Environmental radioactivity measurement capabilities at STUK

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Measurement and Analysis laboratory corresponds of STUK's laboratory radioactivity measurements. The laboratory is an accredited testing laboratory (FINAS T167, ISO/IEC 17025:2017) and the fields of testing consist of food, work and living environment and environmental testing.

The laboratory's responsible within STUK is to maintain and develop the analytical methods for radioactive samples. In addition to the routine analytical testing, the laboratory has a significant role as the Finnish national preparedness laboratory regarding the radioactivity. In a radiological emergency, the laboratory's responsibility is to provide radioactivity analyses for the base of decision-making.

The current accredited methods include gamma spectrometric measurements of variety of sample types (environmental and industrial samples, direct measurements of people), radiochemical analyses from several matrices (Pu, Am, Cu, Sr, ^{3}H, U, Pb, Po, Rn, gross alpha), ICP-MS (inductively coupled plasma mass spectrometry) analyses (U, Th, Sr), airborne Rn measurements and sampling for the environmental surveillance of radioactivity. In addition, the laboratory maintains and develops non-accredited methods, which are either under method development (e.g. ^{3}H in air) or serve as complementary analytical tools (gross beta).

The testing services are provided for both internal and external customers. The major internal customers are the environmental radiation monitoring in the vicinities of the Finnish nuclear power plants, and the monitoring of environmental radiation in Finland. The external customers include for example international organizations, citizens, industry in Finland and abroad, and other authorities. Besides plain radioactivity measurements, the laboratory provides expert services including e.g. baseline surveys for environmental radioactivity, sampling in the vicinity of nuclear facilities and radon measurements in mines.

Annually the laboratory performs over 2000 gamma spectrometric and approximately 1000 radiochemical analyses. In addition, approximately 400 direct measurements of people and a few hundreds of ICP-MS analyses are conducted annually.

The foresight in future includes the increasing use of mass-spectrometric methods for the analyses of radioactive materials both in routine and emergency situations as well as the possible advantages offered by automation in analytics. The implementation of ICP-MS/MS to the current infrastructure and discussion of its major role in future analytics of certain radionuclides is currently in progress at STUK. Also, the utilization of XRF (X-ray fluorescence) as a complementary technique for the sample matrix characterization has been recognized as a potential addition to the current analytical instruments.

In this poster, the laboratory's current analytical activities are exhibited and future needs and insights regarding environmental radioactivity measurements are reflected. The comments and discussions as well as possible collaboration invitations on these topics are warmly welcomed during the ENVIRA 2025 conference and afterwards by a direct contact to the authors.