
Strategic Metals and National Defense: Tungsten in World War II (and Beyond)

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Tungsten in Peace and War

Tungsten, a heavy, steel-gray element with the highest melting point of any metal, was known to scientists 150 years before it became commercially valuable. Most of the world's supply comes from deposits in North America and Asia, particularly Canada, Russia, Kazakhstan, and China. In the U.S., the primary deposits—now mostly depleted—are in Nevada, California, Colorado, and Arizona.¹

The modern era of high-speed industrial technology began with the Paris Exhibition in 1900, at which machinists first demonstrated the superiority of tungsten-hardened steel cutting tools over ordinary carbon-steel products. Over the next several decades, new technologies and new industrial and domestic applications continued to stimulate tungsten production and use. War and its preparation also played a role in tungsten's rise. The enormous military demands for heavy equipment, steel tools and weapons, armor plate, and armor piercing shells in the first half of the twentieth century made tungsten one of the world's strategic metals, an element with political as well as economic importance.²

Strategic Metals in World War II

For most domestic producers of tungsten and other strategic minerals, the interim between the First and Second World Wars was one of frustration and failure. The tungsten market had boomed during World War I, but the industry collapsed in 1919 after the government abruptly

canceled wartime contracts, and the domestic building boom that followed took years to absorb surplus reserves. A government relief bill approved in the early twenties to compensate aggrieved contract holders paid only a fraction of the claims submitted, and the tariffs of 1922 and 1930, which, among other duties, added nearly eight dollars to foreign tungsten imports, were counterproductive in the general collapse of markets and prices after 1929.³

Tungsten demand in the United States remained low during the early depression years, and for most of the thirties isolationist sentiment stymied efforts to increase the U.S. military budget in response to rising fascist challenges around the world. Global tungsten prices began to climb after 1938, as war talk grew in Europe, but large ore reserves in the United States and the lingering effects of recession on steel plants kept a lid on domestic demand. Even the outbreak of war in September 1939 did not immediately stimulate domestic production, in part because of price instability in the tungsten market. With the American economy still recuperating and isolationist resistance still strong, mine owners feared that foreign producers might dump tungsten on the American market, further eroding prices and hurting domestic producers.⁴

Everything changed with the fall of France in June 1940. Even though the United States would not become an official belligerent for another eighteen months, mobilization was in full force after the Nazis marched into Paris. As rearmament mushroomed, the Roosevelt Administration devised new strategies to meet wartime

production needs.

Ensuring an adequate and steady supply of strategic raw materials was the first priority on the wartime production agenda. Despite the proximity of Mexico and other mineral-rich hemispheric nations, America faced glaring shortages of strategic materials after 1940. Defense industry consumption in the war years mushroomed two or three times over that of the 1919-40 base period. During the critical years 1942-44, 90 percent of chromium supplies came from abroad, 86 percent of manganese, 100 percent of nickel, and 61 percent of tungsten. At least a third of all copper, lead, and zinc—metals abundant in the United States—also came from foreign suppliers in these years, although the reason for that had more to do with “a lack of organization and manpower,” as one congressman put it, than a lack of domestic deposits.⁵

Fear of shortages in wartime led to increased calls for stockpiling strategic metals. Bernard Baruch, America’s economic “czar” in World War I, had first raised the idea of a strategic stockpile in 1919. The disarmament mood of the flapper age, however, ended serious consideration until the late 1930s, when Congressman James G. Scrugham, a Nevada Democrat and mining investor, secured a \$3.5 million naval appropriation for purchasing strategic minerals to meet current construction needs. The Scrugham bill was followed, in 1939, by the first significant national stockpile legislation. Sponsored by Senator Elbert Thomas of Utah and Congressman Andrew Jackson May of Kentucky, the “Thomas Act” authorized \$100 million to be spent over a four-year period.⁶

The stockpiling momentum started slowly, but accelerated as national defense took on increasing urgency. In the summer of 1940, Congress revised the stockpile law of 1939, resulting in a much larger and more comprehensive program. The new law gave Hoover’s old corporate lending agency, the Reconstruction Fi-

nance Corporation, broad authority to purchase and control stockpiled materials. President Roosevelt followed with an executive order establishing two RFC subsidiaries: the Metals Reserve Company, and the Defense Contracts Company. First used to build stockpiles of rubber and tin, these lending and spending firms saw both their funding and functions rapidly expanded.⁷

Building a strategic stockpile during a military crisis—with defense industries competing with domestic manufacturers for limited supplies—was next to impossible without both prioritization and conservation. In 1941, through the new Office of Price Mobilization, the feds began a systematic effort to conserve strategic materials, with consumer products taking the biggest hit. To save tungsten, for example, OPM first urged, then ordered the nation’s domestic steel producers outside the defense industries to find substitutes for tungsten. Molybdenum was the government’s recommended substitute, based on studies begun by the Army Ordinance Department in the early thirties suggesting that tungsten’s “twin” could be used for most applications. Tungsten rationing began three months before the U.S. entered the war.⁸

Strategic planning also meant denying vital materials to enemies, real or potential. In wartime that strategy might be pursued aggressively through blockades and bombing raids, but commerce and diplomacy played equally important roles, both before and during the war. Soon after Germany invaded Poland, the State Department imposed a “moral embargo” on molybdenum and other domestic metals scheduled for delivery to Axis powers. When some mining officials protested, Cordell Hull suggested they mollify their stockholders with a newsletter explaining that the embargo applied to “those who had bombed open cities killing women and children.”⁹

Outside of the United States, Hull’s moral

suasion had little impact. Strategic ores produced elsewhere went to the highest bidder. During the thirties Germany was the eight hundred pound guerrilla that dominated the international tungsten market. However, the competition changed after 1940, when the government-backed Metals Reserve Company unleashed the power of the almighty American dollar.¹⁰

To supply the stockpile program as well as keep Chinese ore out of enemy hands, RFC bought eight thousand tons of Chinese concentrate, and continued buying after the Japanese blockaded Hong Kong. Despite enormous transportation costs, shipments came overland via the Burma Road until the Japanese also cut off that route. For a few desperate months in 1942, some American airmen risked their lives flying Chinese tungsten over the Himalayas to freighters waiting in the Indian Ocean.¹¹ Keeping strategic metals from enemy hands was expensive, but national security justified the cost. Overall, during the war years RFC bid from ten to twenty times the normal market price for the most critical metals.¹²

Within the mining industry, prominent spokesmen welcomed the government's emphasis on building strategic reserves, but not at the expense of domestic producers. The early talk of scarcity alarmed military planners, however, and preliminary studies of domestic mineral supplies were not encouraging. Many American ores seemed too marginal to provide a steady and reliable source of strategic minerals, but domestic mining men thought differently. At the annual meeting of the American Mining Congress in September 1940, they sought to reassure Americans there would be no shortages of lead, mercury, copper, tungsten, and other metals in case of war.¹³

Not on the agenda of the AMC meeting, but clearly on the minds of mining representatives, were the adverse consequences of foreign ore

purchases on domestic production and profits. These were old economic fears, reflected in both testimony and legislative language dating back to the tariff debates of the late twenties, but old wine could be packaged in new bottles. Corporate viability was no longer the primary rationale for protecting the nation's mining industry from "low cost and low priced foreign competition." The new justification was national security. In the words of the preamble to the 1939 Thomas bill—language provided by the mining lobby—the nation in wartime faced a "dangerous and costly dependence" on foreign supplies unless America's mines were healthy and productive.¹⁴

National security gave new meaning to the mining industry's call for military and industry procurement agents to "buy American." The phrase came from depression-era economic-stimulus legislation requiring government agencies to purchase domestic commodities, but two glaring loopholes made the law virtually unenforceable. Any department head could demur if he decided that the purchase was too expensive or "inconsistent with the public interest." Therefore, despite the concerns of domestic mining men, until America entered the war and national security became the overriding issue, procurement officers could safely ignore "buy American" stipulations.¹⁵

The failure of "buy American" laws to protect the domestic mining industry made the tariff the last bulwark against foreign competition. Domestic producers had many allies in Washington, but the 1932 election altered the political landscape. Democrats had carried the ball for free trade ever since Grover Cleveland's first term in office; now they were in power again after a long hiatus and clamoring for tariff reform. Retaliatory rate hikes by trading partners in the wake of high Smoot-Hawley duties made reform all the more imperative.¹⁶

Encouraged by Secretary of State Cordell

Hull, the leading free trader in the Roosevelt Administration, the Democratic majority pushed a reciprocal trade bill through Congress in 1934. It revolutionized tariff policy by authorizing the president to negotiate reciprocal rate changes up to 50 percent either way from then-existing levels. Moreover, it paved the way for what was later called the “fast track,” by giving the president power to implement rates without additional legislation. Soon trade barriers began to ease under Hull’s vigorous leadership. Up to 1938, some eighteen treaties had been negotiated.¹⁷

Rearmament and the emphasis on national security complicated tariff reduction efforts. Metal shortages and rising prices after 1940 increased the demand for imports, but free traders made little headway during the critical war years. While State Department officials opposed any “special interest” legislation that tended to undermine the expansion of trade, the tungsten duty remained intact until the shooting stopped. Indeed, as foreign trade routes reopened later in the war, at least one congressman called for increasing the tariff to protect home industry from cheaper minerals pouring into the country.¹⁸

Despite the tariff protection, domestic mine owners clamored for more government aid to stimulate the nation’s strategic minerals industry. In the summer of 1941, they found a new champion in Secretary of the Interior Harold Ickes, one of several progressive Republicans in Roosevelt’s cabinet. In testimony before a congressional committee, he spoke in favor of an accelerated program to discover, develop, and process new domestic deposits. Even low-grade ores, he argued, should be investigated, even if not mined until they were needed.¹⁹

Congress and the Roosevelt Administration soon responded with favorable legislation and new executive orders, using the Reconstruction Finance Corporation as the government’s principal fiduciary link with corporate America. With expanded powers and an enormous budget, RFC

soon began pumping money into domestic strategic production, first by purchasing domestic minerals at a premium over foreign supplies of similar ores, next by raising the ceiling prices the government paid for tungsten and other strategic metals, then by subsidizing major mines to expand production and development, and later by using low-cost loans to help even marginal producers open and develop low-grade deposits. To encourage smaller producers, the government also lowered the tax on excess profits and eased red tape by simplifying reporting procedures.²⁰

Federal subsidies to the domestic mining industry did not end with financial support. Miners had always welcomed government help in locating ore bodies and figuring out the best mining and milling methods—provided, of course, that government did not become a competitive threat to private industry. The 1939 Thomas bill reflected this tradition in a clause providing special funds for federal research and development of strategic deposits.

Bolstered by periodic funding supplements, field crews from the Bureau of Mines and the Geological Survey investigated nearly every mineral district, mountain range, surface deposit, and likely outcrop in the United States. They built pilot plants, conducted beneficiation studies, discovered new milling processes, aided and advised thousands of private operators, and wrote hundreds of reports. Focusing initially on seven critical metals—antimony, chromium, manganese, mercury, nickel, tin, and tungsten—the bureau enlarged its mandate over the years to include twenty-six additional metals and minerals—an indication of shifting defense needs and technologies as the war continued. Many new deposits proved vital to the war industries, and private industry was quick to exploit them.²¹

Even these federal benefits, however, were not enough to sustain a vigorous domestic mining industry, at least in the eyes of mining men

who faced wartime shortages and an unpredictable future. They placed much of the blame on New Deal labor laws, especially the imposition of collective bargaining and the minimum wage.²² Roosevelt's re-election in 1940 disappointed most industrial leaders, and the imposition of wage and price controls as the economy heated up was a mixed bag. Mine owners, for example, welcomed efforts to hold wages in line, but complained loudly about price ceilings for commodities that they produced. From their perspective, commodity prices still reflected depression conditions, while production costs soared in the red-hot wartime economy.²³

As Roosevelt's point man in the Office of Price Administration, Leon Henderson tried to keep a tight lid on inflation pressures after 1941. But there were exceptions, especially in the difficult months of 1942, with America on the defensive and mobilization just beginning to reach its stride. Skyrocketing demand for base metals, coupled with a steady drain of mine and smelter workers, complicated OPA's effort to cap domestic prices for copper, lead, and zinc while holding down wages at the same time. In the Rocky Mountain West, base-metal mines lost men underground to higher-paying and less-difficult defense jobs on the West Coast, despite government decrees closing all "non-essential" precious metal operations, pressuring former gold miners to take base-metal jobs, placing a "freeze" on workers already in strategic industries, and expanding the strategic workweek to 48 hours.²⁴

The draft also took its toll on mining employees. From its inception in 1940, the Selective Service system had the difficult task of deciding how to apportion the nation's limited workforce to meet the accelerating needs of both the military and industry. The first peacetime draft in American history authorized deferrals for men needed in agriculture and industry, but up to 1942 miners, especially single males under thirty-five, were fair game for local draft boards.²⁵

Easing the shortages of metals and mineworkers took nearly a year of pragmatic tinkering. In January 1942 the Metals Reserve Company announced it would pay up to 58 percent above 1941 prices for copper, lead, and zinc. When production still lagged, the War Manpower Commission, under Paul McNutt in the Department of Labor, recommended an increase in the pay of copper, lead, and zinc miners by one dollar a day, and a raise in wages for ASARCO smelter workers by a smaller amount. Some copper mines began recruiting women for surface work in repair shops and concentrators, adding a significant new dimension to "Rosie the Riveter," but the low numbers involved did not materially ease the labor shortage.²⁶ Skilled underground workers remained in short supply, and it took too long to recruit and train able-bodied civilians.

Copper production continued to slide until October 1942, when the army stepped in. Under pressure from industry, agriculture, the Selective Service, and critics of the War Department's concept of total mobilization, it agreed to furlough four thousand enlisted or drafted miners for temporary duty. Most went to underground copper mines, but tungsten, lead, zinc, and molybdenum operations got furloughed men as well.²⁷

By emphasizing labor efficiency; by mobilizing women, students, the elderly, prisoners of war, and other "labor reserves;" by shifting workers from low- to high-priority positions; and by working with the Mexican government to devise a "temporary" alien work program that actually lasted more than twenty years, administration officials eased the labor crises in the mines, fields and factories. By the spring of 1943, Charles Wilson, vice-chairman of the War Production Board, assured a congressional subcommittee that labor shortages could no longer be used as an excuse for scarcity of strategic metals. "Miners required in producing these metals," he said,

“will be made available from some source.”²⁸

Ironically, just as domestic production gained momentum it began to wind down. Soon after American military operations shifted from defensive to offensive, Washington policy-makers shifted gears. Remembering the post-war economic consequences of the First World War, they warned of surpluses instead of shortages in strategic materials. By mid-1943 the same agencies that had stimulated domestic production began canceling contracts, eliminating subsidies, lowering priorities, and forcing marginal producers to face real market conditions. With two years of intense warfare still to come, American military and industrial planners were already anticipating the problems of postwar economic reconversion.²⁹

Conclusion

For nearly two decades federal mineral policies hinged on two ideas the domestic mining industry had been advocating since the early 1920s: that domestic mines have strategic as well as economic importance; and that the nation's strategic mineral producers must be protected from cheap foreign competition. The tungsten duty was lowered in 1948 at the Geneva trade talks as a concession to China, but was soon reimposed after China fell to the Communists.³⁰

Domestic mineral producers continued to use national security as a justification for federal economic intervention on their behalf. From the fall of Paris through the Korean War, assumptions about stockpiling strategic materials and protecting the nation's mineral industry were important components of military planning. By reiterating national defense needs, by intensifying the exploration and development of domestic ores, and by continuing to pay premium prices for domestic copper, lead, zinc, tungsten, and other strategic metals, federal programs offset the lower prices of foreign metals and helped

subsidize domestic producers.³¹

That domestic mining became so dependent on federal support was an ironic outcome for mining executives, traditionally hostile to the political and social implications of big government. But the disruptive decades of war and depression had forced it to forsake ideology in favor of the practical needs of an industry in trouble.

Epilogue

The formative years of the stockpile program ended in the late 1950s, but issues involving “strategic and critical materials” still trouble us today. During the cold war, political and economic issues frequently got in the way of rational strategic planning. Disputes over the nature, cost, extent, and even justification for stockpiling plagued every administration from Truman's to that of the first George Bush. A journalist in the 1970s called stockpiling the “mother lode for mining industry representatives and lobbyists.”³²

Direct government subsidies and price supports for domestic mineral producers ended after 1958, but indirect aid continues through Buy American laws and other federal and state legislation. Defense contractors and the Pentagon must now warrant that at least 50 percent of the materials and labor that go into products made for national defense—including food, clothing, metals, and tools—are produced within our borders. Offsetting the impact of such restrictions, however, are exceptions built into the legislation due to domestic scarcity or for strategic, diplomatic, economic, or other reasons. As a result, “Buy American” is more of a hollow slogan than a practical guideline.³³

Though amended many times since its New Deal origins, “strategic and critical materials” legislation is still a key component of the U.S. Code. As of 2002, fifty-eight varieties of minerals were

still being added to the national stockpile, including three types of tungsten. Over the years, the list of stockpiled materials changed as strategic concepts changed, but the rationale for those code provisions reminds us that strategic stockpiles are still necessary to protect America from a “dangerous and costly dependence” on foreign sources in times of emergency.³⁴

What long-range impact the “global war on terrorism” will have on the nation’s strategic thinking is anyone’s guess, but it seems safe to suggest that few politicians will advocate eliminating or seriously reducing our inventory of “strategic and critical materials” anytime soon. That may be little comfort to the domestic mining industry, however. Despite legislation to “Buy

American,” most of our strategic metals now come from abroad, and that situation is not likely to change in the foreseeable future. ■

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Notes:

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- ⁵ Alan M. Bateman, “Foreign and Domestic Production, Critical Minerals, 1942-44” (chart presented at a hearing before the Subcommittee on Surplus Property of the Senate Committee on Military Affairs, 30 Oct. 1945), reprinted in *Strategic and Critical Minerals and Metals: Hearings before the Subcommittee on Mines & Mining of the Committee on Public Lands*, House of Representatives, 80th Congress, 2nd Session, . . . Committee Hearing No. 38 (Washington D.C.: U.S.G.P.O., 1948), 1135-6 (hereafter *Hearings*). Statement of John A. Church before the Subcommittee on Mines and Mining, House Committee on Public Lands, 7 Apr. 1947, *Hearings*, 1300-1.
- ⁶ Charles H. Segerstrom to Edw. R. Hagenah, 23 Aug. 1938; Segerstrom to J. J. Haesler, 23 Aug. 1938; Haesler to Segerstrom, teletype, 20 Oct. 1939; Segerstrom to George I. Emery, 26 Oct. 1939; Segerstrom Collection. “Bids on Strategic Minerals Opened by Treasury; Offerings of Ores of Manganese, Chromium, and Tungsten for Emergency Stockpile,” *Engineering and Mining Journal* 140 (Nov. 1939): 29-30. *Wall Street Journal*, 28 Oct. 1939, 26 Sep. 1940. Charles H. Segerstrom, “War’s Effect on Tungsten,” *Mining Congress Journal* 27 (Feb. 1941): 38-40. “J. D. Conover Holds Stockpiling as Vital to National Security,”

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- ¹⁴ The "low cost and low priced" phrase comes from the mining lobby's 1933 typescript document, "Tungsten and Tungsten Products Industries 'Code of Fair Competition,'" Segerstrom Collection.
- ¹⁵ "The Buy American Act of 1933, Act of 3 Mar 1933" (47 Stat. 1520); and Public No. 117 (the Thomas bill), 6th Congress, 1st Session, Senate 572 (1939); both reprinted in *Hearings*, 981-2, 1235-6. Charles H. Segerstrom to Geo. I. Emery, 25 Feb. 1938, Segerstrom Collection.
- ¹⁶ Charles A. and Mary R. Beard, *The Rise of American Civilization*, rev. ed. (New York: Macmillan, 1935), 315-6. Stephen Haggard, "The Institutional Foundations of Hegemony: Explaining the Reciprocal Trade Agreements Act of 1934," *International Organization* 42 (Win. 1988): 91-119.
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- ²³ *Wall Street Journal*, 28 Mar. 1942. Kennedy, *Freedom from Fear*, 637-41.
- ²⁴ *Wall Street Journal*, 17 Feb., 17 Apr., 2 June, 12 Aug., and 10 Dec. 1941, 13 Jan., 15 May, and 16 July 1942, and 11 Feb. 1943. *New York Times* 8, 13 and 17 Sep., and 24 Oct. 1942. J. J. Haesler to Charles H. Segerstrom, 21 May 1941, Segerstrom Collection.
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- ²⁶ *New York Times*, 13 Sep., 17 and 24 Oct. 1942. *Wall Street Journal*, 7 July 1942.
- ²⁷ David Hinshaw, *The Home Front* (New York: G.P. Putnam's Sons, 1943), 62-4. *New York Times*, 17 Sep., 21 Nov. 1942. *Wall Street Journal*, 21 Oct., 21 Nov., and 8 Dec. 1942, 1 May 1943.
- ²⁸ Chas. E. Wilson to Senator James E. Murray, 14 May 1943, as reported in *Hearings*, 1464-7.
- ²⁹ Hinshaw, *The Home Front*, 46-59.
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- ³¹ *Wall Street Journal*, 29 July, 16 Aug., and 2 Nov. 1950, 5 Jan. 1951, 23 July 1953, 16 July 1956. *New York Times*, 22 Aug. 1956.
- ³² *Wall Street Journal*, 31 Dec. 1965. *New York Times*, 28 Nov. 1976. See also Charlotte Twilight, "The Political Economy of the National Defense Stockpile," *Policy Studies Review* 8 (Sum. 1989): 774-99. Peter Harben, "Strategic Minerals," *Earth* 1 (July 1992): 36-44.
- ³³ For Buy American provisions and political repercussions see 41 U.S.C. 10a; <http://www.bxa.doc.gov>. Paul Gessing, National Taxpayers' Union website at <http://www.ntu.org>. *PR Newswire*, 11 Nov. 2003, at website <http://goliath.ecnext.com>. Ironically and perhaps intentionally undercutting Buy American laws is the State Department's diplomatic proviso known as the Memorandum of Understanding (MOU). An MOU, now applied to at least twenty-one countries, regards defense materials produced in those countries as essentially "American made." Criticism of MOUs can be found on the International Brotherhood of Electrical Workers website at <http://www.ibew.org>.
- ³⁴ For current stockpile statutory provisions see 50 U.S. Code 98. See also U.S. Department of Commerce, Bureau of Industry and Security, Press Release Oct 29, 2002, on website <http://www.bxa.doc.gov>.