

CONCENTRATION AND DISTRIBUTION EVALUATIONS OF TRACE AND RARE EARTH ELEMENT IN SAMPLE SEDIMENTS OF THE BILLINGS AND GUARAPIRANGA RESERVOIR SYSTEMS

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L.T. Tancredi^a, L.C. Santos, R.E. Diniz and V. Vivolo

^a taglione.tancredi@gmail.com

Nuclear and Energy Research Institute, São Paulo, Brazil

The Instruments Calibration Laboratory of IPEN calibrates annually about 75 instruments used by the radiation protection service at the nuclear reactor of IPEN. These instruments are used to personal and area monitoring and have different shapes and sizes, difficult their positioning in the calibration set up. They are calibrating usually with gamma radiation (^{137}Cs , energy of about 660 keV). The gamma radiation system was automated recently in order to decrease the occupational dose of the technicians involved and accelerate all the calibration process. With the aim of increase the range of energy available to the calibration of the radiation protection instruments used at the nuclear reactor a new X radiation system was acquired by the LCI (YXLON SYSTEM, MODEL MGC41, 320 Kv). The ISO N series radiation protection radiation qualities will be established at this system. To improve the calibration set up, initially it was made the automation of two filter wheels to insert the appropriate thickness filter to each radiation quality. Each one of the 16 radiation qualities will receive a special filter (aluminum, lead or tin). The automation was made in a wheel filter and shutter (motor and pieces) of a former X radiation system (Rigaku Denki). Using the Arduino MEGA 2560 and a C++ programming it was possible to do the wheel rotation control; it chooses the adequate filtration and the shutter position through an interactive panel facilitating operation. The panel also informs the currently shutter position and the positioned filter. The preliminary tests show precision in selecting the position of the shutter, compared with the previously system (the Rigaku Denki system electro-mechanic) which selection was imprecise and often the shutter rotated instead of stopping at the desired position or stopped at an angle where the X-ray beam remained exposed. The new system also demonstrate to be faster to select the desired filtration because the software identifies the its position and rotates the wheel by the smallest path, choosing automatically right or left direction.
