Rare Earth Elements

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SME Statement

It is crucial to re-establish a domestic rare earths minerals production industry to help secure the nation's clean energy future, reduce the United States' vulnerability to material shortages related to national defense, and to maintain our global technical and economic competitiveness.

Given that the Chinese dominance of the rare earths market has adversely impacted supply stability and endangers the U.S. and its allies assured access to key materials, rare earths should qualify as materials either strategic or critical to national security. Further, the U.S. government should facilitate the reintroduction of a globally competitive rare earth industry in the U.S. Realization of these objectives requires:

- Developing domestic processing capability so that the U.S. is not primarily dependent on China as a source of rare earth ore, and almost exclusively dependent on China for processing of the ores;
- Providing a mechanism where access to Federal lands for rare earth exploration and extraction is possible; and,
- Training engineers to design and operate rare earth ore processing facilities.

Issues

- Though at least 40 percent of the world's rare earth reserves are located within the borders of the U.S. and its ally nations, our country depends upon imports from China for nearly 100 percent of its rare earth needs. (Figure 1)
- Although prices for most rare earth compounds declined in 2013, China continues efforts to restrict the supply of rare earth oxides and consolidate its industry. China has the ability to shut off the U.S. supply of rare earth materials for economic or strategic reasons.
- The U.S. has limited rare earth production and remains nearly entirely dependent on overseas refineries (primarily China) for further processing, and does not maintain a "strategic reserve" of rare earth compounds, metals or alloys.

Background

Rare earths are a set of 17 chemical elements in the periodic table that, because of their unique geochemical properties, are typically widely dispersed in the Earth's crust and are not often found in concentrated and economically exploitable forms. This fact requires special recovery and refining techniques to produce useable elements.

Significant quantities of rare earths are used in the production of clean energy technologies, including advanced automotive propulsion batteries, fuel cells, electric motors, high-efficiency light bulbs and generators in wind turbines. Most modern defense technologies such as radar and sonar systems, precision-guided weapons, and cruise missiles require rare earths and the materials produced from them. Rare earths are also required in a variety of high tech applications in computing, pollution abatement, power generation, water treatment, oil refining, metal alloying, decolorizing recycled glass, communications, diagnostic health care, flat screen TVs, and hybrid cars.

More than 97 percent of all rare earths for world consumption are produced in China. China's willingness to export rare earths continues to erode due to its growing domestic demand and its mandate to consolidate the industry by decreasing its number of mining permits.

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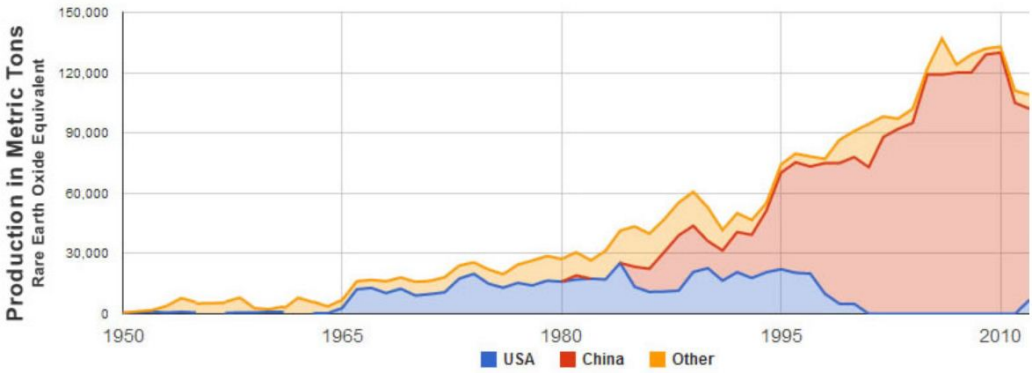

Figure 1. Historical REE Production. Source: Geology.com 2014

SME Statement of Technical Position

- Efforts to re-establish a competitive domestic rare earth supply chain are of critical strategic and economic importance to this nation's commitment to clean energy technology, to a viable national defense, and for the U.S. to be economically competitive in the manufacturing of high tech products.

- Supply chains must include the reintroduction of the capacity to conduct mining, refining/processing, alloying and manufacturing operations using domestic and ally nation suppliers so that the U.S. has a secure source of rare earth materials which are vital to our national security and economic policy.

- There is an urgent need to identify the current global market situation regarding rare earth materials, including the strategic value placed on them by foreign nations including China, and the Department of Defense's and domestic manufacturing industry's supply-chain vulnerability related to rare earths and end products containing rare earths.

- Governments as all levels and industry should work collaboratively to:
    - Expedite the permitting and approval of projects that will increase exploration for, and development of, domestic rare earths.
    - Facilitate the development of domestic ore refining capabilities.
    - Facilitate technology development for rare earth recovery from scrap. The U.S. and its ally nations currently cannot reclaim valuable rare earths from "waste" streams, such as permanent magnets, and such capability should be explored using appropriate research and development projects.

- Professionals and teachers with knowledge of the rare earth industry are in critically short supply and SME supports efforts to encourage people to enter industry or academia and further develop the knowledge needed to foster enhancement of the requisite domestic capabilities.