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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Title: How rising material costs affect DoD programs

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Presentation Outline

- Problem statement
- Background
- Reasons for high costs
- US reliance on importation of minerals and rare earth elements
- Risks to Department of Defense (DoD)
- Conclusions

Problem Statement

The DoD, working in an environment of budgetary constraints and higher material costs, will face challenges in fielding future weapon systems

Will these challenges present risks to national security?

Background

- The Defense National Stockpile Center (DNSC), Ft Belvoir, VA, was created in 1939 by the US War Department.

- After the Cold War ended with the collapse of the Soviet Union in 1992, the stockpile of 90 different commodities was reduced to just 17 by the end of 2007.

- In 2008, in a study titled Managing Material for a Twenty-first Century Military, the National Research Council (NRC) of the National Academy of Science addressed the need for a defense stockpile.

Background (continued)

- The NRC study concluded with the following three (3) major threats to the supply of materials critical to the national defense:

  1- Increased demand from around the world for commodities and materials.

  2- Diminished domestic supply and processing capability along with greater dependence on foreign sources.

  3- Higher risk and higher uncertainty about supply disruptions owing to the fragmentation of global supply chains.

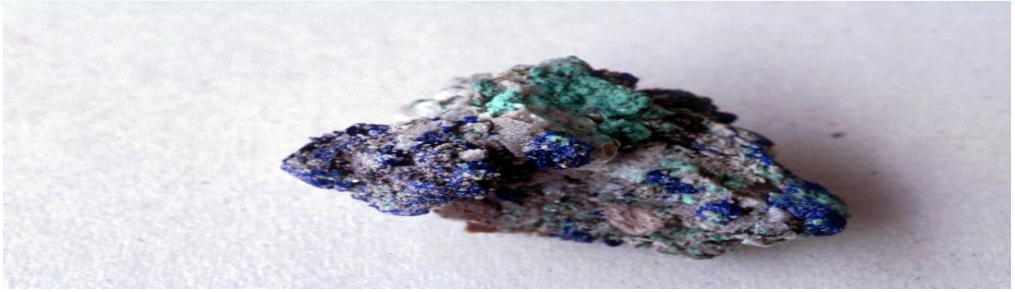
  Source: Red Alert by Stephen Leeb, 2011, p98

Reasons driving metals costs up

- Existing mines are old (up to 100 years old) and grade of metals per ton of earth removed are decreasing, requiring deeper digging:
  - Extra digging requires expensive energy and increases costs
  - Easily accessible material has been extracted
- Mining is not a favorite investment in the US because of environmental issues- toxicity and pollution
- Lower mining and metal costs overseas shut down mines in US
- Some suppliers come from unstable countries not friendly to US interests
- China's demand of commodities has increased as well as it's competition with US for these metals

Base metals costs

Material	Costs as of 14 March 14@LE	Costs as of 2001-2003	Percentage (%) increase
Nickel	$7.14/lb	<$2/lb	257%
Tin	$10.33	<$5/lb	106.60%
Lead	$.91/lb	<$.50/lb	82%
Zinc	$.90/lb	<$.50/lb	80%
Copper	$2.95/lb	$2/lb	47.50%
Aluminum	$.77/lb	<$.60/lb	28.33%



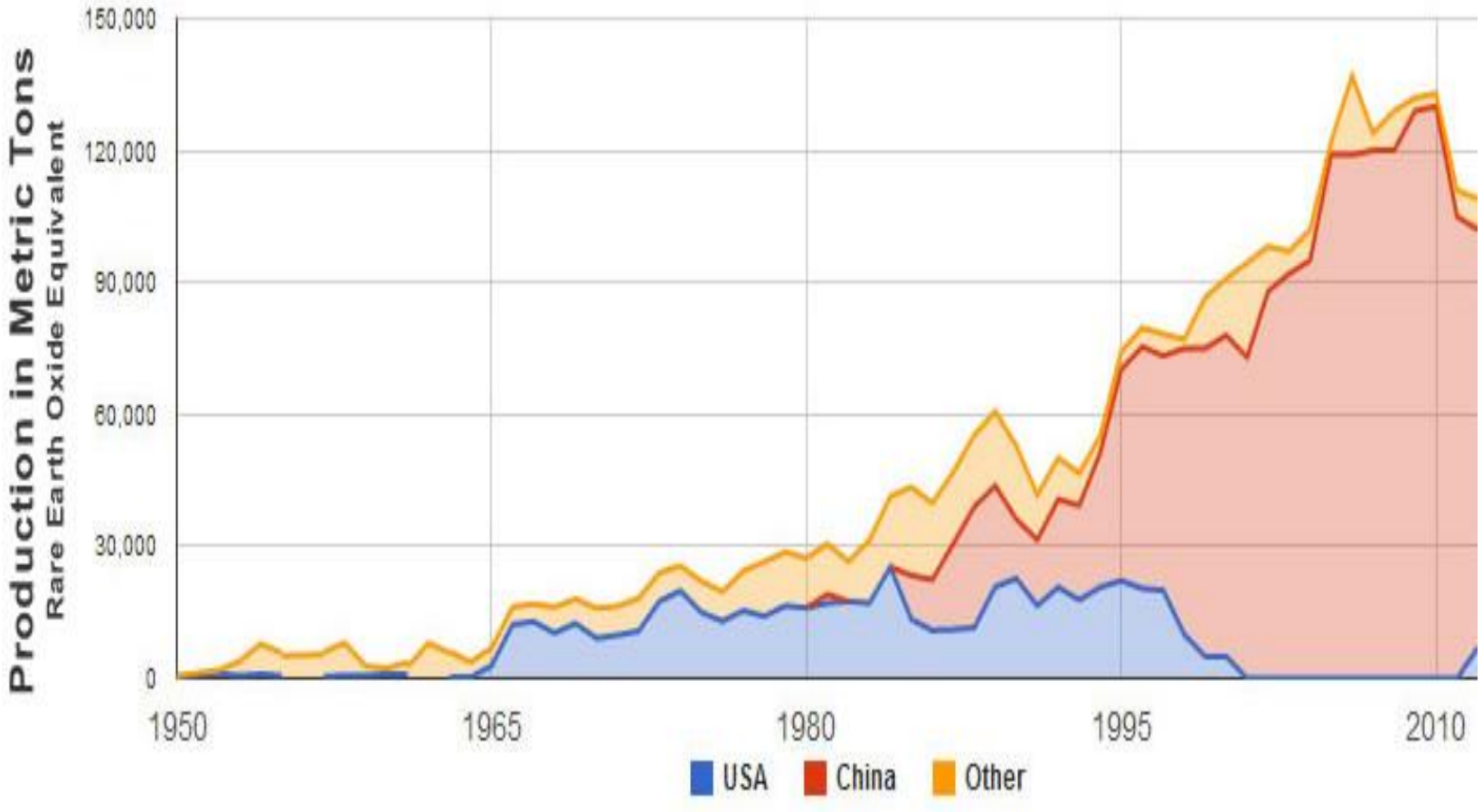
http://www.infomine.com/investment/metal-price

List of Rare Earth Elements (REEs)

Material	Imports from China	Use	Cost (as of 3 Mar 14)
Thulium	100%	Lasers	$31,780/lb
Erbium	100%	Amplifiers in fiber optics data transmission	$102/lb
Neodymium	100%	Laser range finders, guidance systems, and communications	$44.50/lb
Samarium oxide	100%	Precision guided weapons/white noise production in stealth technology	$13.62/lb
Lanthanum	100%	Night vision goggles	$5.90/lb

http://www.mineralprices.com/default.aspx

World Production of REEs



http://geology.com/article/rare -earth-elements/

Variables affecting world production

Following are variables that can cause higher material costs:

1- Geopolitical events resulting in supply interruptions

2- Bull/bear market as a result of a growing or slowing economy

3- Supply and demand not in equilibrium cause price fluctuations

4- Rising economic powers increase demand

5- Earthquakes and mine flooding

Defense Applications of REEs

Precision guided munitions, targeting lasers, avionics, radar systems, night vision equipment, satellites, communications systems, and stealth technology.

Source: Red Alert by Stephen Leeb, 2011, pgs 73-84

Risk to DoD

- The inadequate supplies of key strategic metals could prove to be a major weakness if US finds itself in a confrontation with an adversary

  Weakness- an adversary has high tech weapons equal to or better than US

- Advantages in high technology weapon systems the US has enjoyed since WWII and made it a world superpower could be compromised if US Forces cannot field essential equipment in sufficient numbers.

- With budgetary constraints the DoD has to be more selective in deploying limited funds for new high tech programs; this is further complicated by a rising metal cost environment

Conclusions

- The most critical REEs should be stockpiled to meet the national security requirements:

  Thulium, erbium, neodymium, samarium oxide, and lanthanum

  Expensive and low volume required

- The base metals cost increase range from 257% to 28.33% over a 10 year period but to consider is that the world economy is slowing

  Less expensive and high volume required

- **Will these challenges present risks to national security?**

  The answer is a yes due to rising costs and inadequate supply chains as discussed

Recommendations

- Recommend stockpile reduce the 100% REEs imports by:
  - 1- develop our domestic resources
  - 2- work with friendly countries like Australia and Canada for a stable supply chain
  - 3- investigate feasibility of recycling the scrap known to contain REEs
  - 4- shorten the environmental process approval required to open a new mine from an estimated 15-20 year to 7-10 year

- Start the stockpile of up to 90 metals with a budget of $2 billion to $3 billion annually over a 5-10 year period

List of sources

Book:

Red Alert by Stephen Leeb, 2011

Sites:

http://www.infomine.com/investment/metal-price

http://www.mineralprices.com/default.aspx

http://geology.com/article/rare -earth-elements/

http://en.wikipedia.org/wiki/Prices-of-elements-and-their-compounds

Thank you

Any Questions?

INFORMATION

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