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Strategic Minerals

Is China's Consumption a Threat to United States Security?

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No great nation willingly allows its standard of life and culture to be lowered and no great nation accepts the risk that it will go hungry.

—Hjalmer Schacht, German Minister of Economics, 1937

The vitality of a powerful nation depends upon its ability to secure access to the strategic resources necessary to sustain its economy and produce effective weapons for defense. This is especially true for the world's two largest economies, those of the United States and China, which are similarly import dependent for around half of their petroleum imports and large quantities of their strategic minerals. Because China's economy and resource import dependence continue to grow at a high rate it has adopted a geopolitical strategy to secure strategic resources. China's resulting role in the mineral trade has increased Western security community concern over strategic minerals to its highest point since the end of the Cold War.

The importance of mineral access to security policy turns on the adequacy of domestic supply, reliability of mineral imports, rate of economic growth, and the degree to which the nation perceives threats from external actors. Security policy makers should become alarmed when resource imports are concentrated in a limited number of unstable countries, scarcity drives up commodity prices, external actors undertake behavior that interferes with free trade and mineral access, or peer competitors demonstrate a geopolitical interest in trade vulnerabilities. Today, the rise of China and its growing import dependence are creating conditions that call into question the continued security of mineral imports to the United States and the West.

The U.S. dependence on overseas sources of strategic minerals essential to sustain its economy and defense sector is more pronounced than its dependence upon foreign oil. Approximately 60% of the petroleum consumed in the United States is imported. By comparison the American nation depends upon overseas suppliers for over 80% of its most important strategic minerals, including cobalt, manganese, platinum group metals, rare earths, tantalum, and yttrium. Of interest, 47% of the 19 minerals on which the United States is 100% import dependent upon are produced in China (U.S. Geological Survey, Mineral Commodity Summaries 2010 and 2011). There are substitutes for petroleum as a source of energy, but this is not true of many strategic minerals. There is not, for example, a substitute for manganese in the production of steel, or chromium in the production of stainless steel. While the United States continues to trust the free market to meet its import needs, similarly import dependent China does not and has developed a geopolitical strategy and industrial policy to secure its import supplies in the increasingly tight minerals market. During the Cold War, U.S. vulnerability

Figure 1: Ferrochromium South Africa

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in an effort to mineral import interruption became an active part of Soviet geopolitical strategy and much national security literature reflected upon the resource war between the import reliant U.S. and the mineral rich Soviet Union. United States vulnerability to a loss of access to these important mineral supplies is more pronounced today than at any time since the end of the Cold War. The uneven distribution of strategic mineral reserves and their concentration in a handful of politically unstable or potentially hostile countries makes it necessary that U.S. policymakers recognize the security of resource supply as a top national security issue.

Strategic Resources

Geopolitics may be described as the relationship of international political power to the geographic setting. Strategic resources provide an excellent example of this concept. Resources are anything that satisfies the needs of humankind. Because those needs change, resources change. As E.S. Zimmerman is famously quoted, "Resources are not, they become" (1933). Salt was once a strategic mineral, because of its limited known deposits and essential preservative capability. Salt was once so valuable that it served as currency, drove the establishment of trade routes, and provoked wars. Advances in geology and exploration led to the discovery of widespread deposits and along with the technology of refrigeration reduced salt's strategic importance (Kurlansky 2002). The discovery of petroleum reduced the strategic importance of whale oil. The political power of states controlling access to, and the supply of these resources diminished, while the power of states producing replacement resources, such as the countries of the Arabian Gulf, grew exponentially. The historic OPEC oil embargo of 1973 and 1974 reminded the national security community of the imbalance of resource supply and demand and the geopolitical importance of resource control. As stated by then Secretary of State Henry Kissinger, "This came as somewhat of a surprise. Oil supplies had been affordable and seemingly plentiful, and so it was hard to envisage the resulting disruption and price spikes that ensued….To say we were complacent is an understatement" (2009).

Figure 2: Namibian Uranium Mine

The history of resource geopolitics is long and varied. Roman access to the tin deposits of Cornwall provided the critical alloy to produce resilient bronze weapons. Access to the New World and colonial empires provided the resource imports that delayed the veracity of Thomas Malthus' thesis. The U.S. decision to embargo petroleum and scrap metal to Japan played a major role in Japan's entry into World War II. Germany's lack of resource rich colonies and limited domestic resources underpinned Hitler's expansionist strategy and quest for "lebensraum." The importance of resources to the conduct of war was underscored by Hitler's Minister of Industry, Albert Speer, who wrote, "The consumption of our latest reserves of chromium ore (Turkish) would have ended the war on January 1, 1946 at the very latest." (1970)

During both world wars, U.S. mineral import dependence was a major strategic priority. At the end of World War II, security analysts wrongfully assumed that new high-tech nuclear weapons would obviate the need for conventional warfare and drew down force structures and conventional logistical support systems to low levels. Within five years, the Korean War had broken out and the United States was forced to spend $6 billion under Title III of the Defense Production Act to expand supplies of the strategic minerals essential to the defense and economy of the country (Eckes 1979).

The Soviet Union was essentially autarkic. In the strategic minerals and fuels area, the Soviet Union had no peers. It was the largest producer of crude oil, the second largest producer of chromium, the third-largest producer of cobalt, the number one producer of manganese and the second largest producer of platinum. The United States and its Western allies, Japan and Europe, were forced to import virtually all of the four most important strategic and critical minerals (chromium, platinum, manganese and cobalt). The Soviet Union was not unaware of the strategic vulnerabilities and in1973 Leonid Brezhnev said:

> *Our aim is to gain control of the two great treasure houses on which the West depends, the energy treasure house of the Persian Gulf and the mineral treasure house of Central and Southern Africa* (Nixon 1980).

The Soviet Union embargoed shipments of manganese and chromium to the United States during the Berlin blockade and the Korean War, and purchased a two-year supply of cobalt on the eve of the 1978 invasion of Zaire's Shaba Province by rebels from Soviet-backed Angola. The United State took an appropriate response. President Jimmy Carter, in his 1980 State of the Union Address, "drew a line in the sand" and declared the security of the Persian Gulf to be a vital U.S. interest, one for which men, if necessary, would fight and die. The two Gulf Wars reflect this strategic imperative.

In 1980, the National Defense Stockpile, maintained since 1939 to provide a political, economic, and security advantage against supply import interruption, reached $14.8 billion in materials. In 1988 the stockpile was transferred to the Department of Defense, and in the wake of the Cold War it has been sold down to a 2009 inventory of $1.4 billion (U.S. Congress 2010). The decision to sell off the stockpile was not based on a reduced importance for strategic minerals to the U.S. economy or defense sector. The decision reflected defense budget pressure and the belief that in the absence of a peer competitor, the United States could purchase its resource requirements on the free market and simply pay more than competitors should the price rise. The rise of China is challenging those assumptions.

Figure 3: Tapping the Furnace at a South African Ferrochromium Plant

The Rise of China

The ongoing purchase of new high-tech weapons platforms and the need to replace legacy weapons systems worn out by the recent wars is placing a premium on strategic mineral imports at a time when the price for all minerals has risen dramatically and China is rising as a new peer competitor. Moreover, China has made the assured access of strategic mineral imports a critical component of its geopolitical strategy and is moving aggressively to purchase control of mineral concessions and mining companies.

The United States encouraged China to embrace capitalism and join the international financial system. It has done so to powerful affect. Free-market reforms were implemented in China in 1978. Since then, it's GDP has grown an average of 9.9% per year. In the year before the global recession China's economy grew at 13%, then dipped to 6-7%, but in 2010 grew at a rate of 13% (Davis 2011). In order to retain power and prevent social unrest, the Chinese Communist Party believes it has no choice but to sustain high levels of economic growth. In addition, the Chinese people have gained an awareness of the fruits of capitalism, and are seeking affluence on par with the industrial West.

Because of its size, Chinese consumption patterns are driving world commodity markets. China's per capita supplies of many important minerals, such as chromium and platinum are inadequate, while it has high quality reserves of tungsten, REEs, tin, antimony and zinc, all of which it has exported. In 2002 mineral imports and exports accounted for nearly 20% of China's total trade (CIMG 2003). China's lack of quality copper deposits (copper deposits in China may only last for 12 more years) makes it a large copper importer (AFAR 2008). Between 2002 and 2010 the price of copper rose from $.70 cents per pound to over $4 per pound (Blas, 2010). In 2009, China was the world's largest producer and consumer of primary aluminum, around one-third of global production (37.7 million metric tons) and consumption (34.3 million metric tons) (Halpern 2010). In addition, in 2010 China accounted for almost half of the global figures of cement, consuming 1851MT (The Metaphysics of Existence 2010), and in the 2010 Congressional Research Service reported that China was the world's leader in steel production and consumption (2010). Although China produces many minerals, its demand is rapidly outstripping domestic production for many important minerals. This has important geopolitical implications for China and the United States.

Figure 4: GSA Degassified Cobalt, Democratic Republic of the Congo

China views the world financial and trade systems as creations of the West and does not trust them to supply its needs. As a result, China developed its "Go Out Strategy" to reduce its geopolitical vulnerability to mineral and energy import cut off. Rather than depending upon the free market and paying higher prices, China is pursuing a policy of equity ownership of fuel and mineral producing companies and resource deposits around the world. Because of its trade surplus with the United States it has approximately $3 trillion in foreign exchange reserves to support this strategy. In 2008 China exceeded its $18.5 billion offer for UNOCAL (which at the time owned the Mountain Pass, California rare earth mine) by offering $19.5 billion to acquire a stake in the second largest minerals producing company, Rio Tinto.

While the U.S. and Australia interceded to prevent these acquisitions many others have succeeded. In 2009 China's National Oil Companies established approximately $50 billion in energy agreements with Brazil, Russia, Venezuela and Kazakhstan (Jiang 2009).

Because Southern Africa contains major reserves of chromium, platinum, manganese, and cobalt, and is a source of many other strategically important minerals, it is a priority region for China. Using development assistance, debt forgiveness, military assistance, and providing additional benefits that competing Western companies cannot, such as building football stadiums for governments, China has moved aggressively to tie up mineral concessions in Africa. In 2008 China signed a long-term infrastructure development agreement with the struggling Democratic Republic of the Congo worth over $9 billion, and received the country's preferential access to two rich copper-cobalt deposits (Hellendorf 2011). China is successfully acquiring South African, Zambian, Zimbabwean, Angolan and Canadian mineral and fuel assets (Interviews Johannesburg 2010).

China's growing control of some important mineral resources will enable it to deny mineral imports to the United States or other countries for political reasons. China demonstrated that it will do that when it embargoed rare earth exports to Japan over a territorial dispute in 2010 (Bradsheur 2010). It is quite likely that China's drive for affluence and economic growth will exceed domestic mineral production and cause it to curtail mineral exports, such as the rare earths, for internal economic reasons. China's strategy of acquiring ownership of strategic mineral deposits along with the chronic instability of many mineral producing countries which create U.S. vulnerabilities to mineral import disruptions similar to that faced during the Cold War should be of concern to the national security community (Hargreaves 1983).

Technology and New Strategic Minerals: The Rare Earth Elements

The legacy strategic minerals of chromium, cobalt, manganese and the platinum group metals remain strategically important, however, the evolution of technology has created new strategic minerals such as the rare earth elements (REE), columbium, and tantalum. REE are essential to the latest research and development in defense and high technology industries allowing new capabilities for products ranging from computers to smart bombs and lasers, lightweight magnets and wind power generation. The volume of rare earth consumption is relatively small; in 2008 the United States consumed 432,000 metric tons (MT) of chromium but only 7,400 MT of REE (USGS MCS 2010). Large, minable and separable concentrations of REE are found in only a few locations such as Bayan Obo in China and Mountain Pass, California. The United States once dominated world production of REE but China's growing exports of REE are often recovered as a byproduct of iron mining, which lowers the recovery cost and provides a competitive advantage over other producers, many of which mine deposits exclusively for REE. (Interview, Mark Smith). Between 2005 and 2008 China accounted for 91% of U.S. REE imports, and in 2010 China produced 97% of global rare earth oxides (Hedrick 2010).

As technology progresses, so does our dependency on REE. The seventeen REE are essential to many commercial and defense applications including magnets, metallurgical processes, batteries, lasers, and high end optical apparatus such as mirrors and lenses. Critical commercial uses include computers, lighting and x-ray systems, glass polishing materials, and ceramics.

In addition to the plethora of commercial uses of REE, there are also expanding uses in Radar and missile guidance systems and other critical defense applications. For instance, the REE erbium is used in fiber optic communication systems that are capable of carrying large amounts of digital data more quickly and effectively than copper CAT-5 and CAT-6 cables. Samarium, another REE, is used in high powered rare earth magnets, which are used on flight control surfaces in aircraft systems. A particularly important use for REE in defense applications is yttrium, which is used in the high-temperature resistant ceramic coatings found in jet engines.

China's REE industry has benefited from a strategic industrial policy designed to created advantage and minimize vulnerabilities. China has subsidized research and development for REE, seeking economic and political advantage in new applications while cornering the market on REE production (Hurst 2010). Thus, China's rapidly growing economy, which is also dependent on rare earths, creates vulnerabilities for REE import dependent countries, specifically the United States, Japan and Europe. China's economy and the environmental costs of production are being used as justification for export quota reductions that began in 2006 and constitute a threat to U.S. commercial and defense sectors (Hodge 2010). China recently cut off supplies of REE to Japan in retaliation for a territorial dispute that resulted in the arrest of a Chinese fishing boat captain (Bradshe 2010). China's manipulation of REE supplies is causing consumers to relocate to China to continue their supply. The importance of REEs is that they draw attention to the growing scarcity of resources created by the exponential rise in the global population and China's well designed geopolitical strategy to ensure that its future resources requirements will be met.

What Can Be Done

As stated in the 1952 Paley Commission Report, "The overall objective of the national materials policy for the United States should be to **ensure an adequate and dependable flow of materials at the lowest cost** consistent with the welfare of friendly nations." In support of this policy the United States should assume a measured role that includes:

- Survey the private, government, and defense sectors to fully understand strategic and critical material requirements and potential supply chain vulnerabilities
- Restock, upgrade and adjust the objectives of the National Defense Stockpile, including new strategic and critical minerals such as REE
- Include strategic and critical materials availability as an objective in the next National Security Strategy
- Make strategic mineral producing countries a high priority for diplomatic and development strategies; engage Africa in a more positive, practical way that recognizes African realities
- Encourage research and development of substitutes for REE and other high tech minerals
- Promote the development of additional strategic mineral deposits around the world

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