The departments of Math, Physics and Geology (DMPG) at Cape Breton University (CBU) and Geological Sciences and Geological Engineering (GSGE) at Queen’s University are looking for an MSc student interested in carbonate sedimentology and diagenesis to begin their degree in the summer or fall of 2024. The student will be part of an academia-industry collaborative project between project-lead Dr. Ted Matheson (CBU, adjunct professor at Queen’s), Dr. Peir Pufahl (Queen’s), and Nutrien Potash ( Saskatoon, SK). The student will be based out of Queen’s, benefiting from access to Queen’s Facility for Isotope Research (QFIR) and other sedimentology research spaces in GSGE. The position will include a research internship with Nutrien Potash’s GeoServices Group in Saskatchewan during the summer of 2023 or 2024, which will dovetail with fieldwork and data collection for the MSc research project.

Qualified students are encouraged to contact Dr. Ted Matheson (ted_matheson@cbu.ca) with any questions and are encouraged to visit GSGE’s Graduate Studies Information Page. The DMPG at CBU and the GSGE Department at Queen’s University are committed to building diverse and inclusive research groups, and students from historically underrepresented groups in Science, Technology, Engineering and Mathematics (STEM) and non-traditional backgrounds are highly encouraged to apply. Students will be supported in pursuing endeavours and engaging in science outreach aimed at increasing the diversity and visibility of underrepresented groups in STEM fields.

**Project: Evaluating the depositional and diagenetic history of the Devonian Dawson Bay Formation: Implications for Saskatchewan’s conventional potash mines**

The Dawson Bay Formation of western Canada is an ca. 50 m thick unit containing fossiliferous limestone and dolostone with subordinate siliciclastics and evaporites. It was deposited across the epicontinental Elk Point Basin during the Givetian (Middle Devonian) and immediately overlies the Prairie Evaporite Formation. The Prairie Evaporite in Saskatchewan is responsible for ca. one third of annual global potash production, spread across 8 active or under-construction conventional underground potash mines and 3 commercial solution operations. As the cap rock for the Prairie Evaporite, fluid flow through the Dawson Bay poses a risk of flooding active potash mines, as has historically occurred. As mines extend outside traditional mining areas, understanding future risks posed by Dawson Bay fluid flow conduits is of utmost importance. Although past work has highlighted variance in diagenetic style across the Dawson Bay, there is less understanding of how diagenetic variability relates to modern fluid-flow conduits and the mining risk.

To address this, the MSc student will conduct a comprehensive analysis of the Dawson Bay Formation in the subsurface of Saskatchewan. This will include i) study of Dawson Bay cores at the Saskatchewan Geologic Survey’s Subsurface Geologic Laboratory in conjunction with Nutrien team members, (ii) fieldwork in the Dawson Bay outcrop belt of Manitoba, (iii) incorporation of core and borehole petrophysical data, (iv) standard, epifluorescence, and catholominescence petrographic analyses, (v) use of scanning electron microscopy and other relevant electron beam techniques, and (vi) use of XRD, CT scanning, δ13C and δ18O analyses, as well as other analytical techniques deemed appropriate. The student will gain a wide breadth of industry and academic experience in both field and lab settings.

All students who are potentially interested are encouraged to reach out with questions or for additional details to Dr. Ted Matheson (Ted_matheson@cbu.ca). Any student interested in pursuing this project will be asked to send a statement of purpose, CV, and unofficial transcripts before completing the GSGE application process.