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Preliminary Results of Micropetrographic Investigations of Enigmatic Volcanic Ash Material in the Upper Cretaceous Austin Chalk of Central and South Texas

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ABSTRACT

A number of cm-scale volcanic ash layers, both primary and reworked (resedimented), are present in the subsurface Upper Cretaceous Austin Chalk Group of Central and South Texas, especially in the (upper) B unit. Also present in the upper part of the Austin Chalk are a large number of km-scale-diameter volcanic mounds (tuffs of the Balcones Igneous Province). The composition of the volcanic mounds is altered silica-undersaturated mafic material which differs from most of the potassium- and silica-rich material found in the Austin Chalk ash layers. For example, micropetrographic examination has shown the subsurface volcanic mounds to be primarily altered to Mg-bearing clays (probably chlorite and smectite) and also that the volcanic mounds always lack quartz and K-feldspar. In contrast, the ash layers are rich in illitic clays and have volcanic rock fragments with quartz, K-feldspar, and albite. Resedimented ash layers also contain silt-size carbonate skeletal debris and some benthic foraminifers. Zircons are found in the ash layers but have not been identified in the altered volcanic mound rocks. This discrepancy in compositions creates difficulty in interpretation. Do the Austin Chalk ash layers primarily originate from a distal source (e.g., Mexican volcanos) similar to the ash layers found in the stratigraphically underlying Eagle Ford Shale? Did the weakly explosive eruptive style of the volcanic mounds in the Austin Chalk only produce ash layers in the immediate vicinity of the mounds and not at a distance? Therefore, there could be two volcanic sources supplying ashes within the Austin Chalk Group. Understanding the origin of the volcanic ashes helps predict their distribution and abundance, as well as adding detail to the geological history of South and Central Texas during the Santonian through early Campanian.

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