What are new challenges for Radiation Protection System based on experience of Fukushima accident?

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Current situations in Fukushima

- *Concerns about the risk* at low doses is very much present and amplified among the population.

- *Socio-economic consequences* with inevitable changes of daily live as well as psychological effects.

- *Rehabilitation* moves forward in no way as expected.
What is there behind issues?

- Scientific controversial issues for LNT models
- Diverse perception about what risk is
- Misunderstanding of Radiation Protection System
- Trapped in 1 mSv/year
- Mistrust towards experts and authorities
Previous main approach in radiological protection is based on a planned exposure situation

- In normal situations, radiation uses are strictly regulated based on the principle of as low as reasonable achievable (ALARA).

- This has enabled radiation protection to be developed as an acceptable system in the world.

- However, post-accident situations like the Fukushima bring about a lot of issues.

- Application of previous approach failed to go forward into recovery.

The gap of protective actions between the situations has confused both regulatory side and the affected people.
Situation-based approach
3 types of exposure situations

× **Existing exposure situations**: when exposures result from sources that already exist when decisions to control them are taken. Characterization of exposures is a prerequisite to their control

× **Planned exposure situations**: when exposures result from the deliberate introduction and operation of sources. Exposures can be anticipated and fully controlled

× **Emergency exposure situations**: when exposures result from the loss of control of a source. These situations require urgent and timely actions in order to mitigate exposures

Risk-based approach provides different upper reference levels in prevailing circumstances, even though it equally requires optimisation in any exposure situations
Key issues in Recovery phase
- Post-accident existing exposure situation -

- Implementation of protection strategy
- Protection strategy for actual situations
- Self-help protection and radiation protection culture
- Time-dependent reference levels

- Non-radiological aspects and human dimension

- Environmental monitoring and health surveillance
- Foodstuff management
- Radiation protection of responders
Bands of dose for selecting reference levels and dose constraints

- **100 mSv** (acute or in a year)
- **20 mSv/y**
- **1 mSv/y**

- **Emergency exposure situations**
- **Existing exposure situations**
- **Planned exposure situations** (occupational)
- **Planned exposure situation (public)**

In unacceptable
The Role of Reference Level

**RL should be a driver to improve a situation!**

- **Doses above RL** are not advisable to be exceeded.
- **Below RL**, exposures should be optimized.

**Misunderstanding in Fukushima**

1) RL interpreted as a goal
2) 20 mSv/y is supposed to be maintained
3) No message about the meaning of RL
Practical approach using time-dependent reference levels

The use of reference levels in an existing situation shows the evolution of the distribution of individual doses with time as a result of the implementation of protection strategies.

- Misunderstanding of 1 mSv/y could be avoided by setting a realistic time-dependent RL
- Recommending to set the RL in the lower part of the 1 to 20 mSv/y band, i.e. below 10mSv/y

cf. As the long-term objective for existing exposure situations is ‘to reduce exposures to levels that are close or similar to situations considered as normal’ (ICRP, 2007, Para. 288),
What is a barrier against the ICRP system?

- People are fixed on the idea that universal safe level exists whenever they think about risk like an absolute threshold.

- People believe safety criteria would be universally equal in any circumstances.

- ICRP system has not been disseminated in an articulate way.

- Contrary to the concept, risk itself cornered affected people into a dead-end.
Challenging issues

• **Knowing the ICRP system**
  – Gap between RP community and outside
  – RP experts need to communicate with experts from other fields.

• **Disseminating good science**
  – About radiation risk and particularly low dose risk from internal exposure, low-dose-rate exposure
  – ICRP is responsible for dissemination a different message from UNSCEAR or WHO etc.

• **Improving psychological and life-style aspects**
  – Psychological effects and life-style disease now confront Fukushima
Conclusions

• The ICRP has introduced situation-based approach to implementation of radiological protection

• Post-accident existing exposure situation changes with time. Radiological protection should evolve with time.

• The fundamental principle for implementation of protective strategy should be optimization with time-dependent reference levels.

• Prevailing circumstances should drive the selection and optimization.

• Consideration of non-radiological aspects and human dimension into optimization will be a challenging practical issue.