



The Human Dimension of Remediation after a Nuclear Accident: *From Experience to ICRP Recommendations*

International Experts' Meeting on
Decommissioning and Remediation after a Nuclear Accident

28 January – 1 February 2013
Vienna, Austria

Jacques Lochard, ICRP Main Commission
Chair of Committee 4

Content

- **The characteristics of living in a contaminated area after a nuclear accident**
- **Lessons from Chernobyl on the involvement of stakeholders**
- **The recommendations of the ICRP**

Living in a contaminated area (1)

- **The radioactive contamination: a disquieting presence**
 - Invisible, impalpable, uncatchable
 - Everywhere in the places to live: intrusion in the private sphere
 - Durable: several generations
- **An unspeakable presence: no experience, no memory, no words in the common language**
- **All dimensions of daily life are affected:** health, environment, social life, production and distribution of foodstuffs and commodities... but also psychological, aesthetic and ethical aspects
- **Everyone is involved:** residents, local authorities and professionals, local organizations and businesses,...
- **Strong concern about the future and particularly of children**

Living in contaminated areas (2)

- **For each individual, the presence of radioactivity modifies her/his relationship to risk, to the land, to other people:**
 - Everyone is faced with the thought of death
 - Environment, and particularly foodstuffs, are perceived as hostile
 - Goods and products have less or no value anymore
 - The common heritage is devaluated
 - Residents of the affected areas feels discriminated
- **General feelings among the population:**
 - Loss of control on daily life
 - Loss of confidence in authorities and experts
 - Uncertainties on the long-term effects of radioactivity
 - **Feeling of helplessness, abandonment and exclusion**

Living in contaminated areas (3)

- **Actions implemented by authorities and experts reinforce the feeling of exclusion among the population:**
 - Contamination measurements reduce quality to figures
 - Standards and norms divide the world in “good” and “bad”
 - Countermeasures are intrusive and generate interdictions
- **The difficulties to manage the complexity of the situation leads everyone to look for scapegoats**
 - Politicians and experts put the blame on the population: **theory of radiophobia!**
 - The affected population accuses public authorities of mismanagement, negligence or even abandonment
 - This can turn into strong social distrust very difficult to manage (cf. the Soviet Union situation in the late 80s)

Living in contaminated areas (4)

- **Attitudes and individual strategies faced with contamination**
 - Denial of the risk
 - Resignation and fatalism
 - Anxiety and stress
 - Management of the situation
- **Each individual is permanently confronted to the questions :**
“Should I stay or leave the area?”, “Should I return or not?”
- **To answer to such question people want to know among others:**
 - What is the risk?
 - What are the means to protect themselves and their loved ones?
 - If it is possible to ensure decent and sustainable living conditions in the affected areas including respectable lifestyles and livelihoods

Lessons from Chernobyl on stakeholder involvement (1)

Ethos project (1996-2001) and CORE Programme (2004-2008)

- **Faced with the complexity of the situation the characterization of the radiological situation is a difficult process:**
 - The 'statistical' approach does not account for individual situations, which is the main interest of people
 - Experts do not necessarily know the local living and customs of the inhabitants: need to cooperate with the population (co-expertise)
- **Characterization of individual situations revealed:**
 - The non-homogeneity of local contamination
 - The wide distribution of individual exposures according the different behaviours and habits
 - The existence of considerable leeway at the individual level to reduce exposure

Lessons from Chernobyl on stakeholder involvement (2)

- **When people understand:**

- **Where, when and how** they are exposed?
- **What can they do** to protect themselves ?

they spontaneously participate to their own protection and regain control on the situation

- **To allow people to orient themselves the radiation monitoring must ensure measurements of:**

- Ambient dose rates in living and recreation places
- Contamination of self-produced or gathered food
- Internal contamination of persons

to help establish links between the activities and lifestyle of the individuals and their levels of exposure

Lessons from Chernobyl on stakeholder involvement (3)

- Chernobyl experience showed that it was possible to develop, with the help of local professionals (health personnel and teachers) a **practical radiation protection culture** allowing individuals:
 - To interpret results of measurements
 - To orient themselves in relation to radioactivity in everyday life
 - To bring elements to make decisions and take actions
 - To assess the effectiveness of the protective actions they implement themselves
- A proposed definition of practical radiation protection culture: **the knowledge and skills enabling citizens to make choices and behave wisely in situations involving exposure to ionizing radiation**

Lessons from Chernobyl on stakeholder involvement (4)

- The **pluralism of sources of measurement** (public and private local, regional and national actors) and the establishment of **places for dialogue** are important to ensure **confidence** of the population in the progress of the remediation, the development of a **common language** between all involved stakeholders and the **dissemination of the practical radiation protection culture** in all segments of the population
- Finally, experience has also shown that when people have direct access to measurements, standards cease to be a **limiting/blocking factor** for their involvement in the rehabilitation process, but become **benchmarks to guide** their daily actions and behaviours

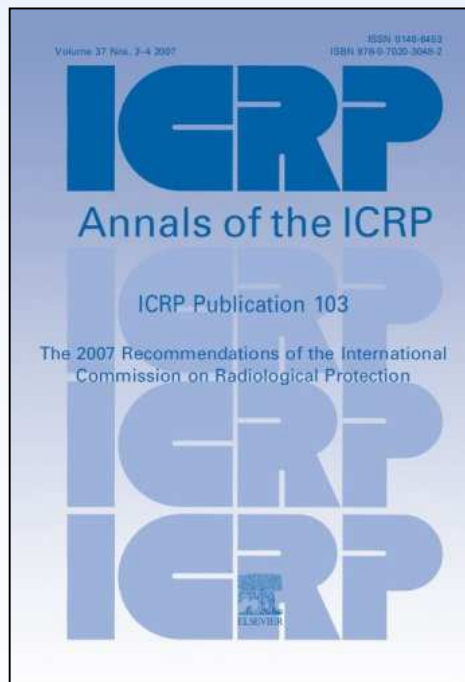
In summary

- Living in a contaminated environment is a **complex situation generating a lot of questions and concerns** among the affected population
- Exposures are driven by **individual behaviours** and the socio-economic situation
- The **direct involvement of inhabitants and local professionals** in the day to day management of a contaminated territory is feasible and also necessary **to break the vicious circle of loss of control and exclusion**
- This involvement must rely on the dissemination within all segments of the population of a **“practical radiation protection culture”** based on 3 pillars: **radiation monitoring, health surveillance and education at school**

Relevant ICRP Publications

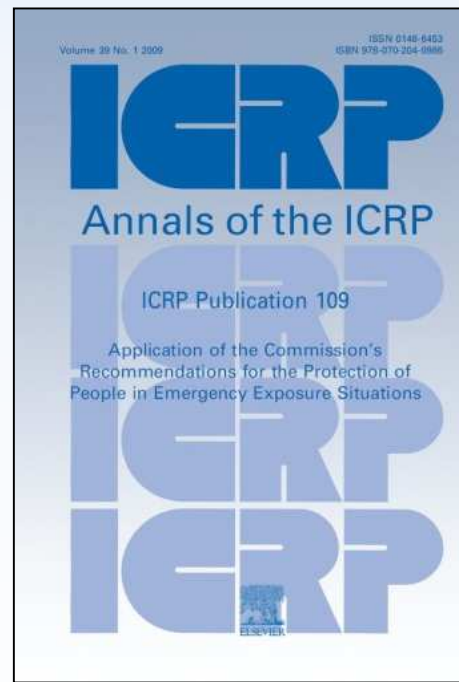
Publication 103 (2007)

**Fundamental
Recommendations**



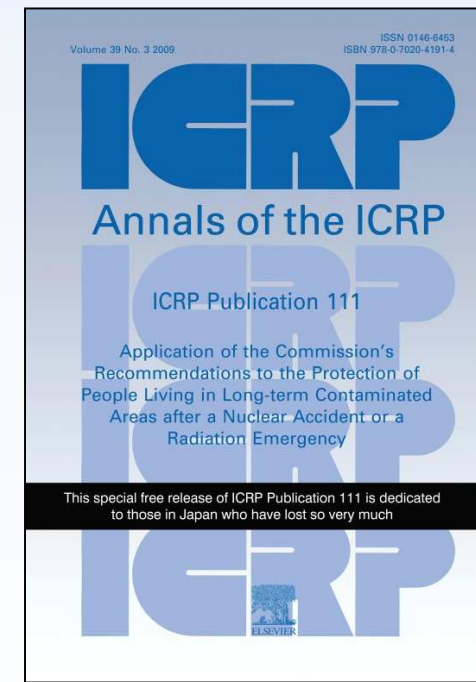
Publication 109 (2009)

**Emergency
Situations**

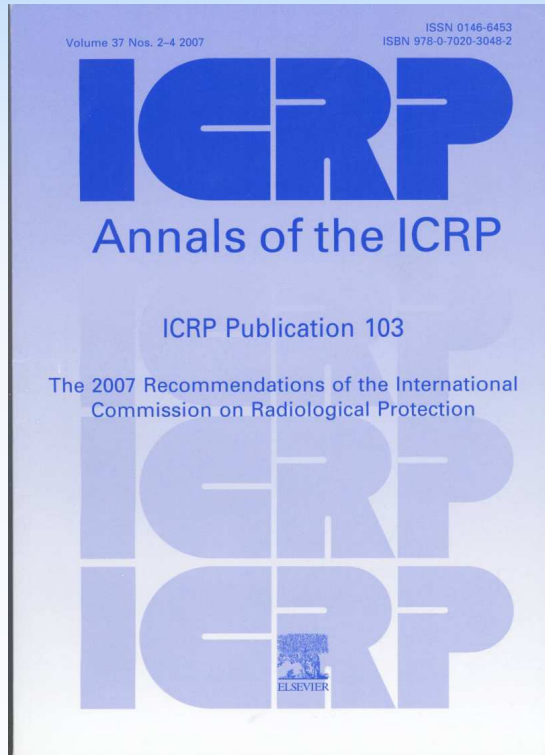


Publication 111 (2009)

**Post-Accident
Recovery**



The aims of the Recommendations



To contribute to an appropriate level of protection for people and the environment against the detrimental effects of radiation exposure **without unduly limiting the desirable human actions** that may be associated with radiation exposure (ICRP 103, § 26)

Definition of an exposure situation

- “The process causing human exposures from natural and man-made sources”



- “Protection can be achieved by taking action at the source, or at points in the exposure pathways, and occasionally by modifying the location or characteristics of the exposed individuals”

The three 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 planned exposure situation**, or the **sudden irruption of an uncontrolled source** (malicious act). These situations require urgent and timely actions in order to prevent exposures to occur or to mitigate them

The Commission defines long term exposures resulting from a nuclear accident as an existing exposure situation

The objective of protection

To reduce and to maintain exposures as low as reasonably achievable taking into account economic and societal factors with restrictions on individual doses

- The general objective is to **keep exposure below 100 mSv**

“At doses higher than 100 mSv, there is an increased likelihood of deterministic effects and a significant risk of cancer”. (ICRP 103, § 236)

- For the protection of the public in case of a nuclear accident with potential long term consequences the Commission is recommending to select reference levels:
 - In the **20–100 mSv/year range** for the **emergency exposure situation**
 - In the **lower part of the 1–20 mSv/year range** for the **existing exposure situation**, with the **long term objective** to reduce and maintain exposures **below 1 mSv/year**

Authorities may select values of reference levels depending on the scale of the accident and the local circumstances

Transition from the emergency to the existing exposure situation after an accident

- **Characterisation of the exposure situation is the prerequisite to take control of the exposures.** The process may take months (even years) and is part of the urgent actions to be implemented in the emergency situation
- Characterization can be considered as achieved when the authorities have a fairly good knowledge of **where, when, and how people are exposed** (and will be exposed in the future) in the affected areas. This in turn allows:
 - For the authorities to decide about **permanent and temporary relocation and/or return home** and the most effective **protection strategy**
 - For the population to decide to leave or to stay and to **participate to its own protection** with the support of authorities and experts
- The transition from the emergency to the existing exposure situation is **a decision taken by authorities** when they have enough information to consider that the exposures can be reasonably controlled and the conditions and means to maintain **sustainable societal and economic living conditions** of the affected population are in place

Optimization of the protection strategy

- A **combination of protection actions** implemented by **authorities** at the national and local level and by the **affected population** itself

The Commission has developed the concept of 'self help protective actions' to characterize these protection actions

- The objective is to reduce all exposures ALARA with **priority given to protect people with the highest exposure** (Equity)
- It is the **responsibility of authorities**:
 - to establish conditions to allow the effective **engagement of the local stakeholders**
 - to set up the conditions and means for **local monitoring**
 - to provide **detailed information** on the exposure situation and ways to reduce doses
 - to evaluate the **performance of the protection strategy** and to report regularly about the progress to the affected population

In summary

Emergency Exposure Situation

- Reference level in the 20-100 mSv/year range
- Protection actions to reduce and maintain exposure ALARA driven by urgency
- **Characterization of the radiological situation**
- Setting-up radiation monitoring, health surveillance and foodstuffs management

Decision by
authorities

Existing Exposure Situation

- Reference level in the lower part of the 1-20 mSv/year range with the long term goal of 1 mSv/year
- Protection actions to reduce and maintain exposure ALARA driven by the improvement of living conditions
- Development of self-help protection and radiation protection culture

Concluding remarks

- The first elements of the return of experience Fukushima show that there are **no significant differences** with regard to Chernobyl general feelings and attitudes of the affected populations
- The **Dialogue initiative launched by the ICRP** to facilitate cooperation between all stakeholders of Fukushima shows that the advice of the Commission, particularly those of Publication 111, found a favourable response from the local authorities and professionals as well as from the population
- The system of protection developed by ICRP for post-accident remediation aims at promoting protection (by keeping exposures ALARA), treating everybody fairly while respecting the fundamental values of **liberty, autonomy and dignity** of the affected people

ICRP

www.icrp.org