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# Chemical Analyses of Middle and Upper Pennsylvanian Coals from Southeastern Kansas

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## ABSTRACT

Elemental and chemical analyses and physical tests were conducted on 36 samples of Middle and Upper Pennsylvanian coals from southeastern Kansas. Concentrations of 35 minor and trace elements in these coals were statistically compared with concentrations in coals of similar rank and age from other areas in the western region of the Interior Coal Province, showing that Kansas coals have significantly higher concentrations of copper, arsenic, and lead. The zinc content in Kansas coal samples ranges from 160 to 51,000 ppm (whole-coal basis), the maximum value being the highest zinc value reported for U.S. coals. Cadmium content also has an extreme range, from less than 1.0 to 160 ppm (whole-coal basis), the maximum value being one of the highest cadmium values reported in U.S. coals. The apparent ranks of these coal samples range from high-volatile B to high-volatile A bituminous coal. Most samples of Middle Pennsylvanian coals from the major coal-mining area in Bourbon, Crawford, and Cherokee counties are high-volatile A bituminous coal. Arithmetic mean values for proximate analyses of coals (as-received basis; n = 25) show these coals to be 15.5% ash, 35.3% volatile matter, 45.9% fixed carbon, and 3.3% moisture and to have a heat of combustion of 11,910 Btu/lb. Arithmetic mean values for ultimate analyses of the coals show these coals to be 4.9% hydrogen, 65.3% carbon, 1.2% nitrogen, 5.5% sulfur, and 7.7% oxygen. The geometric mean values of these Kansas coals are 3.03% pyritic sulfur, 1.25% organic sulfur, and 0.2% sulfate sulfur.

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