

## **Assessment of Radiation Dose and Risk from Fly Ash Effluence of Coal Power Plants**

The goal of this project is to determine the respirable radionuclides emitted from a coal-fired power plant due to health and environmental implications. This information will be used to assess the radiation dose and associated increase in cancer risk to employees working in the plant and individuals living near the power plant. Samples will be taken from the bottom ash, ash from the flue gas desulfurization unit, and fly ash to ascertain the partitioning of the radioactive constituents. Air samples will be drawn using a cascade impactor to find the respirable fraction and quantity of radionuclides present in the effluent. Next, atmospheric dispersion plume models will be used to find the maximally exposed individual and the dose due to the respirable particulate calculated. Air samples will also be taken near the fly ash and coal piles using a high volume air sampler, to determine the inhalation exposure to personnel working in these areas. The common radioisotopes of interest are  $^{238}\text{U}$  and  $^{232}\text{Th}$  and their respective progeny. The typical range for radionuclide activity concentrations in coal for these two isotopes is 10-600 Bq kg<sup>-1</sup> and 12-200 Bq kg<sup>-1</sup> respectively. The alpha emissions from  $^{238}\text{U}$  and  $^{232}\text{Th}$  are of particular interest as they are a significant contributor of the dose to the various components of the lung due to their high relative biologic effectiveness and short range. The gamma emissions from the daughter progeny also pose significant contributions to dose. The literature indicates that the denitrification and desulfurization processes significantly reduce annual dose acquired because of effluent from the coal-fired power plant.