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METROLOGICAL ASSURANCE PROGRAM FOR GASEOUS IONIZING RADIATION DETECTORS AT FUNDACIÓN VALLE DEL LILI

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Introduction: A resource for the continuous improvement of quality in the different healt services at the Fundación Valle del Lili in Cali Colombia, where ionizing radiation is used both in diagnosis and treatment, is achieved through the metrological assurance of the instrumentation used, such as the Geiger Müller (GM) detectors, in order to ensure their proper functioning, and thus comply with legal requirements, guaranteeing the radiological protection of the environment and people.

Material and method: The verification of these detectors made it possible to analyze the behavior against certified radioactive sources of Cs-137, taking into account the most appropriate geometry; a flat type source was used for magnitudes such as surface contamination (S_A) and a cylindrical type source was used for environmental exposure H*(10) and personal exposure H_P. The records were stored with an efficient method using a QR code for each detector, which is linked to the record format in the cloud where the information is stored. Following the ILAC -G24 OIML D10, 2007 guide, method 1 (M1) was implemented through a retrospective analysis of the constancy in previous calibrations, in addition method 4 (M4) was applied by performing intermediate verifications to evaluate in both cases if the equipment operates within the tolerance range.

Results: The results of 50 detectors of this type were evaluated, in order to assess their performance, which should be within ±30% of the expected response, even for the retrospective analysis on the results of previous calibrations, these processes allowed the extension of the calibration intervals of 24 equipments. For radioactive exposure, the reference value obtained for a cylindrical source representing a real geometry was considered, which had a difference of 5.24 uSv/h equivalent to 10.74% in comparison with the approximation for a point source.

Conclusions: The analysis of all the results allowed to support and strengthen the decision to extend the calibration intervals without affecting the performance of the detectors. Periodic checks ensure that the equipment is operating properly and that in the event of a possible failure, timely corrective actions can be taken, thus providing added value to the institution's radiological protection.

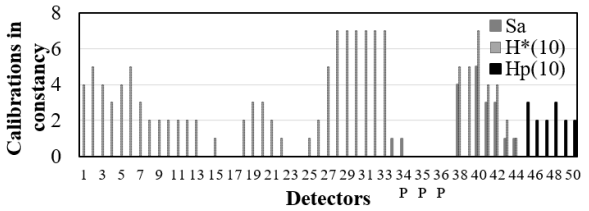

Figure 1: Results method 1 (M1) for S_A, H*(10) and H_p

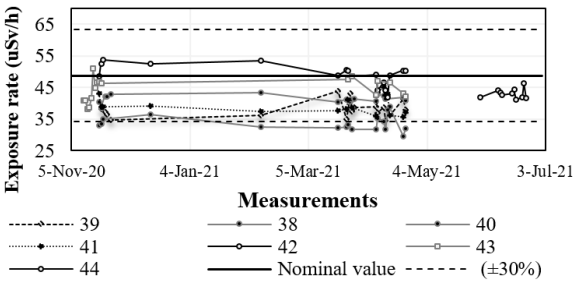

Figure 2: GM portable detectors response for H*(10) method 4 (M4)

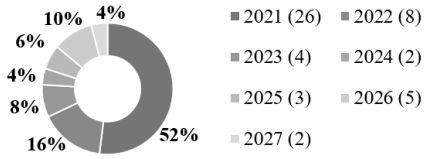

Figure 3: Extention of calibration intervals by year

References:

1. Pibida, L., R. Minniti, M. O'Brien, and M. Unterweger, *Test of radiation detectors used in homeland security applications*, Health Phys., vol. 88, no. 5 SUPPL., pp. 84–90, 2005
2. ILAC-G24 OIML D 10, *Guidelines for the determination of calibration intervals of measuring instruments*, Silverwater NSW 2128, 2007