

The Effects of the Nuclear Disaster at Fukushima Daiichi Nuclear Power Station on Local Governments

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All Japan Council of Local Governments with Nuclear Power Stations (The Council) consists of 30 municipalities in total. They are 24 municipalities that are either the site of a nuclear power station or the planned site for one and their 6 neighboring municipalities. They collaborate with each other to solve problems arising at the site of a nuclear power station. The nuclear emergency that occurred at the Fukushima Daiichi Nuclear Power Station caused damage to our member municipalities and led to an unprecedented and severe situation that included “administrative function transfer” and “large-area evacuation,” which went beyond the municipal areas that were not in the realm of our expectation. The Council established a working group to conduct a survey for the municipalities to verify this disaster and reflect the result on the nuclear energy administration, such as safety and disaster prevention measures. The obtained results were published as a report on March 2012. This paper will report on the outline of the survey and the direction for the engagement with the challenges that were revealed during the survey.

I. Introduction

The 2011 off the Pacific coast of Tohoku Earthquake and its accompanying tsunami caused a large-scale nuclear emergency with a radioactive material release at the Fukushima Daiichi Nuclear Station, which Japan has never experienced. The member municipalities affected by the disaster are still facing difficulties in the management of their administration due to the prolonged evacuation of their residents or the transfer of their administrative functions.

This disaster highlighted a vast number of problems such as the confusion in the initial response of the national government or the delay in the measures for recovery and reconstruction. It is necessary to conduct thorough research/examination of not only the cause of the accident but also the nuclear disaster prevention system including the initial response of the national government to conduct an urgent fundamental review of the crisis management framework and disaster prevention system.

As the municipalities where nuclear power stations are located, we believe that we should examine the measures to protect the safety and security of our residents, and therefore

decided to survey the disaster-stricken areas ourselves.

II. System and Items for the Survey

“The Nuclear Emergency Examination Working Group” comprising staff from 5 cities, 5 towns, and 3 villages among the member municipalities of the Council was established. They surveyed 6 member municipalities in Fukushima Prefecture that were affected by the disaster (Futaba, Okuma, Naraha, Tomioka, Minamisoma, and Namie) as well as the offices of the Nuclear Power stations that did not suffer nuclear emergency even though they were hit by the same earthquake and tsunami (Onagawa Nuclear Power Station and Tokai Daini Nuclear Power Station). Following are the subjects of the survey. Based on the results, extraction of issues and examination of the direction of measures were conducted.

- Notification and information communication
- Evacuation of the residents
- Disaster prevention and response system
- Management of the evacuation center
- Others (Problems and challenges in measures against earthquake disaster, etc.)

III. Survey Result

Table 1 shows the situation of the communication report, as obtained from the operator. The first notification from the Fukushima Daiichi Nuclear Power Station was not recognized by any of the municipalities, and section 10 and section 15 of Act on Special Measures Concerning Response to Environmental Contamination by Radioactive Material Released from the Accident of the Nuclear Power Station caused by the Tohoku District-off the Pacific Ocean Earthquake (Act on Special Measures) also reached only some of the municipalities.

The hotlines between the nuclear power stations and the 4 towns had already been prepared. Especially the one to Fukushima Daini Nuclear Power Station was the type that could be used during a blackout. Thus, it was connected immediately after the earthquake. In addition, staffs of Tokyo Electric Power Company, Inc. (TEPCO) were dispatched there from the early stage and they also accompanied evacuation, thus the system for constantly providing information was in place. However, the information from Fukushima Daiichi Nuclear Power Station was extremely fragment and its contents were insufficient.

Meanwhile, at the neighboring Namie, and Minamisoma next to Namie, they did not receive any communication via phone and no TEPCO staff was dispatched there immediately after the disaster, meaning they could only collect information through a TV.

Table 2 shows the situation of dispatch communication from the national government or the prefectural government such as evacuation orders. Hardly any municipalities received communication from the national government or the prefectural government, and most of them did not even receive evacuation order. Naturally, there was no precise instruction on the evacuation destination or method.

Moreover, there was no communication between municipalities regarding the setting of the off-site center, and information sent from off-site center hardly reached there. Only Okuma could dispatch its staff. However, the function of off-site center itself was down, and therefore sufficient understanding of the situation was impossible.

Table 1 Situation of information communication from TEPCO*

* Time in 24-hour clock	Furaba (Survey, Aug. 22-25, 2011) - Though there was a blackout, the power was secured by using the emergency generator. - Only one landline and one FAX were usable. - Though they had hotlines to Fukushima Daiichi and Daini, only one to Daini which is a rotary dial phone worked.	Okuma (Survey, Oct. 12-14, 2011) - Though there was a blackout, the power was secured by using the emergency generator. - Only one landline and one FAX were usable but they were often not working (FAX started to work from around 19:00, 11 Mar.) - Though they had hotlines to Fukushima Daiichi and Daini, only one to Daini which is a rotary dial phone worked.	Naraha (Survey, Oct. 12-13, 2011) - At the town hall, the generator was working and the blackout was short. - Hotline and FAX was working immediately after the accident. - They stopped working after a while and satellite telephone also stopped working.	Tomiooka (Survey, Oct. 18, 2011) - There was a blackout and emergency generator did not work. - At the neighboring "Manabi no Mori," the power was secured by using the emergency generator, thus the disaster response headquarters was moved there. - The hotlines to Fukushima Daiichi and Daini were not working (The line to Daiichi was not working well and stopped working since the dawn of 12 Mar.)	Minamisoma (Survey, Oct. 19, 2011) - Only the satellite telephone installed in the first floor of the city hall was working. - No hotline with TEPCO	Namie (Survey, Oct. 26-27, 2011) - Though there was a blackout, the power was secured by using the emergency generator. - Phone and FAX were usable. - No hotline with TEPCO
1st Notification (Earthquake Occurrence)	No record	No record	No record (Also no transmission record at TEPCO)	No record	No communication	No communication
Report of Section 10	No record	16:07, 11 Mar. 2011 (Landline)	16:35, 11 Mar. 2011 (Landline/Fax)	No record	No communication	No communication
Report of Section 15	Could not be verified (landline)	16:50, 11 Mar. 2011 (Landline)	No record (TEPCO has transmission record but the town did not receive)	No record	No communication	No communication
Existence of situation communication	Anytime communication	Anytime communication	Anytime communication	Regular communication	No communication	No communication for a few days after the disaster.
Staff dispatch	Mar. 11 around 17:00 2 staff members (Permanently stationed since then)	Mar. 11 around 20:00 2 staff members (Permanently stationed since then)	Mar. 12 around 22:30 2 staff (Permanently stationed since)	Mar. 11 evening- 2 staff members (From Daini) (Permanently stationed since then)	Mar. 25- 1 staff member. It was increased later and currently 7 staffs.	None for a few days after the disaster; (1 staff member permanently stationed after a few days since the disaster.)
Main communication method	- Permanently stationed TEPCO staff - FAX - Landline	- Permanently stationed TEPCO staff - FAX - Landline	- Permanently stationed TEPCO staff - Hotline (Daini) - FAX	- Permanently stationed TEPCO staff - Hotline (Daiichi, Daini)	No communication	No communication for a few days after the disaster.
Accuracy of content	- Information necessary for making decision on evacuation such as the possibility of core meltdown was not provided. - Safety was exaggerated and the seriousness of the accident was not communicated.	- Information necessary for making decision on evacuation such as the possibility of core meltdown was not provided. - Safety was exaggerated and the seriousness of the accident was not communicated.	Could not verify if it was appropriate.	- Information necessary for making decision on evacuation such as the possibility of core meltdown was not provided.	No communication	No communication for a few days after the disaster.
Sustainability of communication	- Continued after evacuation outside the area.	- Continued after evacuation outside the area.	Continued after evacuation outside the area.	Continued after evacuation outside the area.	No communication	No communication for a few days after the disaster.
Notes	- 12 Mar. around 4:00, TEPCO PR department informed about venting.	- A municipal staff member was dispatched to OPC around 16:30 on Mar. 11 to collect information.		- As it is the site of Fukushima Daini, the hotline (a rotary dial phone). - There was hardly any information about Fukushima Daiichi in the communication with Fukushima Daini, and information was collected through TV. - There were cases where information was collected by citizens using their mobile phones faster. - They were informed that venting might be conducted (time unknown).	- As it is outside EPZ, no dispatch related to the Act on Special Measures. - As no information was provided from the operator, information had to be collected from TV. - There were cases where information was collected by citizens using their mobile phones faster.	- It is a town neighboring Fukushima Daiichi and it had the information sharing agreement. However, there was no communication. - TEPCO insists that they sent a fax, but it could not be verified. - As no information was provided from the operator, information had to be collected from TV.

* Some data were corrected by permission of the authors.

Table 2 Situation of information communication from the national government and the prefectural government*

	* Time in 24 hours display.	Fuefuki (Survey, Aug. 22-25, 2011)	Okuma (Survey, Oct. 12-14, 2011)	Naraha (Survey, Oct. 12-13, 2011)	Tomioka (Survey, Oct. 18, 2011)	Mimamisoma (Survey, Oct. 19, 2011)	Namie (Survey, Oct. 26-27, 2011)
Communication about the state of the power station	Communication about the state of the nuclear power station	None	Hardly any (2-3 times only)	None	None	None	None
	Main communication method	—	- Landline, mobile phone	—	—	—	—
	Appropriateness of the contents	—	- No information necessary for evacuation decisions. - Seriousness of the accident not communicated - Slow communication made it impossible to use the information	—	—	—	—
Time of communication of evacuation order, etc.	Continuation of the communication	—	- Continued after evacuation outside the area	—	—	—	—
	Emergency declared	Could not be verified	None	Could not be verified	None	Could not be verified	None
	Prefecture 2 km radius evacuation	Could not be verified	None	Could not be verified	Could not be verified	Could not be verified	None
	3 km radius evacuation	Could not be verified	Around 21:50, 11 Mar. (Permanently stationed TEPCO staff, Checked with TV)	Could not be verified	Could not be verified	Could not be verified	None
	10 km radius evacuation	6:29, 12 Mar 2011 (FAX)	Around 6:00, 11 Mar. (Tel from Hosono aide)	Could not be verified	Could not be verified	Could not be verified	None
	20 km radius evacuation	Could not be verified	Could not be verified	Could not be verified	Could not be verified	Could not be verified	None
	20 km radius evacuation: 20-30 km sheltering indoors	18:25, 12 Mar. 2011	Could not be verified	Could not be verified	Could not be verified	11:56, 15 Mar. 2011 (FAX)	None
	20 km restricted area 20-30 km sheltering indoors	Could not be verified	Could not be verified	Could not be verified	Could not be verified	12:12, 21 Apr. 2011 (E-mail)	21 Apr. 2011 (FAX)
	Planned evacuation area: Emergency evacuation preparation area	Could not be verified	Could not be verified	Could not be verified	Could not be verified	18:13, 11 Apr. 2011	21 Apr. 2011
	Instruction related to evacuation	Evacuation destination/route instruction	None (There is a claim that there was an evacuation order to Kawamata, but could not be verified)	Insufficient (Prefecture instructed to evacuate to Tamura, while the police instructed to evacuate to Kawauuchi)	None	None (There is a claim that there was an evacuation order to Kawamata, but could not be verified)	None
Evacuation method instruction		None	- On the midnight of 11 Mar., the Ministry of Land, Infrastructure, Transport and Tourism informed that it would provide buses. They understood the buses were prepared for 3km radius evacuation. - Around 3:00 of 12 Mar., 50 buses of Ibaraki Kōsan were waiting in Okuma. - The hotline with the prefecture (dedicated phone, fax) was not working. - Around 23:00 of 11 Mar., the vice prefectural governor arrived, and later the vice president of TEPCO arrived.	None	None	None	None
	Notes		- The prefectural emergency communication network (for nuclear disaster prevention) was not working because the western building of the prefectural office was damaged by the disaster. - The inter ground lines of the integrated prefectural information network was not working. While the satellite network was working, it could hardly be used because there was a concentration of communications.			Though Mimamisoma is inside the evacuation zone of the 20km radius evacuation order on at 18:25, 12 Mar., the instruction text (The instruction text was checked at a later date on the website of the Ministry of Economy, Trade and Industry)	

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As the evacuation order from the national government or the prefectural government did not reach the local municipalities, residents had to make a decision about the evacuation on the basis of the information sources such as TV. Moreover, they also had to secure the evacuation site or evacuation method on their own. Though some municipalities used buses dispatched from the national government, most municipalities had to secure transport by themselves. However, it was extremely difficult to organize a transport, forcing many residents to use their own cars for the evacuation. The evacuation orders for the residents were spread using the emergency broadcast system installed in the municipalities, advertisement vehicles or patrols by the fire brigade and the municipal staff.

As the nuclear emergency spread, there were cases where people had to evacuate again from the place they were initially evacuated to. Moreover, since information from System for Prediction of Environmental Emergency Dose Information (SPEEDI) was not provided, there were municipalities that established their evacuation site within the high dose area. (See **Figure 1**).

Response to the people requiring assistance during a disaster or hospital patients was made with cooperation from the local people. For the immediate transportation of patients, the vehicles of the Self Defense Force, ambulance or the police vehicles were used in addition to the measures taken by the hospitals.

After issuing evacuation order within 20 km radius on March 12, the national government issued an order for those who were remaining within 20 km radius to take iodine thyroid blocking agent on March 16. However, this order was not precisely communicated to most of the municipalities. As the residents living nearby by the power station sites had knowledge about

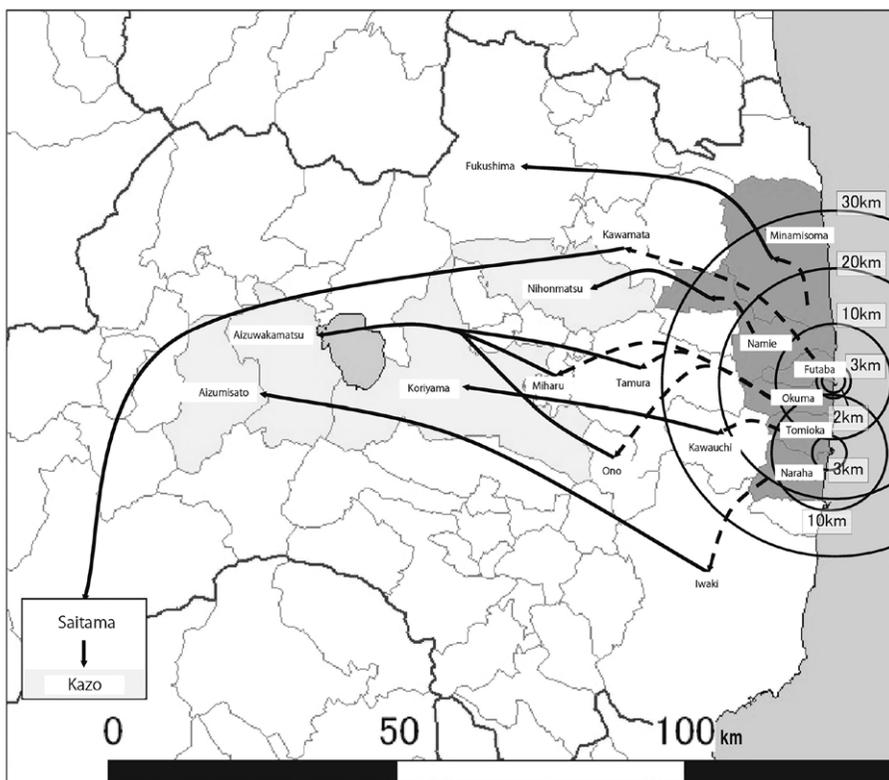


Figure 1 Main evacuation destinations of each municipality

iodine thyroid blocking agent, and demand for its distribution was increasing in response to the hydrogen explosions at Units 1 and 3 of Fukushima Daiichi Nuclear Power Station, municipalities decided to distribute it on their own.

As it was a compound disaster that went beyond expectation and off-site centers were not functioning, the nuclear emergency response trainings in the past by all the municipalities were completely useless. Moreover, there was no preparation for a situation where the administrative function had to be transferred, which made response to the residents extremely difficult. As the evacuation became long-term and expanded to a wider area, the number of evacuation site also increased greatly and problems such as the inability to station staff at each site has occurred. Furthermore, since the distribution of goods was halted in a large area, the staff of the affected municipalities had to go and pick up the goods by themselves.

IV. Challenge/Problem and the Direction of Measures

Based on the survey results, the challenges and problems were extracted from the perspective of municipalities and the direction of the measures was examined. Following are the main points.

1. Information Communication/Public Relation with the Residents

- There was hardly any information from the national government or the prefectural government, forcing people to depend on information from sources such as TV. In addition, confusion was caused because each organization issued different orders and acted differently.
- A thorough examination of the initial response to this accident should be conducted and a system that allows prompt information communication or ensures information sharing between various disaster prevention organizations should be constructed urgently.
- Due to the blackout or communication failure caused by the large-scale disaster, the communication networks of the national government, prefecture, cities, towns, and the operator was stopped and their functions were lost.
- Urgent strengthening and diversification of the communication networks through the installation of satellite telephone or the utilization of security telephone should be conducted to ensure information communication during a large-scale disaster or a blackout.
- The information provided by the national government or the operator was inappropriate and triggered doubt and distrust among many citizens. In addition, information was insufficient among municipalities and they could not provide enough information to the residents.
- A system where the national government directly dispatches a public relation officer who is responsible for a press release and PR with the residents should be constructed.

2. Disaster Prevention System

- There was no information or instruction from the national government and municipality had to make their own decisions. However, small towns and villages did not have staff who were specialized in nuclear emergency.
- The national government and the operator should create a legal framework for

dispatching staff to the disaster response headquarters of municipalities that can provide necessary information and advice during a nuclear disaster.

- A compound disaster was not expected and nuclear disaster prevention measures did not function effectively.
- The national government should learn lessons from this disaster and urgently prepare a concrete guideline for nuclear disaster prevention plan review. Moreover, municipalities must examine a system that can effectively function during a compound disaster.
- The national government caused confusion by taking disaster responses that are not stipulated by laws such as setting up a joint response headquarters and planned evacuation preparation zone or emergency evacuation preparation zone.
- The national government should urgently examine the initial responses to this accident and fundamentally review the disaster prevention policy and crisis management framework.
- Long-term response in a wider area became inevitable, putting an excessive burden on municipal staff.
- The national government should construct a backup system such as a prompt dispatch of staff and specialists to municipalities.

3. Off-Site Center

- The function of the off-site center was lost due to the earthquake, and personnel was not assembled sufficiently. For example, it also did not function later as a base because of the necessity for evacuation.
- The reason why the off-site center did not function at all should be examined, and its structure including the staff assembling system should be reconstructed. Fundamental facility strengthening and securement of alternative facilities such as response to the power loss or dose increase and multiplexing of communication facility should be urgently examined.

4. SPEEDI

- The diffusion prediction information of SPEEDI was not provided to the municipalities.
- The reason why SPEEDI was not utilized should be investigated and examined, and the results should be published.

5. Administrative Function Transfer

- Transfer of the administrative function was an unexpected situation that was beyond the limit of municipalities' ability to respond, leading to the severe deterioration of municipal function.
- The national government or the prefectural government should construct a system for offering backup to municipalities such as securing the location for administrative function transfer.

6. Evacuation Road Maintenance

- Instructions from the national government and the prefectural government on evacuation

destination, method or route were insufficient. They failed to secure buses for the evacuation, forcing many people to evacuate by their own cars. The roads thus became congested, which caused a long delay in the movement of people.

- The national government should take a responsibility to prepare roads that are ready for disasters by taking measures such as creating multiple lanes or removing sudden slope/curves. Moreover, they should examine the state of traffic regulations and traffic control, and construct a system that enables prompt evacuation during a compound disaster.

7. Evacuation of Residents

- The situation required a large-area evacuation that goes beyond the boundaries of municipalities. However, initiatives from the national government and the prefectural government were lacking and no appropriate measures, such as evacuation order and communication of evacuation destination and method, were taken.
- The national government and the prefectural governments should construct a framework that presumes large-area evacuation in advance. Moreover, to protect the local community after the evacuation, it is necessary to devise a system that maintains the connection to the neighborhood.
- As information about radiation diffusion was not provided, some municipalities set up evacuation site within the high dose area.
- The national government and the prefectural governments should urgently construct a system that enables the precise instruction of evacuation destination and route using the monitoring results and diffusion prediction of SPEEDI. An emergency monitoring system, such as the installation of the measurement device or personnel distribution, should be strengthened to promptly obtain a radiation dose in the evacuation destination.
- Following evacuation using private cars, problems such as traffic jam and abandoned cars due to the depletion of fuel and shortage of parking space at the evacuation site occurred.
- A traffic simulation that takes evacuation with private vehicles into consideration should be conducted and a plan for prompt evacuation with private vehicles should be examined.

8. Transport of Supporting Goods/Management of Evacuation Centers, etc.

- Stagnated distribution in a large area caused problems with administrative operation and the lives of the residents. Moreover, there were cases where the staff of the affected municipalities had to go and pick up the aid.
- The national government and the prefectural governments should examine the system of transport of supporting goods in advance in order to avoid unnecessary burden on municipalities.
- As the evacuation destinations were widespread, it was not possible to station required staff and was difficult to respond to the needs of the residents. Moreover, the same evacuation site housed residents from several municipalities and therefore it was difficult to obtain the evacuees' information and to respond to an inquiry about safety confirmation of individual person.
- It is desirable to prepare for a nuclear emergency that would affect a large area and construct a support system of dispatching the municipal staff or the staff of the national government. The municipalities also must secure communication methods between

evacuation sites or to the residents as well as examining the staffing system.

9. Exposure of Residents

- The handling of emergency monitoring by the national government, the prefectural government or TEPCO was insufficient, and prompt measurements on internal exposure was also not conducted.
- A whole body counter should be installed at every area around a nuclear power station site. Especially for children who are considered to be vulnerable to radiation, the national government should be responsible for their continuous health research.

10. Distribution/Taking of Iodine Thyroid Blocking Agent

- The national government did not give appropriate distribution/ingestion instruction.
- The chain of command/communication of this case should be examined thoroughly and measures should be taken urgently. Moreover, its storage and distribution method should be examined and a system that allows prompt distribution should be constructed.

V. Conclusions

Requests to address the issues that should be solved by the national government among the challenges extracted through this survey were sent to relevant ministries. The national government must recognize that unless they respond to these challenges with sincerity, the municipalities with nuclear power stations cannot have hope in local governance.

This survey was conducted only by the municipal staffs. In the course of this survey, the municipalities had to face difficult reality, but they were simultaneously able to examine the new direction of nuclear disaster prevention. There are many issues that require subjective engagement by the municipalities, and the Council is currently examining how to continue the working group this year and reflect its findings on the nuclear disaster prevention plan of each municipality. It cannot be denied that there is a limit to the measures that municipalities as host nuclear power station can take. Still, we are required to urgently devise truly indispensable disaster prevention measures for the local residents. The member municipalities of the Council will further strengthen our solidarity and wholeheartedly engage with the measures to secure safety and comfort of the residents.

References

- 1) Report of Nuclear Emergency Examination Working Group (March, 2012). (<http://www.zengenkyo.org/houkokusyo/bousaihoukokusyo.pdf>) [in Japanese]