DOSE ASSESSMENT OF MAINTENANCE WORKERS AND SIGNIFICANCE OF RADIUM-IMPREGNATED USED FILTERS IN THE PHOSPHATE FERTILIZER INDUSTRY

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ABSTRACT

Phosphate rock from Florida or the western United States is used for making fertilizer in three large plants in Alberta, Canada. With a uranium content of about 150 ppm the raw material presents some radiological problems in its processing, especially with the build-up of radium in filtration units and in the gypsum waste.

As part of a continuing investigation into the occupational hazards associated with the process surveys were conducted in the vicinity of the filtration units of the plants to assess the external doses received by maintenance workers when changing filters. The method involved shadowing the workers and measuring background exposure rates using a sensitive environmental monitor. The study showed that personnel were exposed to annual dose equivalent of from 0.2 to 0.5 mSv (20 to 50 mrem), the range relating to frequency of filter cloth change and how many shifts each change took. The results did not indicate the need for concern, although verification of the doses, by limited use of TLDs was recommended.

During use the filter cloths are impregnated with radium and part of the investigation focused on assessing the concentration. The results from all three plants showed close correlation, with specific activities ranging from 420-1220 Bq/g (11,400-33,000 pCi/g).

It was recommended that all used filters be handled with caution, and only in the damp state, and that they be disposed of within the gypsum tailings retention ponds on site, rather than in domestic landfill sites.