The new criticals – health minerals.

written by Melissa (Mel) Sanderson | February 10, 2025
“In our rapidly evolving world, where the scramble for resources often overshadows their profound impact on human life, it is time to shift our focus to a groundbreaking concept: Health Minerals.” – Melissa “Mel” Sanderson, Co-Chair, Critical Minerals Institute (CMI)

Much has been and is being written about critical minerals, with various derivations of the category tossed around – battery metals, defense metals, rare earths. Battery metals include elements such as lithium, graphite, cobalt and silica: defense metals incorporate gallium, germanium, scandium and others, while the variety of rare earths form their own category in part due to their ubiquitous presence in a range of industries and uses.

I propose we need another category: health minerals. Particularly with a rapidly aging global population, mined elements or compounds thereof which are used in diagnosis and treatment of serious diseases such as cancers or crippling conditions such as arthritis have a vigorous demand curve for the foreseeable future. Add the potential some of these materials also hold for gene-level preventative therapies and you begin to see why pharmaceutical companies increasingly are interested in mining.

Let’s take barium for example. If you ever have had a so-called contrast x-ray or MRI where you had to drink the nasty white brew and wait for it to circulate in your system before your scan, you know what barium is. It’s the stuff that enables high-contrast images of internal organs, especially in the

gastrointestinal structure but also in brain and lung scans. Recall that during and for up to a year following COVID, there were especially long wait times for MRI scans. This wasn't just due to a shortage of technicians (although that also was a factor): it stemmed primarily from supply chain disruptions from China, the primary miner of barite, accounting for over 50% of global supply in 2021.

When it comes to treatment decisions for potentially fatal or debilitating diseases, the clearer the image the better the analysis and the better the potential treatment outcomes. So just as with any other critical mineral, the shorter and more reliable the supply chain the better. Especially as tensions between the West and China around critical minerals writ large escalate and the possibility of increasingly limited and certainly more costly access to China-sourced materials casts a worrying shadow over a range of activities, finding alternative sources of key materials is an urgent strategic issue.

So the discovery in Canada of a natural source of pharmaceutical-grade barium sulfate is good news indeed. Voyageur Pharmaceuticals Ltd. (TSXV: VM), the company holding the mining rights, seems poised to disrupt the existing supply chain and potentially seize a commanding market share of the contrast market in the US and Europe.

Even beyond diagnosis, however, the company seems to be exploring possible new treatment options using nanotechnology and fullerene buckies.

What is fullerene? It's a carbon molecule whose structure resembles the geodesic dome popularized by architect Buckminster Fuller in the 1960's and whose tetrahedron and octahedron structures are lightweight and incredibly strong. Until recently, fullerenes primarily were extracted from plasma-

chamber soot. Working with a company named Rain Cage, Voyageur says it has been able to cost-effectively source fullerenes via carbon capture from tailpipes and stacks in a new form, the endohedral fullerene, aka fullerene buckies. In addition to any other benefits, Rain Cage's technology would be a huge advance for "green" sustainable mining and combating climate change in the energy sector.

Fundamentally, fullerene buckies' structure enables the carbon molecule to enfold other materials such as barium at the nanoparticle level, enabling precise imaging targeting the cellular level of individual tumors by injection of the fullerenes. Some research suggests that future applications could expand beyond vastly improved imaging to actual treatment deliveries for a range of cancers including head and neck, lung, bladder and skin.

Voyageur says the Rain Cage process also produces C60 fullerenes. C60 fullerenes have strong antioxidant properties which potentially could combat conditions such as Alzheimer's, heart disease and cancer. The anti-inflammatory properties of C60 suggest the possibility of treatments for conditions such as arthritis might be possible at some future point as well.

As research and development (R&D) continues to boldly define new uses and technology begins to make key elements cost-effectively available, opening the door to new diagnostic and treatment possibilities, we might soon begin hearing more about 'health minerals' as part of the critical minerals global dialog.