

Practical Measures for Evacuees to Return Their Homes

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Nuclear Regulation Authority (NRA), Japan

Summary

Nuclear Regulation Authority (NRA) of Japan formulated practical measures of radiation protection for the evacuees, who will return their homes, from scientific and technological points of view in cooperation with other governmental organizations. The practical measures stay on addressing the difficulties which the evacuees have been facing. It is expected that the practical measures will be helpful for the evacuees to make decisions whether they return their homes or not.

1. Background

After the accident occurred at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station (hereinafter referred to as "Fukushima Daiichi NPS") on 11 March 2011, the Japanese Government issued an evacuation directive for residents in the area of 20 kilometer radius from Fukushima Daiichi NPS and the areas where annual cumulative dose was estimated to be higher than 20 mSv.

One year later, the Japanese Government re-arranged the evacuation areas depending on the annual accumulative dose levels, and re-classified them into the following three areas:

- Area 1 (Dose \leq 20 mSv) where the evacuation directive is ready to be lifted;
- Area 2 (20 mSv < Dose \leq 50 mSv) where people are not permitted to live at this time; and
- Area 3 (Dose > 50 mSv *) where people are not permitted to live.

*Annual accumulative dose is not expected to decrease to 20 mSv by 2016.

A number of people have still been living away from their homes for longer than two years and eight months as evacuees. The difficulties in their daily life and the hardness to re-build their lives and make life-planning have caused health problem including mental stress. There are furthermore difficulties including separation between family members, devastation of home towns, and collapse of communities. These difficulties have been more complicated, because they are closely related to health concerns of the evacuees about radiation exposure and various anxieties related to re-building their lives in the environment affected radioactively.

Consequently, the evacuees have various thoughts about their future - some of them are stick to returning their homes soon, while the others are eager to re-build their lives in areas where they are living now or have not made decisions to return their homes yet.

2. Concept of Practical Measures for the Evacuees to Return Homes

The Japanese Government has been placing full respect on decision-making by individual evacuee regardless of whether they return to their homes or not. It is significant for the Japanese Government to plan and implement necessary measures taking into consideration the various difficulties which the evacuees have been facing.

The NRA formulated practical measures, that are described in the paragraph 3 below, for the evacuees to return homes, which focus on addressing the anxieties of the evacuees about radiation exposure.

(A) Approach to dose levels

The international knowledge regarding radiation exposure and the international approach to dose levels are as follows:

- In case of exposure dose with higher than 100 mSv, the incidence of cancer and the death rate have the tendency to increase in proportion with the exposure dose. In case of exposure dose with 100 mSv or lower, the effects by radiation exposure to get cancer is not significant than the effects by other cancer-causing factors. In this regard, it is difficult to epidemiologically prove that low levels of radiation exposure leads to an increase of health risk. With reference to the international recommendation, particular attention should be paid to children and pregnant women in implementing radiation protective measures.
- The dose limit of 1 mSv/year for public people has been settled by the International Commission on Radiological Protection (ICRP) based on an estimation of the annual rate (in terms of age) of cancer death due to low-level lifetime exposure and the range of annual exposure dose due to naturally occurring radioactive materials. This dose limit does not represent the border line between “safe” and “not safe” for people. The concept of radiation protection stands on the conservative assumption that risk exists at any level of radiation dose. However, this dose limit should be applied only to the case of controlling radiation exposure, which involves the deliberate introduction and operation of radioactive sources; and not to the case of radioactive emergency and the situation of being exposed already due to radioactive emergency (hereinafter referred to as “existing exposure situation”).

- With reference to the recommendation of ICRP, the dose level to optimize radiation protection for people living in contaminated areas in the existing exposure situation should be determined in the lower range part of 1 - 20 mSv/year as a long-term goal. Formulating an optimization plan to tolerate higher dose levels than this dose level is deemed to be inappropriate, as the dose level is an amount of dose or a risk level below which protective measures should be optimized.
- And the past experience has demonstrated that 1 mSv/year is the appropriate dose level in long-term post-accident situations. The value of dose level should be determined in the sense of careful balance of many related factors including the contamination level of affected areas, the sustainability of social, economic and environmental life, health situations of people, and the views of relevant stakeholders. The dose level is useful not only for planning radiation protective measures but also for evaluating the effectiveness of implementation of the measures.

With reference mainly to the recommendation of ICRP, Japanese Government has determined one of the conditions to lift the evacuation directive, which says annual cumulative dose estimated from the air dose rates monitored in the evacuation areas must be 20 mSv or lower. In another word, it is essential that annual cumulative dose estimated from the air dose rates must be 20 mSv or lower, which is regarded as prerequisite for lifting the evacuation directive or narrowing the scope of evacuation areas.

In addition to the above-described prerequisite, it is important for Japanese Government to realize the following points based on the above-described international knowledge and approach regarding radiation protective measures in the exiting exposure situation:

- Additional exposure dose which an individual person is exposed after returning home should be 1mSv/year or less (a long-term goal); and
- Detailed measures should be formulated and implemented to reduce additional exposure dose, and to care and consult for people who concern health.

(B) Focus on individual dose

In the initial period after the accident at Fukushima Daiichi NPS, it was difficult to measure individual dose with a personal dosimeter. In this situation, evacuation areas were designated, and various protective measures were implemented base on the exposure dose estimated from the air dose rates.

The exposure dose estimated from the air dose rates is actually different from the individual dose measured using a personal dosimeter, because of various factors including a variety of daily life and shield-rate of houses.

It has been acknowledged that the data of individual dose vary depending on individual daily life, and individual dose data collected by municipalities have a tendency to be lower than the exposure doses estimated from the air dose rates.

For the purpose of addressing anxieties about radiation exposure and reducing individual exposure dose after returning homes, it is important for people who returned homes to acknowledge the results of individual exposure dose and to understand the relationship between their daily life and the results of exposure dose. And it is necessary to implement measures to reduce individual exposure dose and health care depending on the individual dose data.

As described in “Suggestion on Health Care related to the Accident at Tokyo Electric Power Company’s Fukushima Daiichi Nuclear Power Station” that was issued in March 2013, it is important to figure out individual exposure dose of people who returned homes as precisely as possible to evaluate the effects of radiation exposure on health. Taking into account long-term health care of people who returned homes, it is also important to continuously measure individual exposure dose using personal dosimeters and keep their recording.

Therefore, the evaluation of exposure doses of people who returned homes should be implemented on the basis not of the exposure dose estimated from the air dose rates but of the individual dose measured actually.

3. Practical Measures for the Evacuees to Return Homes

When the evacuees returned/will return their homes after lifting an evacuation directive or narrowing the scope of evacuation areas, it is necessary for Japanese Government to provide them with measures to support their life-planning and radiation protection. Particularly with respect to radiation protection, it is necessary for Japanese Government to prepare and conduct thorough measures to address anxieties about radiation exposure as much as possible by ensuring health care for people who returned homes and a reduction of their exposure doses.

It is considered that the areas, where the evacuation directive was lifted, are in the existing exposure situation. With respect to such areas, it is internationally regarded that the authorities have to take the responsibility to check whether social systems and facilities for daily life and radiation protection are sufficient for people who made decisions to return their homes. And people who returned their homes should acknowledge their individual dose and keep good health conditions while reducing their individual dose in a proactive way. It is necessary for the authorities to support people who returned their homes for

life-planning and radiation protection in cooperation with the relevant local governments and experts.

The authorities should establish a feedback system to improve implementation methods of the measures and to introduce measures extending across each relevant municipality.

The following measures are conducted by Japanese Government taking into account the above description;

(A) Developing milestones that help the evacuees decide whether or not to return homes

Japanese Government should develop milestones to take measures for people who will return their homes. The measures should depend on the needs of people in terms of time and place, and be conducted in a flexible way. The milestones could help people decide whether they return their homes or not. Infrastructure re-development, creation of local jobs and restoration of daily life-related systems, that would help people decide whether or not to return their homes, are expected to be included in the milestone.

The milestones consist of the following four measures (See the **ATTACHMENT** for more details):

(i) Measurement of individual doses

In order to figure out the level and status of individual exposure dose of people who returned/will return their homes, the dose is meticulously measured using a personal dosimeter depending on individual living condition. And a system is set up by Japanese Government to explain the measured individual dose in an easy-to-understand manner, and help people understand/consult about radiation exposure.

(ii) Protective measures to reduce radiation exposure

Various measures to reduce individual exposure dose include the following points:

- To develop precise radiation maps;
- To implement decontamination activities in linkage with re-construction activities in each municipality;
- To find contamination sources based on individual dose data, and remove the contamination sources; and
- To shield the contamination sources in case of the difficulty of removing the sources.

(iii) Health care and consultations

A system is set up by Japanese Government to facilitate thorough health care and consultations for people who returned their homes.

(iv) Risk communication

Precise information is collected and sorted out based on a wide range of knowledge including radiation-related knowledge, and it is disseminated in an easy-to-understand manner. Japanese Government provides support for experts' activities to address people's anxieties on radiation exposure and health, and build people's trust to them.

With respect to the above-described paragraph (i), it is important to estimate levels of individual doses after returning homes in order to help the evacuees decide whether or not to return their homes.

In this regard, Japanese Government should implement the following measures before the evacuees return their homes:

- To collect individual dose data, daily life conditions and occupations of people who routinely enter the areas to which the evacuation directive is ready to be lifted (e.g., Central and local governmental officers, people who are staying and working on a preparation for the evacuees' returning their homes); and
- To provide information to the evacuees in an easy-to-understand manner, for instance, by developing radiation maps based on individual dose data.

(B) Establishing systems to provide comprehensive supports to the evacuees who made decisions to return their homes

(i) Deployment of COUNSELORS who provide daily supports to people who returned their homes

In order for the evacuees, who will return their homes, to acknowledge their individual dose after returning their homes, and take measures to reduce their exposure dose based on individual dose data, it is essential that COUNSELORS are deployed in each area.

COUNSELORS, who are selected by municipalities depending on the situations of municipalities, form teams which provide daily supports to people who returned their homes. The teams may vary depending on the situations of municipalities. For instance, a team of COUNSELORS may consist of a representative of community association, a local governmental officer, medical doctor, a public health nurse, a nurse and a nursing care worker (hereinafter referred to as "health/ medical/ welfare staff").

The activities by COUNSELORS are essential to effectively implementing measures in a collaborative way to reduce individual exposure dose and address health issues related to radiation exposure. Specifically in order to support people to acknowledge their individual exposure dose, reduce the dose and ensure their health, it is important that

COUNSELORS have the sufficient competence to comprehensively meet people's needs, including health consultations and advices on exposure dose reduction.

In addition, COUNSELORS are expected to play a wide-ranging role, including supporting people's daily life and life-planning, addressing anxieties due to a long-term evacuation, and contributing to improvement of the living conditions (e.g., Recovery and re-vitalization of home towns/ communities).

With respect to the evacuees who made decisions not to return homes, the deployment of COUNSELORS is also helpful for them to address anxieties related to radiation exposure and re-building their living conditions through consultations with the COUNSELORS.

In these regards, Japanese Government should continue to support the activities of COUNSELORS.

(ii) Establishment of facilities to facilitate the COUNSELORS' activities

To facilitate the COUNSELORS' activities described in the above paragraph (B) (i), it is essentially important for Japanese Government to provide systematic and continuous supports from scientific and technological points of view. And it is necessary to establish a system to support COUNSELORS in order to address people's broad and various needs that would be difficult merely for the COUNSELORS to do, and support municipalities to deal with challenges that require inter-municipal cooperation. In these regards, relevant governmental organizations should cooperate with each other to establish facilities of supports for COUNSELORS' activities and municipalities' initiatives. The supportive facilities have the following functions:

- To develop networks consisting of experts of radiation protection, environmental monitoring, health/ medical/ welfare staff, and others; and to support COUNSELORS' activities from scientific and technological points of view;
- To implement trainings for COUNSELORS to increase their knowledge about radiation;
- To continuously figure out individual exposure doses that will be useful to people's health care and consultations; and
- To establish systems to provide advices that meet the broad and various needs of people who returned/will return their homes, and to support activities by municipalities based on people's needs.

The functions of supportive facilities should be expanded or changed flexibly depending on the situations of COUNSELORS' activities and the progress of local re-construction activities.

4. Remarks

It is needless to say that the practical measures could not be developed by the NRA without the cooperation of the members of study team set by the NRA, which had deliberated a proposal on practical measures from scientific and technical points of view, and other governmental organizations. It is expected that the practical measures will be helpful for the evacuees to make decisions whether they return their homes or not.

The NRA is going to watch closely a progress of implementing the practical measures.

(i) Measurement of individual doses

(a) Measures to be implemented by relevant governmental organizations

- To distribute personal dosimeters to measure individual dose, and to explain the residents about the meanings of dose results that they measured.
- To create a database consisting of personal doses and health conditions in the framework of Fukushima Health Management Survey.

(b) Issues to be considered at the time of implementation

- To establish systems to explain the purpose of collecting individual doses, how to use a personal dosimeter and the results of exposure dose.
- To figure out the relationship among the data of measured individual doses, environmental monitoring results, and various protective measures to reduce radiation exposure.
- To make a comparison between the data of measured individual doses and the data of health conditions, taking into consideration the management of personal information.
- To have appropriate communications about radiation effects on health based on individual dose data.
- To create the common ways of dose measurement and evaluation, taking into account that the central and local governments evaluate additional exposure doses based on individual dose data.
- To consider the way to indicate estimated individual exposure doses to people who refuse having personal dosimeters with them.

(ii) Protective measures to reduce radiation exposure

(a) Measures to be implemented by relevant governmental organizations

- To implement decontamination activities depending on the progress of re-construction in each municipality.
- To implement appropriate decontamination activities depending on personal dose results and daily life.
- Based on Comprehensive Monitoring Plan, to develop precise radiation maps upon the residents' request.

(b) Issues to be considered at the time of implementation

- To conduct environmental monitoring depending on the residents' daily life (Special attention should be paid to monitoring in school-commuting zones and near children-related facilities).
- To indicate the locations of contamination sources based on integrated data of various monitoring results that have been measured by various organizations at the time when the results of environmental monitoring are provided to the residents (e.g., To indicate locations where high radiation doses on maps and in the fields).
- To implement decontamination activities in a rational way.

- To figure out the contamination status in residential areas based on the data of individual doses and the residents' daily life, and to implement decontamination activities in an effective way taking into consideration the contamination status. In case of the difficulty of decontamination, measures including shielding should be implemented. Decontamination activities should be implemented in line with the residents' points of view.
- For the purpose of reducing individual internal exposure, it is necessary to establish systems to measure the radioactivity of foodstuff and crops.

(iii) Health care and consultations

(a) Measures to be implemented by relevant governmental organizations

- To implement health care and consultations in the framework of Fukushima Health Management Survey (e.g., Estimation of external radiation dose, ultrasound thyroid examination).
- To support health, medical and welfare experts including public health nurses for their consultations.

(b) Issues to be considered at the time of implementation

- To facilitate the activities of health/ medical/ welfare staff based on the needs of municipalities and communities.
- To implement consultations for people who have been suffered from stress caused by leaving homes for a long time.
- To support the development of systems and facilities which help the residents receive health care and consultations in an easy manner.
- For the purpose of addressing health issues related to radiation exposure, it is necessary not only to check the results of health care but also to accumulate scientific knowledge through promoting investigation and research on the effects of low-level exposure dose on health.

(iv) Risk communication

(a) Measures to be implemented by relevant governmental organizations

- To enlighten people to understand well radiation effect on health, particularly low-level radiation exposures.
- To develop human resources who can disseminate the information on radiation effect on health.
- To organize dialogues and lectures for the residents.

(b) Issues to be considered at the time of implementation

- To enhance and support community-oriented activities by health/ medical/ welfare staff, and to implement trainings of risk communications for them.
- To provide explanations depending on the anxieties of individual resident regarding radiation effects on health based on state-of-the-art knowledge relating to radiation, not merely conveying scientific facts to them.

APPENDIX

The residents who have been living in the areas close to the evacuation areas and people who evacuated voluntarily nothing to do with the evacuation directive have had anxieties about radiation exposure and/or re-building their lives. It is significant for the Japanese Government to take other measures to address these anxieties.

As a member of Nuclear Emergency Response Headquarters, Nuclear Regulation Authority (NRA) of Japan provided Nuclear Emergency Response Headquarters with a proposal on the following six measures that focus on addressing the various anxieties of the above-described residents and people about radiation exposure and/or re-building their lives:

- (a) Measures to support re-construction based on the needs of the municipalities that locate in the evacuation areas and in the areas close to the evacuation areas, and the needs of the evacuees from these areas;
- (b) Measures to promote inter-municipal cooperation to facilitate implementation of measures extending across each related municipality;
- (c) Measures to contribute to life-planning for the evacuees after returning their homes (i.e., education and nurturing systems and/or facilities for children, medical and care systems and/or facilities, and social systems to earn living);
- (d) Measures to reduce anxieties about radiation exposure among the evacuees, the residents who are living in the areas close to the evacuation areas, and people who evacuated voluntarily, as well as to contribute to re-building their lives;
- (e) Measures to avoid frictions between the evacuees with different thoughts about returning homes (e.g., frictions between some evacuees who made decisions to return homes and other evacuees who did not to return homes); and
- (f) Measures to ensure the safety for workers at Fukushima Daiichi Nuclear Power Station, their exposure doses management and their health care system, as well as disseminate the related information.

-END-