Chemical Analyses of Archeological Pottery Sherds Found Along the Colorado River, Grand Canyon, Arizona

Kaskalla, Aspyn (School: Navajo Preparatory School)

My Zuni ancestors lived in the Grand Canyon long ago. A Zuni medicine man pointed out many Zuni features to my mentor on a Grand Canyon Rafting Tour, sponsored by the Grand Canyon Conservancy, and this inspired my project. An Oxford ED-2000 bulk X-Ray Fluorescence (XRF) machine and Geologic Majors+Traces software identified 10 major oxide analytes measured in weight percent, of 16 potsherds loaned by the Grand Canyon NPS. It was these analytes, measured in weight percent, that became the focus of analysis. The term “bulk XRF” means that each measured weight percent is statistically an average of each potsherd. 5 different clay types were investigated as likely components of each of the 16 potsherds: Sodium Bentonite, Sepiolite, Talc, Kaolinite, and Illite. The dominant clays proved to be Kaolinite and iron-based Illite. Percentages of each clay were graphed into a scatter plot via Excel. This scatter plot saw large diversity in Kaolinite-Illite compositions, showing diversity in clay sources and possibly diversity of Grand Canyon inhabitants. Impurities were also documented, including heavy metals Barium and Zinc, and lime (CaO) which could have weakened the pottery. The 16 potsherds came from these 4 locations along the Colorado River. The first 6 sherds were from the Palisades, MP65, where Carbon Creek provided life-giving water. Furnace Flats, MP71, provided 3 sherds and is just 3 miles upstream of the ”Granary” at the Unkar Delta. 3 more sherds came just upstream of Deer Creek, MP136, near a Zuni salt deposit. The final 4 sherds came from Whitford Panel, MP188, which hosts many Zuni petroglyphs. 4 of the potsherds (Palisades P2, Furnace Flats F2) closely matched modern Zuni clay. This showed that past Grand Canyon inhabitants may have included my Zuni ancestors.

Awards Won: