NATURALLY OCCURRING ARSENIC AND RADIOACTIVITY IN THE NEAPOLITAN VOLCANIC PROVINCE AS A SOURCE OF A POTENTIAL HAZARD FOR HUMAN HEALTH

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The Neapolitan Province is located in the Campania Region, along the Tyrrhenian coastline, in one of the most densely populated active volcanic areas of the Earth. More than 3 million people inhabit the 1171 sq km area including Napoli city. The geology of the area is prevalently represented by volcanics, erupted from the Upper Pleistocene to Recent by Mt. Somma-Vesuvius on the east, by Ischia and Campi Flegrei volcanic fields on the west and by different ignimbrite eruptions (Campanian Ignimbrites) originated by fissural volcanic activities developed along fractures activated in the Campanian plain. Geochemical studies carried out on soils of the Neapolitan Volcanic Province (NVP) showed that soils are naturally enriched in As and its background values range between 10 and 19 mg/kg. Concentrations rise up to 150 mg/kg in correspondence with areas where ascent of geothermal fluids occur on the surface such as the Bagnoli brownfield area, the Pozzuoli and the Flegrean Littoral (Cicchella et al., 2005. GEEA, 5, 29–40.). Due to its volcanic nature, the whole NVP territory is also characterized by a natural radioactivity which basically is 2-3 times higher than the areas of Campania region where volcanics are not present or where they are present as a thin pyroclastic layer: total radioactivity (E>0.40 MeV) is generally <40 Bq over silico-clastic and carbonatic deposits of the inland areas and >120 Bq in the provincial area of Napoli, where the Mt. Somma–Vesuvius and Campi Flegrei volcanic complexes occur (Lima et al., 2005. Appl. Geoch., 20, 611-625). Distribution of As and natural radioactivity data obtained for the NVP have been spatially compared with cancer mortality data distribution (Montella et al., 1996. Lega Italiana per la Lotta contro i Tumori, Istituto Nazionale Tumori, Napoli) to evaluate if any correlation occurs between geochemical and epidemiological data (Albanese et al., 2008. In: Environmental Geochemistry: Site characterization, Data analysis and Case histories, Elsevier, 391-404). As matter of the fact, in the NVP the mortality rate for leukemia is higher than the regional average suggesting the existence of a potential relationship with the natural occurring radioactivity. Furthermore, liver cancer is also well correlated with As-rich areas, although such a correlation by no means implies that the naturally occurring As is a primary cause of this increased cancer risk.

Keywords: arsenic, radioactivity, cancer risk