

A COMPARISON OF RADON EMANATION RATES FROM FLY ASH  
AND FROM CONCRETE MADE WITH FLY ASH

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ABSTRACT

Although radium in the earth is often the primary source term for radon entering dwellings, building materials may also contribute significantly to indoor radon levels in certain cases. Fly ash, a byproduct of coal combustion, has been used for many years as a pozzolanic admixture in the production of cement in many countries. Because fly ash has been shown to have radium concentration in the range of 10 pCi/g (0.37 Bq/g) in some cases, the extent to which radon can emanate from fly ash and from products prepared with such ash is of interest.

This study was designed to determine radon emanation coefficients for fly ash as a function of particle size and moisture content, and to determine radon exhalation (radon released per unit surface area) for concrete prepared from fly ash of known particle sizes and radium content. Radon emanation measurements were made for fly ash and concrete samples by means of specially designed emanation chambers. The radon exhaled by the samples was sampled at appropriate time intervals by a standard scintillation cell technique.

For dry fly ash, emanation coefficients were found to vary with particle size, ranging from  $9.6 \times 10^{-4}$  for large particle sizes (421-891  $\mu$ ) to  $3 \times 10^{-5}$  for small particle sizes (less than 75  $\mu$ ). For ash with 20% moisture content the emanation coefficients varied from  $2.0 \times 10^{-2}$  for large particles to  $1.6 \times 10^{-1}$  for small particles. However, when such fly ash was incorporated into concrete, the particle size dependence of the emanation could no longer be observed. For concrete prepared with fly ash, only the total radium content effected the radon exhalation.