

SURFACE CONTAMINATION MEASUREMENT AT HIGH GAMMA BACKGROUND WITH INTELLIGENT DETECTORS

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Quick and accurate surface contamination measurement at high gamma dose-rate has always challenged the experts. In order to carry out this measuring task, two measuring instruments – one gamma background radiation meter and one surface contamination meter – are needed. The BNS-298 instrument was designed to measure the radioactive contamination of the spent fuel pool at Paks Nuclear Power Plant, which was contaminated during an incident in 2003. This instrument is equipped with a total gamma-beta and a gamma dose-rate transmitter. The two intelligent transmitters individually process and store the results; beta surface contamination is calculated by background subtraction in subsequent computerized data processing. Experimental measurements were carried out using similar device in the air ventilation system of Institute of Isotopes Ltd. in order to study whether radioactive contamination is detectable in the pipelines at highly fluctuating gamma background. Based on the same operational principles, the portable versions of the BNS-298, type IH-295 and BNS-295 were developed subsequently. In the case of these new versions, the evaluation of readings and calculation of surface contamination with gamma background correction are carried out by the electronics of the instrument itself, without using an external computer. Therefore the user is enabled to observe the current surface contamination and gamma background data already during reconnaissance. Total beta measuring systems operate with very similar algorithms, where the aim of the measurement is the determination of beta activity instead of surface contamination calculations. Two intelligent scintillation type detectors integrated in a low-background measuring station are operating simultaneously to perform this measurement. The use of sandwich type scintillation crystals allows selection of the light coming out of different layers of the scintillator, that's why such measurements can be carried out using a single detector as well. During the elaboration of the topic, measurement procedures, algorithms and results of various cases of measurements are described.