Minerals Science and Information Coalition response to OSTP Request for Information on Critical and Strategic Materials Supply Chains

Dear Dr. Wadia,

Thank you for the opportunity to submit written comments on critical and strategic materials supply chains and their importance to American prosperity and national security.

The Minerals Science and Information Coalition (MSIC) is a broad-based alliance that represents all stages of the supply chain and supports federal investments in minerals science and research. MSIC commends the Office of Science and Technology Policy and the National Science and Technology Council for taking up this important issue and for recognizing the essential role of reliable sources of raw materials to the nation.

This response from MSIC will focus on the role of mineral science and information in securing supply chains for critical and strategic materials, while noting that “the general subject of the availability of minerals is huge and inextricably connected to almost every aspect of our culture and economy.”¹ Our response starts with some general observations and then addresses several of the specific categories listed in the Request for Information of July 22, 2014.

General observations:

- Stable materials supply chains begin, in almost every case, with reliable sources of mineral materials.
- Nature determines the distribution of mineral deposits and they are not evenly distributed across the globe. This has unavoidable consequences for supply chains.
- The upstream and downstream parts of supply chains are inextricably linked. The timeframe for bringing upstream raw materials and downstream commodities into production can be long, therefore forward-looking communication across the supply and manufacturing sectors is essential.
- Most minerals and mineral materials are globally traded commodities and any analysis of supply chains must take account of the global context for each commodity.
- Accurate, timely information across the full global life cycle of commodities is essential for sound decision making in the public and private sectors.
- The U.S. government should develop the capability to forecast future demand and supply scenarios for known critical and strategic commodities, and in order to identify potentially critical and strategic commodities.

Category 2: Exploration, Mining, and Smelting/Refining:

**Barriers to exploration: Lack of ore deposit models.** Economic geologists study known ore deposits in order to develop predictive models that guide future exploration. We do not have deposit models to guide exploration for many of today’s critical minerals. Investment in basic research at the U.S. Geological Survey (USGS) and in universities on mineral deposits is essential to optimize exploration for critical minerals.

**Barriers to exploration and mining: Workforce issues.** Mining and geological engineering, mineral processing, extractive metallurgy, and applied geology and geophysics programs at our universities are national assets that are critical to maintaining and encouraging the growth of the U.S. energy and minerals workforce. These programs suffer from dwindling federal reinvestment and R&D funding. Without an adequate pipeline of qualified graduates and faculty at U.S. universities, the nation is at a distinct competitive disadvantage in the production of basic raw materials and energy.

**Barriers to exploration and mining: Public understanding and social license.** Public opposition can be a major barrier to establishing new sources of raw materials. Industry must establish a firm reputation as trustworthy operators and good neighbors. However, there is also a role for government and many other stakeholders in explaining the science and societal context of the extractive and manufacturing industries and in openly discussing the benefits and costs associated with all aspects of the supply chain of critical and strategic materials. Decision making at all levels, from government to corporate to individual, is stronger when it is based on openly available, reliable, and neutral information and analysis.

**Barriers to exploration and mining: Access to land.** Federal and state lands may contain significant mineral resources. Balancing multiple uses of public land is challenging but it is important to note that as more land is made off limits to exploration and mining, fewer mineral discoveries may be made.

**Barriers to mining: Lack of information on the environmental consequences of mining for specific commodities in specific environments.** Regulators are wary of making decisions when the outcomes of their decisions are unclear. Understanding the chemical and biological interactions of minerals, mining, and the environment in places where mining is likely to occur would improve the quality and ease of decision making. Investment in basic and applied research at USGS, universities, and elsewhere would reduce uncertainty and identify possible issues that should be addressed by developers, regulators, and the public early in any planned development.

**Barriers to mining: Time and cost of permitting process.** We recognize the necessity for fair, balanced, and inclusive deliberation about any proposed development of earth resources. We note, however, that the complex and costly permitting process may hinder the timely development of domestic supplies of critical materials and thereby increase the nation’s vulnerability to supply disruptions.

Category 3: Supply and Supply Chain

**Identifying vulnerabilities in the supply chain: Accurate, freely available, timely information across the full global life cycle of commodities is essential.** The National Minerals Information Center (NMIC) at the U.S. Geological Survey (USGS) is the sole provider of statistics and analysis on the supply of, demand for, and global flow of about 100 minerals and mineral commodities for approximately 180 countries. These data are essential to monitoring supply chains, to identifying and anticipating vulnerabilities in supply chains, and to sound financial, policy, and national security decision making. Consistent, timely, accurate data from NMIC is one of our strongest bulwarks against disruptions in the supply chains of critical materials.
Identifying vulnerabilities in the supply chain: The need for forecasting capabilities in the federal government. USGS currently lacks the necessary funding to create a much-needed forecasting capability to project trends in the supply of, demand for, and flow of minerals and mineral commodities. This dearth of information leaves the country susceptible to otherwise avoidable supply disruptions and exposes many essential industries to unnecessary risk. The National Minerals Information Center should urgently receive sufficient new funding to acquire the expertise and technology needed to support a national minerals forecasting capability.

Identifying vulnerabilities in the supply chain: Need for a methodology to assess criticality. MSIC commends the Critical and Strategic Minerals Supply Chain Subcommittee for its efforts to develop a methodology for assessing and forecasting criticality. We note that this Request for Information is part of your effort and we offer our help in any way as you develop this important metric.

- **Category 4: Market Dynamics**

  Market distortions, opacity, lack of information, etc.: Accurate, freely available, timely information across the full global life cycle of commodities is essential. This category, once again, highlights the absolute necessity for reliable information that is readily, affordably, and equally available to all involved in the entire supply chain from producers, manufacturers, users, and recyclers to investors, planners, regulators, policy makers, and others. A market economy cannot operate efficiently without reliable, accessible information, and information becomes even more important in those sectors of the supply chain that lack a free market. As Christine Parthemore remarked in 2011, “Without USGS efforts to provide the government and public with neutral information and unbiased analysis, the United States would be forced into a persistent reactionary state whenever concerns about minerals arise – and the U.S. government will be far less well equipped to deal with episodes like the 2010 rare earths dispute with China.”

- **Category 6: Other**

  The upstream sector is important: Innovations in material science cannot be deployed without a reliable supply of the raw materials needed to manufacture the new materials. The upstream sources of raw materials must be assessed and developed in an environmentally sensitive way and in tandem with the development of new materials to avoid creating new vulnerabilities.

  Investing in innovation in the upstream sector may, in certain circumstances, be just as effective a response to vulnerabilities as developing alternative or substitute materials: The extractive industries, including the metals, industrial minerals, and aggregates sectors, have been remarkably successful in staving off shortages in raw materials. Nevertheless, this part of the supply chain may have potential for effective innovations that would address possible supply chain vulnerabilities. We respectfully suggest that your assessment of critical and strategic mineral supply chains should recognize the importance of upstream processes to the stability of supply chains.

  The Minerals Science and Information Coalition stresses the national importance of understanding the nature and global distribution of mineral supplies, and the absolute necessity for unbiased, accurate, freely accessible, and consistent information on all aspects of the life cycle of minerals and mineral commodities, coupled with sound forecasting capabilities.

  We urge the Critical and Strategic Minerals Supply Chain Subcommittee to recognize the value to the nation of the existing minerals science and information functions of the federal government and to

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identify those areas where federal expertise should be expanded and strengthened to meet emerging needs for critical and strategic materials.

Thank you for the opportunity to present these comments. If you would like any additional information please contact Dr. Maeve Boland, American Geosciences Institute, at 703-379-2480, ext. 228, mboland@agiweb.org, or 4220 King Street, Alexandria, VA 22302-1502.

Sincerely,

Dr. P. Patrick Leahy
Chair, Minerals Science and Information Coalition

Aluminum Association
American Chemical Society
American Exploration & Mining Association
American Geosciences Institute
American Physical Society
Associated Equipment Distributors
Association of American State Geologists
Industrial Minerals Association – North America
Geological Society of America
Materials Research Society
Mining & Metallurgical Society of America
National Electrical Manufacturers Association
National Mining Association
National Stone, Sand and Gravel Association
Portland Cement Association
Society for Mining, Metallurgy and Exploration