

H53N-1504 Mapping the distribution of geoenic contaminants in bedrock from Colorado Plateau cores using continuous X-ray fluorescence spectroscopy

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The Navajo Nation is the largest Native American reservation in the United States and is located on the Colorado Plateau. Uranium (U) and Arsenic (As) are two predominantly geoenic contaminants found on the Colorado Plateau. These contaminants leech into groundwater aquifers through anthropogenic activities, but little information is known about the natural distribution of these contaminants. Heavy uranium and coal mining have caused elevated levels of U and As to infiltrate groundwater, however there is little research on the natural distribution of these elements in the regional bedrock and the extent to which they exist as exposure pathways in water, air, and soil. We used a robotic X-ray Fluorescence (XRF) machine, Minalyzer CS, to scan over 850 meters of cores that were collected in Petrified Forest National Park (PFPN) and generated a whole-rock geochemical profile with respect to depth and show the areas in the cores that have elevated levels of Uranium and Arsenic. We also sampled for Inductively Coupled Plasma Mass Spectrometry (ICPMS) to calibrate the concentrations of elements from our XRF scans. In conjunction with X-ray Diffraction (XRD) analysis to quantify mineralogy and Computed Tomography (CT) to quantify porosity/permeability, we are in the process of developing models for the integrated geologic history of the region and the processes responsible for the concentration and mobilization of these elements in bedrock. An understanding of these processes is essential for differentiating the exposure risk between geoenic and anthropogenic sources of U and As.