



# CRITICAL MINERALS

A map of the locations of central Saskatchewan's critical materials. Image courtesy of Saskatchewan Geological Survey.

Many places in the world, including Canada, are trying to reduce the emissions of greenhouse gases to minimize the impacts of a changing and warming climate. This will involve significant development of new green-energy operations and storage facilities, increased use of electric vehicles, and an even greater dependence on a strong digital infrastructure. However, this will require an increased supply of important elements and metals that must be mined and then processed for use. These are called critical materials, as they are important in many green-energy and high-technology applications, but they are often found only in specific parts of the world and their supply may be disrupted. Canada has recently identified 31 materials that are deemed important to our economy and lifestyle.

For example, a number of elements are needed to produce the infrastructure to support a low-carbon future through electricity generation and electric vehicles. Electric vehicles require lithium and cobalt for batteries, copper for wiring, and an array of rare earth elements for the electronics. The latter are also used in permanent magnets for wind turbines. Solar panels contain elements such as indium and gallium.

Consider your smartphone: the display panel, circuitry and battery require various elements such as silica, indium, copper, silver, tungsten, lithium, carbon and many others, that come from minerals. Helium, which is found as a gas, is used in its liquid form to cool superconducting magnets in MRIs, and in high-capacity hard drives in massive data centers (e.g., Netflix and Bitcoin). The great variety of rocks in



Monazite crystals (reddish brown) in a deformed Precambrian host rock; photo from Appia Energy Corp. website.

## Selected Critical Materials in Saskatchewan

- Lithium
- Rare Earth Elements
- Copper
- Cobalt
- Helium
- Major Cities

Saskatchewan, ranging from the igneous and metamorphic rocks of the Canadian Shield in the north, to the sedimentary rocks in the south, means that the province may be able to supply some of these critical materials. For example, rare earth elements are found in the mineral monazite, in a location north of Lake Athabasca, and cobalt has been found associated with some of the large uranium deposits. In the south, lithium could be produced from some of the groundwater found deep in the sedimentary rocks, and helium gas is being extracted from other reservoirs in these rocks.