



IAEA

International Atomic Energy Agency

Atoms For Peace

A world class facility for the analysis of nuclear material and environmental samples

The IAEA Safeguards Analytical Laboratory

The IAEA is responsible for verifying that nuclear material held by Member States is not diverted from peaceful purposes. The Safeguards Analytical Laboratory (SAL) at Seibersdorf, near Vienna, has played a key role in the Agency's verification activities since 1976.

SAL provides accurate and timely analysis of *nuclear material* and *environmental samples*. It is part of a Network of Analytical Laboratories (NWAL), which at present consists of 14 laboratories in eight IAEA Member States.

SAL provides extremely accurate and independent measurements of the samples it receives from the IAEA's safeguards inspectors. Strict confidentiality is maintained. Findings are reported promptly to help the Agency to determine whether States are complying with their responsibility to ensure that nuclear material is not diverted.

SAL consists of two main parts — the *Nuclear Laboratory* and the *Clean Laboratory*. The Nuclear Laboratory analyses nuclear material samples and radioactive environmental samples. The Clean Laboratory screens all environmental samples provided by IAEA safeguards inspectors and analyses approximately 20% of them by highly sophisticated techniques.

The SAL complex at Seibersdorf is organized physically into three areas: *nuclear material samples*; *environmental samples*; and *non-routine samples*.

Analytical chemistry, radiometric and *mass spectrometric techniques* are used to determine the elemental and isotopic composition of nuclear material and environmental samples.

Strict quality assurance and quality control are essential for maintaining confidence in the results. External quality control is attained through SAL's participation in numerous interlaboratory comparison programmes.

SAL aims to keep pace with technological developments, and the use of sophisticated instruments, including robots, is one area of special achievement. *Mechanical* and *electronic workshops*, equipped with state-of-the-art computer hardware and software, assist the analysts in their work.

SAL staff provide comprehensive training for IAEA safeguards inspectors in taking samples of nuclear material and shipping them carefully back to SAL. Inspectors are briefed on the precautions they must take in handling nuclear samples. Training is also provided for inspectors in taking environmental samples, most of which are obtained from swipes of equipment surfaces and building structures.

In partnership with the Japanese authorities, the IAEA has established an on-site laboratory at the Rokkasho-mura reprocessing facility.

Approximately 1000 samples of nuclear material and over 600 environmental samples are received and analysed by SAL every year.



Environmental Samples

The IAEA started its environmental sampling programme in the early 1990s. SAL's Clean Laboratory is an extensive clean room facility for the handling of environmental samples from inspections worldwide. It includes facilities for sample screening and preparation of environmental swipe kits for sample collection, chemical processing and analysis.



Nuclear Material Samples

Nuclear material samples collected from all points of the nuclear material fuel cycle are processed exclusively in SAL's Nuclear Laboratory, which has been in operation for more than 30 years.



Non-routine Samples

Non-routine samples are collected by inspectors from outside a nuclear facility's material balance area. Such samples may have different forms and compositions compared with regular inspection samples and often require special handling and analytical processing.



Safeguards Sampling and Testing

A key element of the safeguards system is the physical inspection of nuclear installations by IAEA inspectors. Among other verification measures, IAEA inspectors may request nuclear material samples from various measurement points of the fuel cycle. Accurate destructive analyses of these samples are an essential element to verify that facilities meet the stringent requirements of nuclear material accounting, that all nuclear material has been correctly declared and that no diversion has occurred.



The Mass Spectrometry Laboratories determine the isotopic composition of samples at the nanogram and even femtogram (10^{-15} g) levels.

Highly sensitive secondary ion mass spectrometry allows SAL to draw spatial images of enrichment.



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A new reprocessing plant at Rokkasho-mura, Japan, started active commissioning and will require verification of large amounts of processed reactor plutonium.

