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On-Site Analysis of Volumes and Chemical Compositions of Radioactive Materials

Development of Mobile Laboratories

The generator is separated for a design that prevents vibrations and noise from directly being relayed

The Japan Atomic Energy Agency (JAEA) has developed mobile laboratories capable of inspecting on-site, the nuclides, volumes and chemical composition of radioactive materials contained in soil or river water. They are the truck vehicles equipped with devices such as the one capable of analyzing the density and chemical composition of radioactive materials contained in a sample of the environment. With them, samples that normally would be subject to elapsed time from collection or disturbance during transportation causing a change in the components may be analyzed on-site. As JAEA is investigating how radioactive materials from the Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station are diffusing and moving through the environment, these laboratories were developed in the course of these studies.

JAEA has been making efforts in environmental studies of investigating how radioactive materials are diffusing and moving through the environment, and until recently, collected samples were transported to an analysis facility within the city of Fukushima where then the samples would be analyzed. However, as this transportation of samples required time, the components of river water would change with time after collection. Also, vibrations from the transportation would cause changes in the distribution and diameters of soil particles.

In view of such problems, JAEA has developed mobile laboratories by equipping large-sized truck vehicles with facilities such as a generator (**Photo – Top Right**), exhaust and drainage equipment, plumbing installations, and a lab bench (**Photo – Top Left**) in order to enable analysis and measurement at the sites of the collection of samples. One of these laboratories is equipped with a HP-Ge semiconductor detector (**Photo – Left**) that is capable of measuring gamma rays within the environmental sample. Also there is a


Inside the Vehicle

laboratory, depending on the method for analysis of the collected sample, may be mounted with an X-ray analyzer, an X-ray fluorescence spectrometer, high-performance liquid chromatography, a UV-visible light absorption photometer, an infrared spectrophotometer, a laser diffraction particle size distribution analyzer, and a total organic carbon analyzer. With this, it has now become possible to analyze not only the density of the radioactive materials of the sample, but the particle diameters of the contained particles, the content and molecular distribution of organic matter, the pH, and other chemical compositions, etc. at the site.

This vehicle is scheduled to be used for measurements at rivers, damns, and reservoirs, etc. in Futaba and Okuma Towns. With this, samples can be analyzed immediately after collection, enabling structuring of a further precise Cs transporting model.

Operation of the Sasakino Analytical Laboratories

As a base for various monitoring inspections such as analysis of radioactive materials contained in soil and water, JAEA and the Environmental Radioactivity Monitoring Center of Fukushima have jointly established analytical laboratories in Sasakino of Fukushima City, and have started the operation of the facilities on September 19th, 2012.

The analytical laboratories are three stories high, consisting of the first floor level being the analytical and testing laboratories of the Environmental Radioactivity Monitoring Center of Fukushima, the second floor level being the laboratories of JAEA, and the third floor level being the offices of both organizations.

This is where JAEA analyzes environmental samples such as the soil samples that are collected during environmental monitoring. The analytical laboratories also have monitoring vehicles and whole body counters in order to measure and evaluate the internal exposure of the staff, and are making efforts in cooperation with the national government and Fukushima prefecture towards recovery of the environment.

Exterior of Analytical Laboratories	**HP-Ge Semiconductor Detector Laboratory**
Monitoring Vehicle	**Whole Body Counter**