

Seminar
Sharing experiences of the accident at the Fukushima daiichi nuclear power plant
July 30, 2011
Tokyo

Explanation of Purpose, Self-Introduction

Moderator: Eri Watanabe (Friends of the Earth Japan)

The purpose of this seminar is to mutually share the experience of Fukushima. Each presenter will speak about their own experience regarding nuclear power, as well as what's happening in Fukushima now. People who are working and supporting people in Fukushima will discuss their experiences and we'll exchange ideas and views about the situation.

Current Situation in Fukushima

Presenter: Hideyuki Ban (Citizen's Nuclear Information Center)

Good morning everyone. We're already running late so I'll just speak very briefly on the issue of the Fukushima Dai-Ichi accident and what happened as a result of the earthquake and tsunami. There are 4 nuclear plants at the Dai-Ichi site and they exploded in different ways. This image shows Unit 3 and Unit 3 when they exploded. I don't have images for Units 2 and 4. This is a video showing the result of the explosion, with Unit 1 on the far right and Unit 4 on the far left. Unit 2 was damaged as a result of the explosion at Unit 3. A hole was created, the panels blew off, but it was able to avoid damage to the actual building. But the basement area where the containment is, in that area, there was an explosion, caused by hydrogen. The fact that hydrogen exploded means that the fuel inside the reactor was melting down. There are various theories about it and about the extent of the meltdown. The critical view is that the fuel has been completely melted and has breached containment, allowing radiation to go down to the concrete under the containment.

Since the fuel has melted, so of course it has to be continually cooled, so they are putting water on the fuel. The water that is thrown in leaks out though and they have to gather it and put it back in, to circulate the coolant water. However, the actual circulatory system is only acting at 60% capacity. For 10 years they will have to continue this sort of cooling of the reactor fuel. Of course these reactors are scheduled to be decommissioned, maybe in 20-30 years.

This map shows the spread of radiation from Dai-Ichi plant. The left map was created by the Japanese government in cooperation with the US government through the use of airplanes from a height of 150-300 m above the site. They flew over and monitored the radiation levels and mapped cesium radiation contamination on the ground. This survey was undertaken in mid-April. Probably as a result of the March 12th explosion, you can see that the northwest area is very heavily contaminated. Red part is about 3 million-30 million bq of contamination. The blue part (Nakadori) is where the Shinkansen route is to go north and also the main highway and also where Fukushima City, the capital of the prefecture, is located. To the south and south-west, you can see that the radiation has also spread – indicated by the green or blue parts.

This map on the right is a public map. Yukio Hayakawa of Gunma University created the map. The blue circle indicates a 200km radius so you can see that the contamination spread beyond 200 km and is continuing to spread.

This graph was published by Fukushima Prefecture and depicts airborne radiation measurements. This area in red is Iitate village. Later this area was evacuated even though it was technically outside of the evacuation zone. This bottom line is Shinjuku and the measurements are all in microsieverts/hour. A normal level is 0.05 microsieverts/hour. Iitate, at the peak, had 45 microsieverts/hour. This is just one example, but within Iitate there were areas with even higher levels. This map is from March 15 where it peaked and then gradually went down. You can see that it's not a straight line coming down but it shows that it peaked again as it went down. As a result of snow, contamination fell to the ground in some areas. Cesium contamination area is a result of whatever came down on the ground.

This map shows all of Japan. The red marks are where they've shut down nuclear reactors as a result of the earthquake and tsunami. The blue marks are nuclear reactors that were shut down as a result of regular outage but have not been started up again. 39 have been shut down out of 54.

This is a map of Fukushima City. On August 2nd, a meeting will be held by the local Fukushima Prefectural NGOs. Many people were concerned about the elevation of radiation in the city. Fukushima measured 0.96-1.0 microsieverts/hour in the area where the meeting will be held. The capital has measurements of 1.19 microsieverts/hour.

Session 1: Issues on evacuation

Moderator: Eri Watanabe

This is Mr. Nakate, the head of the Fukushima Network for Saving Children from Radiation. Mr. Nakate has been involved in anti-nuclear work from before the accident. He has been extremely busy giving talks all over Japan.

Presenter: Seiichi Nakate (Fukushima Network for Saving Children from Radiation)

My name is Seiichi Nakate. I live in Fukushima Prefecture. As one adult living there I have huge regret and huge feelings of remorse and apology. The fact that we were not able to prevent this accident has affected people all over the world and in Fukushima. As Mr. Ban stated, the accident is still ongoing. There are various theories but for now, every hour about 1 billion Becquerels of radiation are being released. Some even believe that this is a low estimate. I would like to talk about the evacuation and contamination that is occurring today as we speak. I'd like to first give a simple self-introduction.

23 years ago, I first realized the danger of nuclear power plants like this one. For about 3 years I was involved in various anti-nuclear activities. After that, for about 20 years, I wasn't involved in anti-nuclear work; I was working on my main occupation. From last year, I felt very strongly that I must start to be involved in stopping the plutonium-thermal program at Fukushima Dai-Ichi Unit 3. And I started to feel

that even more strongly when the accident occurred. Since the beginning of March I've been very heavily involved with anti-nuclear work, working to try to protect the children, and even trying to save just one person from radiation damage. I live right here. That's where the plant is and I live in Fukushima City about 60 km away in the northwest. As was mentioned earlier, this accident occurred as a result of the earthquake and tsunami. The earthquake was also quite strong in Fukushima City where I live. There were no deaths but the water system and gas system all stopped in my city. In some places there was no electricity or Internet and we could only get information from the radio. Based on information that came across the radio on March 12th, the day after the earthquake, already towns where the plants were located were ordered to evacuate, but it took several days to evacuate everybody from the area. The areas in the 20-30 km zone were known as evacuation preparation areas. Evacuation was not obligatory, but residents here were told to be ready to evacuate and to stay indoors on March 12th.

The reactors were going off one after the other. We still don't know precisely what's happening. The hydrogen explosion in Unit 1 on March 15 and 16 caused the highest levels of radiation to be released and a very large area of pollution occurred. For people who had some knowledge of what was going on, they could understand what was happening, but the mass media was saying there was no immediate health effects so almost no one was evacuating except for areas in the mandatory 20 km zone. In mid-to late March, I managed to get a Geiger counter and look around my local area, especially at the elementary schools. The playgrounds of schools get measured on their surfaces. These places had measurements of more than 10 microsieverts/hour. The highest levels were in gutters and ditches on the sides of roads and had measurements of 108.8 microSv/hour, which was much more than I thought they would ever see.

We conducted a survey at seven elementary schools in Fukushima. Schools start in Japan in April, so after the explosion children were basically on spring vacation. We asked the local prefecture education committee to postpone the beginning of school year but unfortunately, the prefecture decided they would go ahead with the beginning of school year. Fukushima Prefecture is roughly in this area. In April they said they would measure the playgrounds and things in elementary schools, junior high schools and kindergartens in about 1600 places. Because of the accident, they had decided to do a full inspection over a wide area. The result was that in the prefecture, they put the results on a website. It was very speedy. My own group also did a compilation of data from inside Fukushima Prefecture in white and red. The white part is 0.6 microsieverts/hour or less. According to Japanese law, that is an area that has to be managed from the point of view of radiation and they have to show this kind of sign. That area is usually where there are workers working in nuclear power stations and they have to be careful because there are radioactive materials present and so people have to be careful about radiation. In 3 months you would get 1.3 milliSv of radiation. The yellow part and red part are 0.6 microsieverts/hour or more.

This is also available on the internet and in English. It's a management area map. It shows that three-quarters of places where the children would be would have the same conditions as working in a power plant. By law they would have to put areas under radioactive management.

<http://Fukushima.greenaction-japan/>

Having understood that situation, the 20 km zone, the evacuation zone, was far too small and really needed to be expanded more. Iitate village, northwest from the power plant and these towns over here, in the 30 km zone, are planned evacuation zones. It was not that they actually measured the radiation, but they predicted the radiation would be very bad before they decided it should be evacuated. When they found out there were areas that were really radiated, they put them into planned zones. My younger sister was in Iitate village. I gave her advice early in March (15-16). She has a family of 10 people and I told her that they should leave, even though they were not actually within the evacuation zone. Plus, there is still economic activity going on in the area, such as civil engineering. The people they worked for asked them to come back and continue working, rather than leave. Unavoidably, toward the end of March, my sister and her husband came out to Fukushima City which is further to the northwest and commuted by car to work. At that time, schools were starting up again, and we were anxious about what would happen to the children. It wouldn't be good to take her children away from their classmates, so my sister decided to have her children go to school. But even the planned evacuation areas were highly polluted. People from Iitate village evacuated toward Fukushima City or further out to the northwest, but this posed another problem. It's a bit difficult to see, but where the people evacuated to was not really what you would call a safe place to be. If you look at this area for example, people near the coast line, people were moving into this blue zone, which was the least polluted zone but there was also yellow and green parts which were more polluted, but still took evacuees. It was very confused. Some people, because they went to places with pollution, got twice as much exposure as they should have. There were substantial problems with the way they were asked to evacuate.

Regarding the evacuation at Chernobyl. Any places that measured over 5 millisieverts/year were obliged to evacuate. In regions with 1-5 millisieverts/year, evacuation was voluntary. At Chernobyl, these zones were in place up to 5 years after. This posed many problems, but this is the system that the government ran. We can guess that in zones that were compulsorily evacuated, the people moved out and move their towns somewhere else. If we imagine the cost of cleaning the pollution in those areas, it was probably better to leave it alone and build the town somewhere else.

We could not do the same thing in Fukushima so we're looking at Mr. Hayakawa's map and we can see that we'd like to think about what would happen to an area polluted like this in an area like Japan. In the north is a big island called Hokkaido. And there also, there's some amount of radiation which is being measured that might go up to 1 millisievert/year. So for example in Japan, we have typhoons. When they come, they have circumferences of 300-400 km and they spin around and around stir everything up. So after the typhoon passes, what will happen to the pollution? It will move. We're not sure what will happen but something will be experienced. Japan is a relatively small island where this disaster occurred. If you want to evacuate, there is really nowhere to go to.

People were separated during the evacuations. For example, for one family in Iitate, his extended family is now living in 3 different locations. In some cases, they don't even live in the same city. Fukushima City

is also a contaminated area so some people have begun renting places outside of the prefecture. So you can understand that the community that originally existed has been destroyed. I think that one main issue with the evacuation policy is that people are not being evacuated with their family.

There's a new area, a special evacuation area, in which some families were evacuated and others were not, on a case by case basis. However, in general, people who should be allowed to evacuate are not allowed. That's the biggest problem right now. People who self-evacuate (graph on right) are not following government policy. My wife too is right now is in Okayama, about 700 km from Fukushima with the children living with relatives, so of course she had to quit work. An estimated 50,000 up to today have done this. Currently it is summer vacation season and many people feel that in summer, children should be able to play outside. Approximately 80,000 children have left for summer vacation, with roughly 100,000 children living outside of Fukushima Prefecture, both permanently and temporarily.

About 1.5 million people live in the red area. About 300,000 of them are children. Only 10% have been able to evacuate. The reason for evacuating is to reduce radiation exposure and health damage. However in the current situation, this is unavoidable and it is currently creating a lot of radiation victims. No remedial measures are being undertaken.

During and after Chernobyl, the damage could not be hidden. Currently today in Fukushima there are reports of high incidences of nose bleeds among children. While this has not been scientifically proven, there was a noticeable increase, especially in mid-May. My children are in the first and fourth grades and both had nosebleeds at the end of May. The older child often has nosebleeds so we didn't worry much, but the younger boy also had one, with a lot of bleeding, and he has never had one in his life.

The damage occurring currently probably occurred faster than we imagined. At any rate, I think we have to be concerned that health damage is happening much more rapidly. The effects of radiation are well known, such as cancer, leukemia and other sorts of issues, though there's very little evidence of early-on symptoms. I believe that a year from now, two years from now, there will be serious health damage. In several years, a larger area will have to be compulsorily evacuated in the future. The work I'm doing is concerned with the need to have the necessary evacuation occur before these things happen.

What we're proposing is the right to be evacuated. We are pushing government authorities to create an additional zone in which people have the right to evacuate if they want, such as in areas that have 1 millisievert/year or more. We cannot avoid the damage that's already occurred, but we can work to reduce future exposure. While 20 millisieverts/year is a standard, experts have differing views. If the experts have different views, the citizens should also have a variety of choices available from which they can choose. 270,000 people live in my town and so it's impossible to move them all permanently. However, if each community could keep its identity, satellite communities could be created. We need an evacuation policy where communities and families aren't split up and they can keep the hope of ultimately returning to their original towns. They could create satellite schools, similar to the ones in

regions where there is a decreased population. In a satellite school, the whole school would move and a new school could be built or they could occupy an existing building until their original schools are decontaminated. If only the children are moved, they could stay in dormitories or in homestays. If their parents and families can go to the satellite community with the children, support for family housing, etc. would also be needed.

Session 2: Issues on agriculture

Presenter: Kazuoki Ohno (Agriculture journalist)

Today, I would like to talk about three things. One regarding the prohibition of planting. The second is how the contamination of food has appeared, and the third is the feeling of farmers who continue to farm while being concerned about the radiation level of their crops caused by soil, air and water contamination.

Planting at the moment: this is the nuclear plant area and here is the 20 km zone. Nobody can go into the zone, so there's no agriculture going on there. Animals have been abandoned or evacuated. Out in the 30 km zone, there has been heavy radioactive pollution of land and grass cannot grow there. Vegetables - as long as they have lower radiation levels than government standards, they're okay, but actually things aren't really growing at all. This pink area is where Iitate village is. The whole village has been evacuated so rice fields and upland fields have also been abandoned. In the lower part of the pink zone, there are rice fields, but farmers have left and the land has been abandoned. The green part was affected by the tsunami.

This is south Soma city, within the 30 km zone. Rice fields are near the coast. This large tractor was completely destroyed and abandoned. Here are some rice fields close to the coast that are not currently suitable for planting rice with all the debris. The green in the background is pasture land, usually for cattle, which has been polluted quite strongly with radiation and cannot be eaten by cattle and so has been abandoned. Rice fields have been plowed but now cannot be used.

Beyond the 30 km zone: the first pollution that occurred with agricultural produce was milk and vegetables. Immediately after the disaster, the vegetables and milk were not supposed to be shipped out. The first vegetable to be affected was spinach. Spinach is grown from winter to spring, and in March, spinach is ready for harvest. The standard for iodine is 500 becquerels/kg. They found it was polluted to about 5-8x more than the standard. For milk, they found nearly 5 times over the standard at the end of March. By about 30th of March, almost all vegetables in Fukushima, whether grown outside or in greenhouses, were totally banned from being shipped. The grass for cattle was banned from being fed to cows. In the early stages, those kinds of problems occurred and these have gradually spread to prefectures around Fukushima.

The green space is Fukushima Pref. Under that is Chiba and Ibaraki. The milk and vegetables from these prefectures have been polluted with radioactivity, including some places where they were not supposed to ship their vegetables. In April, the radioactive pollution hit the shiitake mushrooms and fish and other

marine products. In the sea of Fukushima and Ibaraki, some small baby white fish were found with 4700 becquerels/kg. The local fishermen's union decided not to go fishing. Vegetable problems were also continuing that month. In May, they had problems with Japanese tea leaves. In May, farmers were picking leaves and drying them (during the time for harvest), but then they found cesium on tea leaves – in Kanagawa. There's an area there where they found radioactive cesium in tea leaves there and also in Saitama and Chiba Prefectures. The Kanagawa location was almost 300 km from Fukushima, to the south. In June, this tea pollution moved even further southwest to Shizuoka Prefecture, 400 km away from Fukushima. Shizuoka is the largest tea producing prefecture in Japan. Tea producing areas were almost completely wiped out and couldn't sell any tea. Tea farmers there have had trouble making a living.

In July, still more problems were happening, this time with beef. They found that beef was polluted with cesium. Cattle had been eating polluted rice straw and had been internally exposed. In particular, the black variety of Japanese cattle was affected. This cow has an earring which has a number which tells about its producer. If you look that number up, it tells you about where the cow was from and the kind of feed it was eating. It also provides information about BSE. This is a very popular sort of cow and very delicious. Usually the feed is corn from the US, but they also give them rice straw to eat, so they eat from between 1-2 kg of rice straw a day. Rice straw is hard to get a hold of in Japan. The straw is cut up finely and put on the field. There are special rice farmers that grow rice for the straw. Rice is harvested in the autumn around October and distributed around the country. Sometimes it rains or snows and sometimes the straw sits in the rain or snow and then they collect it in the spring. Some straw became radioactive because of the fallout this spring and then was sent all around the country. Pollution went from Fukushima to Miyagi Prefecture, where there's a large area of rice fields. Iwate Prefecture also had radioactive cesium in their straw, and this straw was distributed in Yamagata Prefecture to the west, in Saitama, and in Gifu and Mie Prefectures much farther to the west of Japan.

Here is a map of Japan. The diagonal lines all over the map indicate rice straw. 3000 cattle have been internally exposed to cesium pollution as of today. The producers are asking the government to inspect every cow. As this begins to happen, the 3000 count will most likely increase. At the moment, they have a standard of 500 becquerels/kg. Now, 51 have gone over this limit, but they think it will keep on increasing. Producers have not been able to ship animals. Prices for Japanese beef are shown on this chart. It used to cost ¥1635/kg but it has dropped to 607yen/kg. Even in areas where cattle are not eating rice straw, meat has become less popular and so prices have dropped overall. This will mostly likely expand in the future.

Pollution with cattle will probably have some effect on pollution of land. High cesium pollution in rice straw and in April they brought tractors into field and plowed polluted straw into the field, before they knew it was polluted. Rice that will be harvested in autumn will most likely be polluted as well. Cattle fertilizer may also be polluted. Each day each cow produces 30 kg of feces and a huge amount of urine. Every day, the waste materials accumulate in the small pen, in the straw, grass and woodchips, then is removed, piled up, fermented, and made into fertilizer. These farms also create fertilizer for sale to

surrounding farms, in exchange for hay, etc. The fertilizer is then used to grow vegetables and other things.

Cattle farms are part of the cycle and beef cattle are key factor in the circle, with 40-50 kg of waste coming from each cow. Where to dispose of it? Right now, it's not being circulated but everyday these cattle will be eating hay or straw. The situation is now expanding and the rice harvest is coming up soon.

I want to finally say that the continuation of farming is important. We never imagined that straw hay would be contaminated at distances of 150-180 km away. Nobody imagined this would happen and we don't know what will happen in the future. We don't know what path agriculture will take. Many farmers are in cooperatives to get compensation from TEPCO, not just for the products that couldn't be sold but also for the drop in price. At present, 43 billion yen – that's the amount that's been billed to TEPCO. The total amount will increase, possibly up to trillions, but nobody knows to what extent the damage will expand and to what extent it will be compensated. Mental damage should also be covered. Some women and elder persons are not included in cooperatives so it is important to find ways to support them.

Session 3: Effects of nuclear power plants on local communities

Presenter: Ayako Ohga (HAIRO Action)

I was 5 km from the Fukushima Dai-ichi plant when the earthquake occurred. I continued to be at the evacuation site and have not been home since that day. The evacuation zone is within the 20 km radius, but even within a 30 km radius there have been evacuations. In Hironomachi, there are still only several hundred people who have gone back, and the situation is the same with other cities. Red areas on this map were required to evacuate. In the prefecture, about 1/3 to 1/2 people have evacuated within Fukushima and the other half have evacuated all over Japan. Life in the evacuated state isn't easy. When we first evacuated, it was like a panic state. Everyone thought they could come back to their homes in 2-3 days and so most people only brought a small amount of articles from their homes. Now I will talk about the 47 year history of power plant and how it affects the economy.

There have been of course many economic advantages. Now everyone is a victim but in the past, a lot of people gained a lot economically and others didn't. When people evacuated there were different categories. For Futaba and Okuma town (where the plant is located), those two towns' evacuees felt they would be the last to return to normal life. Futaba is a typical agricultural town that used to have a military airport. After that, a company brought it up after the war. In 1960, discussions of building the nuclear plant began and in 1963, land was bought up for it. The corporation already had the land where the reactors would be sited, so it was very easy for the land to be purchased. But the surrounding area was agricultural land that was very difficult for doing agriculture. The climate was not good and it was cold often. From post-war times, the agricultural sector wasn't doing very well and people left to go to the cities. Even before construction of the plant, the area was suffering economically.

I was speaking with someone earlier and was asked since Japan had suffered from the nuclear bomb during the war, why would they thus build a nuclear plant? In 1960, the first commercial reactor was

built in Ibaraki Prefecture and began operations in 1966. Research was undertaken in the first half of the 1960's and there were a lot of public relations campaigns regarding the civil use of nuclear power. Citizens were not informed about the potential dangers though. In the early 60s when the project was conceived, nuclear power seemed only like a new technology from abroad and it was seen as advanced. In 1967, the construction of the Dai-ichi plant commenced. In 1968, Dai-ni was announced by the government. In the beginning, all the reactors were imported from overseas, as well as the technicians. There were all kinds of experiments and problems in the beginning, including health problems and problems with radioactivity that was coming out of the plant. In the early 1970's, a nuclear opposition alliance was formed. At that time, labor unions were completing construction of the second Fukushima power plant. Then the 3-mile island incident occurred in 1979 and Chernobyl occurred in 1986. It turned out that the things they were saying were so nice were not so great after all.

I've been involved with the Fukushima power plants for about 20 years. For a while it was taboo to talk about power plants at all. The opposition movement against the plants was going along at the pace of the PR machines of the companies. The movements always feel pressure from those people. From the beginning, if a nuclear power station came to town, there would be lots of subsidies and money for the town, which helps the town's finances. This would allow for hot spring spas, asphalted roads, and improved levels of life. Agriculture didn't develop very much though, and stayed more or less the same. Other businesses helped to enliven the economy even though the local population didn't increase. Even with the subsidies, some of the towns fell into financial difficulties. There was the idea of mixed-oxide fuels for some reactors. This was opposed because it was considered to be dangerous, but then the government said you have to accept the plutonium reactors if you want more subsidies. TEPCO gave billions of yen to local towns and they were caught between something very dangerous and something that provides a lot of money. In 1989, there was a big accident at Unit 3 of Fukushima Dai-ni power plant. TEPCO had covered up a lot of trouble in the nuclear power reactors, which was revealed in 2002 and 2007. The revelations showed TEPCO to be a bad company. Everyone thought that they were being transparent, but they were not. And even if you wanted to oppose it, it was very difficult because one of your relatives might be working for the power plant. Having the plant became like breathing air. We didn't think too much about it. With my friends, I've been active in opposing nuclear power in this kind of atmosphere.

Eventually the reactors are going to reach the end of their lives. They're only supposed to run for 30 years anyway, but now they've been going for 40 years. There's a lot of concern about how long exactly these reactors can continue to run. The old fuel which has been inside the reactors is building up. Last year the opposition movement started actions for plant decommissioning, even before the accident happened. People were planning to have the first symposium for that movement in March.