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Internal exposure monitoring for Polish nuclear facility personnel –current and future status

The National Centre for Nuclear Research (NCBJ) is one of the largest science institutes in Poland and the operator of MARIA nuclear reactor. The NCBJ encompasses: 17 divisions (11 research and 6 development), which include among others the MARIA reactor and supporting facilities. At NCBJ research in various fields of nuclear chemistry (nuclear medicine, dosimetry in radiation protection), physics (accelerator physics, nuclear physics, radiation medical physics), cosmology, advanced materials and technologies (material science, electronics and detectors for nuclear industry) are conducted. Major part of personnel employed at NCBJ is classified as workers occupationally exposed to ionizing radiation thus have to be properly monitored and covered by the radiation dose estimation procedure.

Radiation Protection Measurements Laboratory (RPML) is a science division created in order to provide constant radiation monitoring of Świerk nuclear facility along with exposure monitoring and dose assessment for NCBJ personnel. Within the structure of RPML operates a research laboratory accredited in the field of internal dosimetry and environmental radiation monitoring by Polish Centre for Accreditation (certificate No. AB 567). The laboratory offers internal exposure monitoring for NCBJ personnel and external customers, using both in vitro and in vivo methods, and also coordinates the external exposure monitoring outsourced to other laboratory. RPLM offers the wide range of internal dosimetry measurement techniques including whole body measurements, thyroid measurements and radiochemical analyses of urine samples.

The whole body counter used by RPLM allows to assess internal contamination with gamma radioisotopes at energy range between 60 and 2 100 keV and activity from 0,5 to 10 000 Bq/kg. The thyroid counter allows to measure iodine radioisotopes activity gathered in thyroid at energy range from 20 to 500 keV and activity between 200 and 100 000 Bq for 131I and from 100 to 100 000 Bq for 125I. The radiochemical laboratory is capable of analyzing urine samples for determination of HTO, 14C, 32P, 35S, 90Sr, 90Y, 210Po, 238Pu, 239+240Pu, 241Am, 244Cm, gross alpha and gross beta activity concentrations.

All mentioned techniques are covered by the quality management system compliant with the national standard ISO/IEC 17025:2018. RPLM regularly participates in international laboratory comparisons. The results of comparison are used as a quality management system development tool.

Within this study the internal exposure monitoring rules for Polish nuclear facility personnel and registered radiation dose levels will be presented.

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