

## **Coal Ball Minerology and Geochemistry from the Kalo Formation of Iowa**

Page Jones

*Texas A&M University, Department of Geology and Geophysics, College Station, Texas, USA*

[jonespage@tamu.edu](mailto:jonespage@tamu.edu)

Coal balls are carbonate concretions formed in peat during the Pennsylvanian and early Permian time period. Microprobe and microscope analysis have revealed high-Mg calcite with an unusual crystal habit is the earliest calcium carbonate to form in the Williamson No. 3 coal balls from the Kalo formation in Iowa. This high-Mg calcite has early diagenetic rims of non-ferroan, low-Mg calcite suggesting diagenesis in meteoric water. The combination of high-Mg calcite formation followed by early diagenetic alteration to low-Mg calcite suggests the earliest coal ball carbonate formed in a hydrologically dynamic environment where salt water influx was followed by fresh water conditions. Subsequent generations of carbonate are low-Mg, ferroan carbonate and appear to result from burial diagenesis of the original high-Mg calcite fabric with low-Mg calcite rims. These high-Mg calcite crystals are the first to be reported from the mid-Pennsylvanian. Our research results suggest coal balls may be a good source of Pennsylvanian high-Mg calcite. Williamson No. 3 coal balls that formed in matrix rich, low porosity peats consist primarily of anhedral calcite. Coal balls that formed in surficial leaf rich peats commonly have abundant radiating arrays of calcite crystals. It may be that original pore volume controls the crystal habit of carbonate in coal balls. Subsequent studies will investigate the relationship between pore volume and crystal habit.