

# International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry

VIRTUAL EVENT

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## NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM): A CASE STUDY OF NIGERIA

Naturally Occurring Radioactive Materials (NORM) consist of materials, usually industrial wastes or by-products enriched with radioactive elements found in the environment, such as uranium, thorium and potassium and any of their decay products, such as radium and radon.

Natural radioactive elements are present in very low concentrations in Earth's crust, and are brought to the surface through human activities such as oil and gas exploration or mining, and through natural processes like leakage of radon gas to the atmosphere or through dissolution in ground water

Naturally occurring radioactive materials (NORM) are found almost everywhere. NORM is inherent in many geologic materials and consequently encountered during geological related activities. NORM encountered in hydrocarbon exploration and production operations originate in subsurface formations that may contain radioactive materials such as Uranium and thorium and their daughter products,  $^{226}\text{Ra}$  and  $^{228}\text{Ra}$ . This can be brought to the surface in the surface in the produced water in conjunction with oil and gas. In addition, radon gas, a radium daughter, may be found in produced natural gas. In gas processing activities, NORM generally occurs as radon gas in the natural gas stream.

Radiation protection in exposure to natural sources has been evolving for decades. In the last two decades, developments concerning exposure to NORM have resulted in progress towards achieving broad international consensus on managing exposure to NORM. However, the standards and regulatory approaches being adopted at the national level still need to be harmonized, especially in developing countries with limited regulatory resources. A large effort is underway at the national and international level to assess exposure to NORM and to develop strategies to address existing situations that give rise to exposures. The United Nations Scientific Committee on the Effects of Atomic Radiation, in its 2008 report, encourages further development of inventories and methodologies for dose assessment in order to have a more comprehensive view over the topic.

In Nigeria and other countries, many studies have been carried out on the radioactivity matrices. It has been noted that radiation is part of the natural environment and it is estimated that approximately 80% of all human exposure comes from naturally occurring radioactive materials. Hydrocarbon exploration and production activities have the potential to increase the risk of radiation exposure to the environment and humans by concentrating the quantities of naturally occurring radiation beyond normal background levels. Researches on environment, health and safety shows that the more radiation dose a person receives, the greater the chance of developing cancer, leukemia, eye cataracts, Erythema, hematological depression and incidence of chromosome aberrations. This may not appear until many years after the radiation dose is received (typically, 10-40 years). Ogba/Egbema/Ndoni local government area oil fields produce about 80% of the total crude oil and gas supply in the Niger Delta region of Rivers state, Nigeria. Yet none of the research works done so far has addressed the NORM content of the hydrocarbon exploration and production activities and its radiological impact on the workers and the general public. There is a need to assess the Norm content of hydrocarbon exploration and production activities and to estimate the radiological health implication to the general public and oil/gas workers by Establishment of a Policy and Strategy (P&S) for NORM Waste which includes: Identification of concepts in NORM waste management, Training on the identification of NORM generating industries, NORM generation estimates, Decontamination techniques, radon measurements and NORM waste treatment and storage, Training on technical works required for waste treatment, Radiological measurements and Remediation programme of action to minimize the impact of radioactive residues on populations and to create a favourable conditions for the sustainable development of the affected territories.

However, the assessment of naturally occurring radioactive material (Norm) content of hydrocarbon exploration and production of Ogba/Egbema/Ndoni and other fields around the Niger Delta area is by determining

gross alpha and beta radioactivity concentrations. Research in the host communities show that in soil, field soil and field sediment samples, the concentration of the gross alpha and beta were higher than that of the control samples from a non- oil bearing community. Radionuclide indicates that the cause of Norm elevation which lead to enhanced gross alpha and beta radioactivity might not be from geological constituent of the area but due to industrial activity in the area.

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