



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

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# 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

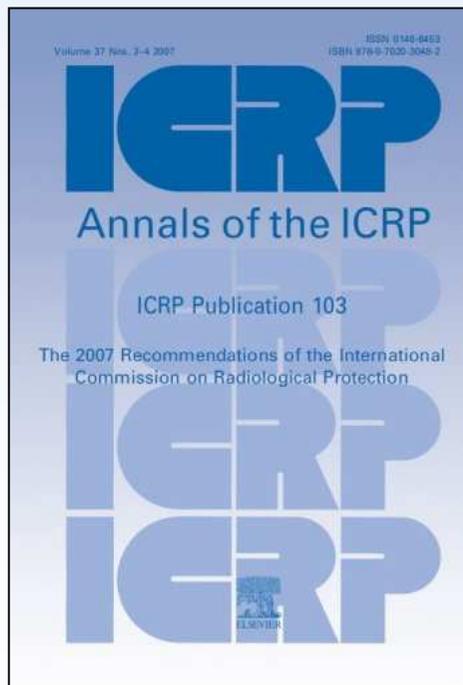
## In summary

- 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

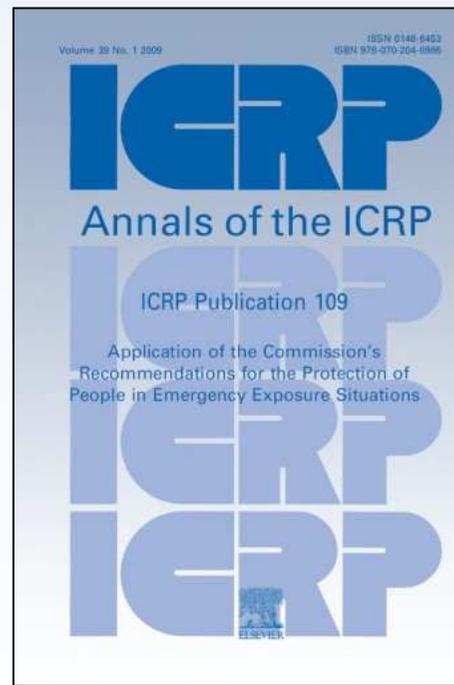
*Publication 103 (2007)*

**Fundamental  
Recommendations**



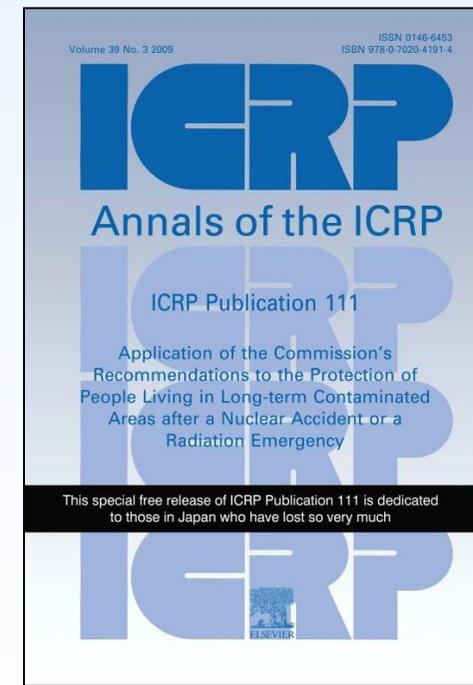
*Publication 109 (2009)*

**Emergency  
Situations**

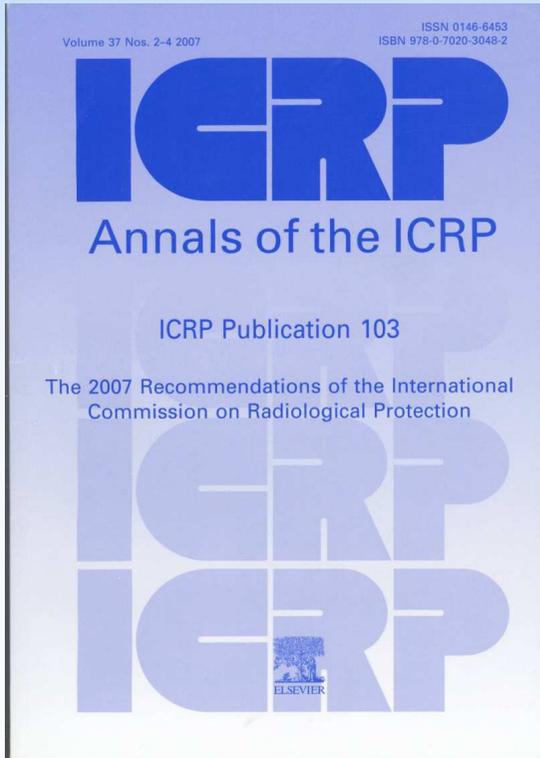


*Publication 111 (2009)*

**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](http://www.icrp.org)