Japanese Government Challenges for Returning Home

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January 8th, 2015
1. March, 2011: The accident occurred. Released the Evacuation and in-house Evacuation orders

2. April, 2011: Set three kinds of evacuation areas:
   - **Restricted Areas (<20 km from NPS)**
     - generally forbidden to enter and stay overnight
   - **Deliberate Evacuation Areas (>20mSv/year)**
     - permitted to enter but generally forbidden to stay overnight
   - **Emergency Evacuation-Prepared Areas (<30km from NPS)**
     - permitted to enter and stay overnight

3. December, 2011: Cold shutdown (CSD) → Ready to start the rearrangement of evacuation areas

4. August 2013: Completed the rearrangement after about two hundred meetings with local residents:
   - **Area 1: Returning Difficult Areas (>50mSv/year)**
     - generally forbidden to enter and stay overnight
   - **Area 2: Restricted Habitation Areas (20-50mSv/year)**
     - permitted to enter, partially permitted to do business, but generally forbidden to stay overnight
   - **Area 3: Evacuation Directive Lift Prepared Areas (<20mSv/yr)**
     - permitted to enter and do business but generally forbidden to stay overnight

Completed the setting of the areas (April 22, 2011)

Completed the rearrangement (August 7, 2013)
2. Basic Characteristics of each Evacuation Areas

Returning Difficult Areas [Area 1]

- **Annual cumulative:** > 50mSv/y (as of March 31, 2012)
  (where the annual cumulative dose is expected to be > 20 mSv/y within 5 years)
- **Rules:**
  1. entry into the area is prohibited in principle
  2. staying in this area is also prohibited
- **Compensation:**
  - real estate: whole (6/6) value before the accident
  - damages for emotional distress: ¥ 6.0 million /person

Restricted Habitation Areas [Area 2]

- **Annual cumulative:** 20mSv/y – 50mSv/y (as of March 31, 2012)
- **Rules:**
  1. entry into the area is available
  2. staying overnight in this area is prohibited in principle
  3. business activities are permitted (limited in some cases)
- **Compensation:**
  - real estate: 3/6 value before the accident
  - damages for emotional distress: ¥ 3.6 million /person

Evacuation Directive Lift Prepared Areas [Area 3]

- **Annual cumulative dose:** < 20mSv/y (as of March 31, 2012)
- **Rules:**
  1. entry into the area is available
  2. staying overnight in this area is generally prohibited
  3. business activities are permitted (exclude only those for residents living inside)
- **Compensation:**
  - real estate: 2/6 value before the accident
  - damages for emotional distress: ¥ 2.4 million /person

Forecast of the annual cumulative dose

- **Area 1:**
  - Annual cumulative: > 50mSv/y (as of March 31, 2012)
  - Decrease to 20mSv/y

- **Area 2:**
  - Annual cumulative: 20mSv/y – 50mSv/y (as of March 31, 2012)

- **Area 3:**
  - Annual cumulative dose: < 20mSv/y (as of March 31, 2012)

※the exposure dose estimated from the air dose rate

- an assumption in this model:
  stay 8 hours at outside and 16 hours at a house (a wooden house) in a day.
- *(a) half period half-life and (b) effect of weather are under consideration. The results of the decontamination are not considered.*
Comparing two results of the aircraft monitoring shown below, we know the average air dose level decreased by almost 50% within 2 years although the estimated decrease in air dose level based on half-life period is -34%.

Estimated annual cumulative dose (as of Nov. 5, 2011) Estimated annual cumulative dose (as of Nov. 19, 2013) based on the 4th Aircraft Monitoring based on the 8th Aircraft Monitoring

3. Transitional Change of Annual Cumulative Dose
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.

- 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.

(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.

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.
(reference 2) Dose scale

Artificial Radiation

- **Cancer radiotherapy** (Dose only at the treated region)
- **Cardiac catheter** (Skin dose)
- **Dose limit for nuclear and radiation workers**
  - 100 mSv / 5 years
  - 50 mSv / year
- **CT** (Dose per examination)
- **Stomach X ray with Barium** (Dose per examination)
- **PET** (Dose per examination)

Natural Background Radiation

- **Natural background radiation** (Annual dose)
  - Ramsar / Iran
  - Kerala, Chennai / India
- **Natural background radiation per person**
  - Approx 2.1 mSv (Average annual dose in Japan)
- **Tokyo-NY (Round trip)**
  - (Increase in cosmic radiation due to high altitude)

Illustrated by NIRS (April 2013)
Reference:
- UNSCEAR 2008.
- ICRP 2007 Recommendations.
- The Guidelines for Medical Exposure by Japan Association of Radiological Technologists.
- Radiation in the living environment, new version.
  (Radiation Safety Research Association, 2011) etc.

**Units of dose**

**Absorbed dose to each organ or tissue: Gy**

The unit to show energy received per unit weight (J/kg) at each organ or tissue exposed to radiation.

**Effective dose: mSv**

The dose of radiation to the entire human body considering sensitivity of each organ or tissue to cancer and hereditary effects. This unit of dose is used for radiation protection.

When the entire human body is evenly exposed to gamma rays at an absorbed dose of 1 Gy, the dose is equivalent to 1000 mSv as effective dose.
### 4. The Schedule of decontamination

#### March. 2014 (3 years after the accident)
- **Pre-homestay**: Aug.2013~3/31/2014

#### March. 2015 (4 years after the accident)
- **Decontamination (residential area)**: Sept.2012~Mar.2013
- **Decontamination (the rest of the evacuation area)**: Apr.2013~Aug.2014
- **Pre-homestay (Area 3)**: 4/26/2014 ~ 9/30/2014
- **The evacuation order on Area 3 was lifted**: 10/1/2014

#### March. 2016 (5 years after the accident)
- **Decontamination (the rest of the evacuation area)**: Aug.2013~Mar.2016
- **Decontamination (the rest of the evacuation area)**: H26.1~H28.3

#### March. 2017 (6 years after the accident)
- **Decontamination (residential area)**: H25.11~H28.3
- **Decontamination (the rest of the evacuation area)**: H26.11~H28.3
- **Decontamination (Area 3)**: ~H28.3
- **Decontamination (Area 3)**: ~H28.3
5. Basic policy for the Reconstruction of Fukushima

"For Accelerating the Reconstruction of Fukushima from the Nuclear Disaster"
(Cabinet Decision on December, 2013)

Basic Principle for the Reconstruction of Fukushima

The top priority is to achieve the reconstruction and revitalization after the Great East Japan Earthquake as soon as possible.
In particular, the utmost efforts should be made for the reconstruction and revitalization of Fukushima after the nuclear disaster.

Government Initiatives to Achieve the Reconstruction of Fukushima

1. Enhance initiatives for lifting of evacuation orders and evacuees’ returning home

2. Enhance initiatives for support of evacuees’ starting new lives

3. Strengthen efforts for settling the accident at the Fukushima Daiichi Nuclear Power Station (especially handling decommissioning and radiation-tainted water)

4. Accelerate the reconstruction of Fukushima after the nuclear disaster under the initiative of the national government (role sharing between the government and TEPCO)

The limit of the loans to NDF (Nuclear Damage Compensation and Decommissioning Facilitation Corporation) was increased from ¥ 5 trillion to ¥ 9 trillion (The government budget, 2014)

Compensation: approximately ¥ 5 trillion
Decontamination including dealing with polluted rubbishes: approximately ¥ 2.5 trillion
Interim storage facility (building, managing and so on): approximately ¥ 1.1 trillion
6. Initiatives for lifting of evacuation orders and returning home

1. Tamura City
- The evacuation order was lifted in April 1, 2014.
- Reconstruction work gains momentum by utilizing government grants.
- Elementary and junior high schools were resumed.
- Residents started to return home.

2. Kawauchi Village
- The Government and the Village prepared an environment cooperatively to facilitate lifting of evacuation orders.
  - Ensuring safety and security
    - Individual dose measurement, health consultation, etc.
  - Additional compensation
    - Additional compensation for quick return, compensation for housing rehabilitation, etc.
  - Improving living environment
    - Restoration and improvement of roads, resume of medical facilities, building a shopping center, attraction of enterprises, etc.
  - Decontamination
    - Decontamination operation by the government, follow-up radiation monitoring, providing consultation desk, etc.
- The evacuation order for Green Area was lifted and on October 1, 2014. (Yellow Area was rearranged into Green Area.)

3. Other municipalities: Naraha town, Katsurao village, and Kawamata Town
- Naraha Town: Decontamination by the government was completed in March 2014
- Katsurao Village and Kawamata Town: Decontamination in residential areas was completed in summer 2014.
  ⇒ Efforts for lifting the evacuation orders and the residents’ returning are fully in progress.
The number of returnees in Kawauchi Village has been also increasing.

According to the survey on returnees conducted by Tamura City in November 2014, the number has been increasing both within a radius of 20km of Fukushima Daiichi NPS and that of 30km.

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<tbody>
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<td>117</td>
<td>133</td>
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<tr>
<td>Households</td>
<td>34</td>
<td>47</td>
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<tr>
<td>Population</td>
<td>1,332</td>
<td>1,403</td>
<td>1,565</td>
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<tr>
<td>Households</td>
<td>566</td>
<td>595</td>
<td>656</td>
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(Based on the survey on the figure of returnees conducted by Tamura City)

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<tr>
<td>Population</td>
<td>1,278 (46%)</td>
<td>1,466 (53%)</td>
<td>1,543 (56%)</td>
<td>1,573 (57%)</td>
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<tr>
<td>Households</td>
<td>526 (45%)</td>
<td>586 (51%)</td>
<td>603 (52%)</td>
<td>609 (53%)</td>
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(Based on the survey on the figure of returnees conducted by Kawauchi Village)
(reference 4) Approaches to improve the living environment and circumstances in Kawauchi Village

**Alleviation of fears on returning**
- Distribution of personal dosimeter
- Counseling by experts like health nurse

**Invitation of corporations**
“Codomo Energy”, whose product “Lunar Wear” (a kind of luminous material) got the first prize in the Monodzukuri (manufacturing) Nippon Grand Awards, advanced in the village.

**Support to restart agriculture**
After completing decontamination in farm areas, sampling soils started 6/26/2014 within a radius of 20km of Fukushima Daiichi NPS. Additionally, experimental cultivation has already started since 2013.

**Restoration of infrastructure**
A public road whose paving was completed in Aug 2014

**Extension of medical and facilities and welfare services**
Not only a hospital or a nursing home but also a kind of hot spring was reopened.

**Extension of educational facilities**
The elementary school and the junior-high school in the village restarted in Apr 2012. The sports festival was held by the elementary school and the preschool in May 2014.
7. Evacuees of Fukushima residents (As of October 1, 2014)

- Evacuees of Fukushima residents: 127,000
  - Evacuees from the Evacuation Areas: 79,000
    - Returning Difficult Area: 24,000 (31%)
    - Restricted Habitation Area: 23,000 (29%)
    - Evacuation Directive Lift Prepared Area: 32,000 (40%)
  - Evacuees from the Emergency Evacuation-Prepared Areas: 20,000
  - Other evacuees of Fukushima residents (a.k.a. “voluntary evacuees”): 28,000
(reference 5) Three conditions for the lifting of the evacuation orders

① Annual cumulative dose: 20 mSv/y or less

② Sufficient advancement of
   - the general restoration of essential infrastructure
     (electricity, gas, tap and sewerage water systems, main roads, telecommunications, etc.)
   - the general restoration of public services for daily life
     (medical and nursing care, postal services, etc.)
   - Decontamination of the areas (mainly in children’s living environments)

③ Extensive talks with prefectural and municipal governments and residents

(reference 6) Individual dose measurement and health consultation

For inhabitants who return,

① lend personal dosimeter

② hold health consultation by a doctor, etc

Examples of the analysis results by personal dosimeter
8. “COUNSELORS” for Fukushima evacuees to return home

(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.

"Practical Measures for Evacuees to Return Their Homes" (NRA, 20 Nov., 2013)

Roles of COUNSELORS (Examples):
• Help people to measure radiation dose (especially, individual dose rate)
• Explain the meaning of measured result
• Listen to people’s concerns and needs about radiation, rebuilding their lives and so on.
• Consider projects which cover people’s concerns and needs to enhance “Self-help” activities.

Expected human resources to be COUNSELORS:
• COUNSELORS are expected to build relationships of trust with local people and connect their concerns and needs to experts or local administrative officers.
• Examples of COUNSELORS: medical doctors, public health nurses, nurses, retired administrative officers, retired teachers, radiation experts/workers, and so on

Support of national government
• Japanese government prepares budget for municipalities to deploy COUNSELORS.
• “Support Center for COUNSELORS” was established in Iwaki City this May.
9-1. Examples of COUNSELORS’ activities #1

1. Date City (The activities of Genki-Up Fukkoutai)

   - Date City hosts residents meetings and opens a counseling counter. It also organized an expert team composed of clinical psychologists, occupational therapists, public health nurses and nursery school teachers. This expert team “Genki-Up Fukkoutai” makes the following efforts for those who worry about radiation and health issues in daily lives:
     1. Organizing small tea parties in local community centers, where giving lectures about how to reduce stress and conducting exercises and games
     2. Health counseling and introduction of how to play with kids for mothers during regular health checkups of babies and infants
     3. Providing information and mental supports for parents and children who returned, etc.

2. Hirono Town

   - The office has three counselors: the head of the office (a chief of Hirono Town Council of Social Welfare), a former nurse who has children and an retired expert of radiation (part-time).
   - The counselors are learning necessary knowledge including health effects of radiation exposure during last year and are going to start counseling work practically in 2015.
9-2. Examples of COUNSELORS’ activities #2

3. Kawauchi Village

- Kawauchi Village is conducting door-to-door health counseling by health nurses with support of Nagasaki University and other health counseling on opportunities such as general checkups and notifications of measured results.
- Kawauchi Village is also lending the villagers individual dose meters, and conducting explanation sessions of measured result and individual counseling on health effects of radiation exposure by Nagasaki University.
- Nagasaki University established an office in Kawauchi Village and deployed a staff (health nurse) according to the corporation agreement with the village.
- In order to listen villagers’ concerns about radiation protection, life-style related diseases, stresses and mental illnesses more carefully, Kawauchi Village will employ another two counselors who support existing health nurses. They will start counseling works after learning necessary knowledge such as health effects of radiation exposure.

4. Tamura City

- Tamura City is lending residents living in the evacuation ordered area individual dosimeters, and conducting explanation sessions of measured result and individual counseling on health effects of radiation exposure.
- Tamura City is also lending students of nursery, elementary and middle school in Miyakoji area which reopened in April 2014, and conducting individual counseling for their parents.