DEFENSE LOGISTICS AGENCY

AMERICA'S COMBAT LOGISTICS SUPPORT AGENCY

Reestablishing Strategic and Critical Material Security in the Department of Defense

May 11, 2011

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
11 MAY 2011		**00-00-2011 to 00-00-2011**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Reestablishing Strategic and Critical Material Security in the Department of Defense	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Defense Logistics Agency Strategic Materials,8725 John J Kingman Road, Ste 3229,Fort Belvoir,VA,22060-6223**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
Presented at the NDIA Environment, Energy Security & Sustainability (E2S2) Symposium & Exhibition held 9-12 May 2011 in New Orleans, LA.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**21**	

Why the Interest in Strategic and Critical Materials?

Metal Prices Recently Skyrocketed

Electronics	
Copper	> 500%
Tungsten	300%
Germanium	300%
Indium	300%

Structure	
Aluminum	250%
Titanium	600%
Chromium	500%
Manganese	350%

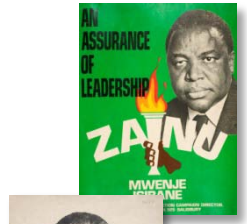
Engine	
Nickel	> 700%
Cobalt	325%
Molybdenum	500%
Rhenium	> 1000%

Peak price increases since January 2003

Major Raw Material Supply Disruptions Have Occurred in the Recent Past

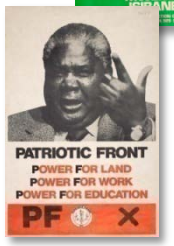
1966 through 1971

Embargo of chromium imports from Rhodesia



1969

Nickel workers strike in Canada



1978

Panic buying of cobalt due to political instability in Zaire and Zambia

Present

Unrest in the Congo causing concern with respect to metal supplies such as tin, tungsten and tantalum

US Reliance on Imports is Expanding at an Accelerated Rate

1997 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS

Commodity	Percent	Major Sources (1993-96)[1]
ARSENIC	100	China, Japan, Hong Kong, Germany
BAUXITE and ALUMINA	100	Australia, Guinea, Jamaica, Brazil
COLUMBIUM (niobium)	100	Brazil, Canada, Germany
FLUORSPAR	100	China, South Africa, Mexico
GRAPHITE (natural)	100	Mexico, China, Canada, Madagascar, Brazil
MANGANESE	100	South Africa, Gabon, Australia, France
MICA, sheet (natural)	100	India, Belgium, China, Brazil
STRONTIUM	100	Mexico, Germany
THALLIUM	100	Belgium, Mexico, Canada
THORIUM	100	France
YTTRIUM	100	China, Japan
GEMSTONES	99	Israel, Belgium, India
TIN	85	Brazil, Bolivia, Indonesia, China
TUNGSTEN	85	China, Russia, Germany, Bolivia
PLATINUM	84	South Africa, Russia, United Kingdom, Germany
TANTALUM	80	Australia, Thailand, Germany, Brazil
COBALT	78	Norway, Zambia, Finland, Canada, Russia
PALLADIUM	76	Russia, South Africa, United Kingdom, Belgium
CHROMIUM	76	South Africa, Turkey, Russia, Kazakstan, Zimbabwe
POTASH	76	Canada, Russia, Belarus, Israel
BARITE	72	China, India, Mexico, Morocco
ZINC	70	Canada, Mexico, Spain, Peru
IODINE	65	Japan, Chile, Canada
STONE (dimension)	64	Italy, India, Brazil, Canada
PEAT	58	Canada
NICKEL	54	Canada, Norway, Russia, Australia
DIAMOND (dust, grit, and powder)	45	Ireland, China, Germany
SELENIUM	41	Canada, Philippines, Belgium, Japan, United Kingdom
ASBESTOS	36	Canada
SILICON	34	Norway, Russia, Brazil, Canada
CADMIUM	33	Canada, Mexico, Belgium, Germany
MAGNESIUM COMPOUNDS	33	China, Canada, Austria, Greece
GYPSUM	30	Canada, Mexico, Spain
ALUMINUM	23	Canada, Russia, Venezuela, Mexico
IRON and STEEL	21	European Union, Canada, Japan, Brazil, Mexico
PUMICE	21	Greece, Turkey, Ecuador
SILVER	17	Canada, Mexico, Germany, Peru, Chile
IRON ORE	15	Canada, Brazil, Venezuela, Australia
CEMENT	14	Canada, Spain, Venezuela, Mexico
LEAD	14	Canada, Mexico, Peru, Australia
NITROGEN (fixed), AMMONIA	14	Trinidad and Tobago, Canada, Mexico
SALT	14	Canada, Mexico, Chile, The Bahamas
COPPER	12	Canada, Chile, Mexico
RARE EARTHS	12	Australia, France
SODIUM SULFATE	12	Canada, Mexico, Japan, Germany
PERLITE	11	Greece
SULFUR	11	Canada, Mexico, Germany
MAGNESIUM	10	Canada, Russia, China, Mexico, Ukraine
MICA, scrap and flake (natural)	3	Canada, India, Finland, Japan
IRON and STEEL SLAG	2	Canada, South Africa
LIME	1	Canada, Mexico

[1]In descending order of importance

Additional commodities for which there is some import dependency but data are withheld or are insufficient to determine import-reliance levels:

Antimony	China, Mexico, Bolivia, South Africa	Mercury	Russia, Canada, Spain, Kyrgyzstan
Bismuth	Mexico, Belgium, China, United Kingdom, Canada	Rhenium	Chile, Germany, Netherlands, United Kingdom, Russia
Gallium	France, Russia, Canada, Germany, Hungary	Rutile	Australia, South Africa, Sierra Leone
Germanium	Russia, United Kingdom, China, Belgium, Ukraine	Titanium (sponge)	Russia, Japan, China, Kazakstan
Ilmenite	South Africa, Australia, Canada	Vanadium (ferrovanadium)	Russia, Canada, Belgium, Austria
Indium	Canada, Russia, France, Italy, China	Vermiculite	South Africa, China
Kyanite	South Africa	Zirconium	Australia, South Africa

from USGS Mineral Commodity Summaries

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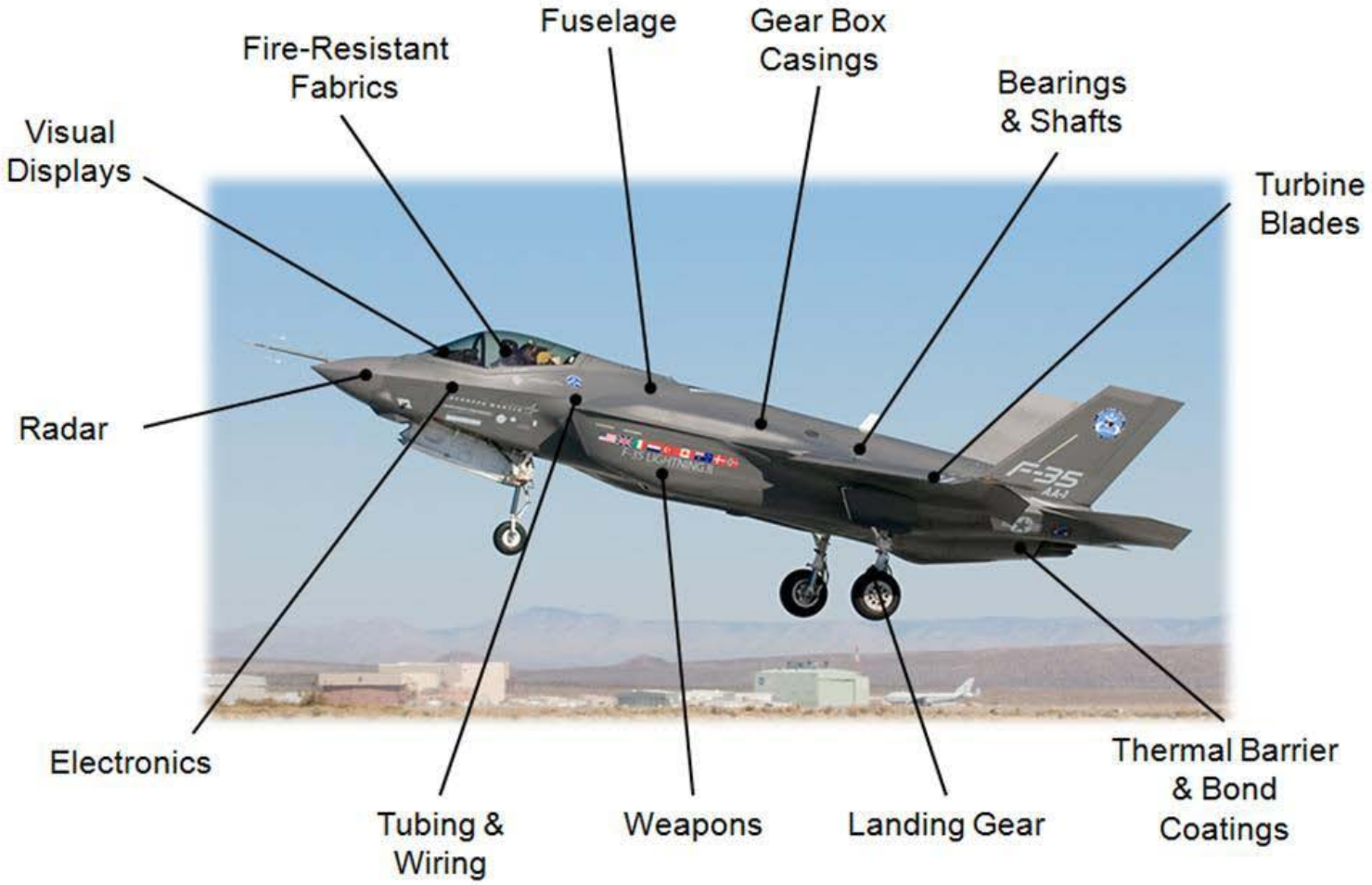
2009 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS

Commodity	Percent	Major Import Sources (2005-08)[1]
ARSENIC (trioxide)	100	China, Morocco, Belgium, Hong Kong
ASBESTOS	100	Canada
BAUXITE and ALUMINA	100	Jamaica, Brazil, Guinea, Australia
CESIUM	100	Canada
FLUORSPAR	100	China, Mexico, South Africa
GRAPHITE (natural)	100	China, Mexico, Canada, Brazil
INDIUM	100	China, Japan, Canada, Belgium
MANGANESE	100	South Africa, Gabon, China, Australia
MICA, sheet (natural)	100	China, Brazil, Belgium, India
NIOBIUM (columbium)	100	Brazil, Canada, Germany, Estonia
QUARTZ CRYSTAL (industrial)	100	China, Japan, Russia
RARE EARTHS	100	China, Japan, France, Russia
RUBIDIUM	100	Canada
STRONTIUM	100	Mexico, Germany
TANTALUM	100	Australia, China, Brazil, Japan
THALLIUM	100	Russia, Germany, Netherlands
THORIUM	100	United Kingdom, France, Canada
VANADIUM	100	Czech Republic, Rep. of Korea, Canada, Austria
YTTRIUM	100	China, Japan, France
GALLIUM	99	Germany, Canada, China, Ukraine
GEMSTONES	99	Israel, India, Belgium, South Africa
ANTIMONY	93	China, Mexico, Belgium
BISMUTH	90	Belgium, China, United Kingdom, Mexico
GERMANIUM	90	Belgium, China, Germany, Russia
PLATINUM	89	South Africa, Germany, United Kingdom, Canada
BARITE	80	China, India
TIN	80	Peru, Bolivia, China, Indonesia
RHENIUM	79	Chile, Netherlands
DIAMOND (natural industrial stone)	78	Botswana, South Africa, Namibia, India
STONE (dimension)	78	Brazil, Italy, China, Turkey
ZINC	76	Canada, Peru, Mexico, Ireland
COBALT	75	Norway, Russia, China, Canada
POTASH	73	Canada, Belarus, Germany, Russia
TITANIUM MINERAL CONCENTRATES	73	South Africa, Australia, Canada, Ukraine
TITANIUM (sponge)	67	Kazakhstan, Japan, China, Ukraine
SILVER	63	Mexico, Canada, Peru, Chile
TUNGSTEN	63	China, Germany, Canada, Bolivia
PEAT	60	Canada
PALLADIUM	47	Russia, South Africa, United Kingdom, Belgium
NITROGEN (fixed), AMMONIA	40	Trinidad and Tobago, Canada, Russia, Ukraine
CHROMIUM	39	South Africa, Kazakhstan, Russia
VERMICULITE	39	China, South Africa
GARNET (industrial)	37	India, Australia, China, Canada
DIAMOND (dust, grit and powder)	35	China, Ireland, Russia, Republic of Korea
MAGNESIUM METAL	35	Canada, Israel, Russia, China
MAGNESIUM COMPOUNDS	28	China, Austria, Canada, Australia
SILICON (ferrosilicon)	27	China, Russia, Venezuela, Canada
COPPER	24	Chile, Canada, Peru, Mexico
PERLITE	21	Greece
GYPSUM	19	Canada, Mexico, Spain
SALT	19	Canada, Chile, Mexico, Peru
ALUMINUM	18	Canada, Russia, Brazil, Venezuela
NICKEL	18	Canada, Russia, Australia, Norway
MICA, scrap and flake (natural)	11	Canada, China, India, Finland
CEMENT	8	China, Canada, Republic of Korea, Thailand
IRON and STEEL SLAG	8	Japan, Canada, Italy, France
IRON and STEEL	7	Canada, European Union, China, Mexico
SULFUR	4	Canada, Mexico, Venezuela
PUMICE	3	Greece, Turkey, Iceland, Mexico
BERYLLIUM	2	Kazakhstan, United Kingdom, Kenya, Ireland
LIME	2	Canada, Mexico
STONE (crushed)	2	Canada, Mexico, The Bahamas
PHOSPHATE ROCK	1	Morocco

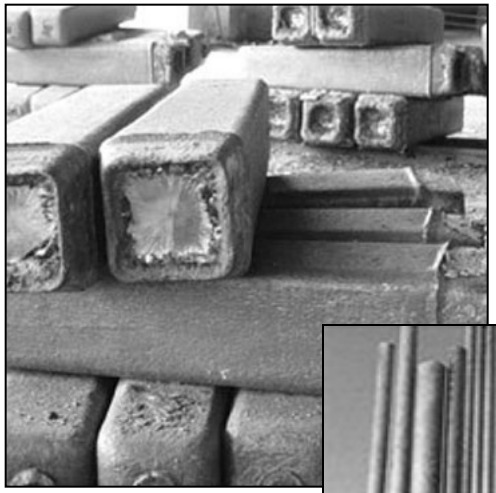
[1]In descending order of import share.

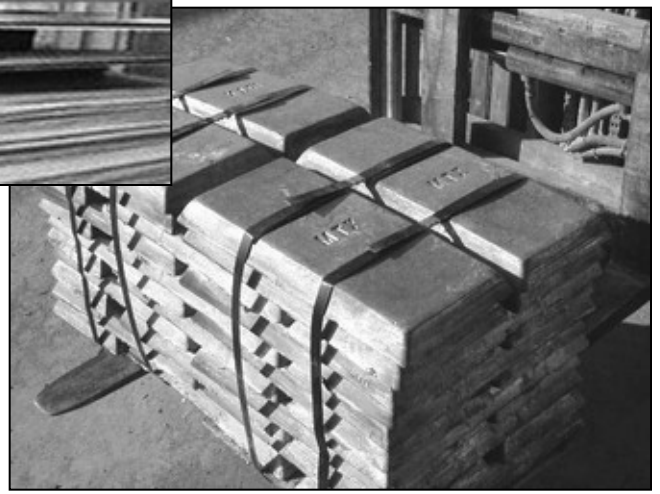
Top Ten Shortage Materials Are Essential for the Production and Performance of Most Systems



The list includes materials other than rare earths and titanium!

What is the Vision for the New Stockpile?





Review of Current Stockpile

- National Defense Stockpile (NDS) History
  - NDS Program established in 1939
  - Purpose: to preclude dependence on foreign sources of supply in time of national emergency
- Reviews of U.S. stockpiling strategies began in 2006
  - A working group was convened in Jan. 2008 by Deputy Undersecretary of Defense for Industrial Policy.
  - Working group included representation from each of the military services, DoD Joint Staff, Department of Commerce, U.S. Geological Survey, and Defense Contract Management Agency.
  - **Conclusion: Stockpile Should Be Reconfigured!**

Reconfiguration Under Way

- Reconfiguration Report submitted to Congress, April 2009
- Initiatives being implemented and/or considered are:
  - Reconfigure the NDS into the Strategic Materials Security Program
  - Grant the SMSP broad programmatic flexibility
  - Modify the current policy to dispose of materials in the NDS
  - Enhance the acquisition authority to employ risk mitigation strategies
  - Consider the need to augment the Transaction Fund with an annual appropriation
- House Armed Services Committee hearing held in July 2009.
- Implementation plan was submitted and accepted in 2010.
- A legislative package has been prepared and is in review.

SMSP Process

- Constantly surveil global markets
  - Assess ever-changing material availability
- Evaluate Material Requirements
  - Military Conflict Scenarios
  - Peacetime Scenarios
- Dynamic List of Material Needs
  - Military weapons platforms
  - Input from Military Services
  - Reviewed by Military Services
- Country Reliability
  - Conflict Scenario
    - Willingness to sell to U.S.
  - Peacetime Scenario
    - Willingness to sell to U.S.
    - Ability to sell to U.S.
- Mitigate Supply Risk
  - Strategic Sourcing
  - Stockpiling
  - Partnering with other countries

"Top Ten" Shortfall Materials

Strategic Material	Important Defense Uses
Aluminum Oxide	Abrasives
Antimony	Flame retardants; batteries
Bauxite, Refractory Grade	High temperature applications
Fluorspar, Acid Grade	Hydrofluoric acid
Manganese Metal	Wireless communications equipment
Neodymium	Magnets, lasers
Tantalum	Capacitors; super alloys
Tin	Solder, alloys
Tungsten	Cutting tools; super alloys
Yttrium	Displays and lighting

What is DLA Strategic Materials doing?

- Moving from traditional stockpiling to acquisition support and commodity/specialty metal expertise
- Performing commodity/specialty metal risk assessments and developing risk mitigation strategies
- Assessing global marketplace and analyzing geopolitical issues for impact on availability of materials
- Continuing to collect data and market intelligence
  - On individual elements
  - On downstream manufacturing into metals, alloys, and semi-fabricated products
- Establishing relationships with key military material experts
- Consolidating DoD material requirements

Titanium Smart Buy

- **DLA contracted to procure titanium:**
  - Navy Requirement: 53,490 lbs in 2009
  - Army Requirement: 148,200 lbs in 2009
  - Total awarded $3.95M
  - Combined procurement for Army/Navy resulted in approximately $1.3M cost avoidance
  - Solicitation included provisions for Army to receive a “credit” for the offal material provided as feedstock and “right to recover” opportunity
- **Collaborating with the Military Services to expand the procurement to a much larger scale**




New Mission Example

- U.S. Army Armament Research, Development and Engineering (ARDEC) Initiatives
  - ARDEC's titanium requirements to be supported by DLA Strategic Materials contract
    - The titanium used for gunner protection kits and seats for humvees
    - Contract will be base year and two option years
    - Annual demand estimated at 250,000 lbs
    - Offal to be used as credit to reduce unit price
  - DLA will continue working with ARDEC on similar initiatives

New Mission Example

- Currently working with Tinker Air Force Base on a rhenium availability issue
  - Rhenium is a super alloy used in high efficiency jet engines
- An extensive recycling effort undertaken by Tinker AFB to successfully address Air Force supply shortfalls
- DLA is exploring options for accepting oversight of the recycling project
- Plan is to broaden recycling program participation to include Army and Navy engine super alloys

New Mission Example

- Exploring U.S. Air Force and National Reconnaissance Office (NRO) germanium issue
  - Germanium is a chemical element used in infrared, LED technologies and solar cells
  - Supply Chain issues affect price, quality and availability
    - Inadequate domestic smelting sources
    - Poor quality of materials provided from foreign sources
    - Unreliable pricing
    - High rate of rejection in finished materials
  - USAF/NRO approached DLA Strategic Materials for help addressing germanium wafer sourcing Issues

Addressing Rare Earths Elements

- Rare earths are a family of 17 elements

Element #	Name	Element #	Name
21	Scandium	64	Gadolinium
39	Yttrium	65	Terbium
57	Lanthanum	66	Dysprosium
58	Cerium	67	Holmium
59	Praseodymium	68	Erbium
60	Neodymium	69	Thulium
61	Promethium	70	Ytterbium
62	Samarium	71	Lutetium
63	Europium		

- Used in numerous defense applications such as missile defense, laser weapons and electronic warfare
- Susceptible to supply disruption; not easily substituted
- 7 of the 17 elements are identified as shortfall materials in our FY11 Requirements Report
- Congressional interest – DLA Strategic Materials currently leading the effort on a rare earths report to Congress per FY2011 NDAA Sec 843

New Mission Examples

- Acquire ferro-dysprosium as a vendor-managed rolling inventory.
  - Metal alloy used to manufacture the popular neodymium-iron-boron magnets
  - Magnets needed for military components and hybrid technologies
- Acquire yttrium oxide for physical stockpiling
  - Oxide is the most flexible form of this material
  - Needed for thermal barrier coatings for aircraft components
  - No U.S. production; 100% import dependent
  - Hold until DLA can identify a yttrium metal manufacturer
- Acquire phosphors as a vendor-managed rolling inventory
  - Phosphors contain terbium and europium metals/powders
  - Critically needed for aircraft heads-up displays (HUD)
  - Shortfalls of both materials identified in FY11 National Defense Stockpile Requirements Report

What's Next?

- Legislative changes to Stockpiling Act
  - Significantly shorten material response timeframes
- Engage in material acquisitions to assure industrial base capability
  - Titanium
  - Rare Earth Elements
  - Germanium
  - Rhenium / nickel super-alloys
  - Other materials as supply chain issues are identified
- Re-acquire and expand material expertise

QUESTIONS?

Ronnie L. Favors
Administrator
DLA Strategic Materials
Ronnie.Favors@dla.mil
(703) 767-5500

DLA Strategic Materials
8725 John J Kingman Road, Ste 3229
Fort Belvoir, VA 22060-6223

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