

## Background

At the SCK-CEN different specialised services are delivered for a whole range of external and internal customers in the radiation protection area. For the expertise group of radiation protection dosimetry and calibrations, these services are organized in four different laboratories: dosimetry, anthropogammametry, nuclear calibrations and non-nuclear calibrations. The services are given by a dedicated technical staff who has experience in the handling of routine and specialised cases. The scientific research that is performed by the expertise group makes sure that state-of-the-art techniques are being used, and that constant improvements and developments are implemented. Quality Assurance is an important aspect for the different services, and accreditation according national and international standards is achieved for all laboratories.

### 1. Dosimetry Laboratory

In the legislation dose limits are foreseen for workers who work with ionising radiation. To control these dose limits, the workers need to wear a legal dosimeter. The dosimetry service of the SCK-CEN is providing and evaluating these dosimeters to workers in the nuclear industry and the medical sector. At present more than 6000 workers are followed on monthly bases with our thermoluminescent detectors. We are also the first service in Belgium to be accredited for whole body dosimetry according to the ISO 17025 standards. Next to whole body dosimeters, the dosimetry service also supplies extremity dosimeters and neutron dosimeters to different customers. At several places around nuclear installations an environmental dosimetry system with passive dosimeters is set-up and operated by the dosimetry service.



Figure 1: The thermoluminescent dosimeters of the SCK-CEN

### 2. Anthropogammametry Laboratory

Anthropogammametry is the direct measurement of internal contaminations in the human body. Radionuclides are identified and their activity is quantified. To detect small amounts of radioactivity, measurements are carried out in shielded rooms to reduce background radiation

Two methods are used in routine to evaluate the activity in human bodies. First method is Whole Body Counting. Measurement is done with a large NaI(Tl) scintillator detector to obtain good efficiency results. Secondly lung measurements are carried out especially to investigate possible inhalation of plutonium. Measurements are done by measuring the daughter nuclide  $^{241}\text{Am}$ . This is done by use of Low Energy Germanium detectors to have good resolution. About 750 WBC measurements and around 100 lung measurements are carried out yearly in the Anthropogammametry laboratory of the SCK•CEN.

The laboratory obtained accreditation for Lung measurements of  $^{241}\text{Am}$  and for WBC measurements based on measurements carried out with different nuclide sources brought in a nylon modular phantom by the Belgian accreditation organisation BELTEST.

The modular phantom can be used to model different human postures. The laboratory is equipped with a software system that manages all the information related to planning of measurements, measurement setup, person information, spectrum acquisition, spectrum analysis, reporting and verification of results.

### 3. Nuclear Calibration Laboratory

The laboratory for nuclear calibration of SCK•CEN is equipped with different high activity gamma, neutron sources and an X-ray tube used for calibration of nuclear measurement equipment as neutron-, gamma-, X- and beta monitors as well as EPD's. The sources are also used for irradiation of various kind of samples for dosimetry and biology lab's or for scientific experiments. The sources are mounted in different beam geometries for horizontal, vertical or panoramic irradiations.



Figure 2: Preparation of doseimeters for panoramic irradiation



Figure 3: Setup for calibration of WBC system with modular nylon phantom and NaI detector.

More than 300 irradiations are carried out yearly and about 50 instruments are calibrated according to ISO standards for neutron (ISO-8529) and gamma-monitors (ISO-4037). The laboratory has accreditation for neutron and gamma calibrations, obtained by the Belgian accreditation organisation BKO.

### 4. Laboratory for non-nuclear calibrations

The laboratory for non-nuclear calibrations started its activities in 1996 as part of the rapidly expanding QA activities at the SCK-CEN. The first accreditation certificates were received in 2001. Presently calibrations are done in the following areas: thermometry, mass, geometry, relative humidity, electrical quantities and pressure. In 2006 in total 230 calibration certificates in these areas were delivered.

### Main contact persons

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