JEP> Vol.2 No.8, October 2011

OPEN ACCESS

Environmental Distribution of the Radon in a Heavily Populated Area: Preliminary Hazard Evaluation and Inference on Risk Factors in Pescara, Central Italy

PDF (Size:756KB) PP. 1118-1126 DOI: 10.4236/jep.2011.28130

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ABSTRACT
The presence of ionizing sources is a high-risk condition if related to a poor management of the hygiene and health of the anthropic environment. Increased hazard derives from the addition of artificial sources to natural sources and the consequent possible late occurrence of epidemic cancer. Therefore, the expenses for medical treatments and potential losses of human lives are thought to be relevant. Although the role of natural exposure is still poorly assessed, it is reasonable that it accounts for a chronic hazard, while the artificial one may constitute an acute hazard. In theory, the medium and large-scale monitoring of the Radon is simple and can be applied in detail to sensible targets. However, mitigation of Radon risk is particularly complex due to the intrinsic structural vulnerability of the urban environment and the general lack of epidemiological data that constrain the extent of specific biological damage. In Italy was suggested a limit to the exposure in working place, instead limits for other private and public facilities are not well established. Despite legal advice, the sensitivity of the social system is low due to the elusive nature of the Radon hazard, and the case considered in this paper account for unpreparedness of the Sanitary and Environmental Authorities when facing to a possible crisis. A monitoring field survey revealed Radon concentrations of at least three times higher than that expected geologically in a fairly localized area of Pescara, Central Italy. The values are about 25 - 30 times the maximum allowed in the buildings. However, these measures are underground and average indoor values in the area were still acceptable. The measures repeated after a year confirms an upward tendency of the previous values. However, it was not possible to go deeper in the investigation about the nature of this underground anomaly because of the strong opposition of some members of the Environmental and Sanitary Authorities. Some rumours filtered by one of this Institution, suggesting a possible correlation of the anomaly with the uncontrolled disposal of radio-iridium needles used in the nearby hospital. A further legal action instructed against the Author discouraged the publication of the data so far. This account for a situation of increased risk. Even if hazardous natural Radon emissions can be investigated, it is difficult to evaluate vulnerability factors related to non-natural diffusion of radio-nuclides progenitors of the Radon (i.e. uranium and radium). Confidence on notional calculation of the hazard by means of algorithms, decreases the alert threshold and promotes the potentially involved authorities to discourage further studies. This increases the vulnerability of the system. Due to negligence and violation of safety norms in Italy, accidents involving ionization agent dispersion in the environment are likely and are an instructive study case. The result of this study may promote mitigation actions and, hopefully, a decrease of the radioactivity risk in a populated area. This paper is intended as a case history depicting unexpected Radon distribution in a city. In these conditions, the density of population and the system unawareness contribute greatly to raise the risk especially if a natural explanation could not find. The suspect of an artificial source, far more hazardous than natural Radon itself, is still up for the investigated area.

KEYWORDS
Radioactive Pollution, Radon Measurements, Radon Distribution, Radon Risk Analysis, Pescara-Italy

Cite this paper
F. Stoppa, "Environmental Distribution of the Radon in a Heavily Populated Area: Preliminary Hazard Evaluation and Inference on Risk Factors in Pescara, Central Italy," *Journal of Environmental Protection*, Vol. 2 No. 8, 2011, pp. 1118-1126. doi: 10.4236/jep.2011.28130.

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