Measurement the radionuclides emanation for fly ash in thermal power stations in middle and south of Iraq

A Thesis

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By

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ABSTRACT

This study aims to determine the concentrations of natural origin of radioactive isotopes and concentrations of heavy metals in 52 samples of fly ash from thermal power stations in the center and south of Iraq, this study included the following samples:

12 samples from Al-Dura thermal power station located at the south of Baghdad city, and 14 samples from Baghdad south located at the south-west of Baghdad city , and 11 samples of Al-Musaeb Thermal Power station located in the north of the Babylon city , and 7 samples from thermal power station Al-Naseraya north of DhiQar city and 8 samples of Thermal Power station Al-Hartha located at the southern of Basra city .

Reagent system used sodium iodide gamma spectrum and is surrounded by a shield of lead to reduce background radiation and measuring models and calculate the concentrations of natural radioactive isotopes of uranium -238 series, and a series of thorium-232, as well as potassium isotope -40 natural and industrial isotope cesium -137. While used reagents technology to track nuclear impact of solid state (SSNTDs) to measure concentrations of radon gas, and the results were compared in this work with the global determinants of the Organization of Safety standard series 115)) to the concentrations of natural radioactive isotopes in the fly ash materials, which are: 1000, 1000 and 10000 Bq \kg of radium and thorium and potassium, respectively.

The results showed that the extent of concentration of radioactivity qualitative in measured samples for isotope of radium -226 from 4.20 to 366.43 Bq\ kg and actinium -228 from 13.79 to 220.34 Bq \ kg, and Potassium_40 from 1347.09 to 389.07 Bq \ kg, with a note that there is simple index on the existence of industrial isotope cesium -137. The term value of the activity is equivalent radium (Ra_{eq}) of samples measured is 234.39Bq / kg, and considers these measured values for

samples below the safety limit, which is 370 Bq\kg recommended by the organization(UNSCEAR,2000) except in the models, S15, S21, S22, S29, S45, S47, S52. The results also showed that the dose rate (D) of all samples is measured 110.95 "nGy \ h, where there are many values are higher than the allowable value which is 51 nGy \h (Scientific Committee, 2003).

The extent of the total value of external and internal hazard indices (H_{ex}, H_{in}) is " 1.881-0.238 " and 2.871_0.263 " " respectively. Therefore, it was observed that some of the H_{ex} values and H_{in} are higher than permitted and established borders by international organizations, especially the S15 model , taking into consideration that dangerous radioactive transaction values must be worth less than one (≤1) to be possible to neglect . Accordingly, the results of measurements have shown that the risk coefficients for samples of fly ash from thermal power stations in central and southern Iraq higher than the permissible limit values internationally The extent of internal and external annual effective dose AEDR (indoor) AEDR (outdoor), the samples is measured "" 0.266-0.0053 msv / y1.588-0.214 msv / y " where allowed is 0.7Sv / Y was the extent of the risk coefficient values (Iγr) and all samples measured is " 0.753- " 4.922 and surveys done 1Bq / kg.

While the concentrations of Radon gas values ranging from "1724.13Bq / m^3 - 64.03Bq / m^3" where were all the results of the concentrations of Radon measurements of samples measured within allowable limits 200_800Bq / m^3 or higher than set by the US Environmental Protection Agency (EPA) (UNSCEAR2000) .

The results also showed an increase in the concentrations of heavy metals in some samples were taken some samples of some electrical thermal power plants and up to 18 samples of fly ash and up to approximately 4 samples of Naseraya and Hartha and Musaeb thermal power plant and 3 samples of Al_Duraand Al-Rasheed thermal power plant, the results showed that the concentration of zinc

ranges between (12.9-0.09 µg / ml) and the concentration of lead (2.241-0232 µg / ml) and the concentration of copper (3.95-0.10 µg / ml) and the concentration of Iron (487.6-0.10 µg / ml)and Cadmium (2.043-0.03 µg / ml) and the concentration of manganese (3.829 -0.09 µg / ml) and magnesium (High_0.029µg / ml) and Nickel (6.49-0.47µ g / ml) and Cobalt (0.84_-0.013µg / ml) and in some samples exceeded the allowable limit internationally.

The results showed by measuring the radius of samples unprecedented mentioned that the metered rate of radioisotopes or heavy items may be very fast in some of them and in the other it may be slow Compared with the (ICRP 60 119) where the results showed that the radius of the samples ranged between (0.963µm_0. 145µm) with energy"9.60E-9Sv / Bq-'1.20E-7Sv / Bq at inhaling rate too fast or medium or slow the inhalation of radioactive isotopes or heavy metals it may be caused some diseases, the most serious of lung cancer .