

Science and Values in Radiological Protection Decision Making: Study by the CRPPH

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Stakeholder Involvement in Radiological Protection Decision Making

- The CRPPH has studied national experience with the involvement of stakeholders in decision making processes since 1993
- The CRPPH has concluded that, while stakeholders do not MAKE decisions, stakeholder involvement is crucial to achieve acceptable, sustainable decisions in complex radiological protection situations (e.g. siting new facilities, emergency and post-accident situations, licensing normal plant releases, etc.)
- The CRPPH has an extensive list of publications and workshops on this topic, and stakeholder involvement continues to be a priority for the Committee

Science and Values in Radiological Protection Decision Making

- As part of the Committee's study of stakeholder involvement, the CRPPH has concluded that RP decisions are informed by science, but are generally driven by social values
- To help to appropriately articulate both the science and values aspects of decisions, the CRPPH has arranged 3 workshop on this subject:
 - Helsinki, Finland (January 2008)
 - Vaulx-de-Cernay, France (December 2009)
 - Tokyo, Japan (November 2012)

S&V Meeting Format

- Selection of 3 topics of “current interest” presenting scientific aspects and values aspects
- Plenary presentations of Science aspects and Values aspects for each topic
- Breakout sessions (2 periods of ½ day) to discuss each topic
- Plenary presentation of Breakout results, and discussion of key issues arising

1st S&V Meeting

Main Issues

- **to improve understanding** in both the research and policy communities on what is at stake in the system of radiological protection as scientific knowledge and social values evolve
- **to contribute to the development** of a more shared view of emerging scientific and societal challenges to radiological protection
- **to identify research** that will better inform judgments on emerging issues
- **to be the first step in the identification** of elements of a framework that is better suited for the integration of new scientific and technological developments and socio-political considerations in radiological protection
- **to identify the most appropriate next steps** in this process.



Scientific Issues and “what if” approach

Breakout Sessions: The moderated discussions followed a "what if" approach, looking at topics currently on the horizon that could affect the way that radiological protection is managed.

Selected Breakout Topics:

- non-targeted effects
- individual sensitivity
- circulatory diseases

1st S&V Results

Non-targeted Effects

- It was felt that better understanding of non-targeted effects would very likely not affect the overall level of risk, but rather would better explain the point of origin of the risk.

Individual Sensitivity

- No need to radically modify the current RP approach, however in emergency situations and in medical diagnostic and therapy situations, it was suggested that some consideration be given to refocusing protective actions taking individual sensitivity into account.

Circulatory Disease

- While there could be a need to lower current dose limits by 30-50%, with strong emphasis on optimisation, the workshop concluded that the science is still evolving and there was no need at that point to recommend change to the system of radiological protection.

2nd S&V Meeting

Main Issues

- Relevant stakeholders in each area presented and exchanged experience related to their viewpoints and relevant values, increasing their levels of mutual understanding to facilitate development of common approaches forward;
- Social and scientific rationale and justification for adopting new approaches to radiological protection in each of these areas was discussed (tipping point);
- Practical approaches to improving radiological protection in each area was discussed based on national experience; and
- Process and framework elements that could enhance radiological protection in these three areas by better integration of social and scientific aspects was identified.



From “What If” to “What Now”

Breakout Sessions: The moderated discussions focused on radiological protection issues that are currently facing us, and that may pose increasing challenges to our world today, thus, “What Now”?

Selected Breakout Topics:

- radon as a public health issue
- medical exposures in diagnostic and screening procedures
- radiation-induced vascular effects

2nd S&V Results

Radon

- Protective actions focus on high-concentration homes, protecting those most exposed. Epidemiology suggests that most lung cancers occur in homes with lower concentrations. Optimisation actions should be a long-term focus.

Medical Exposure Management

- Justification of diagnostic procedures and the optimisation of protection were seen as key issues to discuss and improve. Greater awareness and use of exiting tools, and focus on sensitive populations (e.g. children) seem to be the areas of focus.

Radiation-induced Vascular Effects

- The value driving decisions seemed to give priority to health risks today, which seem to be deterministic rather than stochastic. However, new epidemiological studies suggest that chronic lifetime exposures may cause cardiovascular diseases. While the science is still evolving but it was noted that with the same level of knowledge regarding stochastic effects of radiation in the 1950s, a precautionary approach was adopted

3rd S&V Meeting

Main Issues

- Following the 2008 and 2009 Science and Values workshops and the five Asian Regional workshops held in Japan from 2002, it was agreed to combine the formats of these two successful meetings
- Focus on science and values as drivers of the evolution of the system of radiological protection, and on showcasing input from Asian regional experts and from young scientists and professionals



What Next?

Breakout Sessions: What better understanding of scientific and value elements in the three chosen topical areas could assist radiological protection to move forward in an accepted and sustainable direction - *“Where do we go from here?”*

Selected Breakout Topics:

- **Assessment and Management of Low-Dose Exposures and Public Health**
- **Protection of Children and Self-Help Behaviour Approaches**
- **Non-cancer Effects**

Structure of the meeting

- Plenary Session 1: Managing the Consequences of the Fukushima Accident
- Plenary Session 2: Setting scenes for Breakout Discussions
- Parallel Breakout Sessions
- Plenary Session 3: Specific Aspects of Breakout Topics
- Parallel Breakout Sessions
- Plenary Session 4: Breakout Sessions Summary

Topic 1 – Assessment and Management of Low Dose Exposures and Public Health

Two key questions dealing with Low Dose/Dose Rate exposures and the DDREF are:

1. Is there additional risk when low doses increase?
 - Historically radiation protection used a reducing factor (DDREF) because of the need to use high doses in determining risk factors.
 - New and current information and advanced analysis now require no reduction factors in determining the risk factor.
2. Is there additional risk when dose rates increase?
 - There is not currently enough new information to modify our scientific understanding.
 - There is evidence of dose rate effects, but there is insufficient evidence to change the system of radiation protection. Systematic review of evidence is recommended.

Topic 1 – Assessment and Management of Low Dose Exposures and Public Health

Hormesis is an issue of interest to be dealt with, and would benefit from a proactive approach:

- There is evidence of hormetic biological effects, but hormetic effects can not be extrapolated to health impacts.
- There is a need for more research on this subject.

For Fukushima

- Establishing monitoring programs, or feedback, for people, food, etc. has been shown to be important to make real dose estimates and also for reassuring the public.
- Communication is critical!
 - Risk, as used in radiation protection, is not well understood by the public. A more effective approach, perhaps using layman's terms, should be pursued.
 - Identification of a “spokesperson” to represent the authorities would improve communications.
 - The role of the expert needs to be clarified and their roles and responsibilities identified.
 - There is a need for Short and Long-term communication strategies for outreach to all stakeholders.

Topic 2: Protection of Children and Self-Help Behavioural Approaches

A Success Story was presented by
Ms. **Satsuki Katsumi**, former Principal,
Tominari Elementary school,
and
Mayor Nishida,
Date City,
Fukushima Prefecture



Topic 2: Protection of Children and Self-Help Behavioural Approaches

Behind the Success.....

- **A Desire to improve conditions – Focus on protecting children, a universal objective**
- **Information Sharing**
 - Tominari Community and Helpful Specialists
 - Translating Science into a Sense of Security
- **Equipment and training**
 - The Municipality and the Specialists
- **Knowledge of how to reduce exposure**
 - Input by the specialists
- **Support for improvement projects**
 - Decisions by the Mayor and Community Solidarity

Remaining Issues

- How can the success experience be transferred to help other communities?
- The nominal number in RP system, while there is a need to give priority to children.

Topic 3: Non-Cancer Effects

- What does science tell us? - **Epidemiology:**
 - There is definite evidence that radiation induces circulatory disease, but the shape of the dose response relationship is subject to debate:
 - For low doses, there is a fair amount of uncertainty. A small threshold dose is suggested, but a linear extrapolation cannot be ruled out.
 - Based on current knowledge, experts from the group agree on a threshold about 0.5 Gy.

Topic 3: Non-Cancer Effects

- What does science tell us? **Radiobiology**
 - Mechanisms of circulatory disease after irradiation are not clear, but there are known mechanisms that might apply in different dose ranges.
 - Lots of research is currently carried out so as to improve knowledge regarding these mechanism(s). These 'may' contribute to the interpretation of the 'most appropriate' dose response curve, especially for low doses.

Updating the RP System?

- Uncertainties are difficult to manage:
 - Improve understanding of mechanisms
 - Improve epidemiology
 - Choice of dose-response curve model is key
- But:
 - What is the position of regulators and other stakeholders regarding the management of such uncertainties?
 - What about prudence and precaution?

Updating the RP System?

- **IF** management of cardiovascular disease is based on an LNT dose response relationship:
 - Preliminary calculations suggest a potential increase in radiation detriment on the order of 20-50%.
 - Need to better address the way 'deterministic effects' are taken into account in the definition of detriment

Updating the RP System?

- ***IF*** cardiovascular disease is considered as a deterministic effect with a threshold dose at 0.5 Gy:
 - **Does prevention** of such effects rely on 'limitation' of whole body exposure to the current limit (20 mSv.y^{-1}) for workers (considering Whole Body Exposure and 25 years of work) with emphasis on optimization to reduce annual exposure for such workers?
 - What about people who are chronically exposed in contaminated territories?

Young Professionals

- Significant contribution to presentations
- Need to further encourage participation and experience exchange
- CRPPH to develop a workshop (2013/2014) addressing sharing experience in public communications

Further Science and Values Discussions

- The CRPPH is planning to hold an Asian Regional Science and Values workshop in late 2013 or early 2014, and may address:
 - Management of contaminated waste
 - Internal exposure management
- The CRPPH will continue the S&V series of meetings, with the 4th probably taking place in North America, perhaps late 2014