

## Incorporation Monitoring Services

Quick determination of radionuclide incorporation and dose assessment

### Challenge

Nuclear facilities, including decommissioning and dismantling projects, are obliged to monitor on-site personnel to detect an incorporation of radioactive material and to exactly determine the type of incorporation and the amount of incorporated radioactive nuclides.

In various cases, a possible incorporation must be assessed very quickly. Similar requirements apply in context of protecting the population after a severe nuclear accident.

### Solution

Our incorporation monitoring service determines the incorporated radionuclides and offers speedy in-house analyses.

Two basic methods are used:

- Excretion analysis for Uranium and  $\beta$ -emitting radionuclides (in vitro method) and
- Body counter measurement for  $\gamma$ -emitting radionuclides in the whole body and, if necessary, in the thyroid gland (in vivo method).

Upon request we also determine the resulting radiation dose caused by the incorporations.



LSC measurement of excretion samples



Body counter measurement

### Customer benefits

- Rapid results; 24/7 service upon request
- Accredited laboratory according to DIN EN ISO / IEC 17025
- Approved laboratories for incorporation monitoring according to the BFS (Federal Office for Radiation Protection)
- Reliable result of measurement, usable for dose calculation

**Your performance**  
is our everyday **commitment**

### Technical information

**Excretion analyses** (approved laboratory for incorporation monitoring, ID No. BY03)

**Typical sample spectrum:** Urine

**Analysis spectrum:**

$^3\text{H}$ ,  $^{89/90}\text{Sr}$ ,  $^{234}\text{U}$ ,  $^{235}\text{U}$ ,  $^{238}\text{U}$

**Measuring techniques used:** LSC, ICP-MS

**Detection limits:**

- Uranium: 0.2 mBq/daily urine for  $^{238}\text{U}$
- Sr: 0.1 Bq/daily urine

**Duration of analysis:**

10 working days (5 working days upon request)

**Body Counter** (approved laboratory for incorporation monitoring, ID No. BY04)

**Detectors:**

- Pure Ge detector with electrical cooling (relative efficiency 80%)
- $\text{LaBr}_3$  scintillation detector

**Measurable nuclides:**  $^{51}\text{Cr}$ ,  $^{54}\text{Mn}$ ,  $^{57}\text{Co}$ ,  $^{59}\text{Fe}$ ,

$^{60}\text{Co}$ ,  $^{65}\text{Zn}$ ,  $^{95}\text{Zr}$ ,  $^{103}\text{Ru}$ ,  $^{106}\text{Ru}$ ,  $^{110\text{m}}\text{Ag}$ ,  $^{123}\text{I}$ ,

$^{124}\text{Sb}$ ,  $^{125}\text{Sb}$ ,  $^{131}\text{I}$ ,  $^{134}\text{Cs}$ ,  $^{137}\text{Cs}$ ,  $^{140}\text{Ba}$ ,  $^{144}\text{Ce}$

**Typical limits of detection (10 min measurement):**

$^{60}\text{Co}$ (whole body, 70 kg)	120 Bq
$^{131}\text{I}$ (thyroid gland)	90 Bq

### Key figures

> **3 000** in vitro urine measurements

> **9 000** in vivo (body counter) measurements performed

**Contact:** [radiochemistry@framatome.com](mailto:radiochemistry@framatome.com)  
[www.framatome.com](http://www.framatome.com)

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