

GEOCHEMICAL STUDY OF URANIUM AND VANADIUM IN CORES OF LIGNITE SEAMS AT BIG BROWN, FAIRFIELD, TEXAS

Author: Thomas Girard Chasteen

Purpose of the study: The purposes of the study are three fold: 1) to delineate the concentration of uranium and vanadium in three continuous cores from Big Brown Mine Site, Fairfield, Texas, 2) to make an effort to characterize the distribution of uranium and vanadium in the cores studied, and 3) to estimate the amount of radon-222 contained in lignite seams found in these cores, an estimate based upon uranium-238 content of ten samples.

Procedure: Vanadium was quantitatively determined by atomic absorption using the standard addition method. Uranium was analyzed by delayed neutron activation analysis at Texas A & M University Nuclear Science Center. The distribution ratios (Rd) were determined for uranium in the lignite samples.

Findings: In the vertical cross sections of the cores analyzed, the uranium concentrations ranged from 0 to 16.75 ppm with an arithmetic mean of 5.82 ± 2.98 ppm. The vanadium concentrations ranged from 11.57 to 176.31 ppm with an arithmetic mean of 67.32 ± 50.75 ppm. Significant correlations were found for all non-lignite and non-lignite associated samples for uranium and pyritic sulfur and for vanadium and pyrite sulfur. Also, a correlation between uranium and vanadium was found for these samples. It was observed that uranium, vanadium, selenium, copper, and cadmium exhibit relative concentration enrichment at the soil-lignite interfaces. The distribution ratios for the lignite samples were high, ranging from 6 to 22 indicating a strong affinity of the lignite for uranium under the conditions studied.

Conclusions: The maximum possible release of naturally occurring radon-222 associated with the parent, uranium-238, from the Big Brown Steam Generating plant, Fairfield, Texas, was estimated to be about 24 curies for 1984.

*Masters Thesis
Chemistry Department
East Texas State University
Commerce, Texas 75428*