



TOPICS Fukushima

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Germanium semiconductor detector (Sasakino Analytical Laboratories, Fukushima City)

## Providing highly reliable data on radioactivity measurements

### Acquiring certification of international standards as a laboratory for radioactivity measurement

The Sasakino Analytical Laboratories of the Japan Atomic Energy Agency (JAEA) recently acquired certification as an ISO/IEC 17025 laboratory for radioactivity measurement. ISO/IEC 17025 is an international standard established by the International Organization for Standardization (ISO) which sets forth general requirements for the competence of testing and calibration laboratories. As of October 2015, the Sasakino Analytical Laboratories is the only research institute in Fukushima Prefecture which has acquired this certification in the field of radioactivity measurement.

First, let us explain a little about international standards.

Due to the globalization of the world, international standards and rules are being established as a framework for compliance. Within this framework, ISO establishes standards for industry and the other fields. You may be familiar with the ISO 100 and ISO 400 standards indicating film sensitivity, but there are many other ISO standards such as ISO 9000 for quality management, ISO 14000 for environmental management, and ISO 31000 for risk management. To put it simply, these international standards are expanding their focus from "things" to entire systems.

The ISO/IEC 17025 standard establishes rules for certifying that laboratories conducting inspection and calibration in various fields have the competence required by ISO. A "certified" mark is provided on certificates issued by the laboratories

that have acquired this certification through a public examining authority. This mark is internationally accepted evidence of reliability.

ISO/IEC 17025 sets forth standards for various products, and the corresponding testing, inspection and calibration methods. The scope of the products is broad, ranging from electrical products to machinery, foods, and many other items. No matter what the field, acquiring this certification involves meeting not only technical requirements such as management of precision during testing and calibration, but also a comprehensive, high-level quality management system including auditing.

Sasakino Analytical Laboratories has acquired certification as a laboratory for radioactivity measurement. Throughout Japan, a total of about 60 organizations and laboratories have been certified by ISO for radioactivity analysis.

The following are the reports on the interview with Dr. Jun Saegusa (**lower-left photo**), Principal Scientist of Fukushima Radiation Measurement Group, Fukushima Environmental Safety Center, JAEA. Dr. Saegusa was involved in the effort to acquire this certification.

**Q: Could you explain about the works at the Sasakino Analytical Laboratories?**

**Dr. Saegusa:** The Sasakino Analytical Laboratories opened in September 2012, and started measurement in January 2013. Here, we mainly measure the radioactivity of environmental samples using germanium semiconductor detectors. We are measuring about 1,000 samples per month, and have analyzed approximately 21,000 samples thus far.

Most of the samples are related to JAEA's original research on the behavior of radioactive materials. More specifically, these samples include soil, water, and dust in the air from inside Fukushima Prefecture. We are also measuring the other samples such as monitoring samples periodically taken by the Nuclear Regulation Agency, and standard samples concerning decontamination from the Ministry of the Environment.

Since only gamma-rays can be detected using germanium semiconductor detectors, we are developing technology to analyze tritium and strontium which do not emit gamma-rays.

In addition to these works, we are conducting, 1) characteristic tests for radiation detectors, 2) measurements of internal exposure using whole body counters, and 3) development of radiation measurement using monitoring cars. About 30 staff are working in this Laboratories.

**Q: Where does the JAEA have other facilities for analyzing radioactivity?**



**Dr. Saegusa:** In terms of large-scale facilities, there are the Radiation Protection Departments in the Nuclear Science Research Institute and the Nuclear Fuel Cycle Engineering Labs, both located in Tokai, and they measure a few thousand samples per year. In addition, analyses are being conducted in individual facilities and laboratories for the purpose of radiation control and their original research and development.

Immediately after the accident of the Fukushima Daiichi Nuclear Power Station, the need for the radiation measurements of environmental samples has rapidly increased. Before the Sasakino Analytical Laboratories was constructed, these samples were sent to the facilities in Tokai and Oarai for measurements. Now the Sasakino Analytical

Laboratories measures about 10,000 samples per year, so the Laboratories became one of the JAEA's top facilities in terms of the number of samples measured.

**Q: What is your motivation for trying to acquire ISO/IEC 17025 certification?**

**Dr. Saegusa:** Quality and reliability of analysis are very important in radioactivity measurement. At the JAEA, there was no certified facility for assuring analysis quality. Also, due to the accident at the Fukushima Daiichi Nuclear Power Station, Tokyo Electric Power Company, the world's attention has been focused on radioactivity measurement in Fukushima. Furthermore, considering restoration of Fukushima and residents' early returning home, the results of radiation doses and radioactivity measurements are very important. We felt it was important to certify measurement results based on the international standards. This is our motivation to acquire the ISO certification as early as possible.

Let me talk about my personal affairs. In 2013, I was learning radioactivity measurements at the National Physical Laboratory (NPL) of the United Kingdom. At that time, the experts in the UK were deeply concerned about the situation in Fukushima. One day, a famous researcher in the field of radioactivity measurement visited the NPL. The researcher said, "I am doubtful about the reliability of measurement results in Fukushima." I replied, "The software used for the analysis is a customized version developed in the US." Then the researcher understood the reliability of the measurement results. Looking at Japanese radioactivity measurement technology from a global perspective, I realized then that it was still not fully trusted. So, I keenly felt the need for public certification.

We ourselves proposed acquiring ISO/IEC 17025 certification. This was achieved through repeated investigation and discussion by the staff in charge. I hope this sort of bottom-up realization will serve as a model at the other laboratories. Also, I believe these efforts comport well with the "independent action" advocated by the President of the JAEA.

**Q: After acquiring the certification, the reliability of your data is improving, isn't it?**

**Dr. Saegusa:** Yes. Let me take an example. After the accident, some foreign countries prohibited to import products from Fukushima and Japan. However, if at that time we had had highly reliable data on the radioactivity in the products, it would have been easier to persuade these countries regarding the safety. Some countries require that imports have evidence from an ISO/IEC 17025 certified organization. Our laboratory does not often measure food products. But from now, we expect that the measurement results obtained here will help ensure trust for exports.

**Q: I hear that ISO/IEC 17025 standards are set specifically for each object. What kinds of objects that were certified this time?**

**Dr. Saegusa:** The objects that were certified this time are radioactivity measurement of materials such as soil, water, ash, mud, plants, airborne dust, and filtrate. The measured radionuclides are cesium-134, cesium-137, etc. The measurement methods are based on the radioactivity measurement manual established by the Ministry of Education, Culture, Sports, Science and Technology. This time, we were certified using germanium semiconductor detectors. But we plan to expand the applicable scope to the other areas such as measurement of air dose rates using survey meters, and measurement using whole body counters.

**Q: What are the issues for the future?**

**Dr. Saegusa:** I believe there will be two issues going forward.



Characteristic test for detectors

Dr. Saegusa explaining to the reporter

Certificate awarding ceremony  
(The Japan Accreditation Board)

The first issue is the question of what we can do for the restoration of Fukushima. Our main tasks at present are the JAEA's research on environment dynamics and response to requests from the Nuclear Regulation Agency. I believe these tasks indirectly contribute to the people of Fukushima. However, aside from that, I'd like to see us more involved in community-based activities. For example, we hold a meeting to answer the question to ease people's worries in schools and neighborhood associations in Fukushima. In such meeting, we consider to make a system to measure radioactivity as needed. We are considering such activities in reference to the model systems for academia-industry collaboration.

The second issue is internationalization. In advanced countries, there are representative institutions and laboratories in the field of radioactivity analysis, and there are authoritative researchers representing their country at these facilities. In order to improve international recognition of the fact that we are capable of highly reliable radioactivity analysis in Fukushima, it will be necessary to develop researchers, disseminate results, and utilize the results, while making full use of facilities such as the Sasakino Analytical Laboratories.

There is also an international framework covering radioactivity measurement of environmental samples. This is the laboratory network named as Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA) created by the International Atomic Energy Agency (IAEA). When a nuclear accident occurs, reliable analysis and evaluation



Fractionation of samples



Maintenance of an instrument



Analysis of results



A staff lecturing at the personnel training course



Radiation monitoring

are carried out timely by mobilizing competent personnel from all over the world. During ordinary (non-emergency) times, ALMERA holds workshops and other events, and facilitates exchange of information and proficiency testing. While there are 150 institutions and laboratories from 84 countries participating in this organization, participation from Japan is only the Japan Chemical Analysis Center. In the Asian region, South Korea is working as the coordinating country. Unfortunately, Japan is fall behind in ALMERA, partly because there are few ISO/IEC 17025 certified institutions. First of all, we think it is important that JAEA will participate as an organization in this network. Herewith, we would like to work to improve international recognition and trust.

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