

A review on current status of radioactivity monitoring in Indian nonnuclear industries

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Abstract

The distribution of naturally occurring radioactive materials (NORM) generated/discharged in nonnuclear industries such as coal combustion residuals from different coal-based power plants, fertilizer, construction, tobacco, and other industries into the environment, has not been reviewed in the Indian context. In the present review, systematic survey and analysis of the reported occurrence of U²³⁸, Th²³², and K⁴⁰ in these nonnuclear industrial sectors is discussed. Most of the data compiled and described in this review are sourced from major popularly referred, peer-reviewed scientific journal publications since the year 2005. Apart from radioactivity levels in products from nonnuclear industrial sectors different radiological indices such as absorbed dose, dose rate, etc., are also compared and discussed. Overall, this review presents a comprehensive analysis of NORMs in nonnuclear industrial sectors of India.

Keywords: Fly ash, natural radioactivity, naturally occurring radioactive materials, phosphate fertilizers, rock phosphate

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INTRODUCTION

Radiation is an integral part of nearly all the materials on the earth. No field of a large-scale industry that uses natural resources as raw material remains untouched by natural radioactivity. All the places on earth show some levels of naturally occurring radioactive materials (NORMs). These NORMs are mainly radionuclides of the ²³⁸U, ²³²Th radioactive series, and ⁴⁰K. Because NORMs are of natural origin, exposure to them is not considered significant from radiation protection and control/regulation point of view. As some human activity causes increase or extraction of these naturally occurring radionuclides from their natural origin, leading to exposure to public, it becomes a matter of

regulatory concern. When the levels of NORM are elevated due to human activity, they are called as technologically enhanced NORMs (TENORM). Like the NORM, majority of radionuclides in TENORM are the radionuclides of uranium and thorium radioactive decay series. However, in most cases, the levels of radionuclides such as ⁴⁰K do not increase much in TENORM and are same as that of the background levels.^[1]

Normally, it is believed that radioactivity is strictly the matter related only to the nuclear industry, which of course is not true. There are various nonnuclear industries that deal with radioactive material. Various nonnuclear industries and

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