NWT & NUNAVUT CHAMBER OF MINES

February 15, 2024

Submitted to: **Let's Talk Canada's Critical Minerals list and methodology**

Re: Consultation: Update of Canada's Critical Minerals list and methodology

We are pleased to provide the following feedback to assist with Canada's criteria that define mineral criticality for Canada, and determine which minerals are placed on the Critical Minerals List.

The current definition and criteria under the Canadian Critical Minerals Strategy is the following:

For a mineral to be deemed critical for Canada, the proposed criteria currently specify the mineral meets one or more of the following:

- *essential to Canada's economic or national security*
- *required for our national transition to a sustainable low-carbon and digital economy*
- *a sustainable and strategic source of critical minerals for our international allies*

and both of the following:

- *its supply is threatened*
- *it has a reasonable chance of being produced in Canada in the near- to medium-term*

We agree with most of this criteria, and believe it is sufficient to identify critical minerals. However, we do note in one of our examples below, arsenic, that is also used in medical applications, which Canada might consider as another criteria for use of critical minerals.

In addition, we believe that referencing Supply Chain Risks would also improve the criteria, building on the threatened supply chain with wording like: eg, *Critical Minerals are country specific lists of metals that are essential for the energy transition, new technologies, and/or support important domestic and allied country manufacturing and defense industries, but have risks associated with the current sources of supply, including geographic concentration of production, political uncertainty, policy risks with jurisdictions that are considered unfriendly to Canada, and /or Environmental-Social-Governance concerns that are not aligned with Canadian standards or values.*

While we largely agree with the criteria already in place, we must question if the criteria are sufficiently detailed, or are being applied in a way, to capture minerals they are intended to. We offer two examples of minerals which we believe meet the criteria but haven't been captured as being critical and are not on the current Critical Mineral List. We suggest these minerals and the criteria be examined to determine if there is a weakness in the existing criteria that can be strengthened. We also recommend adding them to the critical mineral list.

#4, 5120 – 49th Street, Yellowknife, NT X1A 1P8 Phone: (867) 873-5281 Fax: (780) 669-5681
Email: tom.hoefer@miningnorth.com Website: www.miningnorth.com

- **Silica** (is already on the critical minerals lists of India, Australia and Europe)

All sand is growing short in global supply. However, high quality silica sand needed for energy transition (solar panels), defense, high tech, etc. is even rarer. See this link for example which provides these quotes.

> Quote: *"The looming shortage of the highest quality silica sand is different from the shortage of construction sand as it involves high-tech industries (e.g. fibre optics, LCD panels, microelectronics, and other electronic uses such as Corning's gorilla glass® in smartphones) and, even more critically, industries involved in the energy transition (e.g. solar glass which comprises 50% of the mass of a solar panel, and wind turbine blades which comprise 50% of glass fibres)."*

Silica and silicon are on the critical minerals lists of India, Australia and Europe.

The Northwest Territories has high quality sand currently being assessed at the Chedabucto project, and the NWT *has a reasonable chance of producing high quality silica sand in the near- to medium-term.*

Question: Why was silica sand not captured by the Canadian Critical Mineral criteria, and can it be added now?

- **Arsenic**: (is already on the US and European Critical Mineral lists)

Arsenic is used for defense, energy, and telecommunications technologies. And being the main compound of arsenic, arsenic trioxide is the precursor to elemental arsenic, arsenic alloys, and arsenide semiconductors.

From the United States Geological Survey:

> *High-purity arsenic (99.9999%) metal was used to produce gallium-arsenide (GaAs) semiconductors for solar cells, space research, and telecommunications. Arsenic also was used for germanium- arsenide-selenide specialty optical materials. Indium-gallium-arsenide (InGaAs) was used for short-wave infrared technology.*

And from the Virginia Department of Energy, here:

> *Today, arsenic is considered a "critical mineral" in domestic metallurgical applications that serve defense, energy, and telecommunications technologies (Fortier and others, 2018).*
>
> *The U.S. does not maintain a supply of arsenic in the National Defense Stockpile and is 100 percent import reliant from several countries including China, Morocco, Japan, and Belgium. Arsenic has not been produced in the United States since 1985. Concerns related to the mining and production of arsenic include release of arsenic into soil and water where contamination is a serious health issue.*

Question: Why isn't arsenic on the Canadian CM list? And why is the US not reliant on Canada for this Arsenic supply which they need?

The Northwest Territories has a significant stockpile of already upgraded or refined arsenic in the form of arsenic trioxide. We believe that the Northwest Territories has high quality arsenic trioxide that *has a reasonable chance of being produced in the near- to medium-term*

Note too that arsenic has medical applications, which could be considered for inclusion into the criteria, eg: from Wikipedia:

> *Arsenic trioxide was approved for medical use in the United States in 2000.[7] It is on the World Health Organization's List of Essential Medicines.[10] Approximately 50,000 tonnes are produced a year.[11] Due to its toxicity, a number of countries have regulations around its manufacture and sale.[12]*
>
> *Arsenic trioxide also is used to treat a type of cancer known as acute promyelocytic leukemia (APL).[7]*

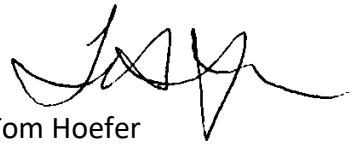
Conclusion:

We believe that the current critical mineral criteria, perhaps with the addition of medical uses, provides an adequate guide to what constitutes a critical mineral. However, we question whether the criteria are being applied diligently or appropriately given that at least two "minerals" – silica sand and arsenic – fell through the cracks. Note that neither are minerals *sensu stricto* and the loose use of the term "critical minerals" to include such elements and aggregate should be clarified.

We recommend:

- **Recommend: A review of the criteria to identify why they didn't capture silica sand and arsenic, which seem to fit**
- **Recommend: inclusion of silica sand and arsenic to the critical minerals list**
- **Recommend: a re-examination of the criteria and adjusting them so that silica sand and arsenic are captured.**
- **Recommend: consideration of medical purposes in the criteria**
- **Recommend: definition of critical "minerals" to include elements and aggregate**

Regards,



Tom Hoefer
Senior Advisor

Attachment: Critical Minerals Lists by Various Countries

#4, 5120 – 49th Street, Yellowknife, NT X1A 1P8 Phone: (867) 873-5281 Fax: (780) 669-5681
Email: tom.hoefer@miningnorth.com Website: www.miningnorth.com

Critical Mineral Lists by Country (compiled by the NWT & Nunavut Chamber of Mines)

Canada 28	US 50	Australia 26	India 31	Europe 34
Aluminum	Aluminium*	High purity alumina		Antimony
Antimony	Antimony	Antimony	Antimony	Arsenic
Bismuth	Arsenic	Beryllium	Beryllium	Baryte
Cesium	Barite	Bismuth	Bismuth	Bauxite
Chromium	Beryllium	Chromium	Cadmium	Beryllium
Cobalt	Bismuth	Cobalt	Cobalt	Bismuth
Copper	Cerium*	Gallium	Copper	Boron/Borate
Fluorspar	Cesium	Germanium	Gallium	Cobalt
Gallium	Chromium	Graphite	Germanium	Coking Coal
Germanium	Cobalt	Hafnium	Graphite	Feldspar
Graphite	Dysprosium	Helium	Hafnium	Fluorspar
Helium	Erbium	Indium	Indium	Gallium
Indium	Europium	Lithium	Lithium	Germanium
Lithium	Fluorspar	Magnesium	Molybdenum	Hafnium
Magnesium	Gadolinium*	Manganese	Niobium	Helium
Manganese	Gallium	Niobium	Nickel	Heavy REEs
Molybdenum	Germanium	Platinum-PGEs	PGE	Lithium
Nickel	Graphite*	Rare-earth elements	Phosphorous	Light REEs
Niobium	Hafnium	Rhenium	Potash	Magnesium
Platinum group metals	Holmium	Scandium	REE	Manganese
Potash	Indium	Silicon	Rhenium	Natural Graphite
Rare earth elements	Iridium	Tantalum	Selenium	Niobium
Scandium	Lanthanum*	Titanium	Silicon	PGM's
Tantalum	Lithium	Tungsten	Strontium	Phosphate Rock
Tellurium	Lutetium	Vanadium	Tantalum	Phosphorus
Tin	Magnesium	Zirconium	Tellurium	Scandium
Titanium	Manganese		Tin	Silicon metal
Tungsten	Neodymium*		Titanium	Strontium
Uranium	Nickel		Tungsten	Tantalum
Vanadium	Niobium		Vanadium	Titanium metal
Zinc	Palladium*		Zirconium	Tungsten
	Platinum*			Vanadium
	Praseodymium*			Nickel
	Rhodium*			Copper
	Rubidium			
	Ruthenium*			
	Samarium*			
	Scandium			
	Tantalum			
	Tellurium			
	Terbium			
	Thulium			
	Tin			
	Titanium			
	Tungsten			
	Vanadium			
	Ytterbium			
	Yttrium			
	Zinc			
	Zirconium			

#4, 5120 – 49th Street, Yellowknife, NT X1A 1P8 Phone: (867) 873-5281 Fax: (780) 669-5681
Email: tom.hoefer@miningnorth.com Website: www.miningnorth.com