TOPICS Fukushima 20 Feb 2015 No. 61

The Japan Atomic Energy Agency (JAEA) held the 9th JAEA Briefing Session on November 27, 2014 in Tokyo. The theme of the Briefing Session was "Time to Reform－Towards the New Departure". About 410 people participated in the Briefing Session. At the beginning of the session, Mr. Shojiro Matsuura, the president of JAEA, explained the present status of the reformation promoted by JAEA and introduced the highlights of research and development in 2014. Then, following the presentations on the reformation of JAEA and Monju, and technological developments for the reduction in volume and toxicity of radioactive wastes, Mr. Hideyuki Funasaka, Director of Planning and Co-ordination Office, Sector of Fukushima Research and Development, gave a lecture entitled "Efforts towards Decommissioning and Environmental Restoration."

The followings are the outline of the lecture by Mr. Funasaka.

Efforts towards decommissioning and environmental restoration

Mr. Hideyuki Funasaka, Director of Planning and Co-ordination Office, Sector of Fukushima Research and Development

The top priority of JAEA's mission is to cope with the accident at the Fukushima Daiichi Nuclear Power Station, Tokyo Electric Power Company with all our efforts. The cores of this mission are the decommissioning and the environmental restoration.

First, let me begin with a topic on our efforts towards the decommissioning.

Accelerating the decommissioning

In order to promote the decommissioning, we need to investigate what happened in the reactor cores and how they are now. JAEA analyzed what happened in the reactor cores at the accident using the Accident Analysis Code. Also we have been estimating the characteristics, components and amount of fuel debris (debris: nuclear fuel assembly once melted and then solidified with the other materials in the reactor core) in the reactor cores using this code. Moreover, we have developed an optical fiber that is proof against high radiation dose. Using this fiber, we have been developing instruments that can observe inside of the real reactor cores.

The estimation of the status in the reactor cores will lead to the extraction of fuel debris from the reactor cores as a next step. However, due to the high radiation doses in the reactor cores, it is not easy for a person to approach them. Therefore, we have been developing remote-controlling instruments. We are also planning to conduct demonstration tests to confirm that these

remote-controlling instruments will surely work in the real reactor cores.

JAEA is preparing to construct a Remote-Control Technology Development Center in Naraha Town. In the Test Facility of this Center, we will construct a laboratory where the leaking point at the lower part of the reactor vessel is simulated. Using this laboratory, the demonstration tests to repair the leaking point using robots and training for operators to improve their skills will be conducted.

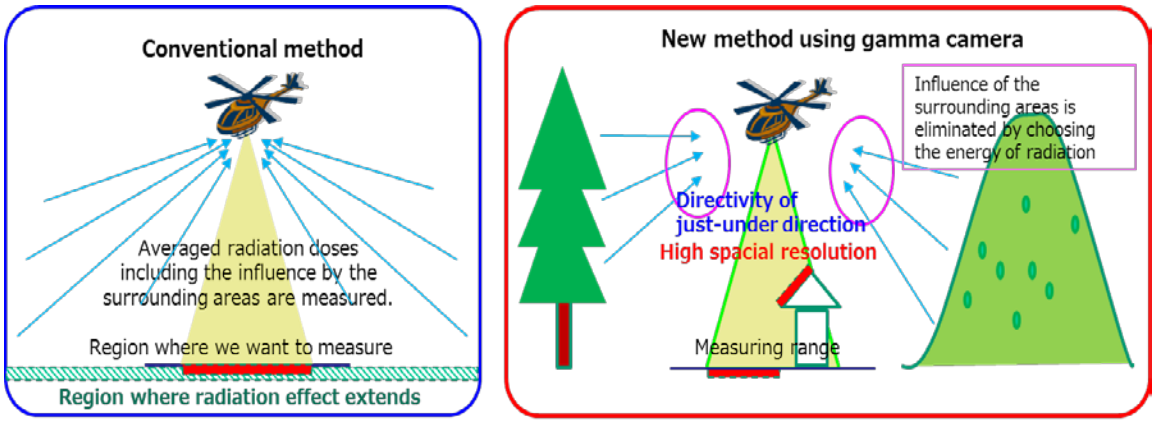
Assuming the necessity to cut the debris in future, JAEA is developing tools suitable for such works and conducting experiments to cut debris using imitated test material.

At the real site of the reactor, it is important to analyze the concentration of radioactive materials and their migration processes. In the reactors, a large amount of radioactive cesium-137 remains, and a part of cesium-137 is migrating from the reactor building to contaminated water. A prompt countermeasures to prevent such migration is being required. Also JAEA has been investigating the routes of underground water flowing within the site. The results have been reflected in the construction to prevent contaminated water from flowing into the harbor.

Advancing environmental restoration effectively

Regarding the environmental restoration, JAEA has been focusing on investigating how much radioactive materials exist and how they migrate if they actually move.

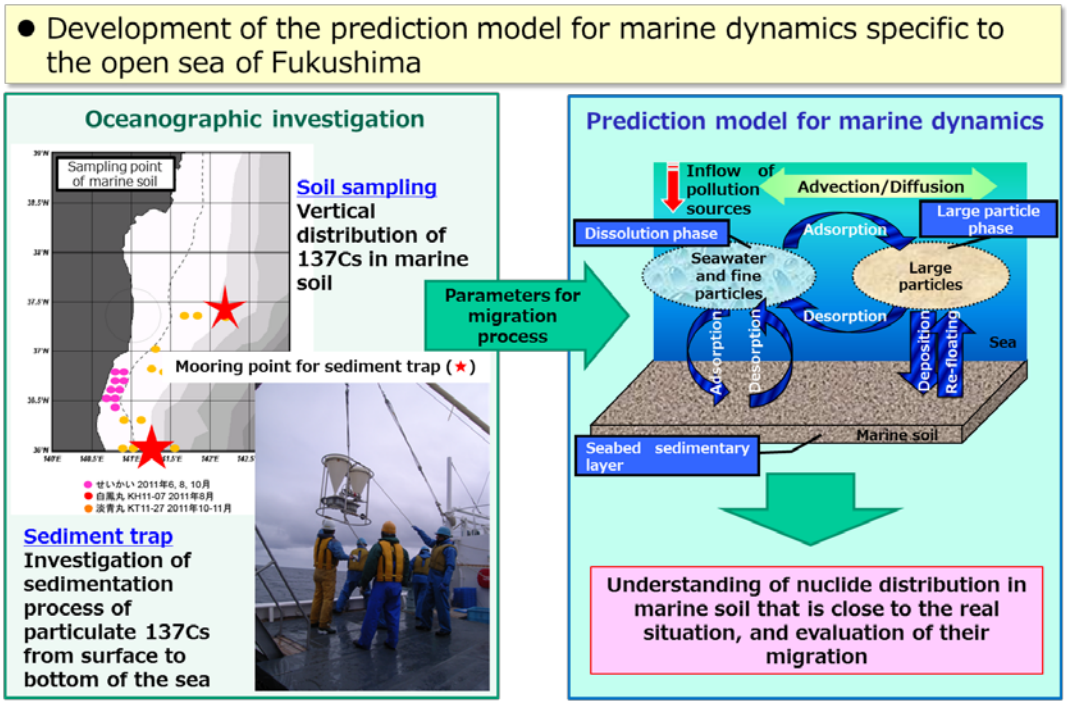
In mountain forests and rivers, for example, it is difficult for a person to measure radiation dose rates by entering there, so we have been measuring the dose rates using unmanned helicopter equipped with radiation detectors. However, the spacial resolution of this method had been limited to the averaged values of several ten to a hundred and several ten meters in diameter. Therefore we improved the performance of the radiation detectors by contriving the method for the measurements. As a result, the spacial resolution of the measurements has improved down to the averaged values of ten meters in diameter. Thus it has become possible to investigate more precise radiation maps from the sky (see lower figure).



Plastic Scintillation Fiber (PSF) is a radiation detector that has an excellent property to measure two-dimensional radiation mapping, because it has a long detection part. Instruments measuring radiation distribution using PSF have been so far used for the measurements in a wide area before and after decontamination or measurements of radiation distribution at the bottom of ponds. JAEA has extended the length of the detection part in PSF up to 50 meters. Thus it has become possible to measure the radiation around a contaminated water tank by putting the PSF around the tank. We confirmed that this type of PSF can be used for detecting the leakage of radioactive materials from a tank (shown in the right photo).

For soil in Fukushima Prefecture, there are many cases where radioactive cesium is trapped in weathered biotite (black mica), which is one of clay minerals. We have analyzed the mechanism where weathered biotite adsorbs cesium at atomic scale. We can expect that the application of the analyzed results will contribute to the stability evaluation of contaminated soil in interim storage facilities and the development of method for volume reduction in waste disposal.

In environmental dynamics research to investigate how radioactive materials migrate if they move, we have made a model for migration process of radioactive materials by monitoring them continuously. Using this model, we predict the future migration in land areas including rivers, ponds and dams. In sea region, we have developed prediction model for marine dynamics based on the results of radiation monitoring in seawater and soil. Using the model, we predict the radiation doses in the bay of the Fukushima Daiichi Nuclear Power Station and open sea of Fukushima Prefecture.



In order to develop medium- to long-term technology required for promoting decommissioning, the government plans to construct the International Cooperative Research Center for Decommissioning (temporary name) as a base of cooperative research for industry-academic-government. About 100～150 domestic and oversea researchers will participate in this organization. JAEA will play a central role in this Research Center.

This Research Center consists of the Analysis and Research Center in Okuma Town as a facility for analysis/research of radioactive materials, the above-mentioned Remote-Control Technology Development Center in Naraha Town, and other facilities. A detailed designing of the Analysis and Research Center in Okuma Town will begin in the next fiscal year. In this Center, we will accept high-radiation secondary wastes generated from contaminated water and fuel debris in the Fukushima Daiichi Nuclear Power Station, as well as low-radiation rubbles. There, we will develop analytical methods for radionuclides which are difficult to be measured, and conduct research on upgrading of the methods for radiation monitoring. Besides, we are also planning to construct the International Cooperative Research Building as a base for the development of human resources.

In addition to these facilities, the accumulation and preservation of information (making archives) are also important. At present, there are approximately 50,000 pieces of internet-based information of governmental organizations and about 1,300 pieces of information on oral presentations in academic conferences in Japan. We will disseminate such recorded information to all over the world, along with compiling and storing the information.

JAEA will surely aim at contributing to the decommissioning and environmental restoration of Fukushima by promoting such efforts in close collaboration and cooperation with the related organizations.

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