Final Report

Jennifer Scott - #100059

Project Title: *Hydrothermal Fluids and Oil Shale Deposits Through Earth History*

1.1 Project Summary

One of the world's most extensive oil shale deposits is preserved in the Eocene Green River Formation of Wyoming, Utah, and Colorado. My research on the Green River Formation is dedicated to characterizing a set of enigmatic carbonate deposits, many of which appear to have been produced in association with hydrothermal fluids. These hydrothermal fluids would have impacted the lake system, creating extreme conditions, and would have contributed to the accumulation of the oil shale.

1.2 Project Outcomes and Impacts

Our 2016 fieldwork identified several new probable hydrothermal deposits in the eastern Greater Green River Basin in Wyoming, and a succession of cemented carbonate lake deposits in Utah that appear to have been influenced by a variety of extreme conditions, including possible hydrothermal fluids within the lake. With MRU undergraduate student Sarah Lilley (NSERC USRA 2016) and Mike Van den Berg (Utah Geological Survey) we completed 2 weeks of work in Utah and Wyoming to study the lake successions associated with the possible hydrothermal fluids in both outcrop and in subsurface core. In particular, our field research in Wyoming was focused on describing the lake deposits, determining the stratigraphic horizons within the lake deposits with which the hydrothermal deposits are most closely associated, and collecting samples for further analytical studies including X-Ray Diffraction (XRD), Raman microspectroscopy, and thin-section petrography. Our lab research in 2016, undertaken in the Faculty of Science and Technology at MRU, focused on identifying unusual minerals in the deposits, using both XRD and Raman spectra. Interpretations of the XRD results and thin-section petrography is still underway. The results to date on the project at one of the sites investigated in 2016, North Barrel Springs area in Wyoming, are especially exciting because they demonstrate that the hydrothermal system in this area may have been active repeatedly through the deposition of the Green River Formation, and contributed directly to extreme conditions across the landscape and near the lake margin. In particular, we identified a pipe feeding one of the smaller spring deposits, which was closely associated with hundreds of siliceous stromatolites as well as organic-rich mudstones.