

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

VIRTUAL EVENT

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NORM management in laboratory processing of heavy mineral rich sands from beach placers of Bangladesh

Abstract: Southeastern coastal belt of Bangladesh is rich in economic heavy minerals as found by the geological exploration which delineated 17 deposits in both recent and paleo dune areas. Averaging 23% heavy mineral containing sands are being processed in Beach Sand Minerals Exploitation Centre (BSMEC) of Bangladesh Atomic Energy Commission (BAEC) located at Cox's Bazar, Bangladesh. Radioactivity has been frequently reported in those heavy mineral deposits. A pilot plant and associated several laboratories at BSMEC have a unique facility to separate several heavy minerals. Among those minerals, zircon and monazite are reported as radioactive, due to the presence of naturally occurring radioactive materials (NORMs), due to which background radioactivity has been found higher in the deposit areas. These radioactivity becomes even higher when the bulk sands are processed in plant and laboratory of BSMEC and radioactive minerals are concentrated in small space. As the radioactivity becomes high, corresponding doses and their effect to laboratory and plant workers also turns out to be high. The present study determines attempts to identify the NORMs, assesses their radioactivity contents in accumulated mineral sands in pilot plant of BSMEC and their potential doses to occupational workers.

Scintillation radiation survey meter and portable radiation dose rate meter were used to determine the amount of radioactivity in counts per minute (cpm) and micro-Sievert per hour ($\mu\text{Sv/hr}$), respectively, in the laboratories and adjacent places of BSMEC. Both meters were calibrated with ^{137}Cs source. Simultaneous measurement of radioactivity and dose rate were carried out in the entire BSMEC plant and laboratory area. Background radioactivity was found as 80-100 cpm, where the dose rate was observed as 1-2 $\mu\text{Sv/hr}$ at the same place. Maximum values of radioactivity were found as 3500 cpm and 60 $\mu\text{Sv/hr}$ in some processed and stored minerals designated as radioactive concentrate. These values are 35 and 30 times higher than background condition. All data were presented in geographical information system (GIS) software and relation between activity and dose rate was evaluated. The dose rate was compared with the literature values. Based on the data, spatial distribution map of the radiation environment of BSMEC was prepared and radiation safety for the occupational workers are recommended.

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