P18 AN OVERVIEW OF THE GASEOUS RADIOACTIVE EFFLUENTS CONTROL AND RADIOACTIVITY ASSESSMENT IN THE ATMOSPHERIC AIR AT IPEN'S CAMPUS

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The routine operation of a nuclear or radioactive installation generally involves the release of radioactive liquid and/or gaseous effluents. At the Nuclear and Energy Research Institute – IPEN there are several nuclear and radioactive facilities, developing activities in the field of nuclear energy. IPEN's Radioprotection Management has established a radioactive effluent sampling program to determine the amount of radioactive material (source term) released into the environment and to detect immediately any unplanned release above the pre-established operating limits. The IPEN Environmental Radiological Monitoring Program – ERMP evaluates the levels of radioactivity to which individuals of the public are exposed through the analysis of atmospheric samples; the main objective of an ERMP is the confirmatory radiological control, which estimates whether the assumptions made in the calculation of the dose, from the source term, are correct. The objective of the present work is to present the gaseous radioactive effluents control and the radioactivity assessment in the atmospheric air at IPEN's campus, since there were implanted in 1988 at the Laboratory of Environmental Radiometry of IPEN. In both, gaseous radioactive effluents control and radioactivity assessment in the atmospheric, cellulose and charcoal cartridge filters are analyzed by gamma spectrometry – HPGe weekly, from the IPEN's radioactive facilities, Accelerators and Cyclotron Center, IEA-R1 Research Reactor Center, Radiopharmacy Center - Building I and II and each 15 days collected from three air samplers located near the nuclear and radiation facilities of IPEN, respectively. The radionuclides determined in the majority of the samples throughout the sampling period were ^{131}I, ^{18}F and ^{67}Ga.

P46 NUCLEAR FORENSICS: STRATEGIES AND ANALYTICAL TECHNIQUES

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The use of environmental monitoring as a technique to identify activities related to the nuclear fuel cycle has been proposed, by international organizations, as an additional measure to the safeguards agreements in force. The elements specific for each kind of nuclear activity, or "nuclear signatures", inserted in the ecosystem by several transfer paths, can be intercepted with better or worse ability by different live organisms. Depending on the kind of signature of interest, the anthropogenic material identification and quantification require the choice of adequate biologic indicators

and, mainly, the use of sophisticated techniques associated with elaborate sample treatments. This work demonstrates the technical viability of using pine needles as bioindicators of nuclear signatures associated with uranium enrichment activities. Additionally, it proposes the use of a technique widely diffused nowadays in the scientific community, the High Resolution Inductively Coupled Plasma Mass Spectrometer (HR-ICP-MS), to identify the signature corresponding to that kind of activities in the ecosystem. It can be also found a description of a methodology recently being applied in analytical chemistry, based on uncertainties estimates metrological concepts, used to calculate the uncertainties associated with the obtained measurement results. Nitric acid solutions with a concentration of 0.3 mol kg^{-1}, used to wash pine needles sampled near facilities that manipulate enriched uranium and containing only 0.1 g kg^{-1} of uranium, exhibit a ^{235}U:^{238}U isotopic abundance ratio of 0.0092 ? 0.0002, while solutions originated from samples collected at places located more than 200 km far from activities related to the nuclear fuel cycle exhibit a value of 0.0074 ? 0.0002 for this abundance ratio. Similar results were obtained for sample solutions prepared by microwave assisted acid digestion and dry ashing process. The different values of ^{235}U:^{238}U isotopic abundance ratio obtained for samples collected in different places permit to confirm the presence of anthropogenic uranium and demonstrate the viability of using this technique and the methodology proposed in this work.

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BRAZILIAN NETWORK OF LABORATORIES ON NUCLEAR FORENSIC SCIENCE (BNLNFS)

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The Brazilian Network of Laboratories on Nuclear Forensic Science (BNLNFS) was created in 2007 with support of IAEA's the Department of Nuclear Security. The main roles of the laboratory are: the development of procedures for characterization of the radioactive or nuclear material in order to determine its production site, production date, intended use, and the route from production site to the crime scene, training and education in nuclear forensics. The network uses a variety of techniques to characterize materials, including nuclear counting, analytical chemistry, radiation measurements, and various radiography techniques. Thus, based on the scientific expertise of IPEN's nuclear scientists and existing infrastructure The network gathers six laboratories located at Nuclear and Energy Research Institute, São Paulo, IPEN's Department of Radiological Protection, and has the support of CNEN's Poços de Caldas Laboratory, Rio de Janeiro, and São Paulo State Police, São Paulo and Federal Police, Brasília. During the exercises, the associated laboratories have to follow all procedures recommended by IAEA to conduct a nuclear forensic investigation.