



## Japan's Nightmare Fight Against Radiation in the Wake of the 3.11 Meltdown

私たちは放射能とどう闘えばよいのか

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Koide Hiroaki, a researcher at Kyoto University's Nuclear Reactor Experiment Research Center, speaks with Watanabe Taeko

Translated by Kyoko Selden

*It is now the second year in the fight against radiation. What should be done in a situation where we can't see what lies ahead of us at all, and what is the situation inside the Fukushima atomic power plant meltdown? We asked Koide Hideaki.*

**—The fight against radiation and contamination has entered a second year and new issues are emerging. First I would like to ask about plans to widely disperse contaminated rubble, which are troubling the nation.**

As far as radioactivity is concerned, the fundamental rule is to make it compact and seal it off, not dilute and spread it. Scattering rubble all over the country violates the rule. National policy at present consists of two pillars. One is for local governments throughout the country to burn contaminated rubble in incinerators. The other is for each local government to dispose of the ashes as it wishes. Both are wrong.

***Although it is not good to scatter the rubble . . .***

Radiation should not be handled except at facilities designed for that purpose. It should not be burned in an ordinary incinerator. If you do that, radioactive matter will disperse. If radioactive contaminated rubble has to be burnt throughout the country, then the first thing that has to be done is to check whether the facilities have the capacity to prevent radiation from scattering. If it seems that radiation may scatter, then equipment must be added to prevent it. Unless that is done, burning should not take place.

**—Do you mean adding a filter?**

Yes. Most incinerators are equipped with a bag filter. If that is correctly used, then I think that cesium can be processed. However, it is necessary to check whether radiation can, in fact, be captured by a filter. If a bagged filter doesn't work, then it is necessary to add a ceramic or high performance filter to contain radiation.

Next, one should never allow each local government to bury the ashes. My proposal is to return the ashes to the Fukushima Daiichi Nuclear Power Plant. In the past, ashes following a meltdown have been used as material for making concrete. At Fukushima Daiichi, a concrete sarcophagus may be constructed over the power plants. Also, it will be necessary to build dams underground to prevent contaminated water from leaking out. For that, massive amounts of concrete will be necessary. So, my idea is to use the ashes to make concrete.

Ideally, incinerators should be used exclusively to handle the rubble at the actual site. But the country has not created appropriate incinerators. Even now the rubble is exposed to the air. If this situation continues unchecked, children in the contaminated areas will continue to be exposed to radiation.

I want to protect children from exposure to radiation. Children here includes those in Tokyo, Osaka, Fukushima, Miyagi, Iwate and all other areas. I think that the main issue is how we can best reduce children's exposure to radiation. We cannot wait until an incinerating facility for exclusive handling of radiation-contaminated rubble is available. But if it can't be helped that the entire country accepts the rubble, the two conditions that I posited must be fulfilled.

About half a month ago, thirty some members of Osaka's Ishin no Kai (Mayor Hashimoto's group) asked me about disposal of contaminated waste. My proposal was that it should not be done unless the two conditions have been met. But they ignored this. It seems they are claiming that, "Koide says that the rubble must be accepted." People at large, too, are angry, saying that Koide is saying something preposterous. But I am saying no such thing.

***If Reactor #4 Crumbles, That's the End***

—It was pointed out in the October 21 2011 issue that Reactor #4 is in danger. Recently, an aerial video was broadcast showing workers at #4.

I saw that video, too. The environment is one of intense exposure to radiation. How many minutes can one stay in that place? It's work that requires a stopwatch held in one's hand. But the work has to be done because, if the pool for spent fuel rods at # 4 crumbles, that's the end. So, the spent fuel at the bottom of the pool has to be taken out before the pool crumbles. At any rate, it has to be removed as soon as possible, before an after shock occurs. For that purpose, some radiation exposure is inescapable.

The reactor core contains approximately 100 tons of uranium. The pool for spent fuel at reactor #4 contains approximately 2.5 times that amount of spent fuel . . . approximately 250 tons. And besides that, there is fuel that has not yet been spent. So, in all, the amount of fuel must be around 300 tons. That is 4,000 times the size of the Hiroshima atomic bomb. Spent fuel is a huge mass of nuclear reaction product. Keeping it at the bottom of the pool allows it to be cooled. At the same time, radiation is blocked.

It cannot be released into the air, so the only way to handle it is to sink a special container exclusively for removal of the spent fuel. The only way is to put the spent fuel into the container within the pool, put a lid over the container and pull it out. But the floor of the reactor building where the spent fuel pool is buried is crumbling, so a crane cannot be used. Therefore, it is necessary to suspend a long armed crane from outside the building, which means that you have to make a colossal container that exceeds the weight of 100 tons. You have to sink the crane to the bottom of the pool and move the spent fuel into it. This is an enormous operation.

—What about re-criticality and explosion?

I think that the possibility of re-criticality is low, and I don't think that there will be an explosion. When the fuel melted and the zirconium reacted with water to produce hydrogen, the hydrogen leaked into the closed space in the reactor building and an explosion occurred. The spent fuel pool is now exposed, but even if the fuel melts and produces hydrogen, it is not accumulating within a closed space. It becomes diluted and escapes. So I don't think that there will be a hydrogen explosion. However, spent fuel is heat generating. If water evaporates and cooling becomes impossible, then the temperature rises and the fuel melts. It melts at 2800 degrees (C.) At that temperature, what can become a gas will all come out. Iodine, cesium, all kinds of radiation, will suddenly jump out into the air.

#### ***We Want to Take it Out, But We Can't Take it Out***

As mentioned, the basic principle for handling radiation is to not spread but seal it in as compactly as possible. So if it is there, then take it out and compact it.

TEPCO and the government imagine that Reactors No. 1-3 had a meltdown of the fuel and the bottom of the pressure containment vessel dropped, so the fuel is at the bottom of the container. But even that is not clear. It is possible that the bottom of the containment vessel is also broken, so the fuel may have sunk even lower. If that is the case, it can no longer be taken out and the only thing to do is to seal it in place.

The Chernobyl Nuclear Reactor was sealed with a sarcophagus without taking out the fuel. Now that coffin is crumbling, so they have to make a second coffin. That too will crumble, so eventually they will have to make a third . . . to be repeated eternally. I think that this will be the case at Fukushima, too. You make a huge concrete coffin; when it crumbles, you cover it with a larger coffin . . . then an even bigger coffin. It is an overwhelming operation. So if possible it would be good to take the fuel out, including the fuel that has already melted. TEPCO also says so. But I think that will take more than ten years to accomplish.

—Concerning the report that the thermometer broke at No. 2, should this claim be taken at face value?

Yes, I think it is broken. Radiation generates heat, so if it accumulates where the thermometer is, the temperature rises. However, the thermometer indicated 400 degrees C. It is impossible that a temperature of 400 degrees C. could be generated in the pressure containment vessel. So after all my guess is that the thermometer is broken. TEPCO's conjecture seems to be the same.

That thermometer uses the principle of thermocoupling. It is a very simple principle and it rarely breaks down. So what does it mean that the thermometer broke?

Some time ago, TEPCO put an industrial TV set inside the containment vessel of No. 2. Water was not visible. In short, water has not accumulated there. Moreover, inside the containment vessel, water is dropping like a waterfall, radiation rays are flying wildly and the image on TV is scarred. It was realized afresh that this was a terrible environment. In that environment, a cable runs which pulls the signal of the thermocouple outside. What I think is that the cable was hit.

This means that from now on, thermometer after thermometer will break. When they break, we have no clue to detect what is going on and we will less and less understand the present situation.

#### ***What Does it Mean to Decommission a Nuclear Reactor?***

—We often hear of decommissioning, but what precisely is meant?

When a nuclear plant operates and stops without any big accident, that is, when it runs its course, the reactor is then decommissioned and the spent fuel is

removed, but the pressure vessel and other things remain a radioactive mass. So, how is decommissioning accomplished? To oversimplify, there are two approaches.

One is to bury it on the spot. You seal the door so that people cannot approach. In this method, you don't have to do too much and there is little exposure to radiation. However, this means that the power plant itself becomes garbage. So it's thought that this is not a very good plan for a country like Japan where land is scarce. So Japan proposes another method.

That method is to take apart the plant and sort out things ranging from badly contaminated parts like the pressure vessel to things that are not so badly contaminated. Something like a pressure vessel can't be handled, so it is necessary to make a deep hole and bury it. As for things that are not badly contaminated with radiation, because it is too much work to baby-sit them given the radiation, they can be handled as general waste.

Handling these parts as general waste is called clearance. But when you chop up a nuclear plant, you get 600,000 cubic meters. When you sort that garbage by degree of radiation, more than 90% is barely contaminated, so it can be handled as general waste.

For example, iron. It may be viewed as general waste. Then scrap iron dealers buy it and recycle it, making for example, tables or desks or frying pans for home use. If you cook with such a frying pan, you will eat radiation with the food. If you eat something cooked in that pan, and if the amount of radiation does not exceed 10 mSv, then it's ok. This was the law up to now. This is what decommissioning a nuclear reactor means.

But the case this time is completely different. First, it's not clear if the spent fuel can be removed and it's hardly possible to dismantle the reactor. So whatever we choose, there has to be a sarcophagus. But it is said that to decommission a normal atomic power plant without problems takes 30, 40, or 50 years. So, it will take far longer to decommission Fukushima Daiichi, which has melted down.

### ***To Mothers of Fukushima***

**—I hear that in Koriyama, people who call themselves advisors have been instructing groups of ten or more people saying, "We radiation specialists are here, so you need not worry." When people are totally exhausted, many feel "that's enough". Fukushima mothers say that they are utterly exhausted. May I have your message for them?**

I'm not qualified. I'm at one end of the spectrum of the group of criminals. I'm among the criminals who made them shoulder a heavy weight. I can only say that I'm very sorry. It's impossible to keep facing fear forever. That is exhausting and people want to forget if possible. How are we to handle such a heavy burden? If you speak of monetary calculation, individual suffering and sorrow can't be translated into money and there is already a huge amount of sorrow. It's hard to know what to do. As long as one lives, there is no choice but to live with this reality. I'm very sorry. I don't know how to apologize. But apology doesn't allow one to take responsibility. I have long been thinking about what I can do to reduce radiation exposure in children, if only a little. And I would like to continue to do so.

Interviewer: Watanabe Taeko (editorial board, *Shukan Kinyobi*.)

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Main writings: *Genpatsu no uso* (The Lie of Nuclear Power) (Fusosha); *Genpatsu wa iranai* (We don't need Genpatsu) (Gentosha); *Genpatsu. hoshano -- kodomo ga abunai* (Nuclear Power Generation: Radiation. Children are in Danger (co-authored, Bunshun Shinsho).

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