DETECTION AND METABOLIC MONITORING OF ARCHAEA IN BENTONITE CLAY. S. R. Crook[1], M. Kroukamp[1], M. Hausner[1], and G. Wolfaardt[1] [1]Department of Chemistry and Biology, Ryerson University, Toronto, Ontario, Canada.

Detection of Microbial Life in Extreme Terrestrial Environments: Extreme environments present unique challenges to microbiologists. One such example of an extreme environment is bentonite clay. This natural material, slated to serve as the primary environmental barrier in the Deep Geologic Repository for spent nuclear waste, has been well characterized both physically and chemically. However, the ultra-oligotrophic and hygroscopic nature of bentonite, along with low biomass have presented hurdles in characterizing the microbial communities present within the bentonite clay matrix, especially in the realm of molecular tools. The metabolic products of sulfate reducers and other microbes could potentially have profound effects on the proposed DGR design by influencing rates of corrosion on surfaces integral to the containment of nuclear waste. Past studies have attempted to identify relevant bacterial and eukaryotic organisms which may affect the proposed DGR design. However, the presence of archaeal populations and the role they may play has yet to be investigated. This study seeks to identify archaea native to bentonite clay and characterize the metabolic properties of these archaea. The presence of microorganisms was investigated through the use of both cultivation and DNA-based techniques. To characterize the metabolic properties of sulfate reducing archaea/bacteria and methanogens present, anaerobic serum bottles containing bentonite and selective media were inoculated with enrichments from a bentonite sample. Sulfate, sulfite, acetate and methane concentrations were monitored. Given sufficiently favorable conditions, microbially driven processes appear to occur which could potentially affect the proposed DGR design. This research furthers the understanding of the role played by microorganisms in bentonite and other extreme environments including the extraterrestrial.