



Use of NaI(Tl) Detectors for Environmental Gamma Survey and Background Radiation Mapping of Venues and other Strategic Locations for Major Public Events

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2016 Rio
norm VIII

Eighth International Symposium on Naturally
Occurring Radioactive Material – NORM VIII
Rio de Janeiro, Brazil, October 18 -21, 2016



Principal Remarks



- Alteration of the natural or original radiometric pattern due the presence of NORM (decorative stones, concrete structures, highways, viaducts, tunnels, built for the 2016 Rio Olympics).
- One of the most important tasks to be performed before the MPE occurs is the background radiation mapping of venues, and this data will serve as baseline for natural radioactive level.
- In urban areas the dose rate will depends mainly on the type of material present . The results obtained in an urban area should be analyzed in conjunction with several other factors.
- Mobile NaI(Tl) gamma spectrometers with GPS / *wifi* / GSM are very versatile detectors. They are capable to localize and identify the radiation sources and make radioactivity maps.
- The detectors use in this work, AT6101c were stabilized and checked against the planar sources at IRD and were checked against NORM sources and test sources: ^{226}Ra , ^{137}Cs and ^{60}Co . The measures were compared against others detectors.
- Most of the alarms of gamma radiation at these venues are from NORM (Potassium, Uranium and Thorium) and medical isotopes (^{99}Tc , ^{131}I the most commons). In the portals with X-Ray monitors or near mobile X-Ray machine detectors the AT6101c is also capable to detect the X ray radiation , with the indication of *b-rad* – Bremsstrahlung radiation.
- At the “Engenhão” Stadium (NILTON SANTOS ARENA) the mean value of $H^*(10)$ was 190 nSv/h with standard deviation of 38 nSv/h. The minimum and maximum values are 103 and 351 nSv/h. These values are higher than normal background but it should be noted the stadium is not a natural environmental.



Figure 1: Background alteration



Figure 2: Detectors Intercomparison



Figure 3: Use the planar source at IRD

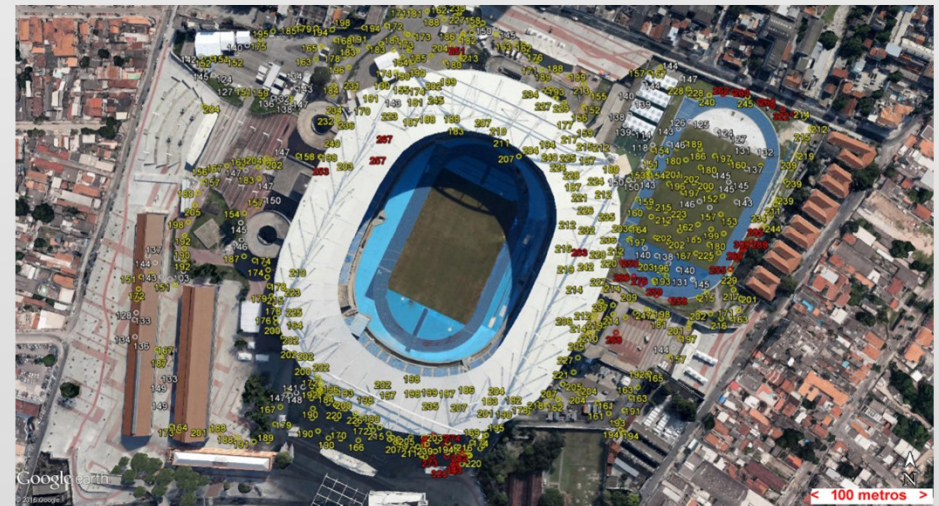


Figure 4: Surveys results at "Engenhão" Stadium