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Rare Earth Element Potential of Coal and Carbonaceous Mudstones within the Whitemud Member (Eastend Formation) in Southern Saskatchewan

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As technologies continue to advance, global demand for critical minerals has reached unprecedented levels, highlighting the need to develop sustainable, secure, and reliable domestic supplies. In 2023, the Government of Saskatchewan launched Securing the Future: Saskatchewan's Critical Minerals Strategy to support growth and development of the province's critical minerals sector. In support of this initiative, a study is currently underway to evaluate the potential of lignite and carbonaceous shale as a source of critical minerals within shallow, coal-bearing Upper Cretaceous strata of Saskatchewan, with a focus on the Whitemud Member within the Eastend Formation. Although coal and carbonaceous sediments typically contain most elements of the periodic table in trace concentrations, specific depositional and diagenetic conditions can promote enrichment of economically valuable elements, making these units potential targets for critical mineral extraction.

To assess this potential, more than 600 samples have been collected from coal and carbonaceous shale horizons within the Whitemud Member in southern Saskatchewan. Sampling targeted outcrop exposures along the Frenchman River Valley near Shaunavon, where shallow stratigraphic successions provide accessible sections for detailed characterization. Ultimately, this study aims to quantify the critical mineral potential of coal- and organic-rich intervals within the Eastend Formation and to better constrain the mode of occurrence of these elements within the study area.