

‘WHAT’S THE NORM?’

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Naturally Occurring Radioactive Material or ‘NORM’ is ubiquitous on earth. The main components of this ambient background radiation, to which humans are exposed every day of their lives, can be divided into either (a) shorter-lived and constantly replenished cosmogenic nuclides (e.g., ^7Be , ^{14}C) or (b) very long-lived, primordial species including ^{40}K , $^{235,238}\text{U}$ and ^{232}Th . This talk will discuss the origins and typical activity levels of NORM and demonstrate how basic high-resolution gamma-ray spectrometry measurements can be used to determine baseline environmental measurements of radioactivity and its potential health effects in the environment. Examples of recent studies of NORM measurements by the Surrey group across the State of Qatar [1, 2], along beaches and rivers in Thailand [3, 4, 5] and in Libyan oil pipelines [6] will be discussed together with evidence for technically enhanced levels of NORM in specific cases.

1. H. Al-Sulaiti *et al.*, *A preliminary report on the determination of natural radioactivity levels of the State of Qatar using high-resolution gamma-ray spectrometry*, Nucl. Instrum. Methods Phys. Res., Sect. A **619**, 427 (2010).
2. H. Al-Sulaiti *et al.*, *Determination of the natural radioactivity in Qatari building materials using high-resolution gamma-ray spectrometry*, Nucl. Instrum. Methods Phys. Res., Sect. A (in press).
3. T. Santawamaitre *et al.*, *An evaluation of the level of naturally occurring radioactive material in soil samples along the Chao Phraya river basin*, Nucl. Instrum. Methods Phys. Res., Sect. A **619**, 453 (2010).
4. T. Santawamaitre *et al.*, *Study of natural radioactivity in riverbank soils along the Chao Phraya river basin in Thailand*, Nucl. Instrum. Methods Phys. Res., Sect. A (in press).
5. D. Malain *et al.*, *Measurements of NORM in beach sand samples along the Andaman coast of Thailand after the 2004 tsunami*, Nucl. Instrum. Methods Phys. Res., Sect. A **619**, 441 (2010).
6. A.S. Habib *et al.*, *The use of MCNP and gamma spectrometry in supporting the evaluation of NORM in Libyan oil pipeline scale*, Nucl. Instrum. Methods Phys. Res., Sect. A **619**, 245 (2010).