

First returns and intentions to return of residents evacuated following the accident at the Fukushima Daiichi nuclear power plant

In the wake of the Fukushima Daiichi accident, the Japanese government promptly decided to take steps to decontaminate areas that had been contaminated by atmospheric releases in March 2011. This concerned both evacuated areas and contaminated areas that had not been evacuated.

In the evacuation zone, which includes all or part of 11 municipalities within the Fukushima Prefecture, decontamination operations on public and private buildings, infrastructure, farmland and roads had been completed in six municipalities (Tamura, Naraha, Kawauchi, Okuma, Katsuro, Kawamata) by the end of 2015. On completion of these and various other operations (restoring infrastructure and services, setting up structures allowing dialogue and information exchange), the authorities lifted the evacuation order in all or part of three municipalities (Tamura, Naraha, Kawauchi). The rate of return of the population to date is between 9% (Naraha now has a population of 700 compared with 7,474 before the accident) and 41% (Tamura, 146 inhabitants compared with 205 previously), representing a total of 900 returnees out of nearly 80,000 evacuees. Regularly organised surveys of evacuees showed that, as at the end of 2014, 22% were prepared to return home, 42% had already decided not to return, while 36% were still undecided.

1) "Fukushima reconstruction" policy

As of 8 August 2013, Japan has engaged in a process aimed at promoting the early return of evacuees under the best possible conditions. This "reconstruction and revitalisation" policy was formally set out in the Prime Minister's Cabinet Decision of 20 December 2013, entitled *For Accelerating the Reconstruction of Fukushima from the Nuclear Disaster*. It is built around four priorities:

- Enhancing initiatives for lifting evacuation orders and for returning evacuees to their homes;
- Enhancing initiatives to support evacuees starting new lives;
- Enhancing efforts aimed at controlling the decommissioning of the Fukushima Daiichi nuclear power plant and managing the contaminated water issue;
- Accelerating the reconstruction of the Fukushima Prefecture after the nuclear disaster (a joint effort by the Japanese government and TEPCO).

The conditions for lifting evacuation orders are set out in the basic principles laid down in the Cabinet Decision *Accelerating the Reconstruction of the Fukushima Prefecture from the Nuclear Disaster*, dated 20 December 2013. There are three conditions:

- A total annual dose below 20 mSv (dose rate less than 3.8 µSv/h);
- Sufficient progress in terms of:

- reconstruction of infrastructure and housing support services (electrical power, gas and drinking water supply, drainage and sewage treatment, main roads, telecommunications, medical and nursing services, post offices, transport, etc.);
- decontamination (especially areas where children are present);
- The creation of structures allowing dialogue between residents and local government (i.e. municipal councils and Fukushima Prefecture).

It must be stressed that the "derived reference value" calculated in terms of dose rate (3.8 µSv/h) measured one metre above the ground is already met in the green zones (except in a few "hot spots") before decontamination work has even begun. This value is calculated on the assumption that the additional exposure due to residual artificial radioactivity from the accident will not lead to an annual dose above 20 mSv, in addition to natural radioactivity (which is 40 nSv/h on average in Japan according to a highly conservative estimate)¹:

$$(3.8 \text{ measured dose rate} - 0.04 \text{ deducted background}) \mu\text{Sv/h} \times (8 \text{ h outdoors} + 16 \text{ h indoors} \times 0.4 \text{ protection factor of roof and walls}) \times 365 \text{ d}$$

$$= 20 \text{ mSv}$$

The "derived reference value" of 3.8 µSv/h must therefore be interpreted as "3.4 µSv/h above the reference background" and within a given agreed framework (considering the occupancy rate of buildings and the average protection factor afforded by their roofs and walls).

The condition relating to decontamination specifies that an effort will be made with particular regard to public places, especially those frequented by children (school playgrounds and sports and playing fields). Thus, a "derived reference value" of 0.23 µSv/h very soon emerged from the value of 1 mSv/year referred to by the government as a long-term goal.

$$(0.23 \text{ measured dose rate} - 0.04 \text{ deducted background}) \mu\text{Sv/h} \times (8 \text{ h outdoors} + 16 \text{ h indoors} \times 0.4 \text{ protection factor of roof and walls}) \times 365 \text{ d}$$

$$= 1 \text{ mSv}$$

The population very often sees this theoretical ambient dose rate of 0.23 µSv/h as a goal to be reached before decontamination can be considered complete and the areas reopened, when in fact the effective reference value is 3.8 µSv/h. This means that lifting an evacuation order in a "green zone" only guarantees in theory that the potential received dose will be below 20 mSv/year (i.e. that the dose rate will be below 3.8 µSv/h).

Given this situation, the other measures implemented to allow evacuees to return home under acceptable conditions (setting up evacuee consultation services, repairing and reopening administrative and economic facilities, providing tax incentives for evacuees who choose to return home, etc.) are often viewed with suspicion by the population, and efforts at rehabilitation (particularly regarding decontamination) are considered inadequate. This reflects the fact that many evacuees consider that acceptable conditions for return have not been met.

¹ Note that the ambient dose rate in France varies from 45 to 210 nSv/h according to the region (influence of terrestrial radiation) or weather conditions (influence of radon). Cosmic radiation alone is estimated at 30-40 nSv/h at sea level, and twice this value at 2,000 m above sea level.

2) From completion of decontamination to lifting of evacuation orders

Decontamination is the top priority among the post-accident countermeasures implemented by and under the responsibility of the Japanese government, laid down in the [Act of 11 November 2011](#) on "Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the NPS Accident Associated with the Tohoku District - Off the Pacific Ocean Earthquake that Occurred on March 11, 2011".

As mentioned earlier, one of the conditions to be met before evacuation orders can be lifted is that "sufficient progress" must have been made in decontamination. Progress in decontamination work is gauged against compliance with the technical criteria set out in a special decontamination guide prepared by the Japanese Ministry of the Environment and published in December 2011 (*Decontamination Guidelines*, 2nd Edition. Tentative Translation, 2013.) This highly illustrated technical guide describes all the decontamination methods, practices and tools available that do not involve the use of chemical processes (high-pressure water cleaning or shot blasting, scrubbing, scraping, ploughing, soil excavation, removing and covering top soil, cutting and pruning vegetation, etc.), according to the contaminated area (soil, walls, roofs, roads, drains, gardens, fields, forests, vegetation, street furniture, sports fields, school playgrounds and parks, etc.), the type of surface and the kind of soil, and the radioactive level prior to decontamination. It also specifies procedures for packing and storing waste generated by decontamination operations, together with the metrological methods and techniques to be used (before, during and after decontamination work).

"Large-scale" decontamination began in November 2012, although many local initiatives had already been undertaken before that date by residents themselves outside evacuated areas. The national government is the project owner for decontamination in the various parts of the Special Decontamination Area (SDA), while this role is assumed by the municipal authorities in the Intensive Contamination Survey Areas (ICSAs).

Decontamination operations have generally fallen behind schedule. The authorities claim this is because "the number of houses and public places to be decontaminated was underestimated". According to the original roadmap prepared in 2012, decontamination was scheduled for completion in spring 2014 (green and orange zones). However, in February 2014, the deadline was put back by a year for Katsurao and Iitate, then postponed by another year in March 2015.

Decontamination was completed in a number of municipalities in the SDA between 2013-2015: Tamura in June 2013, Naraha, Kawauchi and Okuma in March 2014, Katsurao and Kawamata in December 2015 (see Figure 3). The Joban Expressway, which crosses the evacuation zone along a north-south axis, was completely reopened to traffic in March 2015, following the completion of decontamination work in June 2013.

The delays in decontamination work have elicited two attitudes among the population. They often cause anger among evacuees wishing to return home. This generally concerns farmers who are attached to their land and anxious to put an end to the daily to-ing and fro-ing between their farms and their temporary homes, a situation they have had to endure for more than four years (particularly in Iitate). Conversely, those opposing a return home have grouped together to press the government to stop spending (or in their opinion wasting) large sums of money on decontamination operations that they consider unnecessary, and instead to finance the settlement of evacuees outside the evacuation zone which they believe will remain uninhabitable for years to come. This attitude is not only explained by radiological concerns, but also by the lack of jobs and services, and the enforced separation from children, grand-children and loved ones.

On completion of decontamination work, three municipalities - or areas within them - met the conditions for return defined by the Japanese government, leading to the evacuation order being lifted. This concerned the municipalities of Tamura (the village of Miyakoji) on 1 April 2014, Kawauchi on 1 October 2014 and Naraha in September 2015. Before the evacuation order is lifted, residents are prepared for their return home during a period referred to as the "pre-homestay stage". For about six months, they are invited to prepare their homes and future living areas (renovating their home, gardening, etc.), and receive material and financial aid for this purpose. If requested, one member of each household is authorised to remain on the site at night.

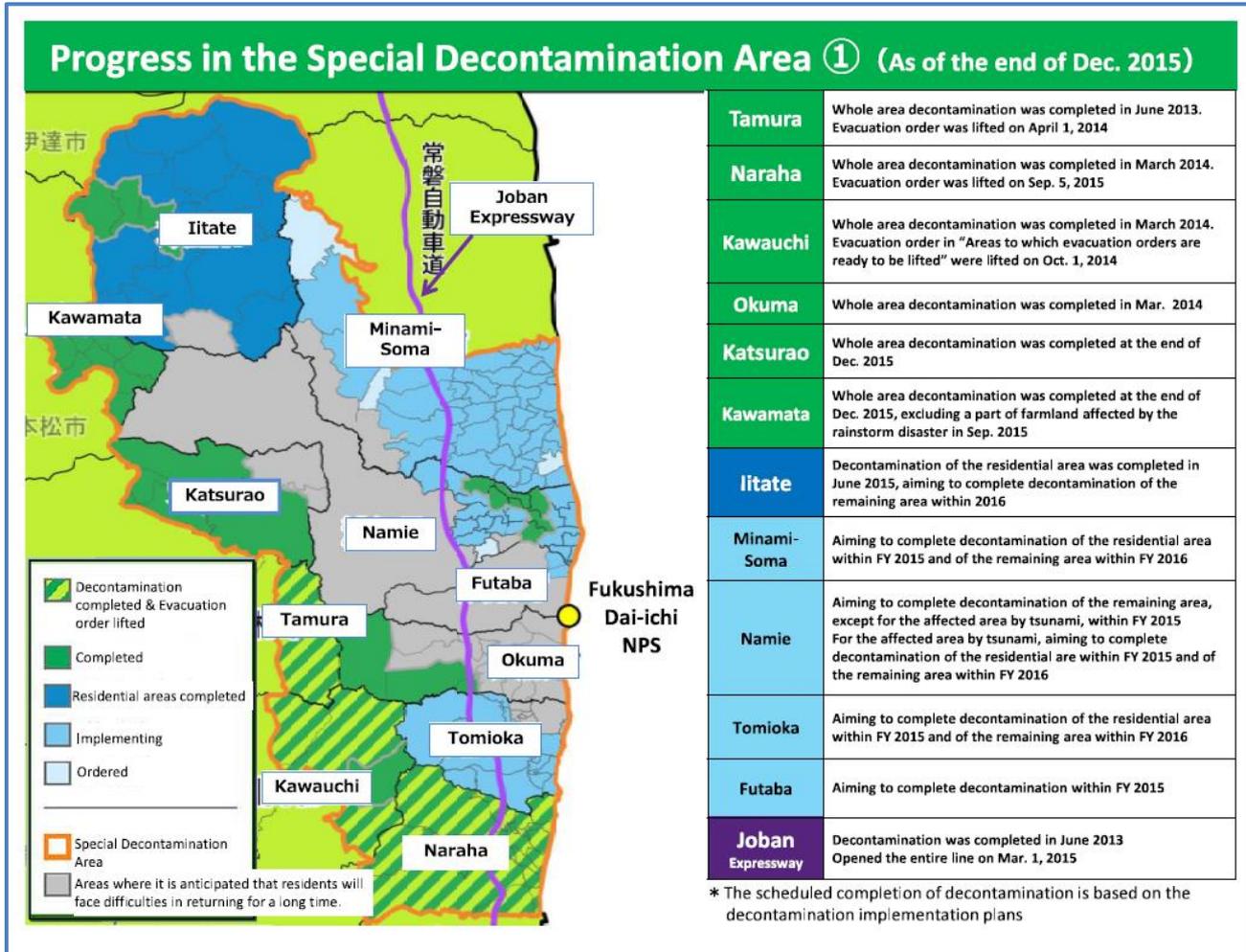


Figure 3: Progress in decontamination work as on 31 December 2015 for the 11 municipalities or areas within them belonging to the Special Decontamination Area (SDA). The SDA includes all the municipalities or areas within them that were evacuated following the accident at the Fukushima Daiichi nuclear power plant. (Source: Japanese Ministry of the Environment).

3) Return of evacuees and intentions to return

3.1) Current situation concerning the return of evacuees

Table 1 shows the estimated number of evacuees by municipality and by zone as of May 2015, and the number of returnees in the three municipalities where evacuation orders have been lifted. The rate of return is respectively 9%, 20% and 41% in Naraha, Kawauchi and Tamura. In all, 900 people have returned to the home they occupied before spring 2011.

Municipality	Green zone	Orange zone	Red zone	Number of evacuees	Number of returnees
Iitate	784	5,266	271	6,321	0
Kawamata	1,054	126	-	1,180	0
Minamisoma	11,774	495	2	12,271	0
Namie	7,713	8,097	3,279	19,089	0
Katsurao	1,321	62	116	1,499	0
Futaba	245	-	6,113	6,358	0
Okuma	23	370	10,485	10,878	0
Tamura	351	-	-	205	146 (1)
Tomioka	1,365	8,630	4,141	14,136	0
Kawauchi	328	-	-	274	54 (1)
Naraha	7,474	-	-	7,474	About 700 (2)
TOTAL	32,432	23,046	24,407	79,685	About 900

Table 1: Number of evacuees and returnees after evacuation orders were lifted since 1 April 2014. (1) Estimated in February 2015. (2) Estimated mid-September 2015.

In June 2012, some 112,000 people had left their homes, either because they lived within a radius of about 30 km around the power plant (86,000 of these people were considered as "forced evacuees"), or because they preferred to leave their homes for fear of being evacuated shortly afterwards (26,000 people considered as "voluntary evacuees" living in the former evacuation preparation zone of 2011), or because they simply preferred to leave given the situation (48,000 other residents in the Prefecture had also left their homes and had not returned in 2012). In all, 160,000 residents of Fukushima Prefecture left their homes as a result of the nuclear accident.

In October 2014, the authorities estimated that some 80,000 evacuees would be able to return home once evacuation orders were lifted. This figure breaks down into slightly more than 32,000 people in the green zone, slightly more than 23,000 in the orange zone, and slightly more than 24,000 in the red zone, where the prospects of return are farther off in the future (Table 1). To this figure must be added another 20,000 residents who had left the former "emergency evacuation preparation" zones, but who did not return after 30 September 2011. This group particularly concerns the municipalities of Kawauchi, Hirono, Tamura and, more especially, Minamisoma, a locality affected by the earthquake and tsunami² as well as the nuclear disaster. Of the total number of residents above, 25% currently reside outside Fukushima Prefecture and 75% have been rehoused there. Some have moved, having bought a house elsewhere, others live with their families or friends or in temporary housing arranged in "villages" scattered in and outside Fukushima Prefecture. Depending on the original municipality of residence, this distribution is highly uneven. For example, 40% of Futaba residents were rehoused outside Fukushima Prefecture, whereas almost all Kawamata (97%) residents remained there (Figure 4). It can be seen that former residents of the municipalities worst hit by the nuclear disaster and tsunami (red zone and coastal towns) have more often been rehoused outside Fukushima Prefecture than people residing in other municipalities.

² The tsunami claimed the lives of 3,800 people in Minamisoma out of a total population of 72,000.

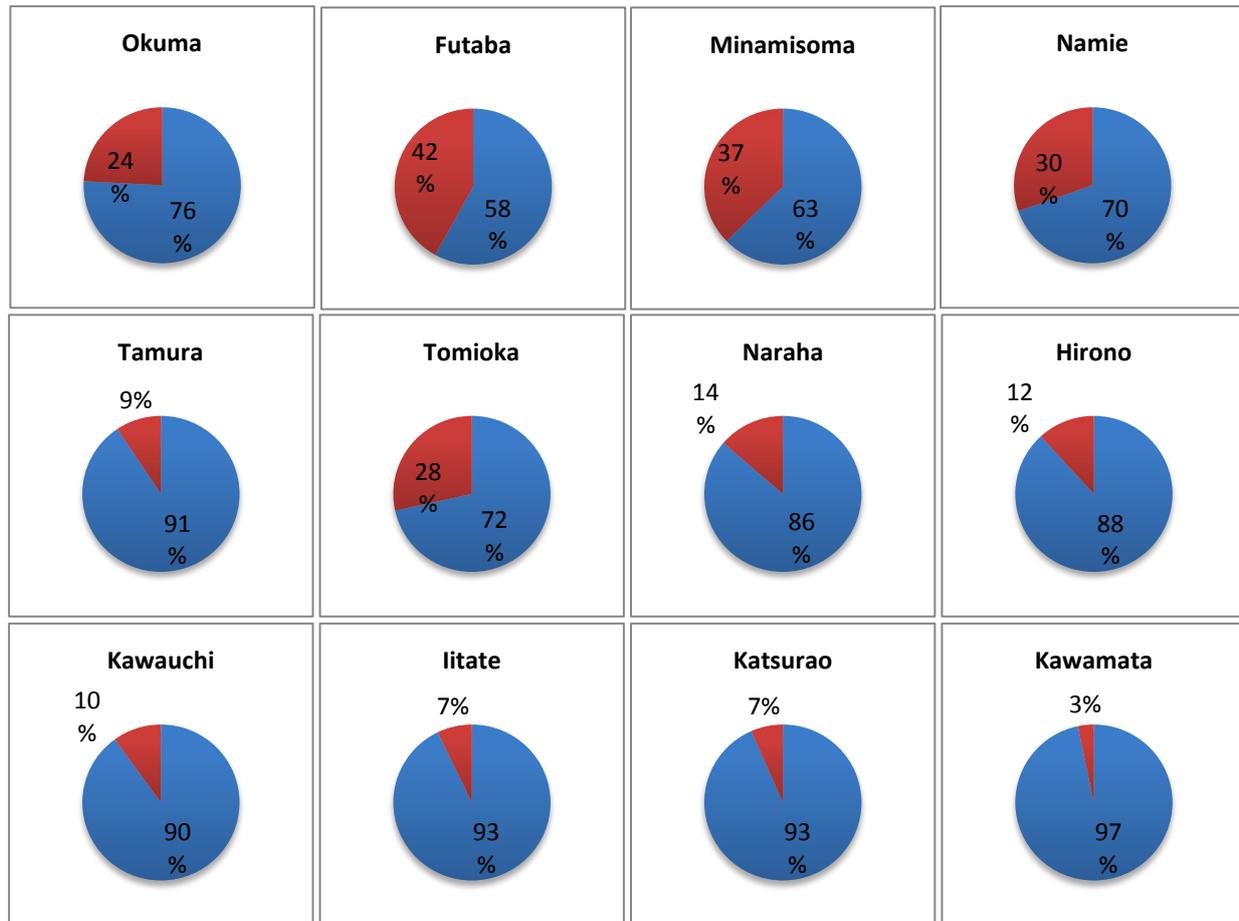


Figure 4. Current place of residence of evacuees - outside Fukushima Prefecture [red] or in Fukushima Prefecture [blue] according to original municipality of residence (data as at the end of 2014).

3.2) Survey of intentions to return

Since 2012, the Ministry of the Environment Reconstruction Agency has regularly published on the Internet (in Japanese) the results of a [survey](#) of evacuees to determine whether or not they intend to return to their homes once the evacuation order is lifted. Respondents are given four choices: 1- "I am going to return", 2- "I have not decided yet", 3- "I am unwilling to return", and 4- "No response". (Figure 5).

The results of this survey show that the number of intentions to return is the lowest in the worst hit municipalities, particularly in areas where return is deemed "difficult" even by the authorities (Futaba, Okuma, Namie, Tomioka): 12% to 17% in autumn 2014. Conversely, the number of intentions to return is the highest (more than 45%) in municipalities where measured levels of radioactivity are currently the lowest, where decontamination is complete and, in some cases, where the evacuation order has been lifted (Tamura, Kawauchi, Naraha and Kawamata). Katsurao, Iitate and Minamisoma have roughly the same responses (about 30% in favour of a return, the same number unwilling to return, and undecided respondents accounting for slightly less than 50% of the total). The number of undecided respondents ranges from 30 to 50% according to the municipality.

Overall analysis of these figures shows that of the 79,500 evacuees from the SDA, only 17,500 (~22%) were prepared to return to the areas they had left more than three and a half years ago, more than 33,000 (~42%) had already chosen not to return, and roughly 29,000 (~36%) were still undecided (see Figure 11). Most (more than 80%) of those who say they intend to return, however, add that their decision is dependent on the restoration of infrastructure in the social (local government and public services, schools, transport) and economic (shops, jobs) areas.

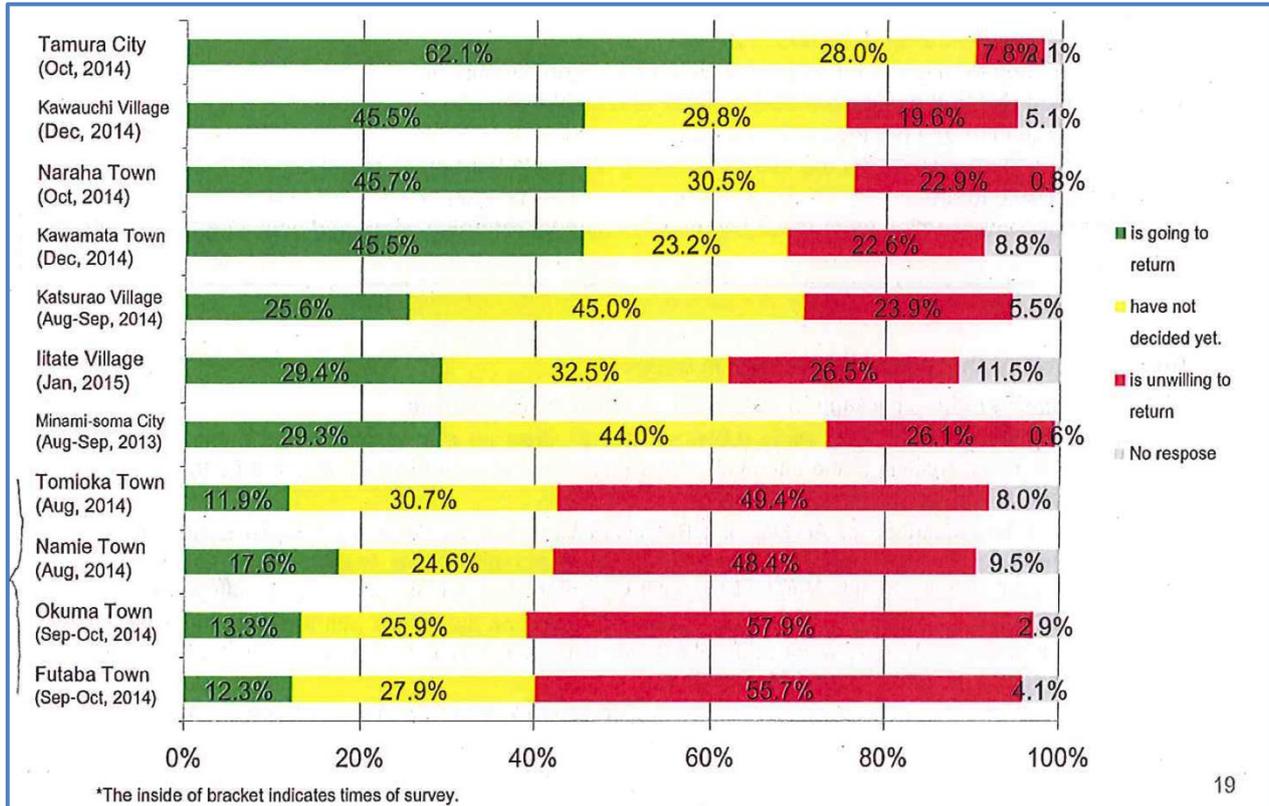


Figure 5. Results of the 2014 survey carried out by the Japanese Reconstruction Agency on whether or not evacuees intend to return home (source: Reconstruction Agency website).

3.3) The role of Counsellors for returnees or evacuees willing to return home

One of the conditions to be met before evacuation orders can be lifted is the requirement to set up permanent structures allowing dialogue between evacuees and residents and with the municipalities (and Prefecture).

The Japanese government has set up a department for supporting residents affected by the Fukushima accident. This department is called the "Support Team for Residents affected by Nuclear Incidents" and is part of the Nuclear Emergency Response Headquarters, Cabinet Office. In 2013, the government carried out several consultations of local experts and residents of a number of municipalities that had not been evacuated and in which radiation protection initiatives had been implemented based on dialogue among stakeholders (Date, Suetsugi in the town of Iwaki). The decision was made in November 2013 to create the function of Counsellor within the consultation team for residents who had decided to remain in or return to the affected areas.

A special budget³ was taken from the "Special Fund for Accelerating the Revitalisation of Fukushima" to deploy at least one and often several counsellors for municipalities in the Prefecture. A communication centre on the radiological risk was set up in Iwaki to provide training for counsellors and coordinate their activities. The chief task of counsellors is to put residents' new living conditions and individual received (measured) doses into perspective. Counsellors must help to improve residents' living conditions and well-being through dialogue and by setting up local projects in consultation with residents.

³ Following the decision by Japan's Nuclear Regulation Authority (NRA) on 20 November 2013 entitled "Practical Measures for Evacuees to Return to Their Homes" and the ministry decision of 20 December 2013 "For Accelerating the Reconstruction of Fukushima from the Nuclear Disaster".

Most counsellors are from civil society and include doctors, nurses, social workers, retired civil servants and former public sector employees, including teachers, or radiation protection experts. They must create a climate of trust in order to:

- help anyone wishing to do so to measure radioactivity (the emphasis being on individual external and internal doses),
- interpret and explain the results of these measurements,
- tune in to residents' needs, questions and concerns,
- propose suitable projects that would contribute to radiation protection and better living conditions for residents in the municipality in question.

The counsellors' job consists in enabling any residents who have chosen to remain in or return to an affected area to know their actual exposure levels according to their daily activities. This can be achieved by enhancing radiation protection culture in general and, more specifically, by teaching residents how to take individual dose measurements.

So far, counsellors have been deployed in municipalities that are located completely or partially outside the evacuation zone (Date, Suetsugi, Iwaki, Fukushima, Hirono, Kawamata, Minamisoma, Koriyama) but in which permanent residents live alongside evacuees in temporary housing. A local consultancy structure is planned wherever evacuation orders have been or will be lifted. This has already been the case in Kawauchi or Tamara since 2014, while in May 2015 an office was opened in Naraha, three months before the evacuation order was lifted. Counsellors also support evacuees who previously resided in the municipalities of Okuma, Futaba, Namie, or Tomioka, and who now occupy temporary housing in and outside Fukushima Prefecture.

4.4) Conclusion

Unlike the Soviet, then Ukrainian, authorities, which decided to declare a long-term exclusion zone over a radius of 30 km around the Chernobyl nuclear power plant after the explosion in reactor 4, the Japanese authorities promptly decided to reclaim contaminated areas through a programme combining massive decontamination operations and revitalisation operations in affected areas. Despite some delays, the decontamination program continues both in evacuated areas and in areas that were contaminated but not evacuated.

Regarding evacuated areas and the SDA, which groups together all or part of 11 municipalities in Fukushima Prefecture, decontamination work on public and private buildings, infrastructure, farmland and roads had been completed in six municipalities (Tamura, Naraha, Kawauchi, Okuma, Katsuro, Kawamata) by the end of 2015. On completion of these and various other operations (restoring infrastructure and services, setting up structures for dialogue and information exchange), the authorities lifted the evacuation order in all or part of three municipalities (Tamura, Naraha, Kawauchi). So far, out of a total population of 7,953, 900 people have returned to these three municipalities. Furthermore, surveys by the Japanese Reconstruction Agency show that more than 40% of evacuees from the entire SDA have already made the decision not to return home when evacuation orders are lifted.