

Palynofacies Analysis, Source Rock Evaluation, and Organic Thermal Maturation of the Gray Fossil Site, Gray, Tennessee, Mohamed K. Zobaa and Michael S. Zavada, East Tennessee State University, Department of Biological Sciences, Johnson City, TN 37614, zobaa@etsu.edu, zavadam@etsu.edu; and Michael J. Whitelaw, East Tennessee State University, Department of Astronomy, Physics, and Geology, Johnson City, TN 37614, whitelaw@etsu.edu

The Gray fossil site (GFS), Gray, Tenn., preserves a paleolake sequence that contains a well preserved faunal and floral biota. It occurs as Miocene aged fill, up to 42 m thick and 3.5 ha in area, which occupies a karst feature developed within Ordovician carbonates. The palynofacies analysis of 28 subsurface core samples has revealed the presence of large amounts of diverse and well preserved particulate organic matter. Samples were counted and data plotted on an “Amorphous Organic Matter (AOM)-Phytoclast-Palynomorph” ternary plot to characterize the kerogen assemblages. Phytoclasts and opaques are the most abundant organic constituents and have diluted both the palynomorphs and AOM. This suggests an oxidizing depositional paleoenvironment or a localized high flux of charcoal following wildfires and subsequently increased runoff. The information provided by estimated vitrinite reflectance, spore/pollen coloration and visual petrographic kerogen analysis is used to define source rock potential as well as organic maturation level. The studied section contains kerogen type III to IV indicative of gas prone source rocks. These rocks are thermally immature and not suitable for natural gas generation. Palynofacies analysis indicates that wildfire was an important and periodic element during deposition of the GFS sediments.