FACT SHEET

The Facts:
Rare Earth Metals and U.S. National Security

This fact sheet supplements American Security Project's "Rare Earth Metals and U.S. National Security" report by Emily Coppel, which was first published on February 1, 2011.

June 8, 2011

In Brief

- There are 17 rare earth metals.
- Contrary to their name, rare earth metals are not rare at all.
- Despite their relative abundance, these metals are difficult to extract from ore and the extraction process is costly and more environmentally damaging than for other elements.

Source: http://www.ars.usda.gov/is/graphics/photos/jun05/d115-1.htm

- Rare earth metals have a wide variety of applications, including use in hybrid car motors, computer hard drives, cell phones, and wind turbines.
- Rare earths are essential for military equipment. Jet engines, smart bombs and guided missiles, lasers, radar, night vision goggles, and satellites all depend on rare earth metals to function.
- The U.S. was once the world's top producer and supplier of these metals, but now China controls the market. While the U.S. has taken some steps to reduce this reliance on China, it has not done enough.

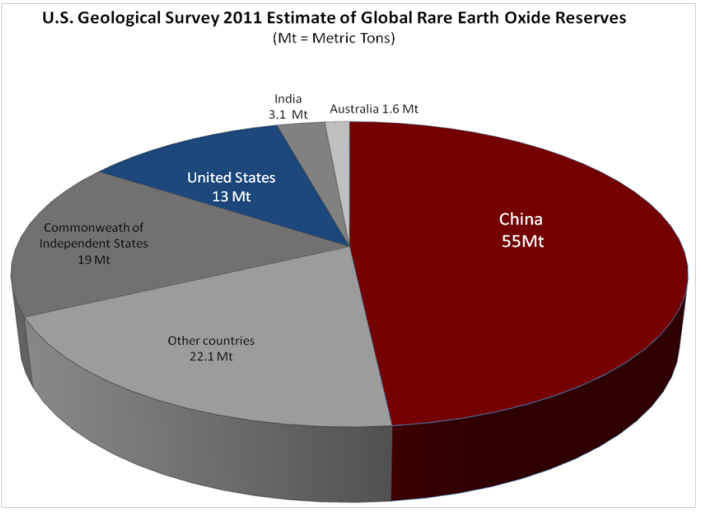
This document lays out key facts about rare earth metals and U.S. national security, and provides a map showing current and potential rare earth producers.

ASP American Security Project

Fact: China owns 97% of the global market in rare earth metals.

China's dominance in the rare earths market means that the U.S. is completely import-dependent on one country for the supply of its rare earths. Since rare earths have a wide variety of applications – wind turbines, hybrid car motors, computers, cell phones, smart bombs, night vision goggles – a shortage in these metals would have severe economic and military implications for the United States.

Stockpiling rare earths would be a short-term measure to alleviate this dependency. It will provide a buffer from future shortages of rare earths, thereby protecting U.S. commercial and military interests. It will also make it more economical for new mines to develop, as stockpiling will increase demand and therefore raise the price of rare earths.



Source: http://minerals.usgs.gov/minerals/pubs/commodity/rare_earths/mcs-2011-raree.pdf

Bottom Line: By relying so heavily on China, the U.S. has severely weakened its supply chain in rare earth metals. We need to diversify our sources of rare earths to protect important commercial and military capabilities. This is an issue of national security.

Fact: Analysts predict a shortage of rare earth metals by 2012-2014 due to increased worldwide demand.

Currently, China accounts for 60% of worldwide demand for rare earth metals. As the Chinese economy expands, China will barely be able to supply its own domestic needs. In addition, other developing countries, such as India, continue to demand more and more rare earth metals as their economies grow. Although this increased demand will make new mining and production facilities in other parts of the world more economical, it will not solve U.S. dependence on others for critical rare earths unless the U.S. begins to develop domestic mining and production capabilities.

Bottom Line: This issue will not go away by itself. The U.S. needs a coherent, long-term strategy to deal with future shortages in rare earth metals and to reduce its dependence on others for critical materials.

Fact: China currently has invested more into R&D for rare earth metals, leaving the U.S. at a significant disadvantage.

One possible way for the U.S. to reduce its reliance on others for rare earths would be to develop alternatives or substitutes for rare earths. However, the U.S. lacks a strong R&D base in rare earth metals, at least when compared to China. China currently has two state-owned laboratories dedicated solely for rare earth metal research, the State Key Laboratory of Rare Earth Materials Chemistry and Applications (located in Beijing), and the State Key Laboratory of Rare Earth Resource Utilization (located in Changchun). China invests approximately 10 million Yuan (approximately 1.5 million USD) annually into the Beijing laboratory in a research fund.[1] In addition, China has the only two scientific journals in the world that are devoted to rare earth metals – the Journal of Rare Earths and the China Rare Earth Information journal.

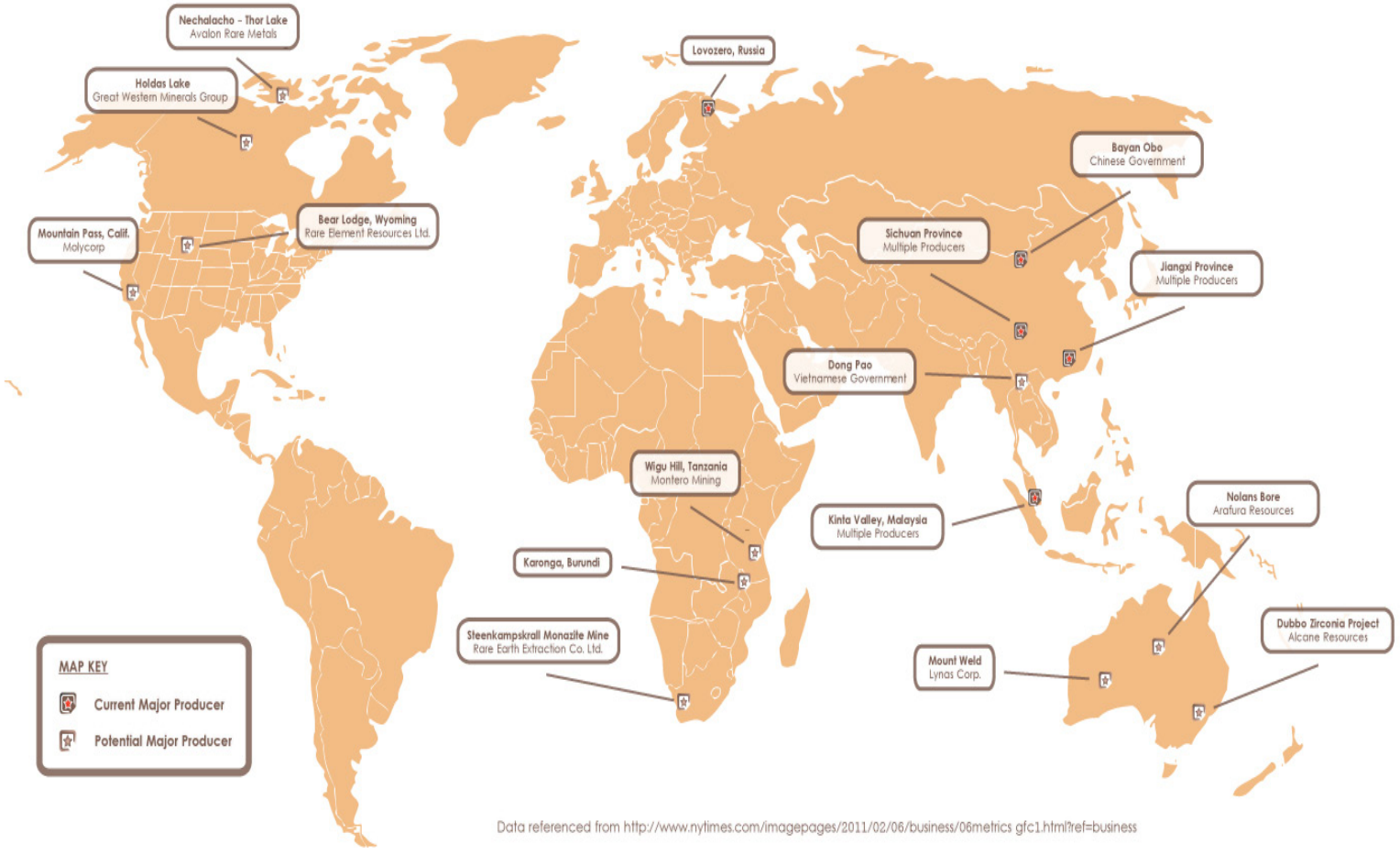
The U.S. is starting to change this imbalance. According to DOE's Critical Minerals Strategy, "[i]n fiscal year 2010, DOE's Office of Science, the Office of Energy Efficiency and Renewable Energy, and the Advanced Research Projects Agency-Energy (ARPA-E) together provided approximately $15 million for research on rare earth metals."[2] With the 2012 Department of Energy budget request calling for "Energy Innovation Hubs," to include research specifically on rare earth metals, this amount should increase.

Bottom Line: Investment in rare earths R&D is important—the first country that is able to develop an effective and reliable substitute for rare earths or that is able to develop new and more efficient technologies will gain a competitive advantage over others.

Fact: The U.S. has the second-largest deposits of rare earth metals in the world. North American mines alone could supply U.S. needs.

As the chart below shows, there are several places in North America where mining may be a worthwhile venture, including Thor Lake in Canada, which possibly contains one of the world's largest deposits of rare earth metals. Experts believe that these and other North American mines could produce as much as 40,000 metric tons of rare earth metals per year, or double what the U.S. currently uses. If the U.S. could fully develop these mines, it would have sufficient rare earths to supply domestic demand, as well as enough to satisfy future growth in demand.

Mine	Date of Operation	Amount of Rare Earths
Mountain Pass, California	Full capacity - end of 2012	22 million metric tons[3]
Bear Lodge, Wyoming	Still testing/drilling - 2012 final feasibility study	Approximately 15.8 million metric tons[4]
Hoidas Lake, Saskatchewan	No date available	286,000 metric tons[5]
Thor Lake, Canada	Production Start-Up – 2015	10,000 metric tons annually – 20 year mine life[6]



Click here for a larger version of the map.

Bottom Line: U.S. dependency is not due to lack of resources. As the map above shows, there are many places across the globe where the U.S. can invest in order to diversify its rare earths supply chain.

Fact: U.S. dependence on China for rare earths does have negative economic implications.

According to the OECD, non-Chinese producers of rare earth metals pay 31% more than Chinese producers. As China continues to restrict exports, this percentage will only increase. Costs for rare earths increased fourfold in 2010, and prices have doubled just in the last four months.

There is also a cost associated with jobs lost/people not hired domestically if the U.S. continues to rely on foreign mines and producers instead of developing its own. For example, the reopening of the Molycorp mine at Mountain Pass, California, will support an average of 700 jobs per day over the 18-month construction period, with an additional 200 to 300 permanent jobs created when the new facility runs at full capacity.[7]

Conclusion

The good news is that the U.S. has the capability to reduce its dependence on others for rare earth metals. However, the United States will need to adopt a coherent, long-term strategy in order to accomplish this. U.S. policy should include greater investment in rare earths R&D to solve the long-term supply problem and stockpiling rare earths to address short-term shortages.

(Endnotes)

1 The State Key Laboratory of Rare Earth Materials Chemistry and Applications, "History and Development," http://www.chem.pku.edu.cn/page/relab/english/history.htm (accessed June 2, 2011).
2 U.S. Department of Energy, "Critical Materials Strategy," December 2010, 53, http://www.energy.gov/news/documents/criticalmaterialsstrategy.pdf.
3 Molycorp Minerals, "Molycorp Minerals Begins Preparations for Renewed Mining," August 11, 2009, http://www.molycorp.com/8_11_2009_mp_restart.asp?option=com_content&view=article&id=1571&Itemid=2 (accessed June 2, 2011).
4 Rare Element Resources Ltd., "Key Highlights," May 2011, http://www.rareelementresources.com/s/Home.asp (accessed June 2, 2011).
5 Great Western Minerals Group Ltd., "Hoidas Lake, Saskatchewan," January 27, 2010, http://www.gwmg.ca/html/projects/hoidas-lake/index.cfm (accessed June 2, 2011).
6 Avalon Rare Metals, Inc., "Fact Sheet #2: Nechalacho, Thor Lake," January 27, 2011, 1, http://www.avalonraremetals.com/_resources/Project_Sheet_2011.04.06.pdf (accessed June 2, 2011).
7 Proctor, Cathy, "Molycorp gets OK for rare-earths processing plant," Denver Business Journal, December 13, 2010, http://www.bizjournals.com/denver/news/2010/12/13/molycorp.html (accessed June 2, 2011).

Building a New American Arsenal

The American Security Project (ASP) is a bipartisan initiative to educate the American public about the changing nature of national security in the 21st century.

Gone are the days when a nation's strength could be measured by bombers and battleships. Security in this new era requires a New American Arsenal harnessing all of America's strengths: the force of our diplomacy; the might of our military; the vigor of our economy; and the power of our ideals.

We believe that America must lead other nations in the pursuit of our common goals and shared security. We must confront international challenges with all the tools at our disposal. We must address emerging problems before they become security crises. And to do this, we must forge a new bipartisan consensus at home.

ASP brings together prominent American leaders, current and former members of Congress, retired military officers, and former government officials. Staff direct research on a broad range of issues and engages and empowers the American public by taking its findings directly to them.

We live in a time when the threats to our security are as complex and diverse as terrorism, the spread of weapons of mass destruction, climate change, failed and failing states, disease, and pandemics. The same-old solutions and partisan bickering won't do. America needs an honest dialogue about security that is as robust as it is realistic.

ASP exists to promote that dialogue, to forge consensus, and to spur constructive action so that America meets the challenges to its security while seizing the opportunities the new century offers.

ASP
American Security Project

www.americansecurityproject.org