its first draft recommendation document, and also in what have been called "building blocks" to support these general recommendations.

It is assumed that the ICRP will develop its general recommendation document based upon the views and opinions it is currently collecting. However, the details that will be provided in the "building blocks" may well be necessary to fully understand the implications of concepts presented but not fully elaborated in the general recommendation document. As such, the ICRP should plan to develop the supporting "building blocks" for review in parallel with the general recommendation document.

Before publishing the next ICRP general recommendations, it would be better to have detailed discussions of the different "building blocks" in order to obtain consensus on the new proposals. Further, it would be useful to test the new draft recommendations to better understand their possible practical implications.

3. KEY ISSUES OF THE DRAFT ICRP FRAMEWORK DOCUMENTS

Given that the two ICRP draft documents present simply the framework for future recommendations, it is understandable that they do not present their ideas and concepts with a great amount of detail. However, some of the key ideas and concepts seem to be either completely new, or to have evolved significantly from their previous manifestations (in ICRP Publications and its subsequent supporting documents). Thus, in order to fully understand the Commission's proposed direction, there is a need for presenting much more detail regarding various key issues, such as:

- Three basic principles presented in the draft texts as Justification, Constraints to Optimisation, and Authorised Levels.
- The concept of exclusion, that is, how and why natural and artificial sources and exposures are included in the system, or considered as not entering into the system of radiological protection.
- The reference flora and fauna approach to establishing radiological protection criteria.

Before defining new concepts, it should be remembered that various international organisations have organised many workshops to try to clarify concepts such as exclusion or exemption, and this work should not be ignored.

In the following sections, details are provided on these points as a result of forum discussions.

Optimisation

ICRP suggests that optimisation should be the responsibility of national authorities. The Forum supports this idea, but thinks that ICRP should deal with concepts and principles.

The Forum agreed with the EGIR that the term ALARA, which is currently widely accepted and used, should be retained. Change would introduce confusion, which should be avoided. The ICRP suggestion that ALARA is too closely related to numerical cost-benefit analysis is not seen as a persuasive reason for abandoning this concept.

In developing its new ideas, the Forum further suggested that the ICRP should keep in mind the needs of and implications on regulatory authorities. The following recommendations were made by the Forum to the ICRP:

- Consider the applicability of new recommendations in all countries. Social and cultural views may differ significantly among countries in North America, Europe and Asia. In addition, many countries in, for example, Asia and Africa have systems that may be built on model regulatory regimes developed by IAEA based on the international Basic Safety Standards. Will the BSS and these model regulations survive the introduction of the new recommendations?
- Recognise the importance of "attitude" and good safety culture in optimisation the way in which optimisation is described as a questioning frame of mind was welcomed.
- Be realistic, not conservative in approach. Regulators will introduce conservative methods as they find it appropriate.
- Consider how the new system, based on source related constraints, accommodates exposures from multiple sources, e.g. workers moving between installations possibly in different countries.

Also in the context of optimisation, the Forum discussed whether it is necessary to optimise below a pre-defined "trivial dose"? Assuming that the LNT hypothesis has to be clarified, and an applicable range above a few mSv/a has been defined, the ICRP *de facto* highlights the question of optimisation of trivial doses. It was clear from the Forum that if dose can reasonably be reduced (easily and cheaply) then this should be done, whether or not dose is below a pre-defined trivial level. It is also clear that social factors may result in the identification of an "accepted" level of dose that is below any pre-defined level of triviality. However, the forum felt that the regulator should not impose pressure to reduce doses if doses are already "low". Under these circumstances, the ICRP should clearly restate that ALARA does NOT mean that doses should tend towards zero at any cost, that ALARA is dose management, not dose minimisation.

Finally, the discussion of exclusion and exemption included consideration of the nature of the source radionuclide, as being natural or artificial. In the case

of optimisation, it was agreed that there are no arguments for a different treatment of natural or artificial exposures.

There was strong support for keeping the term ALARA. Stakeholder input is already provided for in the ALARA process. Other international organisations, such as the IAEA and the NEA, could be helpful in providing guidance on the use of ALARA beyond cost-benefit analysis, but a deeper discussion should begin concerning the need for and use of a level of triviality at which optimisation could be declared sufficient. The ICRP stated, at the conclusion of the forum, that it will not abandon ALARA.

Development of practical dose constraints. Are new constraints for the public a *de facto* decrease in public dose limits?

The new draft ICRP recommendations suggest that fewer constraints may be needed, and that just four would be sufficient to encompass the needs of radiological protection. These have to be established on a uniform and consistent basis.

It should be recalled that the new system will put a greater emphasis both on controllable sources and on the protection of individuals. A dose "constraint" is a level of dose to an individual from a single regulated-source, such as a nuclear power plant, providing a basic standard of protection to the most exposed individuals. A dose "limit" is the maximum dose that an individual should receive from all regulated sources.

Forum participants agree that the existence of about 20 different numerical values applying to different situations in radiological protection is far too complicated. In addition it seems easier to explain four numbers to politicians and stakeholders rather than 20.

ICRP proposed four leading values of source-related dose constraints: 0.01 mSv/year, 0.3 mSv/year, 20 mSv/year and 500 mSv (acute or over decades). These selected numerical values are consistent with the scale of concern elaborated in the ICRP evolution paper i.e. they are expressed roughly as fractions or multiples of the average annual background. They also take into account risk considerations and encompass almost-all current limits, constraints and other action levels.

What is the rationale behind the selection of these four values? The upper level is chosen to avoid deterministic effects, if acute, or excessive stochastic effects, if delivered over decades. For example, the 500 mSv level would

determine the threshold for evacuation or relocation of populations from contaminated territories. At the lower level (10 microSv or below), ICRP considers that exposures are so low that they can be viewed as inherently optimised. In the dose range of most practical concern to the radiological protection community (a few micro-Sieverts to a few tens of milli-Sieverts), two leading constraints (20 mSv/year and 0.3 mSv/year) apply respectively according to the controllability of the source, the surveillance or the training of the population, the direct or indirect benefit.

Serious reservations were expressed at the proposal for a 0.3 mSv constraint because it may incur excessive costs for some sectors of industry. Regulators argued against abandoning the 1 mSv limit on which their regulations for public protection are based. Other stakeholders are afraid that some people may be exposed to several regulated sources each constrained to 0.3 mSv, exceeding 1 mSv, in the case of multiple sources. It was agreed, however, that this scenario is not particularly realistic.

There was unanimous agreement that dose limits are necessary for regulatory purposes, legal purposes, communication and clarity. Moreover, the forum expressed concern that the new concept of 0.3 mSv/y could be considered as a tightening of dose limits for public and not as a constraint for only one source. Given that there was considerable argument against the proposed ICRP approach, the continued use of 1 mSv/a as a regulatory criteria, which should be clearly defined, is perhaps the best compromise.

ICRP understood the reservations of the forum concerning this value and suggested that the commission would keep the 0.3 mSv figure, but allow it to coexist with the current 1 mSv limit. The forum is not sure that this would be realistic. In any case, the ICRP should clearly explain whatever approach it next proposes. Specifically, the Forum suggested that the ICRP should address the following, practical questions in its explanation of the dose constraint and dose limit concepts and numerical values:

- Evaluate the implications for secondary regulatory limits (e.g. for transportation), before the recommendations are finalised – will transportation criteria be retained if they are related to the current dose limits?
- Consider whether guidance is needed on new types of individual exposures (for example at ports and airports) for security reasons.
- Recognise that safety and security are linked topics, i.e. that security issues must be taken into account in optimisation.

In summary:

- The proposed reduction of the 30 numerical values for different types of dose constraints down to 4 numbers was broadly supported by the participants of the meeting. However, some "road testing" may still be useful and necessary.
- Three of the four numerical values proposed were accepted, while the 0.3 mSv dose constraint for the public was rejected in favour of the retention of the 1 mSv public dose limit.
- ICRP has to be clear about the concepts of dose constraints (source related), and dose limits (individual related).
- The proposal of ICRP to base the new levels of concern and individual effective dose in a year on a comparison with natural background, seems logical for outside observers, the public, and many scientists. On the contrary this new approach seems to be not accepted by the majority of regulators, industry and associated experts. It is clear that a thorough analysis of practical implications of the new system, before it is adopted, is required. This is especially true for the apparent consensus of a system mixing the new recommendation and the former BSS limits.

Do we surrender collective dose?

During the course of the last decades, ICRP has provided details on the use of collective dose, in particular on its role in the process of optimisation of protection. ICRP publication 22 (ICRP, 1973) specified that, in order to express health effects of radiation in a population, the collective dose could only legitimately be used if the dose-effect relationship is linear without threshold and independent of the dose rate. In the last recommendations (ICRP, 1991), paragraph 34 outlines that the collective dose *takes account of the number of people exposed to a source by multiplying the average dose to the exposed group by the number of individuals of the group.* However, several examples, such as the Chernobyl accident, clearly show the difficulty of using such a concept when mixing situations where high doses are received by some individuals and low doses received by large populations, both situations resulting in the same numerical value for the collective dose. Since Chernobyl, the use of collective dose has been widely criticised, and the world of radiological protection is more or less divided between two extreme positions:

- one position recommends using collective dose everywhere, in agreement with LNT hypothesis;
- one position considers that abusive use of this concept is contrary to common sense.

Some institutions, like the Pacific Northwest Laboratory in USA and the IPSN in France, have recently produced reports analysing the use of the collective dose concept, its performance, indications and contraindications (Strom, 1998, IPSN, 2002). Their conclusions are clear; this concept is a useful management tool for some specific activities, but there is a potential for incorrect use of this concept.

There is broad agreement, but not full consensus, that collective dose should be kept as part of the system of radiological protection because of its usefulness for managing work situations. It can serve as a trigger for increased attention to particular areas. It is a useful tool for workers when combined with ALARA. It is a useful theoretical tool for choosing between options. But, there is also a broad consensus for a more rigorous matrix element approach to the use of collective dose, particularly for characterising public exposures at very low doses and for very long periods of time.

There was strong support within the Forum to keep the concept of collective dose. However, the forum recognised the need for clear guidance on the use of collective dose, for example limiting its distribution in time and space, and disaggregating the information presented (e.g. the number of individuals, average doses, etc). The Forum warns that even if the concept of collective dose is abandoned by the ICRP, governments and operators may well continue to use it. It seemed from the results of the Forum that ICRP has well understood the concerns about this concept, and will provide clear guidance.

Exclusion and authorisation

Many discussions and workshops have been devoted to the concepts of exclusion and exemption, which have been described by the ICRP as follows:

Exclusion means that a source or an exposure is considered to be "outside the system". The choice to exclude should be based on the ability to affect exposures through inclusion in the system (amenability to control), and on the level of dose that the source or exposure causes.

Exemption is used to judge whether a source or exposure that is already under control, within the system of radiological protection, should no longer be controlled. This decision is based on the level of dose, for example, that does not warrant regulatory efforts (10 μSv/a for example).

Exclusion defines the scope of the ICRP system. **Exemption** is a regulatory tool.

The application of these concepts to natural sources of exposure, however, was not completely understood by the forum. Most “unaltered” natural radionuclides will not be amenable to control. The ICRP proposes to establish a “constraint” in terms of activity concentration (Bq/g), from which regulators could establish an exclusion level, below which materials would not be included in the system of radiological protection. The concept of constraint, however, includes the need to optimise below this level, and this process is associated with exemption. As such, the proposal from the ICRP seems to somewhat mix the concepts of exclusion and exemption. Further, the use of exclusion levels and exemption levels does not assist in understanding the difference in these concepts, or provide guidance as to which should be used in a given situation. This tends to add rather than reduce confusion.

The forum expressed the opinion that exclusion is a useful concept that should be based primarily on amenability to control. This should apply to both natural and artificial. Amenability should take in account such aspects as justification of the practice, benefit of controls, costs, etc. Exclusion should be applied sparingly, and should mostly be applied to natural sources.

All sources and exposures that are not excluded should be subject to authorisation by the regulatory authority. Authorisation could replace the concepts of exemption and clearance. It applies to both natural and artificial sources. Regulatory authorities may wish to define a bottom level below which radiological protection requirement could be relaxed. A single set of numbers for this bottom level, an authorisation threshold, could be useful.

It is clear that exemption, exclusion, and authorisation are concepts that need clarification for public comprehension but also for a better acceptance of the system by all the actors of the radiological protection community. It seems that exclusion is more easily used for natural sources than for artificial sources. It is recommended that the ICRP should develop clear, simple explanations of these concepts. Authorisation could replace the concepts of exemption and clearance.

Environmental protection

Environmental protection is universally seen as necessary. Although, there is broad consensus that the environment is, in general, sufficiently protected against the effects of ionising radiation through existing regulations, there is also a wide agreement that the current system of radiological protection fails to prove that the environment is not put at harm.

Hence, developing a system of radiological protection for non-human species is not driven by concern over the state of environmental protection, but rather by the need to fill a gap in the system of radiological protection. Moreover, it is important to communicate to the non-scientific world that the radiological protection system is providing protection of the environment. Although it is not certain that explicitly addressing the radiological protection of the environment will positively affect public acceptance of radiological protection decisions regarding the environment, such acceptance would certainly be worse if nothing is done. The forum thus supports the ICRP goal to fill this gap, which, if not filled by the ICRP, will be filled by other, less competent organisations.

Similar to the system for humans, ICRP suggests the use of reference set of dosimetric models and a reference set of environmental geometries, applied to reference fauna and flora. ICRP proposes to develop a limited set of reference fauna and flora (fewer than 10 organisms), for a few but clearly defined types of animals and plants. The forum discussed the reference flora and fauna approach as one technique to establish environmental protection criteria that can be used in a regulatory application. However, the forum agreed that the use of a limited set of reference fauna and flora would not be sufficient to cover all types of ecosystems. The forum also felt that the rationale for the selection of reference organisms for a given ecosystem should be clearly defined.

The final system, it was agreed, should be complementary for man and non-human species, and should be harmonised with the protection systems in place to address other environmental stressors, such as chemicals. Radiological protection of the environment has to be consistent with overarching concepts of environmental protection, especially with considerations regarding sustainable development.

The Forum reiterated the ideas and concerns that had already been discussed at the Taormina conference (NEA, 2003).

Meeting participants agreed that the ICRP is the appropriate international organisation to develop radiological environmental protection recommendations, emphasising, however, that a broad dialogue with various interested parties is important. The ICRP will further discuss the radiological protection of non-human species without fixing a specific deadline for the publication of detailed recommendations on this subject. The forum participants expect a practical and simple set of recommendations. With regard to the protection of the environment from ionising radiation, natural background level was felt to be the lowest level needed in any table of levels of concern.

4. DETAILED CONSIDERATIONS

Cost elements

Any change to the regulatory structure may imply costs on the regulatory agencies and operators, and they may be substantial. Any significant change would require new licensing documents and the associated required national procedures would need to be followed. It is not clear to what extent the new proposals would entail such changes, and this could only be determined when the framework proposals are further elaborated and clarified. It was suggested that changes to terminology that did not imply a change in substance would entail an excessive cost for the advantage gained.

All participants to the forum highlighted the importance of cost considerations regarding the implementation of new ICRP recommendations. In view of the potentially large direct and indirect costs of translating ICRP recommendations into national legislation and international agreements and standards, it is suggested that the value of the new recommendations should be demonstrated through the use of road tests and/or case studies before the recommendations are finalised and issued.

Stakeholder involvement

Contemporary society has become increasingly interested in participating more actively in public decision-making regarding health, safety and environmental protection issues. The NEA Committee on Radiation Protection and Public Health (CRPPH) has explored the details and implications of stakeholder involvement in the decision-making process for some time now. The roots of this interest are found in the collective opinion, *Radiation Protection Today and Tomorrow* published in 1994 (NEA, 1994). On the basis of this reflection, the CRPPH organised the Villigen workshops, *Societal aspects of decision making in complex radiological situations* (NEA, 1998), *Better integration of radiation protection in modern society* (NEA, 2001a, NEA, 2001b), and soon *Stakeholder participation in decision making involving*

radiation: exploring process and implications (2003). This workshop series clearly shows the early and continued interest of the CRPPH in this topic. The CRPPH appreciates the recognition by the ICRP of the fundamental importance of stakeholder involvement.

However, the forum raised some questions concerning stakeholder involvement in the implementation of the new ICRP recommendations, and would appreciate guidance for stakeholders' selection. It is also important to know how to obtain public opinion and how to reach the silent majority?

Some of these questions were discussed at the third Villigen Workshop, 21-23 October 2003. What are the roles, and limits of roles, of each stakeholder involved in the decision-making process? How should any bounds placed on the possible outcomes of stakeholder discussions be defined and agreed upon? Can case-specific lessons learned be relevant under other circumstances? How should scientific uncertainty be presented and taken into account by stakeholders in the decision-making process? What are the respective roles of international and national norms and standards in the context of decision-making processes with stakeholders? It is clear that there is a need for inclusion of the relevant stakeholders but a clear understanding of the role and input in the decision making process is crucial and the boundaries between scientific, social and regulatory aspects have to be accepted by the parties involved. It is possible that this new methodology implies giving workers a legal right to participate in decision-making.

The existing experience is limited for developing stakeholder involvement. There is not a unique approach but a spectrum of available techniques.

There is currently a broad recognition of the value of stakeholder participation in decision-making processes. The implications of stakeholder participation are not yet fully explored. The majority of forum participants would appreciate guidance for choosing stakeholders, concerning the definition of the roles of different groups, and with regard to the limits of the system. The CRPPH, which has discussed these issues for many years, seems to be well placed to address these questions, and to play an important role among international organisations in this area. Keeping in mind the need of regulators and operators alike to appropriately address stakeholder issues, the ICRP should be explicit with respect to the scientific, social and regulatory aspects of and bases for its recommendations such that these can be appropriately presented and discussed with stakeholders. This is particularly true with regard to the Commission's selection of numerical criteria.

Dose to individuals – who and how?

The consolidated recommendations under development by the ICRP place greater emphasis on individual-related criteria for protection rather than societal or collective dose-based criteria. A dose constraint is applied to a single source in order to ensure that the most exposed individuals are not subject to undue risk, and to limit the inequity that may be introduced by optimisation.

An ICRP Task Group has been formed to provide clear guidance on how the individual is characterised within the context of the ICRP System of Protection. Several principles being proposed include: (a) the use of an age-weighted estimate of annual dose that accounts for changes in characteristics of the individual over a lifetime; (b) the role of "reasonableness" and "sustainability" when selecting characteristics that define the individual; (c) the importance of pathways and spatial distribution of radionuclides when identifying critical groups; and, (d) guidance on the use of uncertainties when making decisions about compliance.

The Task Group proposes to use average dose over a lifetime rather than the use of different age group dose. This could be justified since dose constraints are based on lifetime exposure and risk. The advantages are consistent with the conceptual foundation of lifetime risk, its robustness, and the lesser likelihood that it will be misused. The estimation of annual dose takes account of age-specific dose coefficients and of the fractions of the exposed population in each of the corresponding age groups. These values are combined with corresponding age-weighted habits in order to estimate dose. This approach will take account of available regional or national data only, and they are likely to represent a robust data set that will show less temporal change over the lifetime of an operating facility. This also avoids the perception that any particular category or age group of individuals has been emphasised or neglected. The analysis of results produced by ICRP models for inhalation and ingestion show that differences between different classes of age could be expected only after ingestion. This is due to a large difference of gastrointestinal absorption between new-borns and adults and has been described a long time ago by a NEA expert group (OECD, 1988).

It is also recommended to select a critical group that is sustainable over the years a practice is conducted. Some extreme values, which might be found in one occasion in very few individuals, should not dictate the intake characteristics of the group. Likewise, the total dietary intake should also be consistent with credible calorific requirements. Similarly, intake by hunters should not exceed feasible game capture.

If specific critical group information is not available for the consumption of particular dietary and habit data, values may be derived from general population data. In this situation, ICRP recommends using the 95th percentile of diet and habit data of the general population to define a critical group. However the selection of this value is primarily the responsibility of regulators and stakeholders. Use of a less conservative value may be appropriate for some situations.

It is clear that there are confusing discussions on sensitivity to ionising radiation. Today, there is no scientific evidence that a particular portion of the human population is more specifically radiosensitive to the low doses of concern to radiological protection than the general population of any specific critical group used for dose calculations (Gentner, 2003). This problem is only acute for radiotherapy.

With regard to spatial distribution of the radionuclides in the environment, the distribution of radionuclides and build-up of long-lived radionuclides from current discharges have to be taken into account when identifying the critical group.

The forum accepts the use of an age-weighted estimate of annual dose, but this methodology needs clear explanation, particularly to avoid reactions of incomprehension by stakeholders. The role of “reasonableness” and “sustain-ability” when selecting characteristics that define the individual is important, as are the selection of pathways and spatial distributions of radionuclides when identifying critical groups. Lastly the forum suggested the development of guidance on the use of uncertainties when making decisions about compliance.

Uncertainties

A key aspect of risk assessment and management is the assessment of uncertainties. Both assessment and management require the use of assumptions, biological models, environmental transport models, dose-effect models, etc. All of these assumptions and models include uncertainties, implying that the end result of such models also has a given level of uncertainty.

Uncertainties are discussed, and it is important to explain that these are quantities that are measured or estimated, and quantities that have been selected, either by the ICRP or other experts groups. Dose constraints and dose coefficients recommended by the ICRP and implemented by regulators are not uncertain. These are specific numerical values that have been explicitly

selected. The inclusion of uncertainties in estimating doses to the individual is the responsibility of the operators and regulators.

Concerning the radiological protection of the environment, at this point there is still very little knowledge, relatively speaking, of various ecosystems, implying that some margins of conservatism will be used. Some conservatism is also found in the application of the system of radiological protection for humans.

Although the ICRP has, in the past, provided some guidance as to how uncertainties should be addressed in regulation and practice, further guidance is certainly necessary. This should begin with general guidance with respect to the overall approach to uncertainty, and continue with more specific guidance as to how such uncertainties should be understood in practice (policy, regulation and application). The need for and use of margins of safety, in regulation and practice, should be part of this discussion for the protection of both humans and non-human species.

Uncertainties are constantly addressed by scientists and model developers. However, regulators need selected values that are not uncertain. A challenge for the system is to explain to stakeholders that uncertainties are already included by experts in the selection of reference values.

Equity and flexibility

The ICRP has suggested in its draft framework that radiological considerations will form only one element, and often not the deciding element, in decisions regarding radiological protection options and optimisation. This implies that the final recommendations will be written in a way to allow national authorities the flexibility to appropriately address local issues. The balance that the ICRP strikes between international harmonisation of numerical criteria and the flexibility necessary for local approaches is very important, and will be a key consideration in the acceptance and functionality of final ICRP recommendations.

Evaluation of equity and flexibility need stakeholder involvement, i.e. the understanding of roles of each stakeholder, and the distinction between scientific, social and regulatory aspects. In a previous report (OECD, 2003) the CRPPH has recommended flexibility for the protection of the environment. It is clear that a unique set of values could pose problems in some situations, countries or regions.

ICRP has already introduced specific dose-per-unit-of-intake factors for protection of workers and the public for internal contamination. This is more or less accepted by national regulators. It seems unfortunate that ICRP has not introduced the concept of specific risk, concerning specific situations such as "the effect of age", where sound scientific data exists, or "low dose and dose rate" situations, such as in waste management and the return of long-lived radionuclides to the biosphere. Guidance from the ICRP is needed for these situations.

In addition, some at the Forum felt that the ICRP should be more flexible in terms of its approach to chronic exposures. In particular, rigid positions could be unproductive in future dialogues with stakeholders.

The ICRP has introduced flexibility in the doses per unit of intakes calculation. It is time to explore new areas where flexibility could also be of value, such as "effect of age" and "low dose and dose rate effects", and chronic exposure situations.

Guidance for the long-term management of radioactive waste

ICRP publications 77 and 81 provide some guidance from the Commission on radiological protection issues in the context of radioactive waste management options. The issue of long-term management of radioactive waste is not discussed explicitly by the draft ICRP framework documents. The forum expressed concern that the issue will have to be appropriately addressed in any future ICRP recommendations. Potential exposures, which have been used with regard to waste management issues, are also not mentioned.

The NEA has worked extensively in the area of confidence and safety cases for the management of high-level nuclear waste, and the IAEA has also developed guidance for disposal of radioactive wastes. In general, however, these works are based on consideration of protection of humans. In the future, waste considerations will need to include explicit consideration of protection of species other than humans. Such documents would focus on effects on biota that impact on biodiversity, or on conservation and sustainable development for present and future generations. Those effects include mortality of individuals and reduction in their reproductive success.

The ICRP and the IAEA are strongly involved in guidance for the long-term management of radioactive waste. The NEA also contributes actively to the debate. ICRP should provide over-arching policy and guidance to address radiological protection in the context of radioactive waste management, based on input from the NEA, the IAEA and others. The IAEA and others should examine how to develop the practical application of the ICRP protection approaches. Co-ordination is strongly recommended.

5. CONCLUSIONS

At the opening of the forum, ICRP announced that the 2005 recommendations would be evolutionary rather than revolutionary. Indeed the previous system was considered too complicated and in need of clarification. Moreover, nine documents following ICRP 60 publication introduced many new concepts, including about 20 different values applying to various specific situations, all of which were difficult to explain to stakeholders. Many of these values and concepts are still not well understood by all experts, increasing the difficulty of explaining them to the public.

The current system is sometimes unsatisfactory, for example in intervention situations, for natural radiation sources, in terms of understanding what is meant by justification, the use of collective dose, and as applied to the protection of the environment. Experts are asking for more coherence and simplicity. National authorities continue to discuss the meaning of exclusion and exemption. Members of the public question today's levels of protection, and discuss the acceptance of radiological risks.

To address these issues, the ICRP is developing new recommendations. The participation of international organisations and radiological protection societies in this work is perhaps the most important and positive aspect of the process. These are the first ICRP recommendations to be subjected to extensive stakeholder comment and adjustment and the ICRP should be congratulated for their openness. Many forum participants favoured an in-depth discussion of some key issues, and "building blocks" as a support for the later development of general recommendations.

However, the forum's participants have reacted strongly to the ICRP's proposals, in part because many countries have recently implemented or are currently in the process of implementing the Basic Safety Standards based on ICRP Publication 60, 1990. Regulators need stability, and are not fully convinced that new recommendations are necessary, since there is little change in the scientific knowledge.

The CRPPH has worked intensively on this subject over the last few years, proposing some adjustments to ICRP proposals, publishing several

documents, holding two forums in collaboration with ICRP, and several workshops. This forum is the best illustration of the good co-operation between the two organisations. Some issues are shared by the two organisations.

- Protection of the environment is not well demonstrated, and needs an overarching conceptual basis. However, some participants think that, because there is consensus that the environment is currently well protected, this is not a high priority from the radiological point of view. Rather, it is agreed that there is a need to fill this conceptual gap, before other less competent organisations do so. At the same time, the CRPPH will work to assure that there is no development of unjustified new research programs.
- Is the use of collective dose or its misuse the problem? New proposals to more explicitly define this concept are welcome.
- It is strongly recommended to keep the ALARA principle.
- Clarification is needed of the exemption and exclusion concepts.
- Involvement of stakeholders is now well accepted.

In summary, the forum was very much in favour of a pragmatic approach, in making changes. Any changes should be evolutionary, allowing reasonable regulatory stability. Changes should continue to assure adequate protection of human health and the environment, and should help to enhance public trust and confidence in radiological protection. But it should be noted that many participants at the forum had arguments, applying to their particular situations, not to change anything. Not the least common of these arguments suggested that there had been enough difficulties with the still recent implementation of ICRP Publication 60 recommendations, that new initiatives would not be well viewed at this time.

In the specific area of the new approach based on constraints rather than limits for public exposure, there were strong reactions. This is probably a critical point in the dialogue between the ICRP and its stakeholders, and is clearly an important point of interest for the NEA. Whatever the outcome of discussions, it is strongly suggested that the final recommendations should be philosophically simple and consistent, rather than a complicated compromise such as maintaining both the 1 mSv/a limit and the 0.3 mSv/a constraint.

In conclusion, the debate between ICRP and stakeholders was very active and positive, resulting in a significant advancement in the understanding of proposed ICRP recommendations.

REFERENCES

HOLM L.E. (2002) *How Could the Systems for the Radiological Protection of the Environment and the Radiological Protection of Man be Integrated?* in "Radiological Protection of the Environment; the Path Forward to a New Policy", Proceeding of a NEA/ICRP Forum, Taormina, Italy, 12-14 February 2002, Paris, France, OECD/NEA, 2003.

ICRP Publication 26, *Recommendations of the International Commission on Radiological Protection.* Pergamon Press, Oxford, ICRP, 1977.

ICRP Publication 60, 1990 *Recommendations of the International Commission on Radiological Protection*. Pergamon Press, Oxford, ICRP, 1991.

The Evolution of the System of Radiological Protection: the Justification for New ICRP Recommendations, Journal of Radiological Protection, 23, 139-142, ICRP, 2003.

Collective Dose, Indications and Contraindications, EDP Sciences, Les Ulis, IPSN, 2002.

The Evolution of the System of Radiological Protection: the Justification for New ICRP Recommendations, The International Commission on Radiological Protection, J. Radiol. Prot. **23** 2003 129-142; GENTNER 2003 *Personal Communication,* JRP, 2003.

Gastrointestinal Absorption of Selected Radionuclides; A Report by an NEA Expert Group, OECD/NEA, Paris, France, 1988.

Radioprotection Today and Tomorrow, OECD/NEA, Paris, France, 1994.

Developments in Radiation Health Science and their Impact on Radiation Protection, OECD/NEA, Paris, France, 1998.

The Societal Aspects of Decision Making in Complex Radiological Situations, Proceedings of an International Workshop, Villigen, Switzerland, 13-15 January 1998, OECD/NEA, Paris, France, 1998.

Critical Review of the System of Radiation Protection: First Reflections of the OECD Nuclear Agency's Committee on Radiation Protection and Public Health, OECD/NEA, Paris, France, 2000.

Policy Issues in Radiological Protection Decision-Making: Summary of the 2nd Villigen, Switzerland, Workshop, January 2001, OECD/NEA, Paris, France, 2001.

Better Integration of Radiation Protection in Modern Society, Workshop Proceedings, Villigen, Switzerland, 23-25 January, 2001, OCDE/NEA, Paris, France, 2001.

The Way Forward in Radiological Protection, OECD/NEA, Paris, France, 2002.

A New Approach to Authorisation in the Field of Radiological Protection: the Road Test Report, OECD/NEA, Paris, France, 2003.

Radiological Protection of the Environment: Summary Report of the Issues (Radiological Protection of the Environment: the Path Forward to a New Policy? Workshop Proceedings, Taormina, Sicily, Italy, 12-14 February 2002, OECD/NEA, Paris, France, 2003.

Strom D.J., R. Harty, E.E. Hickey, R.L. Kathren, J.B. Martin, M.S. Peffers (1998) *Collective Dose as a Performance Measure for Occupational Radiation Protection Programs: Issues and Recom-mendations*, PNNL Report, PNNL-11934/UC -610.

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The Future Policy for Radiological Protection

At the end of the 1990s, the International Commission on Radiological Protection (ICRP) launched a process for establishing new recommendations, which are expected to serve as guidelines for national systems of radiological protection. Currently the ICRP's proposed recommendations are being subjected to extensive stakeholder comment and modifications.

The NEA Committee on Radiation Protection and Public Health (CRPPH) has been actively involved in this process. Part of the Committee's work has been to undertake collaborative efforts with the ICRP through, for example, the organisation of broad stakeholder fora. The first of these, held in Taormina, Italy in 2002, focused on the development of a policy basis for the radiological protection of the environment.

The second forum, held in Lanzarote, Spain in April 2003, addressed the latest concepts and approaches in the ICRP proposed recommendations for a system of radiological protection. During this meeting, the ICRP listened to the views of various stakeholder groups, including radiological protection regulators, environmental protection ministries, the nuclear power industry and NGOs. As a result, the ICRP modified its proposals to better reflect stakeholder needs and wishes. This report presents the outcomes of the discussions, examining what the ICRP proposed and how its proposals have been affected and modified as a result of stakeholder input.

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