## ABSTRACT

**Arsenic concentrations of >100 ppm were detected above the regional value of ~7 ppm in soils near the Georgia Brevard Zone using optical emission spectroscopy (OES). Natural, anthropogenic, and false-positive hypotheses were tested to determine a most likely explanation. Induction coupled plasma mass spectroscopy (ICP-MS), X-ray diffraction, optical microscopy, electron microprobe analysis, and historical aerial photographs were subsequently used to determine the most parsimonious hypothesis. ICP-MS results indicated positive detection and verified accuracy of the OES-measured As and concentrations of many other trace elements such as Se. Arsenopyrite is the primary As- and Se-bearing phase in the underlying mafic schist bedrock. The associated bedrock mineral assemblage suggests a fossil hydrothermal system protolith and subsequent prograde and retrograde moderate metamorphism. As/Se ratios in the 20m-thick saprolite are much higher (~2000) than regional baseline values for the SE United States (~15) and the underlying bedrock itself (~45). The high soil-saprolite As/Se ratio empirically supports a theoretical ionic potential basis for greater solubility and transport of Se (relative to As) out of the weathered zone and into rivers. Published As/Se ratios for biomonitor proxies living in rivers that drain through the Brevard Zone (~0.6) further support the idea that As in saprolites of the Piedmont in the SE United States is more conservative in fate and transport than Se.**