THE EFFECT OF IMPORTS OF VANADIUM ON THE NATIONAL SECURITY

AN INVESTIGATION CONDUCTED UNDER SECTION 232 OF THE TRADE EXPANSION ACT OF 1962, AS AMENDED

U.S. Department of Commerce
Bureau of Industry and Security
Office of Technology Evaluation

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Prepared by Bureau of Industry and Security
http://www.bis.doc.gov

I. Executive Summary

This report summarizes the findings of an investigation conducted by the U.S. Department of Commerce (the "Department") pursuant to Section 232 of the Trade Expansion Act of 1962, as amended (19 U.S.C. §1862 ("Section 232")), into the effect of imports of vanadium[1] on the national security of the United States.

Vanadium is used primarily as a strengthening agent in steel products, particularly for products in the construction industry and in tool steel. A smaller but essential use is in titanium aerospace alloys; military and commercial aircraft are dependent on vanadium-containing titanium products. Vanadium also has significant chemical uses, including as a catalyst in the production of sulfuric acid—itself an important industrial material used in a wide range of production—and in large scale energy storage.

There are three general methods of vanadium production: primary (mining), co-production (from mined ore in concert with steelmaking), and secondary production or recycling (from residues and waste materials). Production generally results in vanadium pentoxide, which can be used in titanium and non-metallurgical uses or further converted, generally to ferrovanadium for incorporation into steel.

[1] *See* Figure 1 in Section IV, "Product Scope of the Investigation," for the vanadium products addressed by this report.

There is currently one primary producer of vanadium in the United States (uranium miner Energy Fuels Resources). There are two active secondary producers (the companies that submitted the Section 232 application, AMG Vanadium and U.S. Vanadium), plus a third secondary producer currently modernizing an idle facility (Gladieux Metals Recycling). The primary producer only produced vanadium during one of the last five years and supplied less than 4% of U.S. demand.

Globally, primary and co-production of vanadium is concentrated in four countries: China, Russia, South Africa, and Brazil, with China accounting for over half of global production. Since 1995, the United States has found that imports of ferrovanadium from all major primary producers except Brazil have been sold at less than fair value, resulting in antidumping duties. These duties remain in effect for China and South Africa but have since been revoked for Russia.

Although the United States is reliant on imports of vanadium pentoxide, ferrovanadium, or vanadium-bearing waste products to meet domestic demand, this import reliance will be mitigated by a major expansion being carried out by AMG Vanadium doubling their ferrovanadium production capacity, and the soon-expected completion of Gladieux's renovation, which will reintroduce significant domestic vanadium pentoxide production. In addition, two mining projects are in

the exploratory or permitting phase, potentially adding domestic production capacity as soon as 2023.

The biggest challenge the industry faces is low and volatile vanadium prices. Prices are currently below the levels required for cost effective primary production in the United States, and make it difficult for secondary producers to source feedstock and operate profitably. Adding to producers' woes are the major demand declines due to COVID-19, with demand for vanadium in titanium products hit especially hard as a result of decreased consumption by the aerospace industry.

Given vanadium's almost-exclusive use in concert with steel and titanium, and, as steel and titanium are both considered critical to national security—with their domestic production threatened by imports, as reported in recent Section 232 reports—the Department finds that unilaterally imposing import tariffs or quotas in order to raise the domestic price of vanadium would largely impact domestic steel and titanium industries and would therefore have significant negative effects on the economic and national security of the United States. Cost increases for only domestic steel and titanium producers would put these critical industries, already threatened by low-cost imports, at a further disadvantage relative to foreign producers.

In conducting this investigation, the Secretary of Commerce (the "Secretary") noted the Department's prior investigations under Section 232. This

report incorporates the statutory analysis from the Department's 2018 reports on the imports of steel and aluminum[2] with respect to applying the terms "national defense" and "national security" in a manner that is consistent with the statute and legislative intent.[3]

As required by the statute, the Secretary considered all factors set forth in Section 232(d). In particular, the Secretary examined the effect of imports on national security requirements, specifically:

i. domestic production needed for projected national defense requirements;

ii. the capacity of domestic industries to meet such requirements;

iii. existing and anticipated availabilities of the human resources, products, raw materials, and other supplies and services essential to the national defense;

iv. the requirements of growth of such industries and such supplies and services including the investment, exploration, and development necessary to assure such growth; and

v. the importation of goods in terms of their quantities, availabilities, character, and use as those affect such industries; and the capacity of the United States to meet national security requirements.

[2] U.S. Department of Commerce. Bureau of Industry and Security. *The Effect of Imports of Steel on the National Security (*Washington, DC: 2018) ("Steel Report") and U.S. Department of Commerce. Bureau of Industry and Security. *The Effect of Imports of Aluminum on the National Security (*Washington, DC: 2018) ("Aluminum Report"). https://www.bis.doc.gov/index.php/documents/steel/2224-the-effect-of-imports-of-steel-on-the-national-security-with-redactions-20180111/file https://www.bis.doc.gov/index.php/documents/aluminum/2223-the-effect-of-imports-of-aluminum-on-the-national-security-with-redactions-20180117/file

[3] Steel Report at 13-14; Aluminum Report at 12-13.

In preparing this report, the Secretary also recognized the close relation of the economic welfare of the United States to its national security. Factors that can compromise the nation's economic welfare include, but are not limited to, the impact of "foreign competition on the economic welfare of individual domestic industries; and any substantial unemployment, decrease in revenues of government, loss of skills, or any other serious effects resulting from the displacement of any domestic products by excessive imports." See 19 U.S.C. § 1862(d). In particular, this report assesses whether vanadium is being imported "in such quantities" and "under such circumstances" as to "threaten to impair the national security."[4]

A. Findings

In conducting the investigation, the Secretary found:

1. Vanadium is essential to U.S. national security

(a) Vanadium is a critical mineral. The Department of Interior included vanadium on the 2018 List of Critical Minerals required by Executive Order 13817, issued December 20, 2017.[5] Pursuant to the Executive Order, the list established vanadium as essential to the national security

[4] 19 U.S.C. § 1862(b)(3)(A).

[5] https://www.usgs.gov/news/interior-releases-2018-s-final-list-35-minerals-deemed-critical-us-national-security-and

of the United States and found that the absence of a vanadium supply would have significant consequences for the U.S. economy and national security.

(b) Vanadium is required for national defense systems because of its use in steel and titanium alloys. Vanadium is irreplaceable in key titanium aerospace applications, and many military airframes contain significant amounts of vanadium.

(c) Vanadium is required for critical infrastructure. A key feature in the high-strength, low-alloy (HSLA) steel products used in the construction industry, as well as in tool steel and high-speed steels, vanadium steel alloys are used throughout U.S. critical infrastructure. In addition, nearly all vanadium-bearing titanium products are used in the critical transportation or defense sectors.

(d) The vanadium industry has significant effects on other industries critical to U.S. national security. As stated above, vanadium has essential uses in steel and titanium products, and vanadium resources in the United States are often co-located with uranium resources. The Department has recently found that imports in all three of these industries threaten to impair U.S. national security.

2. Imports of vanadium have mixed effects on the economic welfare of the U.S. vanadium industry

(a) The United States is presently reliant on imports of vanadium. The only primary vanadium producer in the United States has only produced during one of the last five years, due to low vanadium prices. Domestic secondary producers of vanadium import significant quantities of their feedstock [redacted].

(b) U.S. reliance on imports of vanadium is not increasing. Although the country is reliant on imports of vanadium to meet civilian demand, major U.S. producers of ferrovanadium and vanadium pentoxide are in the process of expanding or restarting operations. Given the successful completion of these initiatives, U.S. capacity for ferrovanadium production from vanadium-bearing waste is projected to more than double in 2021, and U.S. capacity for vanadium pentoxide production from vanadium-bearing waste is projected to increase significantly with the re-opening of a secondary production facility. In addition, several domestic mining companies have idle production capacity or are exploring the development of vanadium mines. If domestic vanadium prices rise, or in the event of a national emergency, these companies may increase production and capacity, including through new mines.

(c) Given continuing low domestic prices, the U.S. vanadium industry may face significant financial challenges. [redacted] However, it is difficult to accurately characterize the financial health of the industry due to recent facility turnover, significant ongoing investments, and recent lack of operational activities.

(d) Significant resources exist in the Unites States for primary production. At least three companies have mines that have produced vanadium in the past, and two additional projects are under development.

(e) Secondary production of vanadium is environmentally beneficial. The vanadium-bearing waste products used in secondary production are classified by the Environmental Protection Agency (EPA) as hazardous waste. However, secondary production reclaims critical minerals and can divert significant amounts of material from landfills, instead using them in products critical to national defense.

3. Displacement of domestically-produced vanadium by imports affects our internal economy, but is mitigated by ongoing actions

(a) U.S. production of vanadium is well below domestic demand. Primary and secondary producers produced an annual average of 3.4 million

kilograms of vanadium content from 2016 to 2019, while domestic imports of key vanadium products approached 8 million kilograms.

(b) Domestic production is highly concentrated and limits the capacity available for a national emergency. Just three domestic companies carried out vanadium production in 2019. Additional capacity in the future is not guaranteed, based on low vanadium prices.

(c) Domestic vanadium production currently requires significant imports of vanadium feedstock, limiting vanadium production capacity available for a national emergency. Only one vanadium producer in recent years has used entirely U.S. origin material, producing the equivalent of 1.4% of total domestic demand since 2016. Secondary producers all use significant levels of foreign feedstock; the United States is unable to satisfy all domestic demand with U.S. sourced material.

(d) Recent trade actions have successfully mitigated artificially low-priced imports of ferrovanadium. Of the four countries with significant primary production of vanadium, three have been subject to the imposition of antidumping duties on ferrovanadium based on petitions from domestic ferrovanadium producers. In all cases, imports of ferrovanadium from the subject countries fell to close to zero following the imposition of the duties.

(e) Critical minerals agreements with other countries will help ensure reliable supplies of vanadium. The United States government (USG) released in June 2019 *A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals*, which includes a goal of enhanced international trade and cooperation related to critical minerals.[6] The United States has subsequently entered into official critical minerals collaborations with Canada and Australia, both of which have significant vanadium resources.

4. Increased global capacity and production of vanadium will further impact the long-term viability of U.S. vanadium production

(a) China, which accounts for an estimated 50 to 60% of global vanadium production and consumption, possesses an outsized role in determining the global price of vanadium. This concentration of supply and demand means that policy changes in China have significant effects on the global vanadium market, including major price changes in the near past.

(b) Expansion of low-cost production in countries other than China will place downward pressure on global vanadium prices. Mines in development or exploration in Kazakhstan, Canada, and Australia have

[6] https://www.commerce.gov/data-and-reports/reports/2019/06/federal-strategy-ensure-secure-and-reliable-supplies-critical-minerals

the ability to nearly double current global mine production, should they all enter production.

(c) Downward price pressure may be mitigated by increased demand for steel, titanium, and energy storage. Although currently significantly affected by COVID-19, higher demand in the steel and titanium industries would put upward pressure on vanadium prices. Additionally, annual growth projections for the use of vanadium-based batteries range from 13 to 42% through 2027, which could produce significant additional demand.

(d) Significant price swings impair the ability of domestic producers to plan and carry out capital expenditures. With vanadium projects taking years to complete and major price swings a common occurrence, companies may be challenged to find financing throughout the course of the development of new vanadium capabilities, or may find their projects not viable once completed.

5. Unilaterally increasing domestic prices of vanadium would harm critical U.S. industries

(a) Domestic vanadium prices significantly exceeding world prices would disadvantage the U.S. steel industry. The Department's 2018 Section 232 investigation on steel imports found that the steel industry was threatened

by imports and in need of assistance to remain viable. As the predominant user of vanadium, the domestic steel industry would face new threats from foreign steel producers if its input costs were significantly higher than those in other countries.

(b) Domestic vanadium prices significantly exceeding world prices would also harm the U.S. titanium industry, to the benefit of Russian and Chinese producers. The titanium industry is dependent on vanadium because vanadium accounts for between 12 and 14% of the cost of a standard titanium alloy. The U.S. titanium industry is facing significant financial challenges from declines in demand (related to COVID-19), and may not be able to bear additional costs that international competitors do not.

B. Conclusion

Based on these findings, the Secretary concludes that the present quantities and circumstances of vanadium imports do not threaten to impair the national security as defined in Section 232. Although vanadium is critical to national security and the United States is currently dependent on imported sources of vanadium, [redacted] several significant factors, including the health of the U.S. industry, availability of idle

domestic resources, existing USG actions, and the importance of vanadium to competitive steel and titanium industries, indicate that imports of vanadium do not currently threaten to impair national security.

The United States is currently reliant on imports to satisfy demand for vanadium products and is not producing significant amounts of vanadium from U.S.-origin material, but these circumstances are not expected to deteriorate. Two domestic secondary producers are in the process of expanding and/or upgrading their facilities, which will add significantly to the U.S. ability to produce ferrovanadium and vanadium pentoxide from vanadium-bearing waste materials.

Furthermore, in addition to the one existing domestic primary producer, several other companies are in the process of exploring vanadium mining ventures and will be in a position to produce within several years if vanadium prices rise sufficiently. Even if primary production is not feasible at current vanadium prices, the availability of these resources allows for production potential in the event of national emergency. An increase in the production of domestic primary vanadium, expansion of secondary production, and the addition of domestic feedstock for secondary production should mitigate the current levels of reliance on imports.

However, the projected rise in capacity does not necessarily mean that the domestic vanadium industry is healthy. Vanadium prices have a long history of

volatility, with prices going through cycles of surging and plunging. The main users of vanadium—the steel and titanium industries—experienced major declines in demand in 2020 related to COVID-19, with the titanium industry particularly challenged by a large decrease in aerospace demand. If vanadium prices fail to rise, some of the capacity under exploration may not turn into production, and one or more secondary producers may face financial difficulty or challenges in sourcing vanadium-bearing feedstock.

Further, the lack of a finding of a threat to national security does not indicate that a healthy domestic vanadium industry is not of vital importance to the United States. While the Secretary does not believe that imports of vanadium need to be adjusted at this time, there are several steps that can and should be taken to support the domestic vanadium industry and related sectors to ensure safe and reliable sources of vanadium in the event of a national emergency, thereby enhancing and protecting U.S. national security.

C. Recommendations

The Department has identified several actions that would help to ensure reliable domestic sources of vanadium and lessen the potential for imports to threaten national security. These actions are not intended to be exhaustive or exclusive; the Secretary recommends pursuing all proposed actions.

Recommendation 1 – Expansion of the National Defense Stockpile to Include High Purity Vanadium Pentoxide

The USG should support domestic vanadium production and ensure a source of vanadium in the event of national emergency by re-adding vanadium pentoxide to the National Defense Stockpile. Vanadium pentoxide was part of the stockpile until 1997; the stockpile held 6,200 tons of contained vanadium[7] in 1965 and had a goal of 7,000 tons though it held just 651 tons prior to the decision to reduce the target level to zero in 1993, following the end of the cold war.[8] Using high purity vanadium pentoxide—suitable for use in titanium alloys or chemical uses as well as conversion into ferrovanadium for use in the steel industry—would ensure vanadium held in the stockpile could be used for any necessary product in the event of national security.

National Defense Stockpile goals were initially set to ensure sufficient product to support one year's demand for the entire country but were later narrowed to focus on defense-specific needs, primarily due to funding constraints. Given the importance of vanadium and other critical minerals to the economy, the economic and national security of the United States would be better served by pursuing stockpile goals that support national security beyond defense-specific

[7] Vanadium is generally reported in terms of "contained vanadium", or the weight of only the vanadium portion of a vanadium compound. Vanadium represents 56% of the weight of vanadium pentoxide.

[8] USGS Vanadium Mineral Commodity Summaries. https://www.usgs.gov/centers/nmic/vanadium-statistics-and-information

requirements. The re-addition of vanadium to the stockpile would require authorization and funding from Congress.

The Department recommends that the size of the proposed vanadium addition to the stockpile should be based on three benchmarks: defense system requirements, broader national security requirements, and total domestic demand. As discussed above, defense system requirements may conservatively amount to 273 metric tons of vanadium content per year; this inventory level would be worth approximately $10.5 million based on average vanadium pentoxide prices since 2016.[9] Critical infrastructure requirements add an estimated 4,527 tons per year, resulting in a minimum stockpile goal based on total national security requirements of 4,800 tons of contained vanadium, at a cost of $184.8 million. Finally, total domestic apparent consumption (including defense and critical infrastructure needs) averaged 8,590 tons of contained vanadium annually from 2016 to 2019. Establishing a stockpile goal at this level, sufficient to meet all domestic demand would, would be valued at $330.6 million.

Beyond the minimum stockpile level, the Secretary further recommends that the stockpile of vanadium pentoxide be authorized to expand in size during periods of unusually low prices (with purchases made from domestic producers), while

[9] Average price per pound vanadium pentoxide from 2016-2019 of $9.80, based on data from USGS: https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-vanadium.pdf

remaining unchanged or shrinking during periods of higher-than-average prices. This policy would help mitigate the large historic price swings that have caused significant financial distress and impeded capital investment in the domestic vanadium industry while helping to regulate domestic prices.

Implementing this policy would require legislative changes to the Strategic and Critical Materials Stockpiling Act (50 U.S.C. §98, et seq.) (Stockpiling Act). While the mitigation of critical mineral price swings and the purchase of critical minerals from domestic producers at a premium when prices are unusually low serves the interest of national defense, the Stockpiling Act requires that the stockpile "not be used for economic or budgetary purposes," which may present a challenge in allowing the stockpile to exceed minimum defense needs based on prices. Allowing the stockpile to be used for economic purposes if such actions support the health and competitiveness of affected industries would help enhance U.S. national security.

As an additional potential benefit, once the vanadium holdings in the National Defense Stockpile are established, they could—with the authorization of Congress and in cooperation with the Department of Energy—be used without cost to support another sector: large scale energy storage. As noted above, a potential new use for vanadium is in vanadium redox flow batteries, which have the advantage of using vanadium in both parts of the electrolyte, eliminating the risk of

cross-contamination and allowing for the vanadium to be re-claimed from the batteries at a low cost with minimal yield loss[10].

With vanadium accounting for approximately 30% of the cost of a vanadium redox flow battery and initial battery cost reductions needed to enable larger scale use, the USG could reduce the costs of the stockpile and support the energy storage sector by leasing a portion of the stockpile to be managed by vanadium redox flow battery companies, on condition of the leased vanadium being immediately reclaimable in the event of a national emergency. Given restrictions on transfers to and from the stockpile, this use of material in the stockpile would require either a legislative change to the Stockpiling Act or the designation of the leased material as still being part of the stockpile despite being used for energy storage.

Recommendation 2 – Recycling Promotion

The Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals (Federal Strategy) identifies an available, on-demand supply of critical minerals as "essential to the economic prosperity and national defense of the United States."[11] The Federal Strategy recommends the support of recycling and reprocessing of critical minerals, including vanadium. Given that nearly all vanadium production in the United States is performed through recycling, the USG

[10] Vanitec estimates cost of conversion from leachate to vanadium pentoxide at $1 per pound vanadium pentoxide with a 95% yield. http://www.vanitec.org/vanadium/ESC-Meetings

[11] https://www.commerce.gov/sites/default/files/2020-01/Critical_Minerals_Strategy_Final.pdf

should support the vanadium industry through USG-wide actions to promote the recycling of materials containing critical minerals.

A 2002 EPA analysis, carried out in support of the May 8, 2002 final rule on the identification and listing of spent catalysts as hazardous waste, showed that in 1999, just 55% of spent catalyst was recycled, in large part because the cost of recycling was estimated to be three times that of landfill disposal.[12] Bringing the recycling of vanadium-bearing wastes generated in the United States to or near 100% has the potential to greatly expand the availability of vanadium products of domestic origin. Such recycling will occur naturally with higher vanadium prices, as refiners typically receive a metals credit from vanadium producers based on vanadium sale price, but can also be encouraged through the consideration of recycling tax deductions or credits as well as EPA review of their regulatory authority governing disposal of hazardous waste.

For example, additional information submitted by industry to the Department reported that the 2020 International Maritime Organization's (IMO) regulation requiring the reduction of allowable levels of sulfur in maritime fuels from 3.5% to 0.5% has increased refinery catalyst use, which is expected to result in increased availability of spent catalyst used to produce vanadium.[13] Similar

[12] 67 FR 30811 and https://archive.epa.gov/epawaste/hazard/web/pdf/backdoc.pdf

[13] https://ig9we1q348z124x3t10meupc-wpengine.netdna-ssl.com/wp-content/uploads/AMG-Annual-Report-Web-FINAL.pdf

regulations in the United States would support both the EPA mission to protect human health and the environment and domestic production of critical minerals.

Recommendation 3 – Continue USG Actions to Support Critical Minerals

Many of the challenges domestic vanadium producers face are not unique to vanadium; with this investigation the Department has completed Section 232 investigations on four of the 35 critical minerals. While the specific challenges of each critical mineral are distinct, many industrial trends are similar and broad solutions may be more effective than individual targeting. There are several ongoing and proposed U.S. government actions that support the domestic supply of critical minerals. Continuing to pursue these actions will provide necessary support to the domestic vanadium industry as well as to the broader critical minerals sector.

Among the key actions that will enable strong domestic critical minerals industries are Executive Order 13817 and the resulting Federal Strategy, Executive Order 13953 (*Addressing the Threat to the Domestic Supply Chain From Reliance on Critical Minerals From Foreign Adversaries and Supporting the Domestic Mining and Processing Industries*), proposals from the USG Nuclear Fuel Working Group, work being carried out by the Titanium Sponge Working Group, and legislative action to support domestic production of critical minerals. Since the list of suitable substitutions for vanadium in steel and certain chemical processes includes other minerals on the critical minerals list (including manganese, niobium,

titanium, tungsten, and platinum), actions to support production of critical minerals as a whole would also help to address domestic vanadium supply challenges.

The Federal Strategy, developed pursuant to Executive Order 13817, was announced in June 2019, with six calls to action containing 24 goals and 61 recommended actions that federal agencies should pursue to improve the availability of critical minerals and their downstream supply chains in the United States to help reduce the country's vulnerability to supply chain disruptions. Many of the identified goals of the Federal Strategy are consistent with the findings and recommendations of this investigation, including:

(a) support for downstream materials production capacity;

(b) enhancing the National Defense Stockpile's ability to meet military as well as civilian requirements;

(c) securing access to critical minerals through trade and investment with allies;

(d) identifying methods to encourage secondary use of critical minerals; and

(e) streamlining permit processes for critical mineral projects

The President issued Executive Order 13953, "Addressing the Threat to the Domestic Supply Chain From Reliance on Critical Minerals From Foreign Adversaries and Supporting the Domestic Mining and Processing Industries," (E.O. 13953), in September 2020. The Order identifies the need to ensure a consistent supply of critical minerals and declares a national emergency to reduce

the threat posed by the country's undue reliance on critical minerals from foreign adversaries. Many of the actions taken pursuant to E.O. 13953 will support the domestic vanadium industry, particularly vanadium mining.

In addition to Executive actions, there have recently been several legislative proposals that would provide support for vanadium and other critical minerals. Examples include H.R. 8143 (also known as the Reclaiming American Rare Earths (RARE) Act) and S. 3694 (the Onshoring Rare Earths (ORE) Act of 2020). Both bills as written restrict the definition of critical minerals to a subset of those identified by the Department of Interior in response to E.O. 13817, and need to be expanded to include vanadium and other critical minerals, but otherwise have features of significant value to the domestic vanadium industry. In addition to allowing a tax deduction for investments in property used for mining, reclaiming, or recycling critical materials, these bills would support the function of critical minerals in the broader economy by providing grants or allowing tax deductions for critical minerals extracted in the United States. In addition to expanding the bills to include vanadium (as noted above), in order to provide the most value to the country, the Department recommends that any legislation should ensure that extraction incentives include recycling and reclamation.

Finally, the Department's Section 232 investigations into imports of Uranium and Titanium sponge resulted in the creation of USG working groups

tasked with developing recommendations additional to those made in each report. Given the significant intersections between the vanadium industry and the uranium and titanium industries, the implementation of the working groups' recommendations will support the vanadium industry as well.

II. Legal Framework

A. Section 232 Requirements

Section 232 of the Trade Expansion Act of 1962, as amended, provides the Secretary with the authority to conduct investigations to determine the effect on the national security of the United States of imports of any article. It authorizes the Secretary to conduct an investigation if requested by the head of any department or agency, upon application of an interested party, or upon his own motion. *See* 19 U.S.C. § 1862(b)(1)(A).

Section 232 directs the Secretary to submit to the President a report with recommendations for "action or inaction under this section" and requires the Secretary to advise the President if any article "is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security." *See* 19 U.S.C. § 1862(b)(3)(A).

Section 232(d) directs the Secretary and the President to, in light of the requirements of national security and without excluding other relevant factors, give consideration to the domestic production needed for projected national defense

requirements and the capacity of the United States to meet national security requirements. *See* 19 U.S.C. § 1862(d).

Section 232(d) also directs the Secretary and the President to "recognize the close relation of the economic welfare of the Nation to our national security, and …take into consideration the impact of foreign competition on the economic welfare of individual domestic industries" by examining whether any substantial unemployment, decrease in revenues of government, loss of skills or investment, or other serious effects resulting from the displacement of any domestic products by excessive imports, or other factors, results in a "weakening of our internal economy" that may impair the national security.[14] *See* 19 U.S.C. § 1862(d).

Once an investigation has been initiated, Section 232 mandates that the Secretary provide notice to the Secretary of Defense that such an investigation has been initiated. Section 232 also requires the Secretary to do the following:

(1) "Consult with the Secretary of Defense regarding the methodological and policy questions raised in [the] investigation;"

(2) "Seek information and advice from, and consult with, appropriate officers of the United States;" and

(3) "If it is appropriate and after reasonable notice, hold public hearings or otherwise afford interested parties an opportunity to

[14] An investigation under Section 232 looks at excessive imports for their threat to the national security, rather than looking at unfair trade practices as in an antidumping investigation.

present information and advice relevant to such investigation."[15] *See* 19 U.S.C. § 1862(b)(2)(A)(i)-(iii).

As detailed in the report, all of the requirements set forth above have been satisfied.

In conducting the investigation, Section 232 permits the Secretary to request that the Secretary of Defense provide an assessment of the defense requirements of the article that is the subject of the investigation. *See* 19 U.S.C. § 1862(b)(2)(B).

Upon completion of a Section 232 investigation, the Secretary is required to submit a report to the President no later than 270 days after the date on which the investigation was initiated. *See* 19 U.S.C. § 1862(b)(3)(A). The report must:

(1) Set forth "the findings of such investigation with respect to the effect of the importation of such article in such quantities or under such circumstances upon the national security;"

(2) Set forth, "based on such findings, the recommendations of the Secretary for action or inaction under this section;" and

(3) "If the Secretary finds that such article is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security . . . so advise the President." S*ee* 19 U.S.C. § 1862(b)(3)(A).

All unclassified and non-proprietary portions of the report submitted by the Secretary to the President must be published.

[15] Department regulations (i) set forth additional authority and specific procedures for such input from interested parties, *see* 15 C.F.R. §§ 705.7 and 705.8, and (ii) provide that the Secretary may vary or dispense with those procedures "in emergency situations, or when in the judgment of the Department, national security interests require it." *Id*., § 705.9.

Within 90 days after receiving a report in which the Secretary finds that an article is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security, the President shall:

(1) "Determine whether the President concurs with the finding of the Secretary"; and

(2) "If the President concurs, determine the nature and duration of the action that, in the judgment of the President, must be taken to adjust the imports of the article and its derivatives so that such imports will not threaten to impair the national security" (*see* 19 U.S.C. § 1862(c)(1)(A)).

B. Discussion

While Section 232 does not specifically define "national security," both Section 232, and the implementing regulations at 15 C.F.R. Part 705, contain non-exclusive lists of factors that the Secretary must consider in evaluating the effect of imports on the national security. Congress in Section 232 explicitly determined that "national security" includes, but is not limited to, "national defense" requirements. *See* 19 U.S.C. § 1862(d)).

In a 2001 report, the Department determined that "national defense" includes both the defense of the United States directly, and the "ability to project military capabilities globally."[16] The Department also concluded in 2001 that, "in addition to the satisfaction of national defense requirements, the term "national security"

[16] Department of Commerce, Bureau of Export Administration; *The Effects of Imports of Iron Ore and Semi-Finished Steel on the National Security*; Oct. 2001 ("2001 Iron and Steel Report") at 5.

can be interpreted more broadly to include the general security and welfare of certain industries, beyond those necessary to satisfy national defense requirements, which are critical to the minimum operations of the economy and government." The Department called these "critical industries."[17] While this report uses these reasonable interpretations of "national defense" and "national security," it uses the more recent 16 critical infrastructure sectors identified in Presidential Policy Directive 21[18] instead of the 28 industry sectors identified in the 2001 Report.[19]

Section 232 directs the Secretary to determine whether imports of any article are being made "in such quantities" or "under such circumstances" that those imports "threaten to impair the national security." *See* 19 U.S.C. § 1862(b)(3)(A). The statutory construction makes clear that either the quantities or the circumstances, standing alone, may be sufficient to support an affirmative finding. The two may also be considered together, particularly when the circumstances act to prolong or magnify the impact of the quantities being imported.

The statute does not define a threshold for when "such quantities" of imports are sufficient to threaten to impair the national security, nor does it define the "circumstances" that might qualify.

[17] *Id.*

[18] Presidential Policy Directive 21; *Critical Infrastructure Security and Resilience*; February 12, 2013 ("PPD-21").

[19] *See Op. Cit.* at 16.

Similarly, the statute does not require a finding that the quantities or circumstances are impairing the national security. Instead, the threshold question under Section 232 is whether the quantities or circumstances "threaten to impair the national security." *See* 19 U.S.C. § 1862(b)(3)(A). This makes evident that Congress expected an affirmative finding under Section 232 before an actual impairment of the national security.[20]

Section 232(d) contains a list of factors for the Secretary to consider in determining if imports "threaten to impair the national security"[21] of the United States, and this list is mirrored in the implementing regulations. *See* 19 U.S.C. §1862(d) and 15 C.F.R. § 705.4. Congress was careful to note twice in Section 232(d) that the list provided, while mandatory, is not exclusive.[22] Congress' illustrative list is focused on the ability of the United States to maintain the domestic capacity to provide the articles in question as needed to maintain the

[20] The 2001 Iron and Steel Report used the phrase "fundamentally threaten to impair" when discussing how imports may threaten to impair national security. *See* 2001 Iron and Steel Report at 7 and 37. Because the term "fundamentally" is not included in the statutory text and could be perceived as establishing a higher threshold, the Secretary expressly does not use the qualifier in this report. The statutory threshold in Section 232(b)(3)(A) is unambiguously "threaten to impair" and the Secretary adopts that threshold without qualification. 19 U.S.C. § 1862(b)(3)(A).

[21] 19 U.S.C. § 1862(b)(3)(A).

[22] *See* 19 U.S.C. § 1862(d) ("the Secretary and the President shall, in light of the requirements of national security and without excluding other relevant factors…" and "serious effects resulting from the displacement of any domestic products by excessive imports shall be considered, without excluding other factors…").

national security of the United States.[23] Congress broke the list of factors into two equal parts using two separate sentences. The first sentence focuses directly on "national defense" requirements, thus making clear that "national defense" is a subset of the broader term "national security." The second sentence focuses on the broader economy and expressly directs that the Secretary and the President "shall recognize the close relation of the economic welfare of the Nation to our national security."[24] *See* 19 U.S.C. § 1862(d).

In addition to "national defense" requirements, two of the factors listed in the second sentence of Section 232(d) are particularly relevant in this investigation. Both are directed at how "such quantities" of imports threaten to impair national security *See* 19 U.S.C. § 1862(b)(3)(A). In administering Section 232, the Secretary and the President are required to "take into consideration the impact of

[23] This reading is supported by Congressional findings in other statutes. *See, e.g.,* 15 U.S.C. § 271(a)(1)("The future well-being of the United States economy depends on a strong manufacturing base…") and 50 U.S.C. § 4502(a)("Congress finds that – (1) the security of the United States is dependent on the ability of the domestic industrial base to supply materials and services… (2)(C) to provide for the protection and restoration of domestic critical infrastructure operations under emergency conditions… (3)… the national defense preparedness effort of the United States government requires – (C) the development of domestic productive capacity to meet – (ii) unique technological requirements… (7) much of the industrial capacity that is relied upon by the United States Government for military production and other national defense purposes is deeply and directly influenced by – (A) the overall competitiveness of the industrial economy of the United States; and (B) the ability of industries in the United States, in general, to produce internationally competitive products and operate profitably while maintaining adequate research and development to preserve competitiveness with respect to military and civilian production; and (8) the inability of industries in the United States, especially smaller subcontractors and suppliers, to provide vital parts and components and other materials would impair the ability to sustain the Armed Forces of the United States in combat for longer than a short period.").

[24] *Accord* 50 U.S.C. § 4502(a).

foreign competition on the economic welfare of individual domestic industries" and any "serious effects resulting from the displacement of any domestic products by excessive imports" in "determining whether such weakening of our internal economy may impair the national security." *See* 19 U.S.C. § 1862(d).

After careful examination of the facts in this investigation, the Secretary has determined that the present quantities and circumstance of vanadium imports do not threaten to impair the national security, as defined in Section 232. Although vanadium is critical to national security and the United States is currently dependent on imported sources of vanadium, several significant factors, including the health of the U.S. industry, availability of idle domestic resources, existing USG actions, and the importance of vanadium to competitive domestic steel and titanium industries, indicate that imports of vanadium do not threaten to impair national security.

III. Investigative Process

A. Initiation of Investigation

On November 19, 2019, AMG Vanadium LLC and U.S. Vanadium LLC (hereafter "Applicants") petitioned the Secretary to conduct an investigation under Section 232 of the Trade Expansion Act of 1962, as amended, to determine the effect of imports of vanadium on the national security.

Upon receipt of the petition, the Department carefully reviewed the material facts outlined in the petition and held initial discussions internally as well as with the Department of Defense. Legal counsel at the Department also carefully reviewed the petition to ensure it met the requirements of the Section 232 statute and the implementing regulations. Subsequently, on May 28, 2020, the Department accepted the petition and initiated the investigation. Pursuant to Section 232(b)(1)(b), the Department notified the U.S. Department of Defense of its intent to conduct an investigation in a May 21, 2020 letter from Secretary Ross to then Secretary of Defense, Mark Esper (*see* Appendix A).

B. Public Comments

On June 3, 2020, the Department published a Federal Register Notice (*see* Appendix B - Federal Register, Vol. 85, No. 107, 34179) announcing the initiation of an investigation to determine the effect of imports of vanadium on the national security. The notice also announced the opening of the public comment period. In the notice, the Department invited interested parties to submit written comments, opinions, data, information, or advice relevant to the criteria listed in Section 705.4 of the National Security Industrial Base Regulations (15 C.F.R. § 705.4) as they affect the requirements of national security, including the following:

(a) Quantity of the articles subject to the investigation and other circumstances related to the importation of such articles;

(b) Domestic production capacity needed for these articles to meet projected national defense requirements;

(c) The capacity of domestic industries to meet projected national defense requirements;

(d) Existing and anticipated availability of human resources, products, raw materials, production equipment, facilities, and other supplies and services essential to the national defense;

(e) Growth requirements of domestic industries needed to meet national defense requirements and the supplies and services including the investment, exploration and development necessary to assure such growth;

(f) The impact of foreign competition on the economic welfare of any domestic industry essential to our national security;

(g) The displacement of any domestic products causing substantial unemployment, decrease in the revenues of government, loss of investment or specialized skills and productive capacity, or other serious effects;

(h) Relevant factors that are causing or will cause a weakening of our national economy; and

(i) Any other relevant factors

The initial public comment period ended on July 20, 2020, and was followed by a public comment rebuttal period, which ended on August 17, 2020. Following requests from the general public, the Department published a copy of the Applicants' petition on September 25, 2020 and opened an additional public comment period, which ended October 9, 2020.

The Department received 32 responsive submissions during the initial public comment period, which were posted on Regulations.gov for public review and rebuttal filing. The Department received 47 rebuttal filings from 11 commenters, which were posted on Regulations.gov for public review. During the additional comment period, the Department received and posted seven comments on Regulations.gov.

Parties who submitted comments included representatives of the domestic vanadium production industry, representatives of the domestic uranium industry, representatives of the foreign vanadium production industry, consumers of vanadium products from the steel, titanium, and energy storage industries, as well as representatives of foreign governments, and other concerned organizations. The Department carefully reviewed all of the public comments and factored them into the investigative process. The public comments of key stakeholders are summarized in Appendix C, which also includes a link to the docket number (BIS-2020-0002) under which all public comments can be viewed in full on Regulations.gov.

C. Information Gathering and Data Collection Activities

Due to the limited number of firms engaged in the U.S. vanadium industry, it was determined that a public hearing was not necessary to conduct a comprehensive investigation. In lieu of holding a public hearing on this

investigation, the Department issued a separate mandatory survey (*see* Appendix E) to participants in the vanadium production and distribution industry, collecting both qualitative and quantitative information. The survey was sent to 34 companies with the ability to develop, produce, or distribute vanadium products for use in the United States. Eight of these companies did not have locations in the United States, and were invited to participate in the survey on a voluntary basis.

The surveys provided a method for respondents to disclose confidential and non-public information. These surveys, to which response was mandatory for domestic respondents, were conducted using statutory authority pursuant to Section 705 of the Defense Production Act of 1950, as amended (50 U.S.C. § 4555) (DPA), and collected detailed information concerning factors such as imports/exports, production, capacity utilization, employment, operating status, global competition, and financial information. The resulting data provided the Department with detailed industry information that was otherwise not publicly available and was needed to effectively conduct analysis for this investigation.

The Department deems the information furnished in the survey responses confidential and will not publish or disclose it except in accordance with Section 705 of the DPA, which prohibits the publication or disclosure of this information unless the President determines that the withholding of such information is contrary to the interest of the national defense. Therefore, the information

submitted to the Department in response to the survey will not be shared with any non-government entity other than in aggregate form.

D. Interagency Consultation

The Department consulted with the Department of Defense's Office of Industrial Policy and the Defense Logistics Agency, regarding methodological and policy questions that arose during the investigation. The Department also consulted with other U.S. Government agencies with expertise and information regarding the vanadium industry including the Department of Energy, the Department of State, the Office of the United States Trade Representative, the Department of Homeland Security, the Environmental Protection Agency, and the Department of Interior's U.S. Geological Survey.

IV. Product Scope of Investigation

The scope of this investigation defined vanadium products at the Harmonized Tariff Schedule of the United States (HTS) 10-digit level. The nine product categories and related HTS codes covered by this report are shown below in Figure 1.

Figure 1: Vanadium Product Scope of the Investigation	
Heading/Subheading/Product	**10 Digit HTS Code**
Vanadium Oxides	2825.30.0010 2825.30.0050
Ferrovanadium	7202.92.0000
Vanadium Carbides	2849.90.5000
Vanadates	2841.90.1000
Vanadium Ore and Concentrates	2615.90.6090
Ash and Residues Containing Vanadium	2620.40.0030 2620.99.1000
Vanadium Sulfate	2833.29.3000
Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides	2850.00.2000
Vanadium, Unwrought and Wrought	8112.92.7000 8112.99.2000
Source: United States International Trade Commission and U.S. Department of Commerce, Bureau of Industry and Security	

In order to ensure that the full vanadium production process was covered, these HTS codes include vanadium products as well as vanadium-containing precursors. Vanadium is most commonly traded as vanadium oxides (typically vanadium pentoxide (V_2O_5)) and ferrovanadium (FeV), with usage in steelmaking accounting for the vast majority of consumption.

Detailed information was collected in the Department's survey responses from U.S. vanadium producers regarding vanadium-containing products. Data throughout this report is presented, to the extent possible, in kilograms or metric tons of contained vanadium. For example, vanadium pentoxide is 56% vanadium by weight, while vanadium content in ferrovanadium varies from 35% to

80%(though is typically consistent for a given producer). Prices of vanadium pentoxide, in keeping with industry conventions, are quoted in U.S. Dollars per pound of vanadium pentoxide (not vanadium content).

This report also considers the state of industries that depend on vanadium, in particular the U.S. titanium and steel industries, both of which manufacture materials that the U.S. government has recognized as critical to national security. As the Department is aware that the principal customers of vanadium are steel producers, understanding potential ramifications on the U.S. steel industry was necessary to ensure a complete analysis of the effect of vanadium imports on the national security. Vanadium is also a key element in the production of titanium alloy products that are critical to national security, with titanium sponge the subject of a recent Section 232 investigation and the focus of an ongoing working group. The Secretary's recommendations consider the interdependence of the U.S. vanadium industry and these crucial U.S. industries.

V. Background on U.S. Vanadium Industry

A. Vanadium Production

Vanadium is produced through three general methods: primary production (mining), co-production (from mined ore in concert with steelmaking), and secondary production (from residues and waste materials). Nearly all vanadium in

the United States is generated through secondary production, with some vanadium mining occurring together with uranium mining in sandstone-hosted deposits.

Currently there is one primary producer of vanadium in the United States: Energy Fuels Resources (USA), Inc. (Energy Fuels). Although Energy Fuels' vanadium production activities are dependent on vanadium market prices, the company also may produce vanadium as a by-product of uranium mining, depending on uranium market prices. The United States had no primary production of vanadium from 2014 to 2018; Energy Fuels restarted production in 2019 following a surge in vanadium prices.[25] The company produced approximately 1.8 million pounds of vanadium pentoxide in 2019—equivalent to approximately 460,000 kilograms of contained vanadium—prior to ceasing production "due to weak vanadium market conditions."[26] Energy Fuels' production accounted for under 1% of estimated worldwide primary- and co-production in 2019, with the remainder produced in four countries: China, Russia, South Africa, and Brazil (see Figure 2).

[25] United States Geological Survey Mineral Commodity Summaries – Vanadium, https://www.usgs.gov/centers/nmic/vanadium-statistics-and-information

[26] Energy Fuels, Inc. 2019 SEC Form 10-K, https://www.energyfuels.com/financials

Figure 2: Estimated Worldwide Mine Production of Vanadium (metric tons)					
Country	**2015**	**2016**	**2017**	**2018**	**2019**
China	42,000	45,000	40,000	40,000	40,000
Russia	16,000	16,000	18,000	18,000	18,000
South Africa	12,000	10,000	7,960	7,700	8,000
Brazil	6,000	8,000	5,210	5,500	7,000
United States	0	0	0	0	460
Total	76,000	79,000	71,200	71,200	73,000
Source: United States Geological Survey Mineral Commodity Summaries – Vanadium, https://www.usgs.gov/centers/nmic/vanadium-statistics-and-information, and Energy Fuels 2019 SEC 10-K filing					

Energy Fuels sold approximately 50,000 of the 460,000 kilograms of contained vanadium it produced in 2019, with the remainder kept in inventory.[27] The company reports that its U.S. mines contain 6.6 million kilograms of measured vanadium content, with another 3.6 million kilograms indicated or inferred.[28] Energy Fuels also operates the only U.S. facility that can process both vanadium ore and conventional uranium, the White Mesa Mill.

Two Canada-based companies are in the process of exploring the development of mines located in the United States. In May 2020, First Vanadium Corporation announced the results of its Preliminary Economic Assessment (PEA) for an open pit mine near Carlin, Nevada, and forecast 16 years of vanadium production capabilities totaling 180 million pounds of vanadium pentoxide, equivalent to 46 million kilograms of vanadium content.[29] The second company,

[27] Energy Fuels, Inc. 2019 Annual Presentation, https://www.energyfuels.com/presentation
[28] Ibid.
[29] "First Vanadium Announces Positive Preliminary Economic Assessment for the Carlin Vanadium Project in Nevada", https://www.firstvanadium.com/index.php/news/2020/548-irstanadiumnnouncesositivereliminaryconomicsse20200511

Silver Elephant Mining, owns Nevada Vanadium LLC, which is in the process of developing the Gibellini vanadium project near Eureka, Nevada. The Gibellini project is in the permitting process, with the Bureau of Land Management expected to reach a decision by August 2021.[30] The company plans to begin production in late 2023, producing 130 million pounds of vanadium pentoxide (33 million kilograms of vanadium content) over 14 years.[31] Other domestic vanadium resources exist, including Western Uranium & Vanadium's Sunday Mine Complex in Colorado and Anfield Resources' Velvet-Wood Mine in Utah, both of which have previously produced vanadium and have the potential to provide primary sources of vanadium, should market conditions support such production. In 2017, the United States Geological Survey (USGS) listed a total of 18 vanadium deposits in the United States, though data was not available on the extent of the deposits for most.[32] The identification of most of these deposits is drawn from assessments carried out in 1968 and 1975 by the American Institute of Mining, Metallurgical, and Petroleum Engineers and the U.S. Geological Survey.[33]

[30] Bureau of Land Management Accepting Comments for Gibellini Mine, August 17, 2020. Available at https://www.blm.gov/press-release/bureau-land-management-accepting-comments-gibellini-mine

[31] Silver Elephant Mining Corporate Presentation: Gibellini Vanadium, https://www.silverelephantmining.com/projects/gibellini-vanadium/

[32] Vanadium: Chapter U of Critical Mineral Resources of the United States—Economic and Environmental Geology Prospects for Future Supply (2017). https://pubs.usgs.gov/pp/1802/u/pp1802u.pdf

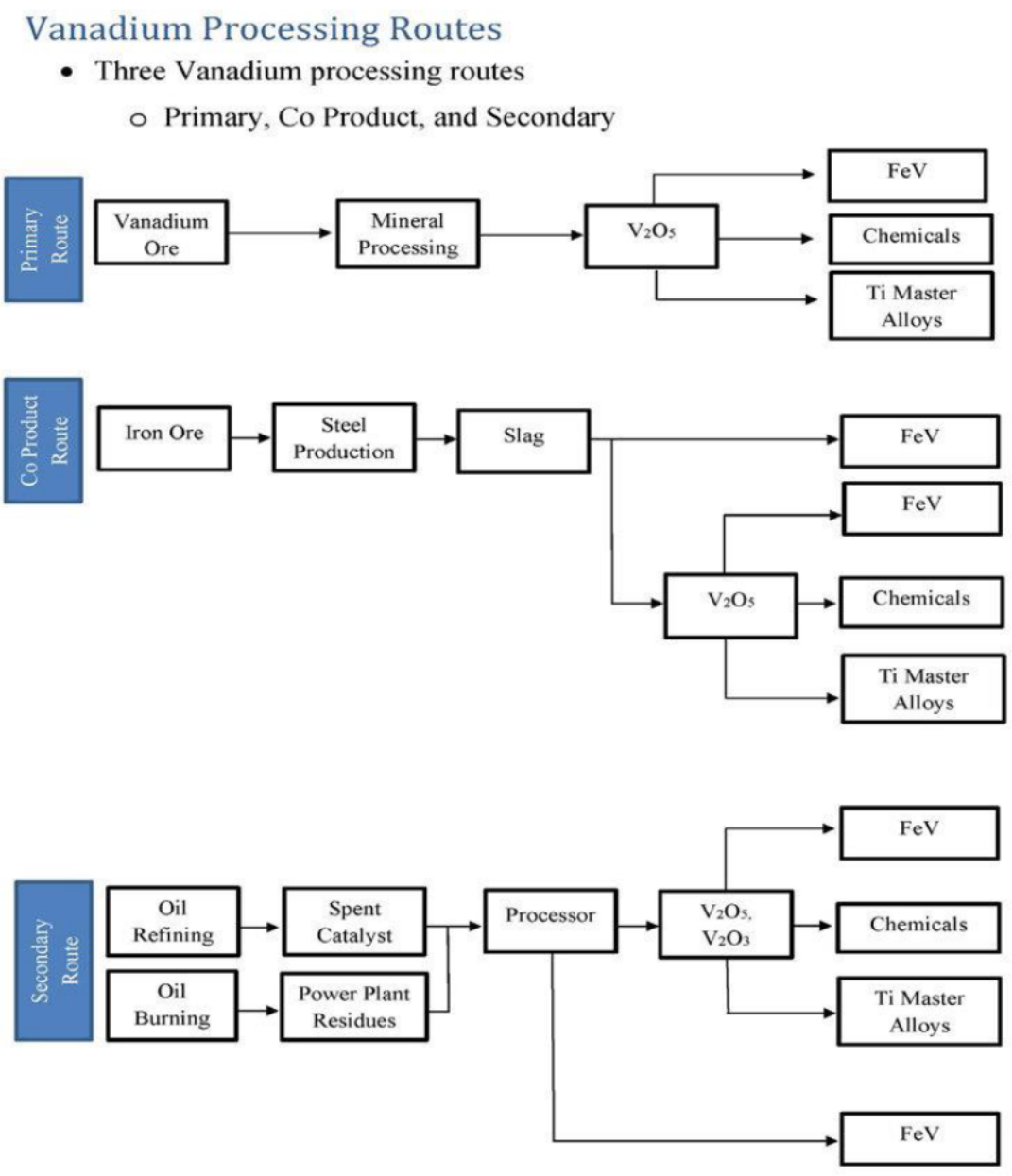
[33] Fischer, R.P., 1968, The uranium and vanadium deposits of the Colorado Plateau region, in Ridge, J.D., ed., Ore deposits of the United States, 1933–1967: New York, N.Y., American Institute of Mining, Metallurgical, and Petroleum Engineers; Fischer, R.P., 1975, Geology and resources of base-metal vanadate deposits: U.S. Geological Survey Professional Paper 926–A, http://pubs.er.usgs.gov/publication/pp926A and Fischer, R.P., 1975, Vanadium resources in titaniferous magnetite deposits: U.S. Geological Survey Professional Paper 926–B, http://pubs.er.usgs.gov/publication/pp926B

Worldwide, most vanadium is produced via co-production with steelmaking, with vanadium-bearing iron ore used in steel furnaces that produce a vanadium slag that is further converted into vanadium pentoxide and ferrovanadium. Co-production accounted for 71% of global vanadium production in 2019.[34] The concentrations of vanadium-bearing iron ore in China, Russia, and South Africa have made co-production more economically feasible in these countries than in others.

The main method of vanadium production in the United States is secondary production, using fossil fuel spent catalysts, residues, and ashes as feedstock. Fossil fuels can produce vanadium-bearing waste both through the use of vanadium catalysts used in the refining process and in the vanadium-rich residues generated from the burning of fuels high in vanadium content. After recovery, the spent catalysts and residues can be processed into vanadium pentoxide and ferrovanadium (see Figure 3). Secondary production of vanadium accounted for an estimated 11% of worldwide vanadium production in 2019, with the United States accounting for roughly one-third of the worldwide total (4% of total global production).[35]

[34] Bushveld Minerals, About Vanadium, https://www.bushveldminerals.com/about-vanadium/.
[35] Ibid.

Figure 3: Vanadium Processing Routes



Source: Petition for Relief Under Section 232, available at https://www.regulations.gov, docket BIS-2020-0002, Document, BIS-2020-0002-0083

Both Applicants are secondary producers of vanadium, using vanadium-bearing waste feedstock to produce vanadium products: AMG Vanadium operates a facility in Cambridge, Ohio that produces ferrovanadium, and U.S. Vanadium operates a facility in Hot Springs, Arkansas that produces vanadium pentoxide. In addition to the Applicants there is one other domestic secondary vanadium producer: Gladieux Metals Recycling in Freeport, Texas and one converter: Evergreen Metallurgical (doing business as Bear Metallurgical Company) in Butler, Pennsylvania.

AMG Vanadium's Ohio facility, which was originally built by the Vanadium Corporation of America, dates to 1952. Updates to the facility in 1970, following a merger with the Foote Mineral Corporation, led to the use of vanadium bearing slag as the facility's raw material input. A further overhaul after the acquisition of the facility by Advanced Metallurgical Group NV in 2007 resulted in AMG Vanadium's current use of spent catalyst as feedstock.[36]

AMG Vanadium is the country's largest producer of ferrovanadium, with average annual production from 2016 to 2019 of [redacted][37] As stated above, the company uses

[36] AMG Vanadium: Our History, at https://amg-v.com/timeline_amg_v/

[37] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.

vanadium-bearing spent catalyst as feedstock [redacted][38]

The completion of a new facility in Zanesville, Ohio (approximately 25 miles from its existing Cambridge facility) will allow AMG Vanadium to more than double its ferrovanadium production capacity to 5.5 million kilograms per year.[39] The new facility is expected to be completed in 2021, at a cost of just over $200 million, and will support approximately 100 new jobs.[40] The company has indicated that its expansion makes sense despite low vanadium prices, based on the fees it receives from refiners to process spent catalyst, which they expect to exceed their operating costs in 2021.[41] [redacted][42]

[38] Ibid.

[39] AMG Vanadium to Duplicate Ohio Recycling Facility. https://www.spglobal.com/marketintelligence/en/news-insights/trending/2zqx3jqhyx72gfgkcowuzq2

[40] AMG Vanadium Constructing a Second Ohio Plant, Investing More Than $200 Million. https://www.jobsohio.com/news/posts/amg-vanadium-constructing-a-second-ohio-plant-investing-more-than-200-million/

[41] AMG Annual General Meeting Minutes (May 1, 2019), as provided in public comments by Bushveld Minerals Limited, available at https://www.regulations.gov/document?D=BIS-2020-0002-0013

[42] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.

In October 2019, U.S. Vanadium LLC (U.S. Vanadium) purchased the vanadium production facility located in Hot Springs, Arkansas, from EVRAZ Stratcor (Stratcor), which had owned the facility since 2006. Vanadium production in Hot Springs dates from mining and milling operations established in 1966 by Union Carbide Corporation, which sold the mill to Stratcor in 1986 and closed the mine in 1989.[43]

U.S. Vanadium was the only company to produce vanadium pentoxide in the United States in 2020, following Energy Fuels' cessation of production and the ongoing idling of Gladieux Metals Recycling. [redacted][44]

[43] Vanadium Mining, Encyclopedia of Arkansas. https://encyclopediaofarkansas.net/entries/vanadium-mining-5915/

[44] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.

Gladieux Metals Recycling (Gladieux) is the owner of an idle vanadium production facility in Freeport, Texas, which it purchased out of bankruptcy from Gulf Chemical and Metallurgical Corporation (Gulf) in 2017.[45] Gulf, which was majority-owned by the French company Eramet, had entered into bankruptcy and idled the vanadium processing facility as a result of low vanadium and molybdenum prices as well as the costs arising from environmental challenges. These costs included 11 felony pollution charges and a resulting $2.75 million fine in 2010, a $7.5 million fine in 2013, and over $50 million in capital expenditures related to environmental matters.[46] While the facility has been idle since 2017, Gladieux has been overhauling operations and has invested more than [redacted] to increase the plant's efficiency and make it more environmentally sound.[47]

Gladieux expects to restart operations [redacted][48] [redacted]

[45] Callahan, Erinn. "Recycling company buys Gulf Chemical." *The Facts,* May 16, 2017. https://thefacts.com/news/article_fe738e6b-8b64-54fb-afd0-c66cbe35f63e.html

[46] Gulf Chemical & Metallurgical Corporation Chapter 11 Bankruptcy Filing, as provided in public comments by Bushveld Minerals Limited, available at https://www.regulations.gov/document?D=BIS-2020-0002-0013

[47] Gladieux Metals Recycling. Comment in response to Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium, July 20, 2020. https://www.regulations.gov/document?D=BIS-2020-0002-0033.

[48] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.

[redacted] Gladieux will use spent catalyst as its feedstock; [redacted].[49]

Bear Metallurgical (Bear) owns a facility in Butler, Pennsylvania, [redacted] but converts vanadium pentoxide to ferrovanadium, primarily on a fee basis for customers.[50] Bear reported that [redacted][51] [redacted][52]

Prior to declaring bankruptcy in 2016, Bear was a wholly-owned subsidiary of Gulf Chemical and Metallurgical (Gulf). The company reported entering into bankruptcy because low vanadium and molybdenum prices limited their toll

[49] Ibid.
[50] Often referred to as a tolling arrangement, with Bear as the "toller" and their customers, who provide material to be converted, as "tollees."
[51] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.
[52] Ibid

conversion volumes, with their reliance on Gulf being a significant factor; as noted above Gulf itself also declared bankruptcy in 2016, and subsequently idled vanadium pentoxide production.[53] Bear was purchased in 2016 by Yilmaden Holding, a subsidiary of the Turkey-based Yildirim Group.[54]

[redacted]

[53] Gulf Chemical & Metallurgical Corporation Chapter 11 Bankruptcy Filing, as provided in public comments by Bushveld Minerals Limited, available at https://www.regulations.gov/document?D=BIS-2020-0002-0013

[54] Mughal, Sarah. "Report: Yildirim Unit Wins Tender for Bear Metallurgical Assets." September 11, 2016. *S&P Global Market Intelligence.* https://www.spglobal.com/marketintelligence/en/news-insights/trending/tetcr1ex6irl2ixbbkkqtw2

[redacted][55]

[redacted]

B. Vanadium Uses

The vast majority of vanadium is used in steelmaking. Estimates for both U.S. and worldwide usage put the steel industry at 90 to 93% of total vanadium usage.[56] The inclusion of small amounts of vanadium—typically well under 1% of the total volume—into steel adds "strength, toughness, and wear resistance," as well as oxidation prevention.[57] The resulting high-strength, low-alloy (HSLA) steel

[55] USGS Vanadium Mineral Commodity Summary, 2020. https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-vanadium.pdf

[56] Vanadium: Chapter U of Critical Mineral Resources of the United States—Economic and Environmental Geology Prospects for Future Supply (2017). https://pubs.usgs.gov/pp/1802/u/pp1802u.pdf

[57] Ibid.

products are common in the construction industry, particularly in earthquake-resistant rebar, as well as in buildings, bridges, and cranes. HSLA steel products are also used in the automotive sector, in shipbuilding, and in various defense-related uses such as armor plating.[58] Additionally, use of vanadium is common in tool steel, with chromium-vanadium steel commonly used in hand tools with vanadium concentrations of 0.15 to 0.2%.[59] Vanadium is also used at significantly higher concentrations in high speed steel used in cutting and drilling tools, as well as aerospace applications such as gas engine turbines, at concentrations that can exceed 5% vanadium.

Substitution for vanadium is possible in most steel products. Molybdenum produces similar mechanical properties in tool steels and is substituted on the basis of price and the existence of pre-established supply chains.[60] In HSLA steels, niobium is a standard substitute for vanadium, though "significant technical adjustments to the steel production process" are required.[61] Many Chinese steel mills, for instance, carried out this substitution in 2018 in response to a surge in vanadium prices.[62] Nonetheless, vanadium is generally preferred in applications

[58] Ibid.
[59] Which is better for hand tools? Chromium-Molybdenum or Chromium-Vanadium Steel. https://www.tekton.com/crmo-or-crv-steel
[60] Ibid.
[61] Vanadium: Chapter U of Critical Mineral Resources of the United States—Economic and Environmental Geology Prospects for Future Supply (2017). https://pubs.usgs.gov/pp/1802/u/pp1802u.pdf
[62] Press Release: Roskill: Niobium industry looking for a future beyond steel. https://www.globenewswire.com/news-release/2020/02/10/1982500/0/en/Roskill-Niobium-industry-looking-for-a-future-beyond-steel.html

such as rebar, though Roskill—a major metal and chemical industry research and consultancy group—notes that "once mills are accustomed to niobium and have made the technical changes, they are unlikely to fully switch back."[63]

Compared to its use in steel alloys, the aggregate use of vanadium in titanium alloys accounts for a much smaller percentage—approximately 3 to 5% of total vanadium demand—but it is "irreplaceable in aerospace applications."[64] Most titanium products contain vanadium; the vanadium is typically incorporated into the titanium melt process as a master alloy that is 65% vanadium and 35% aluminum, producing a variety of titanium mill products. The most common is Ti-6Al-4V, a product that is 4% vanadium by weight and between 12 and 14% by cost.[65] Other titanium alloys contain up to 15% vanadium by weight.

Most titanium products are used in the aerospace and military sectors, which account for approximately two-thirds of titanium mill product demand.[66] Titanium accounts for approximately 14% of the Boeing 787 airframe, for instance, and up to 39% of the weight of F-22 fighter jet.[67] Other national security titanium

[63] Vanadium Outlook to 2029, 18th Edition, Publicly available summary, https://roskill.com/market-report/vanadium/

[64] Vanadium: Chapter U of Critical Mineral Resources of the United States—Economic and Environmental Geology Prospects for Future Supply (2017). https://pubs.usgs.gov/pp/1802/u/pp1802u.pdf

[65] Titanium Metals Corporation Public Comment on Section 232 National Security Investigation of Imports of Vanadium. Available at https://www.regulations.gov/document?D=BIS-2020-0002-0019

[66] Olin, Chris. Titanium Market Update: Highlighting Global Trends in 2017. Longbow Research.

[67] Boeing 787: From the Ground Up. https://www.boeing.com/commercial/aeromagazine/articles/qtr_4_06/article_04_2.html and U.S. Department of Commerce. Bureau of Industry and Security. *The Effect of Imports of Titanium Sponge on the National Security.*

applications include ship components, military ground vehicles, and armor. Industrial use of titanium accounts for approximately 25% of demand; vanadium is used in the chemical industry, power plants, and desalination plants, but these sectors are more likely to use unalloyed "commercially pure" titanium.

The primary remaining vanadium uses, accounting for 2 to 4% of total vanadium demand, are categorized as chemical or non-metallurgical use. One key non-metallurgical use is in catalysts, with vanadium-based products being the most common catalysts used for selective catalytic reduction to reduce the production of nitrogen oxides in industrial power plants.[68] Vanadium is used as a catalyst in the production of sulfuric acid, itself an important industrial material used in the production of fertilizer, pulp and paper, titanium dioxide, cellulosic fibers and plastics, explosives, electronic chips, batteries, and pharmaceuticals.[69] Consumption of sulfuric acid is "regarded as one of the best indexes of a nation's industrial development."[70] A significant national security use of vanadium within the chemical industry is in longwave-infrared (LWIR) imaging, used for night

[68] Types of Catalysts for SCR Operations, https://sviindustrial.com/2020/04/08/types-of-catalysts-for-scr-operations/

[69] PubChem Sulfuric acid compound summary, NIH National Library of Medicine, National Center for Biotechnology Information. https://pubchem.ncbi.nlm.nih.gov/compound/Sulfuric-acid#section=Uses

[70] National Mineral Information Center, Sulfur Statistics and information. https://www.usgs.gov/centers/nmic/sulfur-statistics-and-information

vision and targeting systems. Vanadium oxide is the most frequently used material in the bolometers supporting LWIR imaging.[71]

An additional chemical use of vanadium is in large scale batteries. This accounts for a very small percentage of current usage—estimated well under 1% of total demand—but is an area in which some researchers have seen potential for significant expansion. Vanadium redox flow batteries (VRBs) were first patented in 1986, and VRB technology was advanced by Pacific Northwest National Laboratory in 2011, significantly shrinking the size of the batteries and increasing temperature tolerance.[72] These batteries have attributes that make them valuable for use in energy grids such as longer life cycles, lack electrolyte cross-contamination, and the ability to remain idle without losing capacity.[73] The vanadium accounts for approximately 30% of the cost of a vanadium redox flow battery, requiring between 3 and 6 kilograms of vanadium per kilowatt-hour of energy storage.[74] Estimates of the potential market growth of the vanadium redox flow battery vary wildly, from minimal amounts to estimates exceeding 40% compound annual

[71] Andrew Voshell, Nibir Dhar, Mukti M. Rana, "Materials for microbolometers: vanadium oxide or silicon derivatives," Proc. SPIE 10209, Image Sensing Technologies: Materials, Devices, Systems, and Applications IV, 102090M (28 April 2017); doi: 10.1117/12.2263999

[72] Yang, Z Gary. It's Big and Long-Lived, and It Won't Catch Fire: The Vanadium Redox-Flow Battery. IEEE Spectrum, October 26, 2017. https://spectrum.ieee.org/green-tech/fuel-cells/its-big-and-longlived-and-it-wont-catch-fire-the-vanadium-redoxflow-battery

[73] Vanadium Redox Flow Batteries: Improving the performance and reducing the cost of vanadium redox flow batteries for large-scale energy storage. October 2013. U.S. Department of Energy Electricity Delivery & Energy Reliability, Energy Storage Program. Available at https://www.energy.gov/sites/prod/files/VRB.pdf

[74] Energy Storage & Vanadium Redox Flow Batteries 101, November 13, 2018. http://www.bushveldminerals.com/wp-content/uploads/2018/11/Energy-Storage-Vanadium-Redox-Flow-Batteries-101.pdf

growth.[75] To date, use of vanadium redox flow batteries has not shown sharp growth, in part due to cost. As the Department of Energy noted as part of its 2020 Energy Storage Grand Challenge Draft Roadmap, "future capital cost reductions will require replacing vanadium with lower cost raw materials to approach the $100/kWh targets required for wider-scale deployment of energy storage."[76]

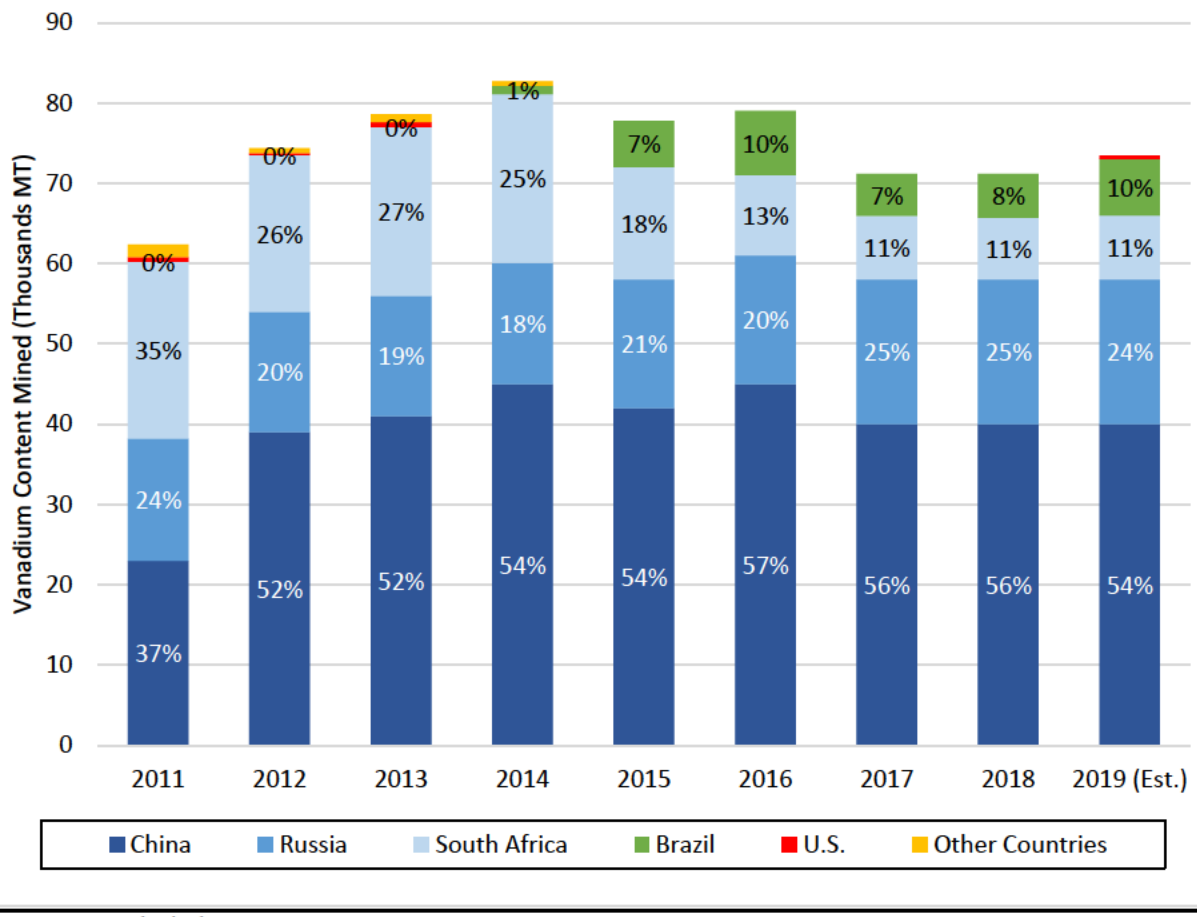
VI. Global Vanadium Industry Conditions

A. Overview

Primary and co-production of vanadium is largely undertaken in four countries: China, Russia, South Africa, and Brazil (see Figure 5). In addition to these countries, the United States Geological Survey (USGS) lists known reserves in the United States and Australia. Worldwide resources significantly exceed known reserves, which are considered "a working inventory of mining companies' supplies of an economically extractable mineral commodity;" global reserves are estimated at 22 million metric tons, with world vanadium resources estimated to exceed 63 million metric tons.[77]

[75] Ibid.
[76] Department of Energy, "Energy Storage Grand Challenge Draft Roadmap", available at https://www.energy.gov/energy-storage-grand-challenge/energy-storage-grand-challenge
[77] United States Geological Survey Mineral Commodity Summaries – Vanadium, https://www.usgs.gov/centers/nmic/vanadium-statistics-and-information

Figure 5: World Vanadium Mine Production, 2011 - 2019



Source: U.S. Geological Survey

Countries other than the United States that are in the process of developing significant reserves include Canada and Kazakhstan. Australia already maintains notable vanadium reserves, which it is seeking to expand, but does not have any recorded mine production. The Government of Australia reports nine vanadium production projects underway, with five of these at advanced stages of exploration,

and some vanadium production possible in 2021.[78] One mine—the Windimurra mine—completed a feasibility study in April 2020 and expects to produce 4,250 tons of vanadium content annually.[79] The Windimurra mine has successfully produced vanadium in the past, operating from 1999 to 2003 with an annual production capacity of 3,000 tons contained vanadium.[80] Four other Australian projects are in the process of permitting, design, or pilot studies with a total potential annual production of 22,000 tons of contained vanadium.[81]

Several mining projects for vanadium-bearing iron ore in Canada are in exploratory phases. Two are in the Lac Doré area of Québec, with partial funding provided by the government of Québec. One of the two, operated by BlackRock Metals, plans to begin operations in 2021, with cast iron and ferrovanadium as the main products.[82] This project is expected to yield 5,200 tons of ferrovanadium annually with 80% vanadium content, to be processed at a nearby facility.[83] The second company, VanadiumCorp Resources, is in the exploration phase, with drill

[78] Submission from the Australian Government to the United States Department of Commerce, Section 232 National Security Investigation into Imports of Vanadium, submitted to https://www.regulations.gov, docket BIS-2020-0002 July 20, 2020.

[79] Ibid.

[80] United States Geological Survey, Vanadium Minerals Yearbook reports. Available at https://www.usgs.gov/centers/nmic/vanadium-statistics-and-information

[81] Submission from the Australian Government to the United States Department of Commerce, Section 232 National Security Investigation into Imports of Vanadium, submitted to https://www.regulations.gov, docket BIS-2020-0002 July 20, 2020.

[82] "Métaux BlackRock a un client pour son titane", Radio-Canada, May 8, 2019, https://ici.radio-canada.ca/nouvelle/1168744/ferrovanadium-usine-saguenay-client-mine-chibougamau

[83] "BlackRock Project: Iron Ore Exploitation at lac Doré", https://iaac-aeic.gc.ca/050/documents/p62105/90319E.pdf

testing programs completed in 2019 and a mineral resource estimate completed in October 2020.[84] The estimate showed 8 million metric tons of measured magnetite concentrate at 1.2% vanadium pentoxide content, equal to 56,000 tons of contained vanadium, with an additional 324,000 tons indicated and 155,000 tons inferred.[85] A third Canadian company, Vanadium One Iron Corporation, released the results of its PEA in February 2020 for its Mont Sorcier property in Québec, anticipating the ability to produce five million tons of ore per year with a 0.6% vanadium pentoxide content.[86]

Figure 6: Estimated New Mine Production Potential of Select Vanadium Projects in Canada and Australia (in metric tons contained vanadium)

Country	Project	Status	Estimated Reserves	Estimated Annual Production
Australia	Atlantic Vanadium: Windimurra Mine	In Development	131,936	4,256
Australia	Multicom: Saint Elmo Mine	Finalizing Environmental Approvals	112,000	5,600
Australia	Australian Vanadium Ltd: Australian Vanadium Project	Feasibility Study	97,152	5,715
Australia	TNG Limited: Mount Peake Mine	Engineering Design	124,320	3,360
Australia	Technology Metals Australia: Gabanintha Mine	Feasibility Study Completed 2019	114,688	7,168
Australia	**Total**	---	**580,096**	**26,099**
Canada	BlackRock Metals: Chibougamou Mine	Authorized	176,439	4,152

[84] VanadiumCorp Lac Doré Vanadium Project, http://www.vanadiumcorp.com/projects/lac-dore-vanadium-project/
[85] VanadiumCorp Reports Lac Dore Mineral Resource Estimate (MRE). October 29, 2020. https://www.vanadiumcorp.com/releases/vanadiumcorp-reports-the-lac-dore-mineral-resource-estimate-mre-2/
[86] Vanadium One Iron Corporation PEA Results, February 2020, https://www.vanadiumone.com/pea-results/

Canada	VanadiumCorp Resources: Lac Doré Project	Mineral Resource Estimate Complete	379,273	10,306
Canada	VanadiumOne: Mont Sorcier Project	Preliminary Economic Analysis Complete	117,600	16,800
Canada	**Total**	---	**673,312**	**31,258**

Sources:
Submission from the Australian Government to the United States Department of Commerce, Section 232 National Security Investigation into Imports of Vanadium, submitted to https://www.regulations.gov, docket BIS-2020-0002 July 20, 2020.
BlackRock Mining Project Summary. Available at https://comexqc.ca/en/fiches-de-projet/projet-dexploitation-dun-gisement-fer-vanadium-metaux-blackrock-inc/
VanadiumCorp Reports Lac Doré Mineral Resource Estimate. October 29, 2020. Available at https://www.vanadiumcorp.com/releases/vanadiumcorp-reports-the-lac-dore-mineral-resource-estimate-mre-2/
VanadiumOne Iron Corp. Preliminary Economic Analysis Results, February 2020. Available at https://www.vanadiumone.com/pea-results/

In Kazakhstan, the Ferro-Alloy Resources Group, based in Guernsey and listed on the London and Astana International Stock Exchanges, owns Firma Balusa, LLP, which holds the rights to the Balasausqandiq vanadium deposit in the southern part of the country. The site currently has minimal vanadium production, but has rapid expansion plans, forecasting in 2019 reaching production levels of 4,000 tons contained vanadium in 2020 and 13,000 tons in 2023.[87] The projected 2023 production would make Kazakhstan the world's third leading producer of mined vanadium based on current totals. The company's production levels appear significantly behind its initial plans, attributed primarily to the COVID-19 pandemic; through August of 2020 the company indicated it had produced 168 tons of vanadium pentoxide (94 tons contained vanadium) from secondary concentrate,

[87] Ferro-Alloy Resources Ltd Corporate Presentation, March 2019. http://ferro-alloy.com/en/news/FAR%20-%20Corporate%20Presentation%20-%20%20update%20March%202019.pdf

and indicated the development of the Balasausqandiq deposit was ongoing.[88] The company says it "plans to become the world's lowest cost primary producer."[89]

Beyond the estimated 73,000 tons of mine-produced vanadium reported worldwide in 2019, secondary production added as much as 30,000 tons to worldwide totals, with most of the additional production in the U.S., Germany, Austria, Japan, and Taiwan.[90] Significant producers outside of the U.S. include Treibacher in Austria, AMG Technologies in Germany, Shinko Chemical, Taiyo Koko, and Metal Technology in Japan, and Hong Jing Environment, Plum Movax, and Full Yield Industry of Taiwan. Interest in secondary production has risen in recent years as tightened environmental controls on fuels has increased interest in processing spent catalyst and fossil fuel residues. In addition to their U.S. expansion, AMG is exploring the construction of facilities in Saudi Arabia and China to process catalysts from those regions.[91]

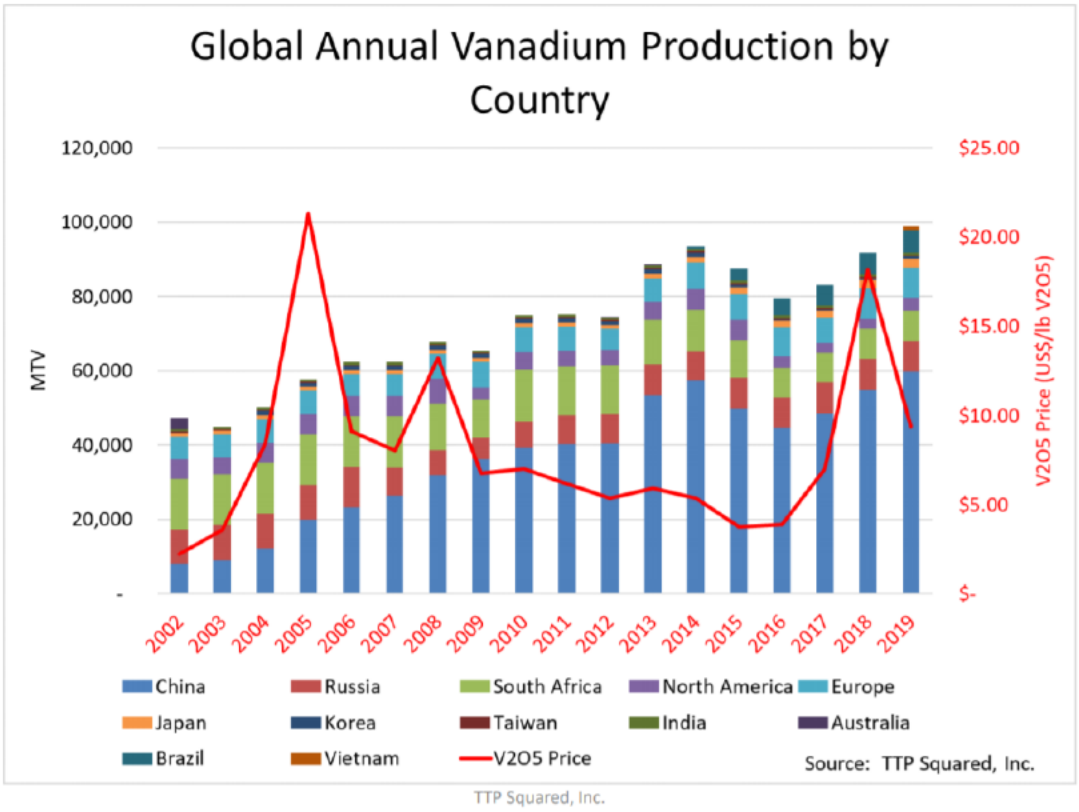
[88] Ferro-Alloy Resources Unaudited interim financial results for the six months to 30 June 2020. http://www.ferro-alloy.com/en/investors/financials/

[89] Ferro-Alloy Resources Corporate Profile. http://www.ferro-alloy.com/en/company/corporate-profile/

[90] Based on USGS estimates and Perles, Terry. Vanadium Market Fundamentals: China's 2019 4th International Vanadium Forum Chengdu, Sichuan, China. April 13, 2019. Submitted as public comment by Treibacher Industrie, July 20, 2020. Available at https://www.regulations.gov/document?D=BIS-2020-0002-0026

[91] AMG 2019 Annual Report. Available at https://ig9we1q348z124x3t10meupc-wpengine.netdna-ssl.com/wp-content/uploads/AMG-Annual-Report-Web-FINAL.pdf and Shell & AMG Recycling B.V. Sign Agreement with Shandong Yulong Petrochemical Co., Ltd to Assess Building a Spent Residue Upgrading Catalyst Recycling Facility. Available at https://www.globenewswire.com/news-release/2020/10/26/2114333/0/en/Shell-AMG-Recycling-B-V-Sign-Agreement-with-Shandong-Yulong-Petrochemical-Co-Ltd-to-Assess-Building-a-Spent-Residue-Upgrading-Catalyst-Recycling-Facility.html

Figure 7: Vanadium Pentoxide Production



Source: Vanadium Market Analysis, Terry Perles, TTP Squared, April 3, 2020.
http://www.ferro-alloy.com/en/vanadium/TTP%20Squared%20market%20summary%203%20April%202020.pdf

While China accounts for an estimated 50 to 60% of global vanadium production, exports of vanadium from China constitute only approximately 15% of worldwide vanadium exports, because most Chinese production is consumed domestically in the steel industry. Primary producers South Africa and Brazil, as well as European Union countries, which represent a much larger share of global vanadium exports than production. The European Union alone accounts for over one-quarter of global exports of contained vanadium (see Figure 8).

Figure 8: Estimated 2019 Share of Production and Exports of Vanadium Content in Vanadium Pentoxide and Ferrovanadium		
Country	**Estimated 2019 Share of World Production**	**Estimated 2019 Share of World Exports**
China	55%	15%
Russia	18%	15%
European Union Countries*	9%	27%
South Africa	8%	13%
Brazil	7%	13%
United States	4%	4%
Japan	2%	1%
India	1%	1%
South Korea	<1%	7%
Taiwan	<1%	2%
Thailand	<1%	1%
Canada	<1%	2%
Sources: U.S. Geological Survey, TTP Squared, Bureau of Industry and Security, IHS Markit Global Trade Atlas * Includes exports within the European Union		

Vanadium production generally results first in vanadium pentoxide, which may be exported or further processed into ferrovanadium for use in steel. A large portion of the difference between world production and export share for E.U. countries results from their import of vanadium oxides—principally from Russia—for conversion into ferrovanadium, which was then exported (see Figure 9). In fact, nearly all Russian exports of vanadium oxide went to the Czech Republic, home to EVRAZ Nikom, one of the E.U.'s main producers of ferrovanadium.

Figure 9: Top World Trade Pairings 2016-2019: Vanadium Oxides (HTS 2825.30) (in tons vanadium oxide)							
Exporter	**Importer**	**2016**	**2017**	**2018**	**2019**	**Share of Country's Exports**	**Share of World Exports**
Russia	Czech Republic	6,656	8,656	8,676	9,683	99%	23%
South Africa	Netherlands	3,415	3,225	3,871	3,711	56%	10%
China	South Korea	3,140	4,620	3,186	2,750	47%	9%
Brazil	Netherlands	1,740	4,343	4,039	3,380	37%	9%
Brazil	South Korea	3,640	1,460	660	2,320	22%	5%
South Korea	Japan	1,181	2,357	1,840	2,051	73%	5%
South Africa	United States	1,676	1,744	1,603	1,521	26%	4%
Brazil	United States	660	1,377	2,442	1,993	18%	4%

China	Netherlands	2,376	1,860	1,199	615	21%	4%
Netherlands	Austria	2	46	3,100	1,773	75%	3%
Brazil	Canada	980	940	1,320	1,340	13%	3%
China	Japan	926	720	917	722	11%	2%
China	United States	930	565	639	69	8%	1%
Brazil	Japan	680	440	440	440	6%	1%
China	Canada	120	420	599	510	6%	1%
South Africa	Japan	267	244	391	560	6%	1%
Taiwan	United States	533	510	57	126	38%	1%
Thailand	India	60	320	520	240	55%	1%
Brazil	India	260	660	200	0	3%	1%
South Africa	India	0	0	486	480	4%	1%
All Countries	All Countries	33,293	37,220	39,074	38,719	---	---
Source: IHS Markit Global Trade Atlas							

Czech ferrovanadium, in turn, was exported principally to the United States, Japan, Netherlands, and Germany (see Figure 10). Other major exporters of ferrovanadium include the Netherlands (the principal importer of South African vanadium oxide), South Korea (the principal importer of Chinese vanadium oxides), and China which, despite exporting a relatively small percentage of their production still accounts for a major portion of global exports due to the sheer size of their production.

Figure 10: Top World Trade Pairings 2016-2019: Ferrovanadium (HTS 7202.92) (in tons ferrovanadium)

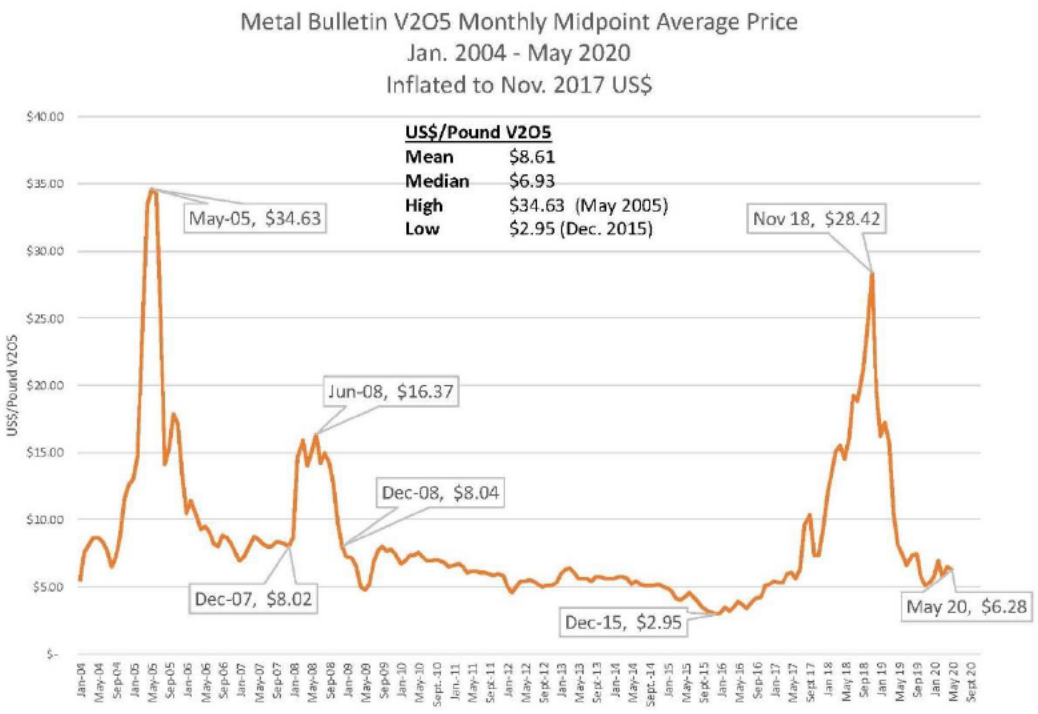
Exporter	Importer	2016	2017	2018	2019	Share of Country's Exports	Share of World Exports
Netherlands	Germany	1,902	1,832	3,758	1,913	28%	7%
South Africa	Netherlands	2,112	1,662	1,563	1,579	59%	5%
China	Netherlands	2,380	1,540	1,549	930	28%	5%
South Korea	Netherlands	1,364	1,714	1,543	1,333	53%	4%
China	Japan	1,467	1,323	1,635	1,370	25%	4%
China	South Korea	975	995	1,667	1,661	23%	4%
Czech Republic	United States	1,016	940	1,045	1,691	18%	3%
Netherlands	United States	1,398	186	2,091	893	13%	3%
Czech Republic	Japan	1,025	740	1,020	806	14%	3%
Netherlands	Italy	718	895	1,039	523	9%	2%
China	Taiwan	1,109	595	787	644	14%	2%
Canada	United States	142	767	869	1,266	91%	2%
United States	Canada	474	295	1,403	843	59%	2%

Czech Republic	Netherlands	870	457	270	1,184	11%	2%
Czech Republic	Germany	1,162	1,009	361	247	11%	2%
Netherlands	Spain	784	654	484	175	6%	2%
South Africa	Japan	312	404	605	640	17%	1%
South Korea	Japan	596	258	459	601	17%	1%
Russia	Netherlands	404	700	360	420	32%	1%
United States	Mexico	304	266	642	315	30%	1%
All Countries	All Countries	33,477	30,849	39,300	32,367	---	---
Source: IHS Markit Global Trade Atlas							

In recent years, the global vanadium market has been subject to severe price fluctuations. Three times since 2004 the benchmark vanadium pentoxide price has more than doubled in under a year, after which a precipitous drop to more typical price levels occurs (see Figure 11). These rapid price changes have led to a history of investment and expansion during price spikes and plant idlings and bankruptcies in market economies during and following price drops. Starting new primary production has been especially challenging, as new mining ventures can take many years to progress through exploration and permitting to production. The Windimurra mine in Australia, for instance, is in the midst of its fourth re-opening attempt since 1999, having operated from 2000 to 2003, invested in reopening from 2005 to 2009 that ultimately failed to materialize, reopening with new ownership from 2012 to 2014, and currently under development by a new owner.[92]

[92] McKinnon, Stuart. Vanadium Price Boom Offers Hope of WIndimurra Revival. *The West Australian*, April 2, 2018. Available at https://thewest.com.au/business/mining/vanadium-price-boom-offers-hope-of-windimurra-revival-ng-b88792684z

Figure 11: Vanadium Pentoxide Prices



Source: Metal Bulletin, TTP Squared, Inc., as presented at 7th Vanitec Energy Storage Meeting, June 29, 2020. Accessed July 17, 2020, http://www.vanitec.org/vanadium/ESC-Meetings

Compared to primary production facilities, secondary production facilities can have less extended lead times, but still take years to complete. The establishment of AMG Vanadium's new facility in Ohio was announced in October 2018, broke ground in August 2019, and is expected to be completed in 2021.[93] The Gladieux facility in Freeport, Texas was purchased in 2017 and is not yet operational.

B. Prior Trade Investigations

[93] AMG Vanadium Muskingum County Facility Website. https://amg-v.com/muskingumfacility/

The U.S. government has previously taken action against artificially low-priced vanadium product imports. Several antidumping investigations conducted by the Department of Commerce and the USITC affirm that sources of imported ferrovanadium from nearly all countries that mine vanadium ore have engaged in dumping that injures U.S. producers. Among the significant miners of vanadium ore, only Brazil has not been subject to an antidumping finding. AMG Vanadium (or its predecessor) has been a petitioner for all ferrovanadium antidumping cases, joined by Bear, Gulf, and Stratcor (or its predecessor) for the petitions on China, South Africa, and Korea. Figure 12 lists USITC investigations into vanadium imports since 1995:

Figure 12: U.S. International Trade Commission Vanadium Cases Since 1995

Investigation	Date	Finding
Ferrovanadium and Nitrided Vanadium from Russia	July 30, 1995	Affirmative
Ferrovanadium and Nitrided Vanadium from Russia (First Review)	May 15, 2001	Affirmative
Ferrovanadium from China and South Africa	January 28, 2003	Affirmative
Ferrovanadium and Nitrided Vanadium from Russia (Second Review)	September 28, 2006	Affirmative
Ferrovanadium from China and South Africa (First Review)	November 24, 2008	Affirmative
Ferrovanadium from China and South Africa (Second Review)	January 28, 2015	Affirmative
Ferrovanadium and Nitrided Vanadium from Russia (Third Review)	August 22, 2012	Negative
Ferrovanadium from Korea	March 17, 2017	Affirmative
Ferrovanadium from China and South Africa (Third Review)	August 7, 2020	Affirmative

Source: United States International Trade Commission

Russia

In July 1995, the Department of Commerce found that imports of ferrovanadium and nitrided vanadium from Russia were sold in the United States at less than fair value, and the USITC found that the dumped imports were materially injuring the U.S. industry. In the course of the investigation, USITC determined that ferrovanadium and nitrided vanadium, despite having somewhat disparate end uses, constituted a single like product based on the significant vanadium content and generally interchangeable use in steel alloys.[94]

This affirmative finding was renewed following the Department of Commerce's and USITC's first five-year review of the antidumping duty order in May 2001, as well as the second five-year review in September 2006. At the third set of five-year reviews completed in August 2012, the USITC noted there had been no subject imports since 1996, and that in the case of nitrided vanadium there had been no U.S. production since 1992.[95] However, while there were no imports of ferrovanadium from Russia during the time period, there were imports of Russian vanadium pentoxide, which were then converted to ferrovanadium in the

[94] U.S. International Trade Commission. *Ferrovanadium and Nitrided Vanadium from Russia*. Investigation No. 731-TA-702, Final. https://www.usitc.gov/publications/701_731/pub2904.pdf

[95] U.S. International Trade Commission. *Ferrovanadium and Nitrided Vanadium from Russia*. Investigation No. 731-TA-702 (Third Review). https://www.usitc.gov/publications/701_731/pub4345.pdf

U.S., as well as imports of ferrovanadium from Russian-owned EVRAZ Nikom in the Czech Republic, made from Russian-sourced vanadium pentoxide.[96]

The USITC's third review found, contrary to the prior reviews, that imports of ferrovanadium from Russia would not be likely to significantly increase if the antidumping order was revoked. The decision noted that Russian capacity and production had declined from prior significant excesses, with less focus on exporting ferrovanadium.[97] The report also noted the increased tendency to supply the U.S. market with vanadium pentoxide, rather than the subject product ferrovanadium. On this basis, the antidumping order against Russian ferrovanadium was revoked in October 2011.

China and South Africa

In January 2003 the Department of Commerce determined that imports of ferrovanadium from China and South Africa were sold in the United States at less than fair value and the USITC found that the dumped imports were materially injuring the U.S. industry. In the first sunset reviews (completed November 2008), second sunset reviews (completed January 2015), and third sunset reviews (completed August 2020), the Department of Commerce and the USITC determined that revocation of the existing antidumping duty orders on

[96] Ibid.
[97] Ibid.

ferrovanadium from China and South Africa would likely lead to continuation or recurrence of dumping and material injury to an industry in the United States within a reasonably foreseeable time.[98]

Following the imposition of the antidumping order in 2002, imports of ferrovanadium from China fell from an average of 497,000 kilograms of contained vanadium per year from 1999 to 2001 to "zero or close to zero in every year since 2002."[99] USITC cited China's status as the world's largest producer of ferrovanadium and its continued increases in capacity as reasons for an affirmative injury finding.

Imports of ferrovanadium from South Africa showed similar declines following the initial antidumping order. From an average of 758,000 kilograms of vanadium content per year from 1999 to 2001, by 2003 imports had fallen to account for no more than 0.1% of U.S. market share.[100] As was the case with Russian providers, since the imposition of antidumping duties South African

[98] Ferrovanadium from the People's Republic of China and the Republic of South Africa: Continuation of Antidumping Duty Orders, 73 FR 77609, December 19, 2008; Ferrovanadium From the People's Republic of China and the Republic of South Africa: Continuation of Antidumping Duty Orders, 80 FR 8607, February 18, 2015; Ferrovanadium From the Republic of South Africa and the People's Republic of China: Continuation of Antidumping Duty Orders, 85 FR 51408, August 20, 2020.

[99] U.S. International Trade Commission. *Ferrovanadium and Nitrided Vanadium from China and South Africa*. Investigation Nos. 731-TA-986-987 (Third Review). https://www.usitc.gov/publications/701_731/pub5099.pdf

[100] Ibid.

vanadium has continued to enter the United States in other forms not subject to antidumping duties, such as vanadium pentoxide and nitrided vanadium.

Korea

In March 2017 the Department of Commerce determined that imports of ferrovanadium from Korea were sold in the United States at less than fair value and the USITC found that the dumped imports were materially injuring the U.S. industry. Unlike Russia, China, and South Africa, Korea is not a significant source of vanadium production. Rather, the USITC noted that Korean ferrovanadium was produced primarily from vanadium pentoxide originally sourced from China.[101] The USITC found that ferrovanadium from Korea was sold in the United States in "increasing and significant volume … at declining prices."[102]

C. U.S. Duties on Vanadium Imports

As of November 2020, all vanadium products in the scope of this investigation, with the exception of vanadium ore and concentrates (Harmonized Tariff Schedule of the United States (HTSUS) 2615.90.6090) and ash and residues

[101] U.S. International Trade Commission. *Ferrovanadium and Nitrided Vanadium from Korea*. Investigation Nos. 731-TA-1315. https://www.usitc.gov/publications/701_731/pub4683.pdf

[102] Ibid.

containing vanadium (HTSUS 2620.40.0030 and 2620.99.1000) are subject to duties between 2 and 5.5% (see Figure 13).

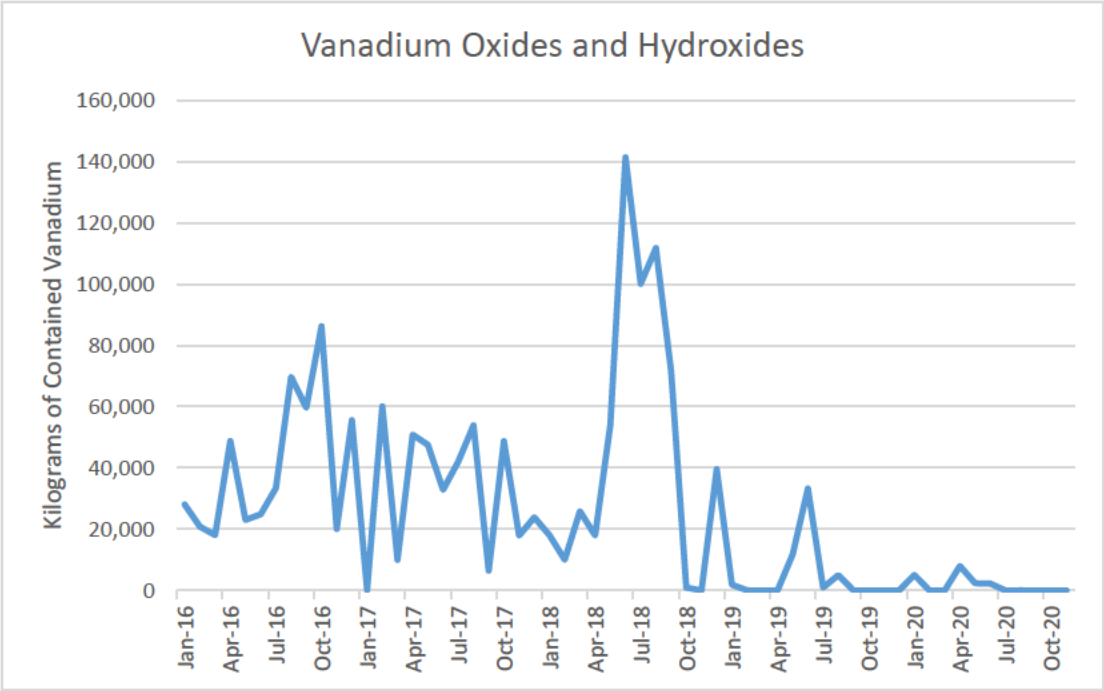
Figure 13: Duties on Vanadium Products		
Heading/Subheading/Product	**10 Digit HTS Code**	**Duty**
Vanadium Oxides	2825.30.0010	5.5%
	2825.30.0050	5.5%
Ferrovanadium	7202.92.0000	4.2%*
Vanadium Carbides	2849.90.5000	3.7%
Vanadates	2841.90.1000	5.5%
Vanadium Ore and Concentrates	2615.90.6090	Free
Ash and Residues Containing Vanadium	2620.40.0030	Free
	2620.99.1000	Free
Vanadium Sulfate	2833.29.3000	5.5%
Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides	2850.00.2000	5.5%
Vanadium, Unwrought and Wrought	8112.92.7000	2%
	8112.99.2000	2%
Source: United States International Trade Commission and U.S. Department of Commerce, Bureau of Industry and Security, as of December 7, 2020 * Ferrovanadium products from China, South Africa, and Korea are subject to additional antidumping duties		

Antidumping duties on ferrovanadium add significantly to the rates for ferrovanadium from China, South Africa, and Korea (see Figure 14).

Figure 14: Antidumping Duties on Ferrovanadium		
Country	**Exporter/Producer**	**Dumping Rate**
China	Pangang Group International Economic & Trading Corporation	12.97%
	China-Wide	66.71%
South Africa	Highveld Steel and Vanadium Corporation, Ltd	116.00%
	Xstrata South Africa (Proprietary) Limited	116.00%
	All Others	116.00%
Korea	Korvan Ind. Co., Ltd.	3.22%
	Fortune Metallurgical Group Co., Ltd.	54.69%
	Woojin Ind. Co., Ltd.	54.69%
	All Others	3.22%
Source: Federal Register; 68 FR 4168, 68 FR 4169, 82 FR 14874		

In addition to the above general and antidumping duties, China has been subject to Section 301 duties on all subject vanadium products except HTSUS 2620.40.0030 (ash and residue containing mainly aluminum and vanadium-bearing materials) of 10% starting September 21, 2018 and 25% starting August 20, 2019. Prior to the imposition of Section 301 duties, vanadium oxides was the only category of vanadium product with significant imports from China. Imports of vanadium via vanadium oxides fell from a monthly average of 31,500 kilograms in the year prior to the initial announcement of Section 301 tariffs to 7,200 kilograms per month in year following the imposition of tariffs. Between the initial announcement of Section 301 duties in April 2018 and the imposition of duties on vanadium products in September 2018, imports of vanadium oxides from China rose to 96,000 kilograms of contained vanadium per month, perhaps due to companies increasing inventories in anticipation of duties (see Figure 15).

Figure 15: Imports of Vanadium Oxides and Hydroxides from China (in kilograms of contained vanadium)



Source: ITC Dataweb, HTS 2825.30

VII. Findings

A. Vanadium is Essential to U.S. National Security

1. Vanadium is Considered a Critical Mineral

Vanadium is one of the 35 minerals included by the Department of Interior (DOI) on the Critical Minerals List. This list, which President Trump directed DOI to define in E.O. 13817, includes minerals which meet the following criteria:

(i) A non-fuel mineral or mineral material essential to the economic and national security of the United States,

(ii) the supply chain of which is vulnerable to disruption, and

(iii) that serves an essential function in the manufacturing of a product, the absence of which would have significant consequences for our economy or our national security.[103]

In its report, *Critical mineral resources of the United States—Economic and environmental geology and prospects for future supply,* USGS observed that vanadium is used in steel alloys which are in turn used in critical sectors including bridges, pipelines, ships, rail cars, truck bodies, and military vehicles, and is "irreplaceable for its role in aerospace applications" via titanium alloys.[104] For this reason among others, and based on input from other U.S. government agencies, USGS included vanadium on the critical minerals list.

As discussed in Section V of this report, in addition to its use in alloys, vanadium is a vital component in the production of vanadium redox flow batteries (VRBs), chemical catalysts, ceramics, electronics, and other vanadium chemicals. VRBs are a potential area of large scale energy storage, a fast-growing sector that will help support the growth and reliability of the power grid. As noted above, sulfuric acid's wide array of manufacturing uses means its production is highly

[103] White House, "Presidential Executive Order on a Federal Strategy to Ensure Secure and Reliable Supplies of Critical Materials", (December 20, 2017), https://trumpwhitehouse.archives.gov/presidential-actions/presidential-executive-order-federal-strategy-ensure-secure-reliable-supplies-critical-minerals/

[104] Kelley, K.D., Scott, C.T., Polyak, D.E., and Kimball, B.E., 2017, Vanadium, chap. U of Schulz, K.J., DeYoung, J.H., Jr., Seal, R.R., II, and Bradley, D.C., eds., Critical mineral resources of the United States—Economic and environmental geology and prospects for future supply: U.S. Geological Survey Professional Paper 1802, p. U1–U36, https://doi.org/10.3133/pp1802U.

correlated with industrial development. Though a small percentage of overall vanadium demand, these catalyst uses are essential for multiple critical infrastructure and commercial sectors.

USGS cited continued need for steel products as a driver of vanadium demand, specifically noting expansion of Chinese demand, increased vanadium content in steel rebar in China and Japan, growing steel production in India, and expansion of energy uses of vanadium. As a result, USGS predicts that new sources of vanadium and more efficient extraction from existing sources will be required to supplement the current limited supply. Further, as vanadium is required for the manufacture of titanium products and is a significant alloying agent in high strength steel, limited vanadium production capacity could create a supply bottleneck. Such a bottleneck is one of the "vulnerabilities" identified in E.O. 13817.[105]

2. Vanadium is Required for National Defense Systems

Vanadium, as a result of its use in steel and titanium alloys, is a critical input to many defense systems. The 2017 and 2019 Department of Commerce Section 232 reports on the effects of steel and of titanium sponge on national security found that those metals were required for national defense. Therefore, because

[105] White House, "Presidential Executive Order on a Federal Strategy to Ensure Secure and Reliable Supplies of Critical Materials".

vanadium is frequently used in these metals and there is no suitable substitute for vanadium in many of these products, vanadium is also required to meet national defense needs.

DLA has identified [redacted] defense systems that require the use of vanadium, including but not limited to the [redacted]. The average titanium content for military airframes that entered service after 2000 is 30%, implying vanadium content of roughly 1% by weight.[106] For example, each F-22A Raptor aircraft contains at least six separate titanium alloys, some containing as much as 15% vanadium by weight, with a finished aircraft containing approximately 9,000 pounds of titanium.[107] Building each aircraft requires significantly more material: about 50 metric tons of titanium, which in turn requires approximately 2 metric tons of vanadium content based on a standard Ti-6Al-4V alloy.[108] The F-35 Lightning II requires an estimated 15 tons of titanium

[106] U.S. Department of Commerce. Bureau of Industry and Security. *The Effect of Imports of Titanium Sponge on the National Security (*Washington, DC: 2019) ("Titanium Report") and based on use of standard Ti-6Al-4V alloy.

[107] Cotton, James D. et al. Titanium Alloys on the F-22 Fighter Airframe. Advanced Materials & Processes, May 2002. https://www.asminternational.org/documents/10192/1756963/amp16005p025.pdf/c0972040-8169-4998-8699-f051fab52d9b/AMP16005P025

[108] Seong, Somi et al. Titanium: Industrial Base, Price Trends, and Technology Initiatives, 2009. https://www.rand.org/content/dam/rand/pubs/monographs/2009/RAND_MG789.pdf

per plane to build.[109] Overall, defense uses account for an estimated 10% of titanium demand, equivalent to approximately 43 tons of vanadium content per year.[110]

The Department's 2018 Steel Report aligns with this finding. The report found that the Department of Defense has "a large and ongoing need for a range of steel products that are used in fabricating weapons and related systems for the nation's defense." Among the defense steel uses cited were aircraft carriers, submarines, and tanks, as well as the high-strength steel alloys used on aircraft and discussed above. The Steel Report indicated that Department of Defense's steel requirements amount to 3% of annual overall U.S. steel production, equivalent to approximately 230 metric tons of vanadium content per year.[111] In addition to direct incorporation of vanadium into defense systems, the production of these systems relies on vanadium-containing infrastructure, as tool steels and high speed steels often have a significantly higher vanadium content than other steel.

3. Vanadium is Required for Critical Infrastructure

As with national defense systems, vanadium is a key component of much of the steel and titanium used in U.S. critical infrastructure. Vanadium is a key feature

[109] Ibid.
[110] Based on average annual 2016-2019 USGS vanadium apparent consumption of 8,590 tons, titanium uses accounting for 5% of vanadium consumption, and defense use accounting for 10% of titanium demand
[111] Based on average annual 2016-2019 USGS vanadium apparent consumption of 8,590 tons, steel uses accounting for 90% of vanadium consumption, and defense use accounting for 3% of steel demand

in high-strength, low-alloy (HSLA) steel products used in the construction industry, including earthquake-resistant rebar, bridges, and construction cranes. Hand tools and high-speed steel tools for cutting and boring commonly contain vanadium as a strengthening agent. The commercial aerospace industry also relies on vanadium through its use of titanium alloys, and the chemical production industry uses vanadium directly for production of sulfuric acid.

The Department's 2018 Steel Report determined that 54 million metric tons of steel per year were consumed in critical industries, accounting for half of all domestic steel consumption.[112] Steel had uses in all of the United States' 16 critical infrastructure sectors, with the transportation, energy, and water treatment sectors specifically noted as vulnerable to disruption. A conservative estimate of the use of vanadium in critical infrastructure via steel products amounts to 3,865 tons of vanadium demand annually.[113]

In the titanium industry, nearly all vanadium-bearing titanium products have end-uses in critical infrastructure and defense sectors. Beyond the 10% of titanium consumed via military uses, an estimated 55% of consumption is in commercial aerospace products—part of the transportation critical infrastructure sector—with

[112] Based on the 16 designated critical infrastructure sectors identified pursuant to Presidential Policy Directive 21 (PPD-21). https://www.cisa.gov/critical-infrastructure-sectors

[113] Based on average annual 2016-2019 USGS vanadium apparent consumption of 8,590 tons, steel uses accounting for 90% of vanadium consumption, and critical infrastructure use accounting for 50% of steel demand. Use is likely higher, as critical infrastructure sectors are more likely to use HSLA and full alloy steels.

nearly all remaining consumption in industrial or medical uses. Use of vanadium in critical infrastructure via titanium products thus amounts to between 236 tons and 365 tons per year.[114]

Nearly all non-metallurgical uses of vanadium are also related to critical infrastructure. The energy sector is a primary destination; vanadium is used as a catalyst in industrial power plants and as the electrolyte in vanadium redox flow batteries. The other significant non-metallurgical use is in the chemical production sector, where vanadium is used as a catalyst in the production of sulfuric acid and maleic anhydride. With non-metallurgical use accounting for an estimated 5% of vanadium demand, direct vanadium use in critical infrastructure amounts to approximately 430 tons per year.[115]

With indirect use in all 16 critical infrastructure sectors, direct use in the energy and chemical production sectors, and an "irreplaceable" status in titanium alloys used in the transportation sector, vanadium has a key role in U.S. critical infrastructure. Overall annual critical infrastructure use of vanadium amounts conservatively to 4,542 tons.

[114] Based on average annual 2016-2019 USGS vanadium apparent consumption of 8,590 tons, titanium uses accounting for 5% of vanadium consumption, and critical infrastructure use accounting for between 55% and 85% of titanium demand; commercial aerospace estimated at 55% of titanium demand, but up to 85% of vanadium-alloyed titanium demand, with industrial and medical titanium commonly unalloyed

[115] Based on average annual 2016-2019 USGS vanadium apparent consumption of 8,590 t

4. Vanadium Has Significant Effects on Other Critical Industries

As discussed above, vanadium has essential uses in steel and titanium production, and vanadium resources in the United States are often co-located with uranium. Titanium and uranium have been identified as critical minerals by the Department of Interior, with steel, titanium sponge, and uranium all the subjects of recent Section 232 investigations. The impact of the vanadium industry on other critical industries is significant, underscoring vanadium's status as a critical commodity.

Following the Section 232 investigation into the effect of imports of steel products on national security, on March 8, 2018, the President issued a proclamation concurring with the Secretary of Commerce's finding that imports of steel articles threatened to impair U.S. national security, and imposing a 25% tariff on imports. The goal of the tariff was to help ensure the economic viability of the domestic steel industry, which was threatened by low-cost imports. The basis for the President's actions, and the Secretary's findings, was the critical role of the steel industry in national security.

As discussed above, the steel industry accounts for approximately 90% of the U.S. demand for vanadium.[116] Compared to the estimated $92 billion worth of raw steel produced in the United States in 2019, vanadium costs constituted only a small expense for the overall industry. However, certain industry sectors incurred far higher cost exposure to vanadium. In an industry threatened by low-cost imports, even minor cost changes can have significant effects on domestic producers. Domestic producers challenged by low-cost imports for more than one essential "ingredient" for their product (e.g. steel and vanadium) face even more daunting odds.

Aside from steel, the primary use of vanadium is for use in titanium alloys. In March 2019, following a petition from Titanium Metals Corporation (TIMET), the Department of Commerce initiated a Section 232 investigation into the effect of imports of titanium sponge on U.S. national security. The Secretary's report found that imports of titanium sponge and scrap depressed U.S. prices and constituted a threat to national security, but did not recommend adjustment of imports, favoring other measures. The President issued a proclamation on February 27, 2020 concurring with the Secretary's finding.[117] In preparing its report, the Department

[116] Equivalent to 7,731 tons contained vanadium, valued at $297 million based on U.S. Geological Survey Vanadium Mineral Commodity Summary, apparent consumption and average vanadium pentoxide prices

[117] Memorandum on the Effect of Titanium Sponge Imports on the National Security. Available at https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-effect-titanium-sponge-imports-national-security/

found that an area of particular concern for the U.S. titanium industry is the advance of Russian and Chinese producers in aerospace-quality titanium product capabilities.

The President's February 2020 proclamation also directed the formation of a working group to ensure U.S. access to titanium sponge. Since its formation, the Titanium Sponge Working Group (TSWG) has explored measures that may help to ensure access to titanium sponge for U.S. national defense and critical infrastructure purposes. The TWSG, co-led by the Departments of Commerce and Defense, is considering a series of recommendations to move toward this goal. [redacted]

Accounting for approximately 5% of domestic vanadium demand, the U.S. titanium industry consumes an estimated 430 tons of contained vanadium annually, valued at $17 million.[118] As noted in above, in a standard Ti-6Al-4V alloy, vanadium makes up 4% of the weight and between 12 and 14% of the product cost, making the titanium industry relatively exposed to vanadium cost changes.

In the United States, primary vanadium production is currently performed only in conjunction with uranium mining. The only company to produce mined

[118] Based on U.S. Geological Survey Vanadium Mineral Commodity Summary, apparent consumption and average vanadium pentoxide prices

vanadium in the United States in recent years, Energy Fuels, was one of the applicants in the Section 232 investigation into the effect of imports of uranium on national security. The Section 232 report on uranium was completed and sent to the President in April 2019. In his report, the Secretary found that uranium was being imported in such quantities and under such circumstances as to threaten to impair national security.

The President's responsive proclamation, issued in July 2019, expressed concern about domestic uranium supplies and directed the establishment of a Nuclear Fuel Working Group (NFWG) to carry out a "comprehensive review of the entire domestic nuclear supply chain."[119]

In April 2020, the Secretary of Energy announced the NFWG's findings and recommendations in a *Strategy to Restore American Nuclear Energy Leadership.* The Strategy recommended "taking immediate and bold action to strengthen the uranium mining and conversion industries."[120] The report also cited the inclusion in the President's Fiscal Year 2021 Budget Request of $150 million for a domestic

[119] Memorandum on the Effect of Uranium Imports on the National Security and Establishment of the United States Nuclear Fuel Working Group. https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-effect-uranium-imports-national-security-establishment-united-states-nuclear-fuel-working-group/

[120] Department of Energy, Secretary Brouillette Announces The Nuclear Fuel Working Group's Strategy To Restore American Nuclear Energy Leadership. April 23, 2020. https://www.energy.gov/articles/secretary-brouillette-announces-nuclear-fuel-working-groups-strategy-restore-american

uranium reserve. The Fiscal Year 2021 Budget passed by Congress included $75 million for establishment of a uranium reserve.

As demonstrated by the comments submitted by several companies with uranium mining resources in response to the Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium, industry sees a clear connection in the critical nature of vanadium and uranium. For example, Energy Fuels submitted a comment supporting a recommendation for Section 232 relief for vanadium, in part on the basis that there was "significant uncertainty" about a successful outcome for implementation of the NFWG's recommendations.[121] Energy Fuels also wrote that vanadium relief "together with a reasonable uranium price" would enable the company to mine both uranium and vanadium in the future. Another uranium mining company, Nuvemco, LLC, submitted a comment that included their submission to the NFWG, based on the adjacency of the two mining sectors in the United States.

B. Imports of Vanadium Have Mixed Effects on the Economic Welfare of the U.S. Vanadium Industry

1. The U.S. is Presently Reliant on Imports of Vanadium

[121] Energy Fuels Resources (USA) Inc. Comment in response to Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium, July 20, 2020. https://www.regulations.gov/document?D=BIS-2020-0002-0016

Though the scope of this investigation covers 12 discrete 10-digit HTS codes, the bulk of the vanadium imported into the United States consists of just two products: vanadium pentoxide and ferrovanadium. The third most frequently imported vanadium product is carbides, a product sector heavily dominated by South Africa exports of vanadium carbide nitride, which is used as an alternative to ferrovanadium in steel production. The remaining vanadium products imported into the United States that are covered under the scope of this investigation either constitute niche application areas or are used as inputs or feedstock in order to produce vanadium products.

Figure 16: U.S. Imports of Vanadium Products, 2017-2020 (in millions of USD)

HTSUS	Description	2017	2018	2019	2020 (Projected)
7202.92.0000	Ferrovanadium	$94.60	$232.65	$167.90	$56.65
2825.30.0010	Vanadium pentoxide (anhydride)	$60.32	$168.95	$109.92	$36.90
2849.90.5000	Carbides, whether or not chemically defined, nesoi* (excluding of boron, of chromium, or of tungsten)	$49.38	$90.84	$98.89	$27.57
2620.99.1000	Ash & residues (except from the manufacture of iron or steel), containing mainly vanadium	$14.51	$63.90	$54.48	$0.48
8112.99.2000	Vanadium and articles thereof, wrought, waste and scrap, powders, nesoi	$10.75	$17.22	$17.64	$6.08
2620.40.0030	Ash and residues (other than from the manufacture of iron or steel), containing mainly aluminum, vanadium-bearing materials	-	-	$4.29	$9.99
2841.90.1000	Vanadates,(vanadium content)	$6.24	$17.46	$3.26	$2.04
2615.90.6090	Vanadium ores and concentrates	$0.28	$8.45	$9.49	$0.54
2825.30.0050	Vanadium oxides and hydroxides, except vanadium pentoxide, nesoi	$3.68	$5.45	$6.84	$3.02
8112.92.7000	Vanadium and articles thereof, unwrought, powders, except waste and scrap	$2.60	$2.21	$4.10	$0.07
2850.00.2000	Hydrides, nitrides, azides, silicides and borides, whether or not chemically defined, of vanadium	$1.08	$0.92	$0.85	$0.65
2833.29.3000	Vanadium sulfate	$0.05	$0.12	$0.62	$0.27
Total	Total	$243.49	$608.17	$478.28	$144.26

Source: ITC Dataweb, 2020 data through November

*nesoi indicates "not elsewhere specified or indicated"

Any measurement of the United States' reliance on imports of vanadium must take into account the wide array of vanadium products and end uses. U.S. vanadium import reliance varies depending on the type of vanadium product. Additionally, because some vanadium products are used to produce other vanadium products, import reliance calculations must consider domestic capabilities for both the vanadium end products and their vanadium-bearing feedstocks.

Domestic production capabilities exist for ferrovanadium (50% and 80%), vanadium oxides and hydroxides (including regular grade and high purity vanadium pentoxide), vanadates, vanadium ore and concentrates, vanadium master alloys, and vanadium sulfates. The United States does not currently have domestic capability for vanadium carbides (HTS 2849.90.5000) or vanadium hydrides, sulfides, nitrides, azides, silicides, and borides (HTS 2850.00.2000), [redacted] [redacted][122] The United States has very limited capacity to produce vanadium ore

[122] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.

and concentrates, with recent production intermittent and linked to uranium production.

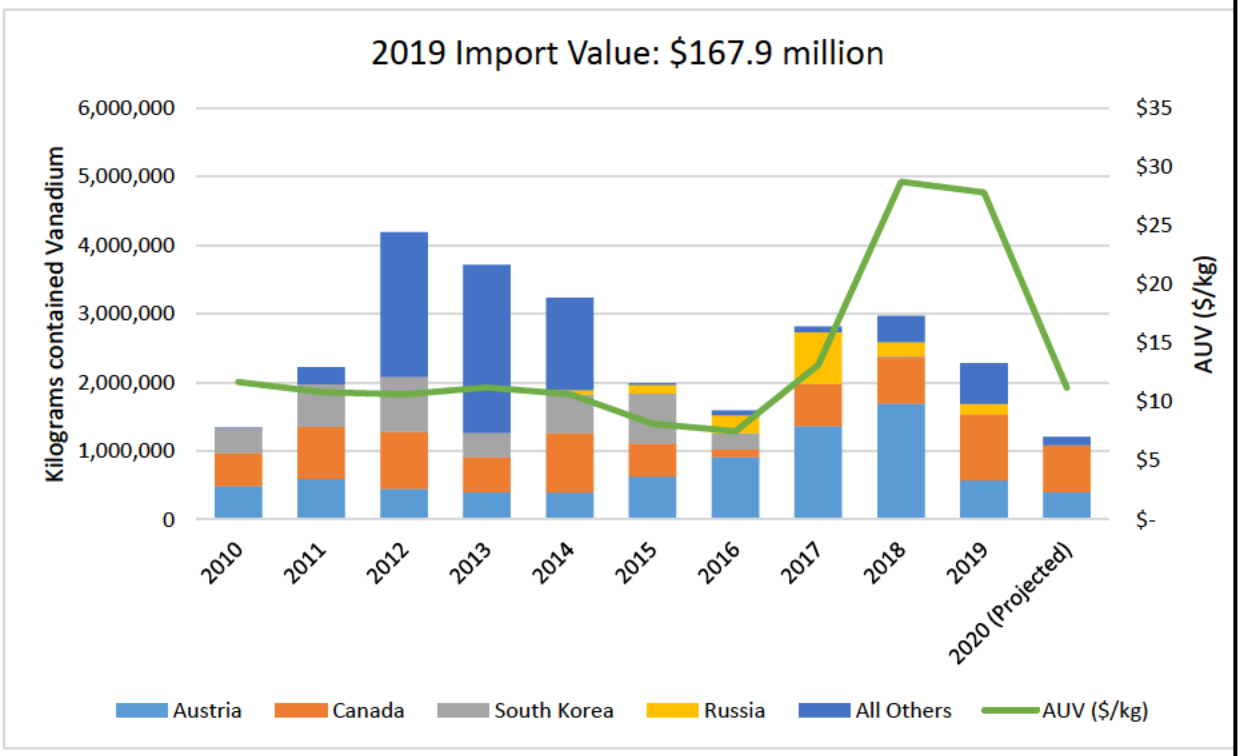
The following import analysis focuses primarily on ferrovanadium and vanadium pentoxide, recent import trends for these products and their feedstocks, and the United States' reliance on imports to satisfy domestic demand.

Ferrovanadium

Ferrovanadium imports to the United States have fluctuated significantly in the past decade, generally tracking higher prices with lower imports, with sources increasingly concentrated in Europe and Canada (see Figure 17). In 2019, the last year for which full data is available, the United States imported roughly 2.3 million kilograms of contained vanadium of ferrovanadium, from Canada (43%), Austria (25%), Russia (6%) and others (26%). These imports accounted for approximately [redacted] of total U.S. demand for ferrovanadium in 2019, with the remaining demand filled by the domestic ferrovanadium producer AMG Vanadium and converter Bear Metallurgical. Import reliance fluctuated between [redacted] from 2016 to 2019, averaging roughly [redacted] over the period.[123]

[123] Data from U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey. U.S. ferrovanadium producers produced and sold enough material to satisfy an average of [redacted] of apparent domestic consumption between 2016 and 2019. The U.S. exported an average of 373,154 kilograms of contained vanadium in ferrovanadium each year, resulting in domestic production filling approximately [redacted] of domestic demand.

Figure 17: Imports of Ferrovanadium, 2010 – 2020 (projected)



Source: ITC Dataweb

While the United States' two domestic producers of ferrovanadium have produced and sold enough material to satisfy [redacted] of U.S. demand from 2016 to 2019, the companies' operations require sourcing vanadium-bearing feedstock in order to produce ferrovanadium. These U.S. producers convert either vanadium-bearing waste products (ash, residues, and spent catalysts) or vanadium pentoxide in order to produce ferrovanadium. Therefore, in order to fully capture the U.S.'s

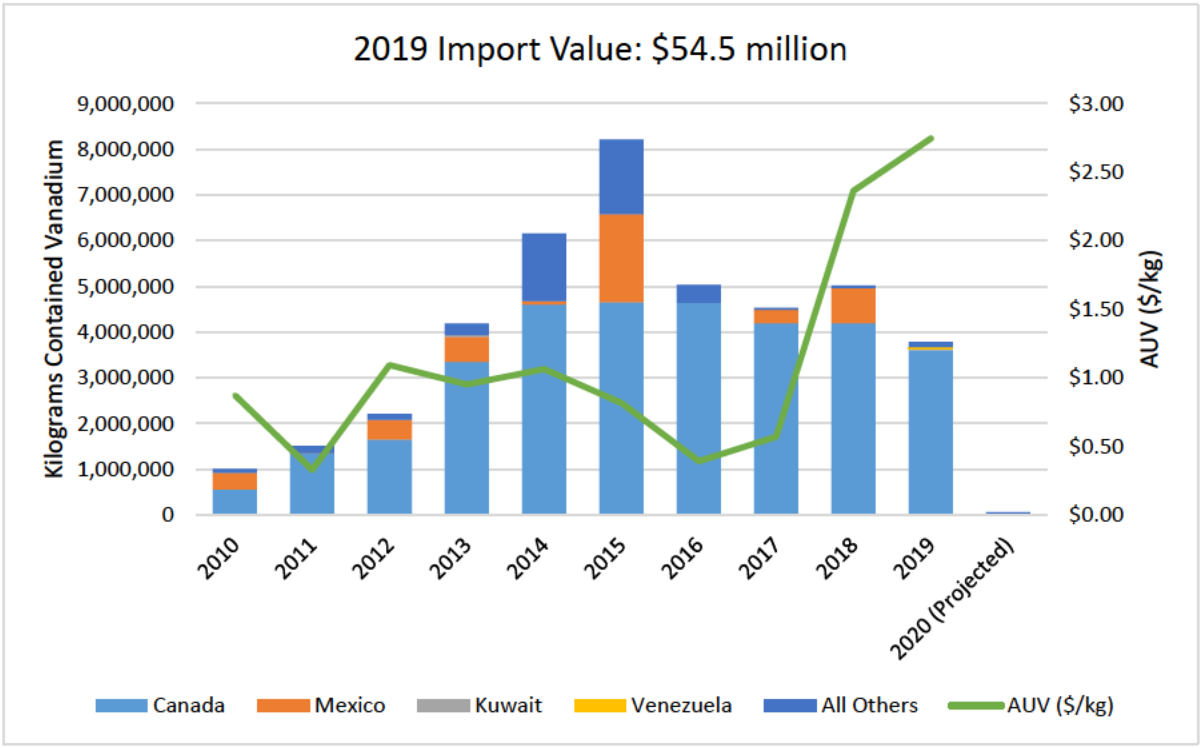
level of reliance on imports for ferrovanadium, U.S. ferrovanadium producers' reliance on imported feedstock must be taken into account.

Ash, Residues, and Spent Refinery Catalyst Feedstock for Ferrovanadium Production

AMG Vanadium, one of the U.S.'s two current producers of ferrovanadium, produces ferrovanadium by recycling spent refinery catalysts. Between 2016 and 2019, the company [redacted][124] In 2019, U.S. imports of vanadium-bearing waste product were almost exclusively sourced in Canada, with Mexico as the primary other source since 2010[redacted] (See Figure 18).

[124] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

Figure 18: Imports of Vanadium-Bearing Waste, 2010 – 2020 (projected)



HTSUS Codes: 2620.40.0030 and 2620.99.1000

Source: ITC Dataweb

[redacted]

[redacted][125] [redacted]

[redacted]

[redacted]

However, the company's initiative to double its production capacity (via the

[125] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

opening of a new facility) means that the company will soon have the ability to [redacted].[126]

Vanadium Pentoxide Feedstock for Ferrovanadium Production

Another feedstock source used to produce ferrovanadium is vanadium pentoxide. Evergreen Metallurgical (dba Bear Metallurgical (Bear)) operates a Pennsylvania facility that converts customer-provided vanadium pentoxide into ferrovanadium with 80% vanadium content (FeV-80). Bear does not source its own vanadium pentoxide, but instead acts as a service provider by toll-producing vanadium pentoxide into FeV-80 for customers. Since the idling of the only U.S. facility that produces regular grade vanadium pentoxide (less than 99% purity), Bear has been heavily reliant on imported vanadium pentoxide feedstock from its

[126] Ibid.

customers.[127] That facility was owned by Bear's parent (Gulf Chemical) prior to their bankruptcy and the idling and sale of the facility in 2017 to Gladieux.

Therefore, although Bear's conversion of vanadium pentoxide into ferrovanadium satisfied approximately [redacted] of total U.S. demand for ferrovanadium between 2016 and 2019, the company [redacted].[128]

In summary, while domestically-produced ferrovanadium was sufficient to meet approximately [redacted] of total domestic demand for ferrovanadium from 2016 to 2019, both domestic ferrovanadium producers [redacted].

[127] Gladieux Metals Recycling (GMR) owns a Freeport, Texas facility that converted vanadium-bearing waste products (spent catalysts) into vanadates and vanadium pentoxide (including high purity vanadium pentoxide). The facility was in operation until 2017 when it was idled and sold to new ownership from previous owners Gulf Chemical & Metallurgical Corp. Gladieux has not produced and sold any material since 2017, but is in the process of upgrading the facility, and plans to restart production [redacted] U.S. Vanadium operates a facility that produces high purity vanadium pentoxide, typically used in titanium or chemical uses rather than ferrovanadium production.

[128] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

[redacted].

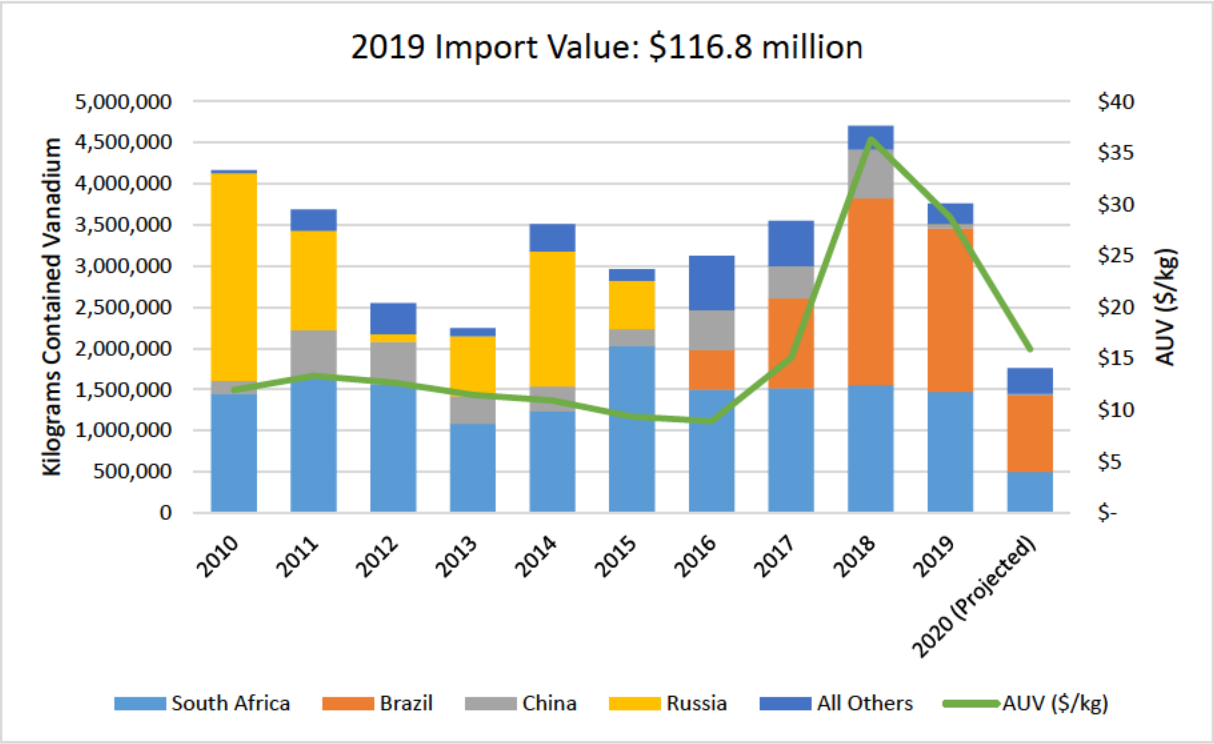
The following section addresses U.S. import trends for vanadium oxides and hydroxides, including regular grade vanadium pentoxide, high purity vanadium pentoxide, and other vanadium oxides and hydroxides. These products are used in Bear's ferrovanadium conversion activities as well as in the company's production of vanadium products used for chemical and aerospace applications.

Vanadium Oxides and Hydroxides

Demand for vanadium oxides and hydroxides—driven by vanadium pentoxide—accounts for close to half of all vanadium demand in the United States. On average, imports of vanadium pentoxide account for over 90% of all oxide imports each year.[129] Since 2010, overall vanadium oxide and hydroxide imports, including imports of vanadium pentoxide, have ranged between 2 million and 4.5 million kilograms of contained vanadium (imports in 2020 are projected to fall below two million, the lowest level since 2009) (see Figure 19). Between 2010 and 2015, Russian-sourced oxides and hydroxides were a major portion of U.S. imports, accounting for nearly 35% of imports, but were largely replaced by growing imports from Brazil and South Africa beginning in 2016.

[129] ITC Dataweb

Figure 19: Imports of Vanadium Oxides and Hydroxides, 2010 – 2020 (projected)



HTSUS Codes: 2825.30.0010 and 2825.30.0050

Source: ITC Dataweb

Russian ferrovanadium, which had been absent from the U.S. market from 1997, returned to U.S. markets in 2014 following the October 2011 revocation of the antidumping order. Imports of Russian vanadium oxides have been largely replaced by imports of Russian ferrovanadium, though not at levels approaching the 2010 to 2014 period.

Vanadium oxides and hydroxides cover a range of vanadium products with different application areas. A nuanced measurement of the U.S.'s import reliance for this category of goods must take into account each type of product with the

category, including regular grade vanadium pentoxide, high purity vanadium pentoxide, and other oxides and hydroxides.

Vanadium Pentoxide

Vanadium pentoxide can generally be divided into high purity (suitable for use in the chemical and titanium industries) and regular purity (more commonly converted to ferrovanadium for use in the steel industry). No domestic producers are currently producing regular purity vanadium pentoxide, though Gladieux is planning to restart production [redacted]. With Gladieux's facility idled since 2016, the U.S. has been close to 100% reliant on imports for regular grade vanadium pentoxide. U.S. Vanadium is the primary domestic producer of high purity vanadium pentoxide; Energy Fuels also provided small amounts in 2019.

Much of the regular purity vanadium pentoxide in the United States is converted into FeV-80 at Bear's Pennsylvania facility. With annual vanadium pentoxide imports from 2016 to 2019 averaging 3.8 million kilograms of vanadium content, and the company processing regular purity vanadium an annual average of [redacted] of vanadium content during this period, at least [redacted] of

vanadium pentoxide imports were provided to Bear for conversion into ferrovanadium.[130]

U.S. import reliance on vanadium pentoxide has risen significantly, from 55% in 2016 to 87% in 2017 and to close to 100% in 2018, due in part to the sole domestic producer of regular purity vanadium pentoxide (the Gulf/Gladieux facility in Freeport, Texas) idling operations in order to modernize the facility. The other major producer of vanadium pentoxide—the Hot Springs, Arkansas facility operated by EVRAZ Stratcor until its sale to U.S. Vanadium in 2019, which produces high purity vanadium pentoxide— has reportedly had a history of feedstock supply difficulties leading to production difficulties, which were exacerbated in 2017 following sanctions prohibiting imports from Venezuela.[131] As a primary producer of vanadium, Energy Fuels is the only domestic entity entirely independent of foreign sources for generating vanadium pentoxide.

Energy Fuels has moderate vanadium pentoxide production capacity, producing high purity vanadium pentoxide containing 460,000 kilograms of vanadium in 2019, of which only a small portion was sold (approximately 410,000 kilograms was unsold and remained in the company's inventory). However, should

[130] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

[131] Bushveld Minerals Limited. Comment in response to Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium, July 20, 2020. https://www.regulations.gov/document?D=BIS-2020-0002-0013.

vanadium prices rise, Energy Fuels has the capability to restart vanadium mining operations, with the capacity to produce [redacted][132] With Gladieux planning to resume operations and U.S. Vanadium increasing production levels of high purity vanadium pentoxide [redacted], direct U.S. import reliance for vanadium pentoxide will likely decrease in the future. [redacted][133]

However, because U.S. secondary producers are reliant on imports of vanadium-bearing wastes for most of their feedstock, the United States will likely continue to be dependent on foreign sources of vanadium to meet domestic demand for vanadium pentoxide.

Other Vanadium Products

While ferrovanadium and vanadium oxide products are the most heavily traded vanadium products, the United States is also reliant on imports for other vanadium products including vanadates, vanadium carbides, vanadium sulfates, and vanadium hydrides, sulfides, nitrides, azides, silicides, and borides.

[132] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey
[133] Ibid.

Of these products, the United States has production capacity for only vanadium sulfate and vanadate production, and is completely import reliant for vanadium carbides and vanadium hydrides, sulfides, nitrides, azides, silicides, and borides.[134] Of these products, vanadium carbides comprised the largest share of trade by a significant margin during the period of study. Imports of vanadium carbides averaged $67 million annually from 2016 to 2019, while the imports of vanadium sulfate, vanadates, and vanadium hydrides, sulfides, nitrides, azides, silicides, and borides combined averaged $9 million annually during the same time period.[135]

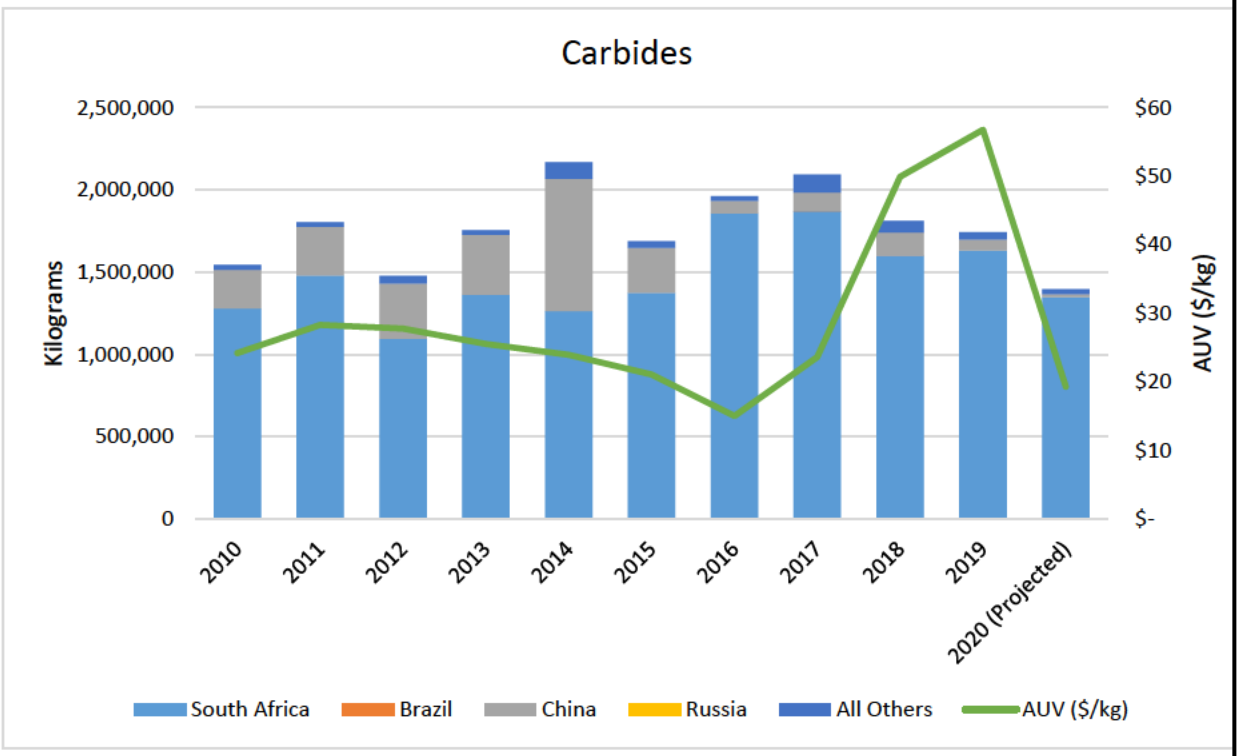
Imports of vanadium carbides, relatively stable since 2010, have come overwhelmingly from South Africa (see Figure 20). The most commonly imported carbide product is in the form of nitrided vanadium carbide sold as Nitrovan®. As noted in the USITC's 2012 antidumping report for the third sunset review on imports of ferrovanadium and nitrided vanadium from Russia, the U.S. has not produced nitrided vanadium since 1992.[136]

[134] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

[135] ITC Dataweb

[136] U.S. International Trade Commission. *Ferrovanadium and Nitrided Vanadium from Russia*. Investigation No. 731-TA-702, (Third Review). https://www.usitc.gov/publications/701_731/pub4345.pdf

Figure 20: Imports of Vanadium Carbides, 2010 – 2020 (projected)



HTSUS Code: 2849.90.5000

Source: ITC Dataweb

In summary, understanding the overall U.S. import reliance on vanadium must take into account the structure of the vanadium supply chain, including the original feedstock of the vanadium products. [redacted]. The United States has no producers of vanadium carbides, nor of vanadium hydrides, nitrides, azides, silicides, and borides. For the balance of vanadium products the United States is not directly import reliant, but to the extent that it is reliant on imports of

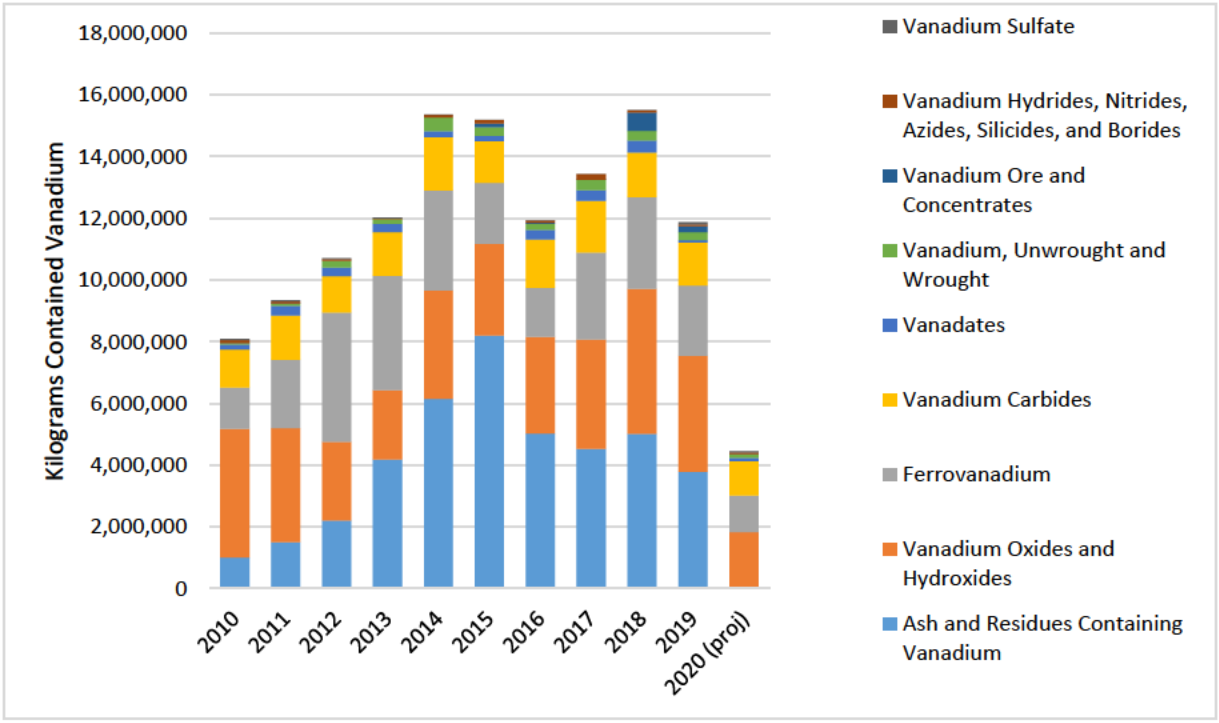
vanadium feedstock and vanadium pentoxide, it is because these products depend on non-U.S. origin inputs.

2. U.S. Reliance on Imports of Vanadium is Not Increasing

Imports of contained vanadium to the United States have not increased since 2014 and have decreased moderately since that time (see Figure 22). Even before the 2020 plunge in imports (driven by COVID-19-related demand declines),

overall contained vanadium imports in 2019 were 4% below the 2010-2019 average.

Figure 22: Imports of Contained Vanadium, 2010 – 2020 (projected)



Source: ITC Dataweb

Further, import reliance is not likely to increase. Major U.S. producers of ferrovanadium and vanadium pentoxide are in the process of expanding or restarting operations. U.S. capacity for ferrovanadium production from vanadium-bearing waste will more than double in 2021 with the opening of AMG Vanadium's new facility; the production increase will exceed annual average imports of ferrovanadium. U.S. capacity for vanadium pentoxide production from vanadium-

bearing waste will also [redacted] with the opening of Gladieux's Texas facility, [redacted].

However, despite these upcoming significant increases in vanadium pentoxide and ferrovanadium production capacity, the United States will remain heavily reliant on foreign sources of vanadium, as significant quantities of the feedstock that U.S. producers use are sourced from outside the country. Mitigating factors on this reliance include that [redacted].[137]

In addition, several mining companies with locations in the United States have idle production capacity, significant inventory, and/or are exploring the development of vanadium mines. For example, Energy Fuels retains 410,000 kilograms of vanadium in inventory from 2019 production, and has indicated the ability to produce [redacted].[138] The Gibellini project in Carlin, Nevada expects to receive permits in 2021 and begin production

[137] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey
[138] Ibid.

in 2023, with an annual production forecast of 2.4 million kilograms of vanadium content per year.[139] Should both of these producers achieve their full capacity, their production would equal [redacted] of vanadium content per year, or [redacted] of annual domestic demand from 2016 to 2019. An increase in the availability of domestic primary vanadium, expansion of secondary production, and the addition of domestic feedstock for secondary production would mitigate current high reliance on imports.

3. Prices

Vanadium prices have a long history of volatility, with resulting impacts on the availability of vanadium resources and the viability of vanadium producers, as well as patterns of investment. The benchmark vanadium pentoxide price has more than doubled in short spans three times since 2004, most notably rising from $7 per pound in September 2004 to nearly $35 per pound in May 2005 before falling to $10 per pound by June 2006.

Such cycles may be more the standard than an anomaly in the vanadium industry. In 1977, the primary U.S. producer of vanadium oxide—Union Carbide—cut its production due to low prices and, in 1978, announced the idling of its Arkansas mine and mill.[140] Less than a decade later, in 1985, the U.S. Bureau

[139] Silver Elephant Mining Corporate Presentation: Gibellini Vanadium, https://www.silverelephantmining.com/projects/gibellini-vanadium/
[140] Bureau of Mines Minerals Yearbook, Vanadium 1977.

of Mines wrote that the domestic vanadium industry was in the midst of a "major restructuring … triggered by (1) the sharp decline in ferrovanadium consumption by U.S. steel producers during the 1982-83 recession, and (2) continuing depressed prices for co-product uranium oxide."[141] Just four years later, they reported:

> The year 1988 proved to be a boom year for vanadium producers as tight supply and strong demand by the steel industry and other consumers pushed up the price of vanadium compounds. … By the end of 1989, vanadium's fortunes had turned full circle as the market witnessed prices headed for levels lower than at any time since the early 1980s.[142]

Price-related closures and investments have continued. The Australian Windimurra mine, for instance, closed as the result of low prices in 2003 only to be purchased by a new company when prices spiked in 2005. After an investment of more than $100 million, prices fell and the mine was not reopened.[143] In the United States, during the latest price spike, AMG Vanadium announced the approval for construction of its new facility (in October 2018);[144] the owners of the Gibellini property completed its Preliminary Economic Assessment (PEA) (in May 2018);

[141] Bureau of Mines Minerals Yearbook, Vanadium 1985.
[142] Bureau of Mines Minerals Yearbook, Vanadium 1989.
[143] McKinnon, Stuart. Vanadium Price Boom Offers Hope of WIndimurra Revival. *The West Australian*, April 2, 2018. Available at https://thewest.com.au/business/mining/vanadium-price-boom-offers-hope-of-windimurra-revival-ng-b88792684z
[144] AMG ADVANCED METALLURGICAL GROUP N.V. COMPLETES FEASIBILITY STUDY TO EXPAND SPENT CATALYST PROCESSING CAPACITY . https://amg-v.com/oct-16-18-news/

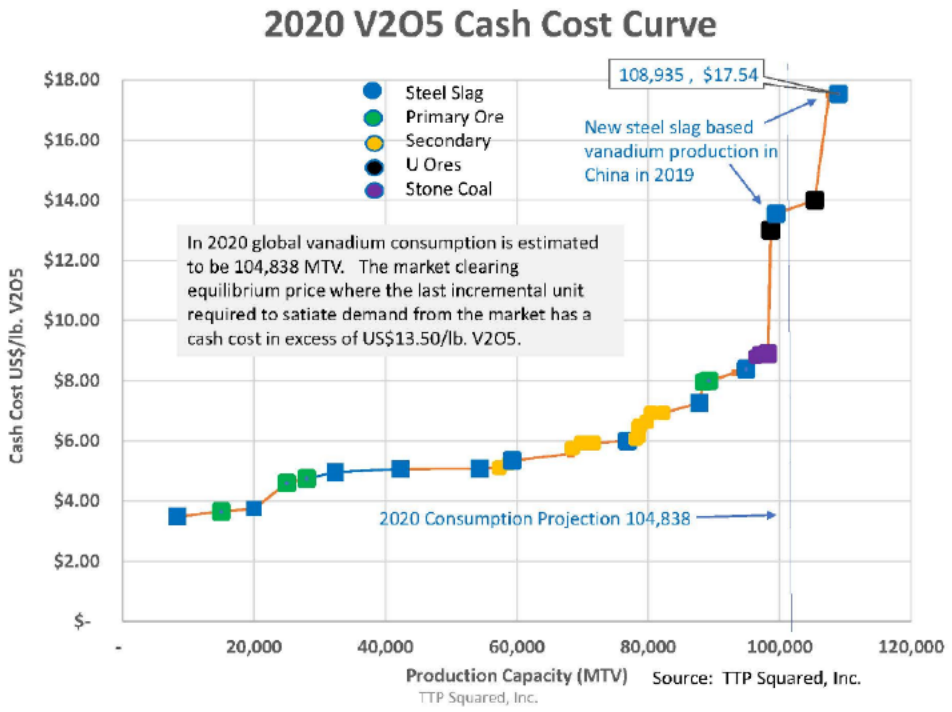
and First Vanadium carried out its maiden mineral resource classification (in February 2019).

The introduction of new capacity is tied to vanadium prices, as extraction that is not viable at $6 per pound vanadium pentoxide can become profitable at $12 per pound. First Vanadium's PEA assumes a vanadium pentoxide price of $10.65 per pound, well above current prices, and a cost of production of $5.17 per pound.[145] Only [redacted] U.S. producers of vanadium pentoxide or vanadium ore indicate the ability to produce at current prices, though the number of producers rises [redacted] once prices increase to $10 per pound of vanadium pentoxide and [redacted] at $13 per pound.[146] This is consistent with the world cost curve, which shows most currently viable production operates below a cost of $8 per pound (see Figure 23).

[145] First Vanadium Announces Positive Preliminary Economic Assessment for the Carlin Vanadium Project in Nevada https://www.firstvanadium.com/index.php/news/2020/548-irstanadiumnnouncesositivereliminaryconomicsse20200511)

[146] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

Figure 23: Vanadium Pentoxide Production Costs



Source: Terry Perles, Ferroalloynet.com Vanadium Forum, March 7, 2019.
http://www.spartonres.ca/wp-content/uploads/2019/03/Presentation-Terry-10-Ex-China-Vanadium-Market.pdf

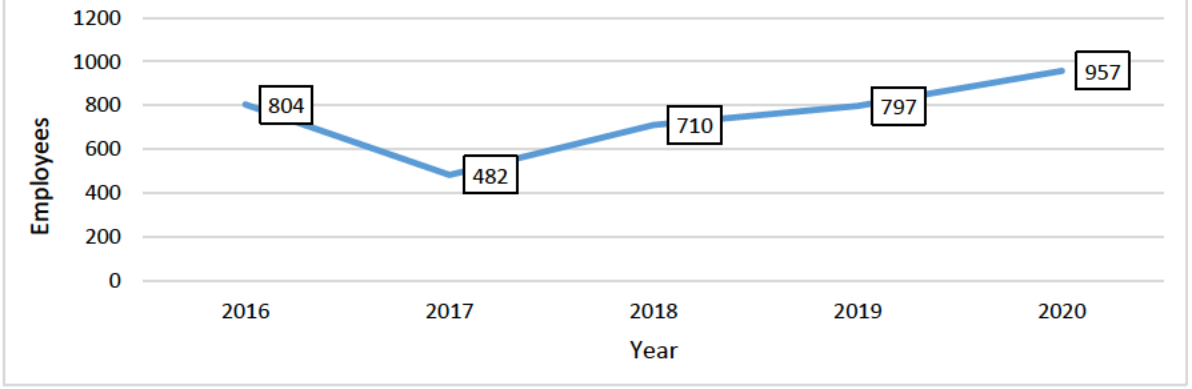
4. Employment

Although never a major employer, aggregate employment in the U.S. vanadium industry has waxed and waned during the last decade. The sector currently employs more people than it has during that time period, however, this current increase has not been shared equally across industry participants. While some producers have added employees, others have not.

Employment levels among vanadium producers were most notably affected by the 2017 idling and ongoing refurbishment of Gladieux's Texas facility. The

facility's closure caused aggregate industry employment to drop sharply in 2017 but the numbers rebounded sharply in 2018 (see Figure 24).

Figure 24: Aggregate U.S. Vanadium Production Employment



Source: U.S. Department of Commerce, Bureau of Industry and Security, Vanadium Survey
Includes employees and contractors

[redacted]

[redacted]

Most U.S. producers of vanadium products indicate that the volatility of vanadium prices make it difficult to recruit and retain employees. [redacted]

5. Financial Outlook

The U.S. vanadium production industry is small and in the midst of significant restructuring, making the industry's overall financial outlook difficult to characterize. However, it is clear that the industry has been significantly impacted by rapid changes in vanadium prices, particularly the collapse in price in 2019 from a high of approximately $30 per pound of vanadium pentoxide in November 2018 to less than $7 per pound by the end of 2019 and by the ongoing impacts of COVID-19 on the steel and titanium industries.

[redacted][147]

Given its acquisition of EVRAZ Stratcor's Arkansas facility in October 2019, it is difficult to fully assess the financial health of U.S. Vanadium, as the facility's business practices are in transition. [redacted]

[147] AMG Annual General Meeting Minutes (May 1, 2019), as provided in public comments by Bushveld Minerals Limited, available at https://www.regulations.gov/document?D=BIS-2020-0002-0013

[redacted]

The facility of the remaining U.S. secondary producer, Gladieux, remains idle as the company completes the extensive modernization started after Gladieux purchased the facility from Gulf Chemical in 2017. [redacted]

[redacted]

The only other company that has produced vanadium production since 2016 is Energy Fuels Resources, whose primary business line is uranium mining.

[redacted]

[redacted]

6. Exploration

In addition to Energy Fuels' primary production capacity, several other companies have properties that have mined vanadium in the past or are now under exploration. However, future profitable production at any of these properties is dependent upon an increase in the price of vanadium.

Western Uranium & Vanadium [redacted]

[redacted][148]

Nuvemco, LLC owns the Last Chance Mine in Colorado, which has been idle since 2009 but the company says can return to operations within 120 days.[149] [redacted]

Two additional projects are under development: First Vanadium Corporation's Carlin Vanadium Project and Nevada Vanadium LLC's (Nevada Vanadium) Gibellini Vanadium Project. The Gibellini project is in the permitting process, with BLM expected to reach a decision by August 2021.[150] Nevada Vanadium plans to begin production in late 2023, producing vanadium pentoxide with 33 million kilograms of vanadium content over 14 years.[151] [redacted]

[148] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

[149] http://www.nuvemco.com/Projects.html

[150] Bureau of Land Management Accepting Comments for Gibellini Mine, August 17, 2020. Available at https://www.blm.gov/press-release/bureau-land-management-accepting-comments-gibellini-mine

[151] Silver Elephant Mining Corporate Presentation: Gibellini Vanadium, https://www.silverelephantmining.com/projects/gibellini-vanadium/

First Vanadium Corporation completed the PEA for its Carlin project in 2020, forecasting 16 years of vanadium production capabilities totaling 46 million kilograms of vanadium content.[152]

7. Capital Expenditures

U.S. producers of vanadium have made significant capital expenditures in the last four years, with the construction of AMG Vanadium's new Ohio facility and Gladieux's overhaul of its Texas facility at the forefront. AMG Vanadium's expansion will more than double its ferrovanadium production capacity, adding

[152] "First Vanadium Announces Positive Preliminary Economic Assessment for the Carlin Vanadium Project in Nevada", https://www.firstvanadium.com/index.php/news/2020/548-irstanadiumnnouncesositivereliminaryconomicsse20200511

over 2.5 million kilograms per year of capacity and 100 new jobs at an estimated cost of $200 million.[153] [redacted]

Gladieux has invested more than [redacted] in the restart of its Texas facility, planning to open vanadium pentoxide production in [redacted]

Among potential primary producers, [redacted]

[153] AMG Vanadium Constructing a Second Ohio Plant, Investing More Than $200 Million. https://www.jobsohio.com/news/posts/amg-vanadium-constructing-a-second-ohio-plant-investing-more-than-200-million/

[redacted]

8. Environmental Factors

Vanadium-bearing waste products—the primary source material for vanadium production in the United States—are classified by the EPA as hazardous wastes.[154] The recycling of these materials and reclamation of critical minerals constitutes an important step in both protecting human health and promoting an assured supply of critical minerals. AMG Vanadium claims a "99% conversion rate for all raw material," and has a policy not to send spent catalyst to landfill.[155]

[154] 63 FR 56710

[155] https://amg-v.com/wp-content/uploads/2019/11/The_Gold_Standard_Risk_Mitigation_Handbook_Nov_2019.pdf

However, the recycling and reclamation process is expensive and subject to fines if not implemented correctly or fully. For example, one of the causes of Gulf's 2016 bankruptcy was the challenge and resulting costs of managing the pollutants from its Texas facility. The company spent more than $60 million on environmental protection-related expenditures and fines between 2010 and 2016. As noted above, since Gladieux purchased the facility in 2017, it has invested more than [redacted] in updating the facility to "best in class" standards.

Most vanadium-bearing spent catalysts are covered by a rule published by the EPA on August 26, 1998.[156] That rule identifies spent catalysts from hydrotreating and hydrorefining as hazardous wastes, does not comment on spent hydrocracking catalyst. In 2002, the EPA later issued a clarification of the scope of the hazardous waste listings; as part of that rulemaking process, the agency gathered industry data on quantities of spent catalyst generated and recycled in the United States.[157] This data showed that the country generated 31,313 tons of spent catalyst classified as hazardous waste in 1999, with 55% of it recycled/reclaimed. The EPA estimated the cost of reclamation at $725 per ton, while the cost of landfilling the catalyst was $240 per ton; low vanadium prices were cited as one potential reason for the difference in cost.

[156] 63 FR 42110
[157] https://archive.epa.gov/epawaste/hazard/web/pdf/backdoc.pdf

Safe processing of refinery byproducts is essential for continued oil refining in the United States. With valuable minerals contained in these waste products and human health and environmental risks stemming from their improper disposal, encouraging safe full value extraction will support the long term economic health and competitiveness of the country. However, solutions to the recycling of refinery byproducts in the United States attractive to current producers, especially while vanadium prices remain below levels that allow for profitable production, are essential.

C. Displacement of Domestically-Produced Vanadium by Imports Affects Our Internal Economy, but is Mitigated by Ongoing Actions

1. U.S. Production of Vanadium is Well Below Domestic Demand

Between 2016 and 2019, the United States produced an annual average of 3.4 million kilograms of contained vanadium from primary or secondary production while importing 7.8 million kilograms of contained vanadium in the form of ferrovanadium, vanadium pentoxide, and carbides. Production capacity in 2020 remained insufficient to meet domestic demand, with non-conversion production capacity totaling [redacted] of contained vanadium.

Domestic production capacity will greatly expand in the near future with AMG Vanadium's expansion in Ohio planned to open in 2021 with capacity to produce ferrovanadium with [redacted] from spent catalyst, and Gladieux's overhaul of their Texas facility expected to be completed [redacted][158] These additions will raise U.S. production capacity [redacted]. Additionally, should vanadium prices increase sufficiently, Nevada Vanadium's Gibellini mine could begin production in 2023 with an estimated annual production level of 2.4 million kilograms of contained vanadium.[159]

2. Domestic Production is Highly Concentrated and Limits Capacity Available for a National Emergency

There were just three companies that carried out vanadium production in 2019—AMG Vanadium, US Vanadium, and Energy Fuels—with one additional company—Gladieux—idle for renovation. [redacted]. Several companies have

[158] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey

[159] Silver Elephant Mining Corporate Presentation: Gibellini Vanadium, https://www.silverelephantmining.com/projects/gibellini-vanadium/

undertaken major investments in vanadium production capacity in anticipation of higher prices, but should prices not increase, one or more secondary producers may face challenges to continue production and additional mine capacity is unlikely to come on line.

Producers of high purity vanadium pentoxide face particular challenges because the primary destination of their product is the titanium industry, which has been significantly impacted by the COVID-19-related drops in air travel and, accordingly, aerospace industry production. There is no clear marker for when domestic aerospace production will begin to recover. Additionally, other than the approximately 10% of industry demand from titanium and non-metallurgical uses, domestic producers of vanadium pentoxide are reliant on toll converter Bear to supply product to the steel industry. [redacted]

Reactivation of idle capacity is not a quick process. [redacted] Additionally, as noted above, Gladieux's renovation of its Freeport facility has taken more than three years.

However, adding new capacity would take significantly longer than reactivating existing facilities. While AMG Vanadium's new facility is projected to take about two years to complete, this is a relatively short time period that reflects the company's experience and the fact that the facility under construction is similar to its existing facility. The exploration and construction of primary production facilities in the United States takes significantly longer than the secondary production facility construction illustrated by AMG Vanadium. A more typical timeline may be Nevada Vanadium's Gibellini mine—the new project most likely to receive a permit—which carried out its PEA in 2018, is expected to receive permitting from BLM in 2021, and hopes to begin production in 2023, more than five years after its PEA.

These limitations represent a threat to the continued availability of domestically produced vanadium pentoxide, as needed to support national defense and critical infrastructure needs.

3. Domestic Vanadium Production Currently Requires Significant Imports of Vanadium Feedstock, Limiting Capacity Available for a National Emergency

Vanadium production in the United States is reliant on imports of vanadium feedstock to produce all vanadium products. The only vanadium producer in recent years to use entirely U.S. origin material is primary producer Energy Fuels, which

has produced 460,000 kilograms of contained vanadium since 2016, accounting for 1.4% of U.S. apparent consumption.

Secondary producers AMG Vanadium, U.S. Vanadium, and Gladieux have all historically used foreign sources of vanadium-bearing wastes to provide portions of their feedstock. [redacted]

Current sourcing practices leave the United States unable to meet domestic demand with U.S.-sourced material; [redacted]. Although Energy Fuels' 2019 production of high purity vanadium pentoxide with 460,000 kilograms of vanadium content [redacted] is likely sufficient to meet defense system requirements (which are estimated above at less than 300,000 kilograms of contained vanadium per year), other national security requirements cannot currently be met using only U.S.-origin vanadium.

4. Trade Actions Have Been Successful in Mitigating Artificially Low-Priced Imports of Vanadium

Of the four countries with significant primary production of vanadium, three (Russia, China, and South Africa) have been subject to the imposition of antidumping duties on ferrovanadium by the Department and the USITC. Although not a primary producer, Korea has also been subject to antidumping duties. In all cases, after the duties were imposed, imports of ferrovanadium decreased significantly.

These cases show the longstanding and repeated success of antidumping duties in countering imports of ferrovanadium products sold in the United States at less than fair value.

5. Critical Minerals Agreements Will Help Ensure Reliable Supplies of Vanadium

In June 2019 the Department issued a report, *A Federal Strategy to Ensure a Reliable Supply of Critical Minerals.* This report "outlines a coordinated approach by the Federal Government in response to Executive Order 13817 to reduce the Nation's vulnerability to disruptions in the supply of critical minerals." The Federal Strategy includes six calls to action, covering 24 goals and 61 recommendations, to achieve the goals put forth in E.O. 13817. One of these calls to action is "Enhance

International Trade and Cooperation Related to Critical Minerals," and recommends working with allies to ensure access to critical minerals as well as "robust enforcement of U.S. trade laws and international agreements."[160]

To achieve this goal, the Federal Strategy proposes that the USG establish intergovernmental agreements with partner countries, focused on ensuring continued access to critical minerals. The Federal Strategy recommends that the USG continue to expand cooperation and collaboration with interested parties on critical minerals issues related to:

(1) resource identification and exploration;

(2) processing and recycling;

(3) mitigating supply risk and preventing supply chain disruptions;

(4) research and development related to critical mineral materials and manufacturing and;

(5) tracking and sharing information on foreign investment and acquisitions of mineral rights, property, and development.

Among the achievements resulting from this call to action to date are:

U.S.-Canada Joint Action Plan on Critical Minerals

[160] https://www.commerce.gov/sites/default/files/2020-01/Critical_Minerals_Strategy_Final.pdf

In January 2020, the United States and Canada announced the finalization of the U.S.-Canada Joint Action Plan on Critical Minerals Collaboration.[161] The plan aims to facilitate development of secure supply chains for critical minerals that are key to strategic industries. This bilateral initiative addresses concerns about reliance on other countries for the supply of minerals critical to defense, aerospace, communications, and other strategic industries.

As part of the joint action plan, Canada and the United States have identified areas for cooperation, including: (i) securing critical mineral supply chains for strategic industries and defense; (ii) improving information sharing on mineral resources and potential; (iii) engaging with the private sector; (iv) collaborating in multilateral fora and with other countries; (v) undertaking research and development initiatives; (vi) engaging in supply chain modeling; and (vii) increasing support for the metals and mining industry.

As a result of its strong political and economic ties to the United States, the shared border, its stable regulatory environment, and an abundance of mineral resources, collaboration with Canada provides the United States a path to expanded secure supplies of critical minerals, including vanadium. Although not a current producer of vanadium, Canada has several projects underway, including

[161] https://www.state.gov/united-states-and-canada-finalize-action-plan-on-critical-minerals-cooperation/

BlackRock Metals' Chibougamou mine, which may begin production in 2021 with planned annual production of more than 4,000 tons of vanadium, close to half the U.S.'s average annual consumption from 2016 to 2019 of 8,590 tons.

U.S.-Australia Critical Minerals Plan of Action

In November 2019, the United States and Australia formalized a partnership to collaborate on research and increase critical minerals capacity.[162] The activities under the Plan of Action include focusing on resource mapping and quantitative assessments, determining geological controls on critical minerals distribution, and improving understanding of supply and demand scenarios for shared critical minerals trade between the United States and Australia.

As Australia is one of six countries in the world with USGS-recognized vanadium reserves, and has five exploration projects in advanced stages, this partnership holds significant promise to support U.S. access to reliable sources of vanadium.

D. Increased Global Capacity and Production of Vanadium Will Further Impact the Long-Term Viability of U.S. Vanadium Production

1. China Possesses an Outsized Role in the Global Price of Vanadium

[162] https://www.doi.gov/pressreleases/united-states-and-australia-formalize-partnership-critical-minerals

China accounts for an estimated 50 to 60% of global vanadium production, with a similar level of demand. This concentration of production and consumption means that policy changes in China can have large effects on the global vanadium market. As Energy Fuels' vice president Curtis Moore said in 2019, "the biggest driver of vanadium prices is economic and industrial policy in China, which is opaque to say the least."[163]

The spike in vanadium prices from 2017 into 2018 was largely attributed to a change in Chinese steel rebar standards to require the addition of more vanadium.[164] Similarly, the precipitous fall in prices following the implementation of the standard on November 1, 2018 has been linked to "enforcement of the standards not being as stringent as previously expected," as well as the substitution of niobium for vanadium due to price increases.[165] Finally, Chinese vanadium pentoxide production in the first half of 2019 was 30% higher than in the first half of 2018, increasing supply more than anticipated and further driving prices down.[166] China's ability to influence vanadium markets through supply, demand,

[163] Barrera, Priscili. Vanadium Outlook 2020: Is Vanadium Due for a Comeback? December 31, 2019. https://investingnews.com/daily/resource-investing/battery-metals-investing/vanadium-investing/vanadium-outlook

[164] Vanadium: Prices soar as new rebar regulations take effect. November 1, 2018. https://roskill.com/news/vanadium-prices-soar-as-new-rebar-regulations-take-effect/

[165] Radford, Charlotte and Lv, Amy. Focus: Why China's implementation of new rebar policy is failing to support vanadium prices. December 20, 2018. https://www.metalbulletin.com/Article/3850389/FOCUS-Why-Chinas-implementation-of-new-rebar-policy-is-failing-to-support-vanadium-prices.html

[166] Lv, Amy. Oversupply to persist for China V market. August 16, 2019. https://www.amm.com/Article/3889693/Oversupply-to-persist-for-China-V-market.html

and policy changes has a significant impact on the ability of companies in the United States to plan investments and production decisions.

2. Expansion of Low-Cost Production in Several Countries Will Place Downward Pressure on Global Vanadium Prices

In 2019, total production of primary- and co-produced (mine) vanadium was 73,000 metric tons. However, there are mines in development or exploration in Kazakhstan, Canada, and Australia which have the estimated capacity to add 12,408 tons of production in 2021, and 57,000 additional metric tons in future years, should all projects enter production.[167] The owners of the Kazakh mine have claimed it can operate "at the world's lowest cash cost of production." By contrast, mine facilities in the United States are expected to have the capacity to produce 3,100 tons of vanadium in 2021, with an additional 2,900 tons per year in exploration.[168] This amount would satisfy the majority of current domestic demand, but is not likely to be produced without higher vanadium prices.

In addition to primary vanadium, AMG Vanadium plans to open its new Ohio facility in 2021, with the capacity to produce [redacted]

[167] Data from USGS, Government of Australia, BlackRock Metals, VanadiumCorp Resources, Vanadium One Iron Corporation, and Ferro-Alloy Resources Group

[168] Data from Energy Fuels Resources (USA), First Vanadium Corporation, and Silver Elephant Mining

[redacted][169] The company is also exploring the construction of similar facilities in Saudi Arabia and China, and has noted that their recycling operations have little dependence on the cost of vanadium, with recycling fees driving profits.[170] The ability to generate cash flow independent of vanadium costs could result in the introduction of new capacity even at low vanadium prices. Barring significant new demand for vanadium, the addition of new sources of supply will continue to impact vanadium prices.

3. Downward Price Pressure May Be Mitigated by Increased Demand for Steel, Titanium, and Energy Storage

With the steel industry consuming approximately 90% of vanadium demand, changes in vanadium consumption are largely tied to that industry. Global steel production in 2020 was affected by the COVID-19 pandemic, and had a forecasted decline of 2.4%.[171] Steel production in the United States saw a much larger decrease of approximately 18% from 2019.[172] The declines in steel production impact vanadium prices, which had not recovered since falling from a peak of nearly $34 per pound vanadium pentoxide in November 2018 to $6 per pound in

[169] U.S. Department of Commerce, Bureau of Industry and Security, Section 232 Investigation into Imports of Vanadium Survey.

[170] Bushveld Minerals Limited. Comment in response to Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium, July 20, 2020. https://www.regulations.gov/document?D=BIS-2020-0002-0013.

[171] Worldsteel Short Range Outlook October 2020. October 15, 2020. Available at https://www.worldsteel.org/media-centre/press-releases/2020/worldsteel-Short-Range-Outlook-October-2020.html

[172] Data as of December 16, 2020. https://www.steel.org/industry-data/

December 2019.[173] While steel demand, and accordingly vanadium demand, is projected to bounce back in 2021 to 4.1% growth, longer range forecasts estimate global steel demand growing at an annual rate of 1.4% through 2035.[174] Increased vanadium use within the steel industry, such as that resulting from implementation of the 2018 regulation in China requiring the addition of vanadium to steel rebar and increased demand for high strength and tool steel, may provide additional growth in vanadium demand, with Vanitec (a global vanadium industry association) forecasting a 30% increase in vanadium demand by 2025.[175]

The titanium industry, with approximately 55% of demand coming from the aerospace sector, has been even more significantly affected by COVID-19 than the steel industry. Global titanium sponge production was projected to decline [redacted] from 2019 to 2020, with titanium shipments falling [redacted].[176] Prior to the pandemic, titanium alloy growth rates were forecasted in the 3 to 5% per year range, and expected to track closely with aircraft demand.[177] To the extent that the end of the pandemic spurs air travel to return to previous levels and

[173] Vanadium pentoxide flake 98% purity, China price. Vanadiumprice.com.
[174] Steel Demand Beyond 2030: Forecast Scenarios. Presented to OECD, Paris, September 28, 2017. Available at https://www.oecd.org/industry/ind/Item_4b_Accenture_Timothy_van_Audenaerde.pdf
[175] 7th Vanitec Energy Storage Meeting, June 29, 2020. http://www.vanitec.org/vanadium/ESC-Meetings
[176] Information presented to U.S. Government Titanium Sponge Working Group
[177] Fior Markets Titanium Alloys Markets, Published May 2019; Research and Markets Titanium Alloys And Ultrafine Titanium Dioxide Global Market Opportunities And Strategies To 2023, May 2019; Titanium USA 2018 Conference, October 7-10, 2018.

growth rates, longer term titanium demand could provide support for vanadium prices.

The energy storage sector is another potential area for growth in vanadium demand. While the demand for vanadium redox flow batteries have not yet seen massive growth, Growth estimates vary wildly, from Roskill's 13% per annum growth to Bushveld Mineral's "aggressive forecast" of 42% annual growth.[178] The relatively conservative Roskill estimate would account for added demand by 2027 of 5,000 tons of vanadium, while Bushveld's forecast would have vanadium redox flow battery demand increasing by 93,000 tons by 2027, exceeding 2017 total vanadium production.

4. Significant Price Swings Impair the Ability of Domestic Producers to Plan and Carry Out Capital Expenditures

The historic volatility of vanadium prices make it difficult for producers to plan and follow through on investments in new capabilities. Although many industry projects take four or more years to complete, it is likely that vanadium market conditions and prices will change significantly between the beginning and the end of a project, impacting the project's viability and access to financing.

[178] Bushveld Minerals, Energy Storage & Vanadium Redox Flow Batteries 101. November 13, 2018. http://www.bushveldminerals.com/wp-content/uploads/2018/11/Energy-Storage-Vanadium-Redox-Flow-Batteries-101.pdf

For example, when Gulf filed for bankruptcy in June 2016, vanadium pentoxide prices had recent lows of $3 per pound. At the time of Gladieux's purchase of Gulf's facility, prices had risen to close to $6 per pound. While Gladieux has been updating the facility, prices have spiked to $30 per pound in November 2018, but fell back to $6 a year later. [redacted]

The most advanced primary vanadium exploration project underway in the United States has had a similar experience. Nevada Vanadium completed the PEA for the Gibellini project in June 2018, when vanadium pentoxide prices were $15 per pound. The PEA used a forecast price of $12.73, and reflects a 14-year breakeven price of $7.76 per pound.[179] With current prices below the breakeven level and an estimated [redacted] required to construct and open the mine, completion of the project may be postponed or cancelled unless vanadium prices have risen before the expected BLM permit decision in August

[179] https://www.silverelef.com/files/Gibellini_2018_PEA_Technical_Report.pdf

2021. [redacted]

Similar price challenges exist at other domestic mining projects, with limited investment expected absent a rise in vanadium prices. [redacted] In summary, while significant domestic resources of vanadium exist, the long project lead times and volatile vanadium prices often create challenges in obtaining the investments necessary to bring the projects to completion.

E. Unilaterally Increasing Domestic Prices of Vanadium Would Harm Critical U.S. Industries

1. Domestic Vanadium Prices Significantly Exceeding World Prices Would Disadvantage the U.S. Steel Industry

Imports of steel products are currently subject to adjustment based on the finding of a threat to national security in the Secretary's 2018 Steel Report. That report found that the domestic steel industry was threatened by low-cost imports and recommended enhancing the industry's viability through the imposition of tariffs. In imposing a 25% tariff on imports, the President also authorized the creation of an exclusions process, whereby companies could request an exclusion from the tariff. Since the start of the exclusions process in March 2018, more than

250,000 requests for exclusion from the steel tariff have been filed, reflecting significant interest in avoiding additional costs related to the domestic sale of steel products.

With annual production in the U.S. worth $92 billion, the estimated $300 million in vanadium demand attributable to the steel industry represents less than 1% of total cost. However, in an industry with small profit margins and under threat from low-cost imports, additional costs for U.S. companies that foreign companies do not bear can be determinative on the company's survival.

While not all steel products contain vanadium, some parts of the steel industry require it. Analysis of exclusion request data showed that 24% of the requests for exclusion from the Section 232 steel tariff involved a product with at least some vanadium, and 9% of requests required at least 1% vanadium.

Vanadium accounts for a significant percentage of the cost of the steel products in which it is an ingredient, with the result that small changes in the price of vanadium can have a major effect on the overall steel product cost. The cost per ton of vanadium is some 20 to 30 times that of steel products, meaning a 50% rise in vanadium prices would result in a more than 1% increase in the cost of rebar with 0.1% vanadium by weight.[180] For products such as high speed steel with

[180] Average 2016-2019 vanadium pentoxide prices of $9.80 per pound, equivalent to $21,560 per ton. Rebar cost estimated at $1000 per ton

significantly higher vanadium content, the impact can be significantly higher. In an industry such as the steel industry that is already threatened by low-cost imports, imposing additional costs could have a major impact. An increase in the domestic cost of vanadium, while beneficial in the short term to the domestic vanadium industry, would be harmful to the steel industry and encourage the import of steel products that contain vanadium, to the detriment of both the domestic steel and vanadium industries.

2. Domestic Vanadium Prices Significantly Exceeding World Prices Would Harm the U.S. Titanium Industry, to the Benefit of Russian and Chinese Titanium Producers

Although the titanium industry uses far less vanadium than the steel industry, it is much more dependent on vanadium. For most steel uses of vanadium, substitution of niobium or molybdenum is possible, but vanadium is essential to most aerospace applications using titanium. The most common titanium alloy, Ti-6Al-4V, contains 4% vanadium by weight, but represents between 12 and 14% by cost. Further, nearly all vanadium-containing titanium products are used in the aerospace and military sectors, both essential to national security.

Titanium, like vanadium and steel, is critical to national security, and was also subject to a Section 232 investigation, based on imports of titanium sponge.

One significant concern for the titanium industry is the expansion of low-cost, vertically integrated Russian and Chinese titanium producers. One of the findings of the titanium sponge investigation was that increases in the Chinese and Russian premium quality sponge production threatens the viability of domestic U.S. titanium suppliers to the aerospace industry. The report found that Chinese and Russian sponge producers, underwritten by government support, have or are moving toward creating vertically integrated titanium supply chains that undercut U.S. producers. Because it is able to provide the necessary quality of titanium at lower prices than U.S. producers, Russian titanium producer VSMPO-Avisma provides 35% of Boeing's titanium products, and 50% of Airbus's titanium products.

The threat to U.S. titanium producers from low-cost imports has increased since the titanium sponge investigation ended, as a result of the impact that COVID-19 has had on global titanium demand. Titanium shipments fell [redacted] from 2019 to 2020. Further, demand [redacted] As a result of these factors, the U.S. titanium industry is facing severe hardship, and any product cost increases in the United States will likely to further disadvantage the industry relative to Chinese and Russian suppliers.

VIII. Conclusion

A. Determination

Based on the findings in this Report, the Secretary concludes that the present quantities and circumstance of vanadium imports do not threaten to impair the national security as defined in Section 232. Although vanadium is critical to national security and the United States is dependent on imported sources of vanadium, several significant factors, including the health of the U.S. industry, the availability of idle domestic resources, ongoing USG actions, and the importance of vanadium to maintaining competitive steel and titanium industries, indicate that imports of vanadium do not threaten to impair national security.

The United States is reliant on imports to satisfy demand for vanadium products and is not producing significant amounts of vanadium from U.S.-origin material, but these conditions are not expected to deteriorate further. A number of U.S. vanadium producers are increasing their production capacity and/or modernizing currently idled facilities and mines. These initiatives will improve domestic capabilities specific to ferrovanadium and vanadium pentoxide, as well as in primary production. Even if primary production is not feasible are current vanadium prices, the availability of the resources allows for production potential in the event of national emergency. The increased availability of domestic primary vanadium, expansion of secondary production, and addition of domestic feedstock

for secondary production should mitigate current abnormal levels of reliance in imports.

However, the Department recognizes that rising capacity does not necessarily mean the domestic vanadium industry is healthy. In addition to the long history of volatility of vanadium prices, the main users of vanadium—the steel and titanium industries—experienced major declines in demand in 2020 as a result of COVID-19, with the titanium industry particularly challenged due to its reliance on aerospace demand. If vanadium prices fail to rise, some of the capacity under development or exploration may not turn into production, and one or more secondary producers is likely face financial difficulty or challenges in sourcing affordable vanadium-bearing feedstock.

Further, the Department's lack of a finding of an immediate threat to national security does not indicate that a healthy domestic vanadium industry is not of vital importance to the United States. While the Secretary does not believe that imports of vanadium need to be adjusted at this time, there are steps that should be taken to support the domestic vanadium industry and related sectors, to ensure safe and reliable sources of vanadium in the event of a national emergency and to enhance and protect U.S. national security.

B. Recommendations

The Department has identified several actions that would help to ensure reliable domestic sources of vanadium and lessen the potential for imports to threaten national security. These actions are not intended to be exhaustive or exclusive; the Secretary recommends pursuing all proposed actions.

Recommendation 1 – Expansion of the National Defense Stockpile to Include High Purity Vanadium Pentoxide

The USG should support domestic vanadium production and ensure a source of vanadium in the event of national emergency by re-adding vanadium pentoxide to the National Defense Stockpile. Vanadium pentoxide was part of the stockpile until 1997; the stockpile held 6,200 tons of contained vanadium[181] in 1965 and had a goal of 7,000 tons though it held just 651 tons prior to the decision to reduce the target level to zero in 1993, following the end of the cold war.[182] Using high purity vanadium pentoxide—suitable for use in titanium alloys or chemical uses as well as conversion into ferrovanadium for use in the steel industry—would ensure vanadium held in the stockpile could be used for any necessary product in the event of national security.

National Defense Stockpile goals were initially set to ensure sufficient product to support one year's demand for the entire country but were later

[181] Vanadium is generally reported in terms of "contained vanadium", or the weight of only the vanadium portion of a vanadium compound. Vanadium represents 56% of the weight of vanadium pentoxide.

[182] USGS Vanadium Mineral Commodity Summaries. https://www.usgs.gov/centers/nmic/vanadium-statistics-and-information

narrowed to focus on defense-specific needs, primarily due to funding constraints. Given the importance of vanadium and other critical minerals to the economy, the economic and national security of the United States would be better served by pursuing stockpile goals that support national security beyond defense-specific requirements. The re-addition of vanadium to the stockpile would require authorization and funding from Congress.

The Department recommends that the size of the proposed vanadium addition to the stockpile should be based on three benchmarks: defense system requirements, broader national security requirements, and total domestic demand. As discussed above, defense system requirements may conservatively amount to 273 metric tons of vanadium content per year; this inventory level would be worth approximately $10.5 million based on average vanadium pentoxide prices since 2016.[183] Critical infrastructure requirements add an estimated 4,527 tons per year, resulting in a minimum stockpile goal based on total national security requirements of 4,800 tons of contained vanadium, at a cost of $184.8 million. Finally, total domestic apparent consumption (including defense and critical infrastructure needs) averaged 8,590 tons of contained vanadium annually from 2016 to 2019.

[183] Average price per pound vanadium pentoxide from 2016-2019 of $9.80, based on data from USGS: https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-vanadium.pdf

Establishing a stockpile goal at this level, sufficient to meet all domestic demand would, would be valued at $330.6 million.

Beyond the minimum stockpile level, the Secretary further recommends that the stockpile of vanadium pentoxide be authorized to expand in size during periods of unusually low prices (with purchases made from domestic producers), while remaining unchanged or shrinking during periods of higher-than-average prices. This policy would help mitigate the large historic price swings that have caused significant financial distress and impeded capital investment in the domestic vanadium industry while helping to regulate domestic prices.

Implementing this policy would require legislative changes to the Strategic and Critical Materials Stockpiling Act (50 U.S.C. §98, et seq.) (Stockpiling Act). While the mitigation of critical mineral price swings and the purchase of critical minerals from domestic producers at a premium when prices are unusually low serves the interest of national defense, the Stockpiling Act requires that the stockpile "not be used for economic or budgetary purposes," which may present a challenge in allowing the stockpile to exceed minimum defense needs based on prices. Allowing the stockpile to be used for economic purposes if such actions support the health and competitiveness of affected industries would help enhance U.S. national security.

As an additional potential benefit, once the vanadium holdings in the National Defense Stockpile are established, they could—with the authorization of Congress and in cooperation with the Department of Energy—be used without cost to support another sector: large scale energy storage. As noted above, a potential new use for vanadium is in vanadium redox flow batteries, which have the advantage of using vanadium in both parts of the electrolyte, eliminating the risk of cross-contamination and allowing for the vanadium to be re-claimed from the batteries at a low cost with minimal yield loss[184].

With vanadium accounting for approximately 30% of the cost of a vanadium redox flow battery and initial battery cost reductions needed to enable larger scale use, the USG could reduce the costs of the stockpile and support the energy storage sector by leasing a portion of the stockpile to be managed by vanadium redox flow battery companies, on condition of the leased vanadium being immediately reclaimable in the event of a national emergency. Given restrictions on transfers to and from the stockpile, this use of material in the stockpile would require either a legislative change to the Stockpiling Act or the designation of the leased material as still being part of the stockpile despite being used for energy storage.

[184] Vanitec estimates cost of conversion from leachate to vanadium pentoxide at $1 per pound vanadium pentoxide with a 95% yield. http://www.vanitec.org/vanadium/ESC-Meetings

Recommendation 2 – Recycling Promotion

The Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals (Federal Strategy) identifies an available, on-demand supply of critical minerals as "essential to the economic prosperity and national defense of the United States."[185] The Federal Strategy recommends the support of recycling and reprocessing of critical minerals, including vanadium. Given that nearly all vanadium production in the United States is performed through recycling, the USG should support the vanadium industry through USG-wide actions to promote the recycling of materials containing critical minerals.

A 2002 EPA analysis, carried out in support of the May 8, 2002 final rule on the identification and listing of spent catalysts as hazardous waste, showed that in 1999, just 55% of spent catalyst was recycled, in large part because the cost of recycling was estimated to be three times that of landfill disposal.[186] Bringing the recycling of vanadium-bearing wastes generated in the United States to or near 100% has the potential to greatly expand the availability of vanadium products of domestic origin. Such recycling will occur naturally with higher vanadium prices, as refiners typically receive a metals credit from vanadium producers based on vanadium sale price, but can also be encouraged through the consideration of

[185] https://www.commerce.gov/sites/default/files/2020-01/Critical_Minerals_Strategy_Final.pdf
[186] 67 FR 30811 and https://archive.epa.gov/epawaste/hazard/web/pdf/backdoc.pdf

recycling tax deductions or credits as well as EPA review of their regulatory authority governing disposal of hazardous waste.

For example, additional information submitted by industry to the Department reported that the 2020 International Maritime Organization's (IMO) regulation requiring the reduction of allowable levels of sulfur in maritime fuels from 3.5% to 0.5% has increased refinery catalyst use, which is expected to result in increased availability of spent catalyst used to produce vanadium.[187] Similar regulations in the United States would support both the EPA mission to protect human health and the environment and domestic production of critical minerals.

Recommendation 3 – Continue USG Actions to Support Critical Minerals

Many of the challenges domestic vanadium producers face are not unique to vanadium; with this investigation the Department has completed Section 232 investigations on four of the 35 critical minerals. While the specific challenges of each critical mineral are distinct, many industrial trends are similar and broad solutions may be more effective than individual targeting. There are several ongoing and proposed U.S. government actions that support the domestic supply of

[187] https://ig9we1q348z124x3t10meupc-wpengine.netdna-ssl.com/wp-content/uploads/AMG-Annual-Report-Web-FINAL.pdf

critical minerals. Continuing to pursue these actions will provide necessary support to the domestic vanadium industry as well as to the broader critical minerals sector.

Among the key actions that will enable strong domestic critical minerals industries are Executive Order 13817 and the resulting Federal Strategy, Executive Order 13953 (*Addressing the Threat to the Domestic Supply Chain From Reliance on Critical Minerals From Foreign Adversaries and Supporting the Domestic Mining and Processing Industries*), proposals from the USG Nuclear Fuel Working Group, work being carried out by the Titanium Sponge Working Group, and legislative action to support domestic production of critical minerals. Since the list of suitable substitutions for vanadium in steel and certain chemical processes includes other minerals on the critical minerals list (including manganese, niobium, titanium, tungsten, and platinum), actions to support production of critical minerals as a whole would also help to address domestic vanadium supply challenges.

The Federal Strategy, developed pursuant to Executive Order 13817, was announced in June 2019, with six calls to action containing 24 goals and 61 recommended actions that federal agencies should pursue to improve the availability of critical minerals and their downstream supply chains in the United States to help reduce the country's vulnerability to supply chain disruptions. Many of the identified goals of the Federal Strategy are consistent with the findings and recommendations of this investigation, including:

(a) support for downstream materials production capacity;

(b) enhancing the National Defense Stockpile's ability to meet military as well as civilian requirements;

(c) securing access to critical minerals through trade and investment with allies;

(d) identifying methods to encourage secondary use of critical minerals; and

(e) streamlining permit processes for critical mineral projects

The President issued Executive Order 13953, "Addressing the Threat to the Domestic Supply Chain From Reliance on Critical Minerals From Foreign Adversaries and Supporting the Domestic Mining and Processing Industries," (E.O. 13953), in September 2020. The Order identifies the need to ensure a consistent supply of critical minerals and declares a national emergency to reduce the threat posed by the country's undue reliance on critical minerals from foreign adversaries. Many of the actions taken pursuant to E.O. 13953 will support the domestic vanadium industry, particularly vanadium mining.

In addition to Executive actions, there have recently been several legislative proposals that would provide support for vanadium and other critical minerals. Examples include H.R. 8143 (also known as the Reclaiming American Rare Earths (RARE) Act) and S. 3694 (the Onshoring Rare Earths (ORE) Act of 2020). Both bills as written restrict the definition of critical minerals to a subset of those identified by the Department of Interior in response to E.O. 13817, and need to be

expanded to include vanadium and other critical minerals, but otherwise have features of significant value to the domestic vanadium industry. In addition to allowing a tax deduction for investments in property used for mining, reclaiming, or recycling critical materials, these bills would support the function of critical minerals in the broader economy by providing grants or allowing tax deductions for critical minerals extracted in the United States. In addition to expanding the bills to include vanadium (as noted above), in order to provide the most value to the country, the Department recommends that any legislation should ensure that extraction incentives include recycling and reclamation.

Finally, the Department's Section 232 investigations into imports of Uranium and Titanium sponge resulted in the creation of USG working groups tasked with developing recommendations additional to those made in each report. Given the significant intersections between the vanadium industry and the uranium and titanium industries, the implementation of the working groups' recommendations will support the vanadium industry as well.

THE EFFECT OF IMPORTS OF VANADIUM ON THE NATIONAL SECURITY

AN INVESTIGATION CONDUCTED UNDER SECTION 232 OF THE TRADE EXPANSION ACT OF 1962, AS AMENDED

U.S. Department of Commerce
Bureau of Industry and Security
Office of Technology Evaluation

APPENDICES

February 22, 2021

UNITED STATES DEPARTMENT OF COMMERCE
The Secretary of Commerce
Washington, D.C. 20230

May 21, 2020

The Honorable Mark T. Esper
Secretary of Defense
Washington, DC 20301

Dear Mr. Secretary:

I am writing to notify you that I am initiating an investigation in response to a petition requesting a determination of the effects of imported vanadium on the national security of the United States. I am taking this action pursuant to Section 232 of the Trade Expansion Act of 1962, as amended (19 U.S.C. § 1862). Section 232 requires that notice be provided to the Secretary of Defense upon initiation of an investigation.

During the course of the investigation, Department of Commerce staff will consult with their counterparts in the Department of Defense regarding any methodological and policy questions that arise during the investigation. The investigation report will include information provided by the Department of Defense regarding the national defense requirements for vanadium.

The Department's point of contact for this investigation is Richard E. Ashooh, Assistant Secretary for Export Administration, Bureau of Industry and Security. Mr. Ashooh can be reached at Richard.Ashooh@bis.doc.gov and (202) 482-5711.

I look forward to our collaboration on this important issue.

Sincerely,

Wilbur Ross

cannot guarantee that we will be able to do so.

Sheleen Dumas,

Department PRA Clearance Officer, Office of the Chief Information Officer, Commerce Department.

[FR Doc. 2020–11966 Filed 6–2–20; 8:45 am]

BILLING CODE 3510–07–P

DEPARTMENT OF COMMERCE

Bureau of Industry and Security

Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium

AGENCY: Bureau of Industry and Security, Office of Technology Evaluation, U.S. Department of Commerce.

ACTION: Notice of request for public comments.

SUMMARY: On May 28, 2020, in response to a petition, the Secretary of Commerce (the ''Secretary'') initiated an investigation to determine the effects on the national security from imports of vanadium. This investigation has been initiated under section 232 of the Trade Expansion Act of 1962, as amended.

Interested parties are invited to submit written comments, data, analyses, or other information pertinent to the investigation to the Department of Commerce's (the ''Department'') Bureau of Industry and Security by July 20, 2020. Rebuttal comments will be due by August 17, 2020. While the Department is interested in any information related to this investigation that the public can provide, this notice identifies particular issues of significance.

DATES: The due date for filing comments is July 20, 2020. The due date for rebuttal comments is August 17, 2020. Rebuttal comments may only address issues raised in comments filed on or before July 20, 2020.

ADDRESSES: *Submissions:* All written comments on the notice must be addressed to Section 232 Vanadium Investigation and filed through the Federal eRulemaking Portal: *http://www.regulations.gov.* To submit comments via *http://www.regulations.gov*, enter docket number BIS–2020–0002 on the home page and click ''search.'' The site will provide a search results page listing all documents associated with this docket. Find a reference to this notice and click on the link entitled ''Comment Now!'' (For further information on using *http://www.regulations.gov,* please consult the resources provided on the website by clicking on ''How to Use This Site.'')

FOR FURTHER INFORMATION CONTACT: Industrial Studies Division, Bureau of Industry and Security, U.S. Department of Commerce, (202) 482–5481, *Vanadium232@bis.doc.gov.* Unless otherwise protected by law, any information received from the public during the course of this investigation may be made publicly available. For more information about the section 232 program, including the regulations and the text of previous investigations, please see *www.bis.doc.gov/232.*

SUPPLEMENTARY INFORMATION:

Background

On May 28, 2020, in response to a petition, the Secretary initiated an investigation under section 232 of the Trade Expansion Act of 1962, as amended (19 U.S.C. 1862), to determine the effects on the national security from imports of vanadium. If the Secretary finds that vanadium is being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security, the Secretary shall so advise the President in his report on the findings of the investigation.

Written Comments

This investigation is being undertaken in accordance with part 705 of the National Security Industrial Base Regulations (15 CFR parts 700 to 709) (''NSIBR''). Interested parties are invited to submit written comments, data, analyses, or information pertinent to this investigation to the Department's Office of Technology Evaluation no later than July 20, 2020. Rebuttal comments submitted in response to issues raised in comments received on or before July 20, 2020 may be filed no later than August 17, 2020.

The Department is particularly interested in comments and information directed to the criteria listed in § 705.4 of the NSIBR as they affect national security, including the following:

(i) Quantity of or other circumstances related to the importation of vanadium;

(ii) Domestic production and productive capacity needed for vanadium to meet projected national defense requirements;

(iii) Existing and anticipated availability of human resources, products, raw materials, production equipment, and facilities to produce vanadium;

(iv) Growth requirements of the vanadium industry to meet national defense requirements and/or requirements for supplies and services necessary to assure such growth including investment, exploration, and development;

(v) The impact of foreign competition on the economic welfare of the vanadium industry;

(vi) The displacement of any domestic vanadium production causing substantial unemployment, decrease in the revenues of government, loss of investment or specialized skills and productive capacity, or other serious effects;

(vii) Relevant factors that are causing or will cause a weakening of our national economy; and

(viii) Any other relevant factors, including the use and importance of vanadium in critical infrastructure sectors identified in Presidential Policy Directive 21 (Feb. 12, 2013) (for a listing of those sectors see *https://www.dhs.gov/cisa/critical-infrastructure-sectors*).

Requirements for Written Comments

The *http://www.regulations.gov* website allows users to provide comments by filling in a ''Type Comment'' field, or by attaching a document using an ''Upload File'' field. The Department prefers that comments be provided in an attached document. The Department prefers submissions in Microsoft Word (.doc) or Adobe Acrobat (.pdf). If the submission is in an application format other than those two, please indicate the name of the application in the ''Type Comment'' field. Please do not attach separate cover letters to electronic submissions; rather, include any information that might appear in a cover letter in the comments themselves. Similarly, to the extent possible please include any exhibits, annexes, or other attachments in the same file as part of the submission itself rather than in separate files. Comments will be placed in the docket and open to public inspection, except information determined to be confidential as set forth in § 705.6 of the NSIBR. Comments may be viewed on *http://www.regulations.gov* by entering docket number BIS–2020–0002 in the search field on the home page.

Material submitted by members of the public that is properly marked business confidential information and accepted as such by the Department will be exempted from public disclosure as set forth in § 705.6 of the NSIBR. Anyone submitting business confidential information should clearly identify the business confidential portion at the time of submission, file a statement justifying nondisclosure and referring to the specific legal authority claimed, and provide a non-confidential submission

which can be placed in the public file on *http://www.regulations.gov.* Communications from agencies of the United States Government will not be made available for public inspection. For comments submitted electronically containing business confidential information, the file name of the business confidential version should begin with the characters ''BC''. Any page containing business confidential information must be clearly marked ''BUSINESS CONFIDENTIAL'' on the top of that page. The non-confidential version must be clearly marked ''PUBLIC''. The file name of the non-confidential version should begin with the character ''P''. The ''BC'' and ''P'' should be followed by the name of the person or entity submitting the comments or rebuttal comments. All filers should name their files using the name of the person or entity submitting the comments. If a public hearing is held in support of this investigation, a separate **Federal Register** notice will be published providing the date and information about the hearing.

The Bureau of Industry and Security does not maintain a separate public inspection facility. Requesters should first view the Bureau's web page, which can be found at *https://efoia.bis.doc.gov/* (see ''Electronic FOIA'' heading). If requesters cannot access the website, they may call 202–482–0795 for assistance. The records related to this assessment are made accessible in accordance with the regulations published in part 4 of title 15 of the Code of Federal Regulations (15 CFR 4.1 *et seq.*).

Richard E. Ashooh,

Assistant Secretary for Export Administration.

[FR Doc. 2020–11926 Filed 6–2–20; 8:45 am]

BILLING CODE 3510–33–P

DEPARTMENT OF COMMERCE

International Trade Administration

[A–412–801]

Ball Bearings and Parts Thereof From the United Kingdom: Third Amended Final Results of Antidumping Duty Administrative Review Pursuant to Court Decision; 2010–2011

AGENCY: Enforcement and Compliance, International Trade Administration, Department of Commerce.

SUMMARY: On March 26, 2020, the United States Court of International Trade (CIT) sustained the October 2019 final results of redetermination pertaining to the administrative review of the antidumping duty order on ball bearings and parts thereof (ball bearings) from the United Kingdom covering the period May 1, 2010 through April 30, 2011. The Department of Commerce (Commerce) is, therefore, amending the final results with respect to Bayerische Motoren Werke AG (BMW).

DATES: Applicable June 3, 2020.

FOR FURTHER INFORMATION CONTACT: Thomas Schauer, AD/CVD Operations, Office I, Enforcement and Compliance, International Trade Administration, U.S. Department of Commerce, 1401 Constitution Avenue NW, Washington, DC 20230; telephone: (202) 482–0410.

SUPPLEMENTARY INFORMATION:

Background

On January 27, 2015, Commerce published the *Final Results* in the above-referenced administrative review.[1] Commerce selected the highest rate from the petition (254.25 percent) as the weighted-average dumping margin for BMW based on adverse facts available (AFA). BMW of North America LLC appealed the *Final Results* to the CIT, and on March 2, 2017, the CIT remanded the *Final Results*.[2] Specifically, the CIT remanded the *Final Results* directing that Commerce either: (1) Provide a new corroboration analysis for the selected petition rate that is consistent with Commerce's obligations and the Court's opinion; or (2) determine a new AFA rate consistent with Commerce's obligations and the Court's opinion.[3]

On May 12, 2017, Commerce issued its final results of redetermination pursuant to remand, in accordance with the CIT's order.[4] On remand, Commerce determined a new AFA rate of 126.44 percent for BMW, consistent with the *First Remand.* On August 23, 2017, the CIT sustained Commerce's *First Redetermination*.[5] On September 2, 2017, Commerce published the *Second Amended Final Results* in the **Federal Register**.[6]

The CIT's ruling was appealed to the U.S. Court of Appeals for the Federal Circuit (CAFC). On appeal, the CAFC concluded that ''Commerce did not set forth its reasoning in sufficient detail to allow review of whether the selected AFA rate was unduly punitive'' and remanded the case.[7] Based on the CAFC's decision, the CIT issued the *Second Remand* on July 3, 2019.[8]

On October 1, 2019, Commerce issued its final results of redetermination in accordance with the *Second Remand*.[9] On remand, Commerce determined a new AFA rate of 61.14 percent for BMW, consistent with the *Second Remand.* On March 26, 2020, the CIT sustained Commerce's *Second Redetermination*.[10]

Amended Final Results

Because there is now a final court decision, Commerce is amending the *Final Results* with respect to BMW. The revised weighted-average dumping margin for BMW for the period May 1, 2010 through April 30, 2011, is as follows:

Exporter or producer	Weighted-average dumping margin (percent)
Bayerische Motoren Werke AG ..	61.14

Liquidation and Assessment of Antidumping Duties

In the event the CIT's ruling is not appealed, or if it is appealed and upheld by a final and conclusive court decision, Commerce will instruct U.S. Customs and Border Protection (CBP) to assess antidumping duties at a rate equal to the weighted-average dumping margin listed above for all entries of subject merchandise during the period May 1, 2010 through April 30, 2011, that were produced and/or exported by BMW.

[1] *See Ball Bearings and Parts Thereof from Japan and the United Kingdom: Final Results of Antidumping Duty Administrative Reviews; 2010–2011,* 80 FR 4248 (January 27, 2015), amended in *Ball Bearings and Parts Thereof from the United Kingdom: Amended Final Results of Antidumping Duty Administrative Review; 2010–2011,* 80 FR 9694 (February 24, 2015) (*Final Results*).

[2] *See BMW of North America LLC* v. *United States,* Court No. 15–00052, Slip Op. 17–22 (CIT March 2, 2017) (*First Remand*).

[3] *See First Remand* at 12–17.

[4] *See* Results Of Remand Redetermination, *BMW of North America LLC* v. *United States,* Court No. 15–00052, Slip Op. 17–22, dated May 12, 2017 (*First Redetermination*).

[5] *See BMW of North America LLC* v. *United States,* Slip Op. 17–109, Consol. Court No. 15–00052 (CIT 2017).

[6] *See Ball Bearings and Parts Thereof From the United Kingdom: Notice of Court Decision Not in Harmony With Amended Final Results and Notice of Second Amended Results of Antidumping Duty Administrative Review,* 82 FR 42296 (September 2, 2017) (*Second Amended Final Results*).

[7] *See BMW of North America LLC* v. *United States,* 926 F.3d 1291, 1293 and 1302 (CAFC May 9, 2019).

[8] *See BMW of North America LLC* v. *United States,* Court No. 15–00052 Order at 1 (CIT July 3, 2019) (*Second Remand*).

[9] *See* Results Of Remand Redetermination, *BMW of North America LLC* v. *United States,* Court No. 2018–1109, dated October 1, 2019 (*Second Redetermination*).

[10] *See BMW of North America LLC* v. *United States,* Slip Op. 20–41, Consol. Court No. 15–00052 (CIT March 26, 2020).

III. Data

OMB Control Number: 0693–0072.

Form Number(s): None.

Type of Review: Revision and extension of a current information collection.

Affected Public: Business or other for-profit organizations.

Estimated Number of Respondents: 100.

Estimated Time Per Response: 30 minutes.

Estimated Total Annual Burden Hours: 50 hours.

Estimated Total Annual Cost to Public: $0.

Respondent's Obligation: Mandatory.

Legal Authority:

IV. Request for Comments

We are soliciting public comments to permit the Department/Bureau to: (a) Evaluate whether the proposed information collection is necessary for the proper functions of the Department, including whether the information will have practical utility; (b) Evaluate the accuracy of our estimate of the time and cost burden for this proposed collection, including the validity of the methodology and assumptions used; (c) Evaluate ways to enhance the quality, utility, and clarity of the information to be collected; and (d) Minimize the reporting burden on those who are to respond, including the use of automated collection techniques or other forms of information technology.

Comments that you submit in response to this notice are a matter of public record. We will include or summarize each comment in our request to OMB to approve this ICR. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you may ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Sheleen Dumas,

Department PRA Clearance Officer, Office of the Chief Information Officer, Commerce Department.

[FR Doc. 2020–21179 Filed 9–24–20; 8:45 am]

BILLING CODE 3510–13–P

DEPARTMENT OF COMMERCE

Bureau of Industry and Security

Reopening of Comment Period for Section 232 National Security Investigation of Imports of Vanadium

AGENCY: Bureau of Industry and Security, Office of Technology Evaluation, U.S. Department of Commerce.

ACTION: Notice on reopening of comment period for previously published notice of request for public comments.

SUMMARY: On June 3, 2020, the Bureau of Industry and Security (BIS) published the *Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium.* The June 3 notice specified that the Secretary of Commerce initiated an investigation to determine the effects on the national security of imports of vanadium. This investigation was initiated under section 232 of the Trade Expansion Act of 1962, as amended. The June 3 notice invited interested parties to submit written comments, data, analyses, or other information pertinent to the investigation to the Department of Commerce's Bureau of Industry and Security. The deadline for written comments was July 20, 2020, and the rebuttal comment deadline was August 17, 2020. Today's notice reopens the public comment period with a deadline of October 9, 2020. BIS has posted the initial application for a section 232 investigation into imports of vanadium, titled ''Petition for Relief Under Section 232,'' (dated November 19, 2019) and supplemental information (dated April 2, 2020), as submitted by the applicant, on *http://www.regulations.gov* in the interests of transparency and to allow additional public comment. Public versions of the exhibits are available online (*see* the **ADDRESSES** section).

DATES: The due date for filing comments is October 9, 2020.

ADDRESSES: *Submissions:* All written comments on the notice must be addressed to Section 232 Vanadium Investigation and filed through the Federal eRulemaking Portal: *http://www.regulations.gov.* To submit comments via *http://www.regulations.gov,* enter docket number BIS–2020–0002 on the home page and click ''search.'' The site will provide a search results page listing all documents associated with this docket. Find a reference to this notice and click on the link entitled ''Comment Now!'' (For further information on using *http://www.regulations.gov,* please consult the resources provided on the website by clicking on ''How to Use This Site.'')

Application for investigation: The public versions of the application for a section 232 investigation, the later-submitted supplemental information, and the exhibits, are available online at *http://www.regulations.gov* under the docket number BIS–2020–0002.

FOR FURTHER INFORMATION CONTACT: Industrial Studies Division, Bureau of Industry and Security, U.S. Department of Commerce, (202) 482–5481, *Vanadium232@bis.doc.gov.* Unless otherwise protected by law, any information received from the public during the course of this investigation may be made publicly available. For more information about the section 232 program, including the regulations and the text of previous investigations, please see *www.bis.doc.gov/232.*

SUPPLEMENTARY INFORMATION:

Background

On June 3, 2020, (85 FR 34179), the Bureau of Industry and Security (BIS) published the *Notice of Request for Public Comments on Section 232 National Security Investigation of Imports of Vanadium.* The June 3 notice specified that on May 28, 2020, the Secretary of Commerce had initiated an investigation to determine the effects on the national security of imports of vanadium. This investigation was initiated under section 232 of the Trade Expansion Act of 1962, as amended (19 U.S.C. 1862). (*See* the June 3 notice for additional details on the investigation and the request for public comments.)

Reopening of Public Comment Period

The June 3 notice included a comment period deadline of July 20, 2020 and a rebuttal comment period deadline of August 17, 2020. The Department of Commerce has determined that it is warranted to reopen the comment period for fourteen days. While comments may be submitted at any time, today's notice specifies that comments must be received by October 9, 2020 to be considered in the drafting of the final report. Today's notice reopens the comment period for fourteen days to allow for additional time for the public to submit comments on the investigation of imports of vanadium pursuant to BIS posting the November 19, 2019 application for an investigation by U.S. Vanadium LLC and AMG Vanadium LLC and the April 2, 2020 supplemental information on *http://www.regulations.gov.*

Posting of Application for Section 232 Investigation

BIS has posted the application for an investigation into imports of vanadium under section 232, titled ''Petition for Relief Under Section 232'', which was submitted by U.S. Vanadium LLC and AMG Vanadium LLC on November 19, 2019, on *http://www.regulations.gov.* BIS has also posted the supplemental information to the application, titled ''Supplement to Section 232 Petition'', which was submitted by U.S. Vanadium LLC and AMG Vanadium LLC on April 2, 2020, on *http://www.regulations.gov.* BIS has posted this application for an investigation and supplemental information in the interests of transparency and is allowing for additional public comments related to the application and supplemental information. The public versions of the exhibits are available online, except for those exhibits, which are noted with the bracketed text [CBI] (*see* the **ADDRESSES** section), containing confidential business information, which were not susceptible to public summarization.

BIS has confirmed with U.S. Vanadium LLC and AMG Vanadium LLC that all confidential information, including business proprietary information, has been properly redacted (as indicated by the presence of bracketing) from the public versions of the application and supplemental information posted on *http://www.regulations.gov.* Where text has been omitted from what has been posted the presence of confidential information is indicated by bracketing, with the confidential text omitted.

Matthew S. Borman,

Deputy Assistant Secretary for Export Administration.

[FR Doc. 2020–21243 Filed 9–24–20; 8:45 am]

BILLING CODE 3510–33–P

DEPARTMENT OF COMMERCE

International Trade Administration

[A–580–839]

Polyester Staple Fiber From the Republic of Korea; Rescission of Antidumping Duty Administrative Review; 2019–2020

AGENCY: Enforcement and Compliance, International Trade Administration, Department of Commerce.

SUMMARY: The Department of Commerce (Commerce) is rescinding the administrative review of the antidumping duty (AD) order on polyester staple fiber from the Republic of Korea (Korea) for the period of review (POR) May 1, 2019, through April 30, 2020, based on the timely withdrawal of the requests for review.

DATES: Applicable May 1, 2020.

FOR FURTHER INFORMATION CONTACT: Jason Willoughby, AD/CVD Operations, Office I, Enforcement and Compliance, International Trade Administration, U.S. Department of Commerce, 1401 Constitution Avenue NW, Washington, DC 20230; telephone: 202–482–5509.

SUPPLEMENTARY INFORMATION:

Background

On May 1, 2020, Commerce published a notice of opportunity to request an administrative review of the AD order on polyester staple fiber from Korea for the POR of May 1, 2019, through April 30, 2020.[1] On May 29, 2019, Commerce received timely-filed requests from DAK Americas LLC and Auriga Polymers, Inc. (the petitioners) [2] for administrative reviews of Huvis Corporation (Huvis) and Toray Chemical Korea, Inc. (Toray) and from Huvis [3] for administrative review of itself, in accordance with section 751(a) of the Tariff Act of 1930, as amended (the Act), and 19 CFR 351.213(b). Commerce received no other requests for administrative review.

On July 10, 2020, pursuant to these requests, and in accordance with 19 CFR 351.221(c)(1)(i), Commerce initiated an administrative review of the AD order on polyester staple fiber from Korea.[4] On July 20, 2020, the petitioners withdrew their request for an administrative review of Toray.[5] On August 3, 2020, the petitioners withdrew their request for an administrative review of Huvis.[6] On August 3, 2020, Huvis withdrew its request for an administrative review of itself.[7]

Rescission of Review

Pursuant to 19 CFR 351.213(d)(1), Commerce will rescind an administrative review, in whole or in part, if a party that requested a review withdraws the request within 90 days of the publication date of the notice of initiation of the requested review. The petitioners and Huvis withdrew their requests within 90 days of the publication date of the notice of initiation. No other parties requested an administrative review of the order. Therefore, in accordance with 19 CFR 351.213(d)(1), we are rescinding the administrative review of the AD order on polyester staple fiber from Korea covering May 1, 2019, through April 30, 2020, in its entirety.

Assessment

Commerce intends to instruct U.S. Customs and Border Protection (CBP) to assess antidumping duties on all appropriate entries of polyester staple fiber from Korea during the POR at rates equal to the cash deposit of estimated antidumping duties required at the time of entry, or withdrawal from warehouse, for consumption in accordance with 19 CFR 351.212(c)(1)(i). Commerce intends to issue appropriate assessment instructions to CBP 15 days after the date of publication of this notice in the **Federal Register**.

Notification to Importers

This notice serves as a final reminder to importers of their responsibility under 19 CFR 351.402(f)(2) to file a certificate regarding the reimbursement of antidumping duties prior to liquidation of the relevant entries during this review period. Failure to comply with this requirement could result in Commerce's presumption that reimbursement of antidumping duties occurred and the subsequent assessment of doubled antidumping duties.

Administrative Protective Orders

This notice also serves as a reminder to all parties subject to administrative protective order (APO) of their responsibility concerning the disposition of proprietary information disclosed under APO in accordance with 19 CFR 351.305, which continues to govern business proprietary information. Timely written notification of the return/destruction of APO materials or conversion to judicial protective order is hereby requested. Failure to comply with the regulations and terms of an APO is a violation which is subject to sanction.

Notification to Interested Parties

This notice is issued and published in accordance with sections 751(a)(1) and 777(i)(1) of the Act, and 19 CFR 351.213(d)(4).

[1] *See Antidumping or Countervailing Duty Order, Finding, or Suspended Investigation; Opportunity to Request Administrative Review,* 85 FR 25394 (May 1, 2020).

[2] *See* Petitioners' Letter, ''Polyester Staple Fiber—Review Request,'' dated May 29, 2020.

[3] *See* Huvis's Letter, ''Certain Polyester Staple fiber from Korea; Request for Administrative Review for 2019–2020 Period,'' dated June 1, 2020.

[4] *See Initiation of Antidumping and Countervailing Duty Administrative Reviews,* 85 FR 41540 (July 10, 2020).

[5] *See* Petitioners' Letter, ''Polyester Staple Fiber from Korea—Withdrawal of Review Request for Toray Chemical Korea,'' dated July 20, 2020.

[6] *See* Petitioners' Letter, ''Polyester Staple Fiber from Korea—Withdrawal of Review Request for Huvis Corporation,'' dated August 3, 2020.

[7] *See* Huvis's Letter, ''Certain Polyester Staple Fiber from Korea; Withdrawal of Request for Administrative Review for 2019–2020 Period,'' dated August 2, 2019.

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OMB Control Number: 0694-0120
Expiration Date: December 31, 2020

Section 232 Investigation into Imports of Vanadium

SCOPE OF ASSESSMENT

The U.S. Department of Commerce, Bureau of Industry and Security (BIS), Office of Technology Evaluation (OTE), is conducting a survey of the U.S. vanadium industry. The survey results will be used to support an ongoing investigation on the effect of imports of vanadium products on the U.S. national security initiated under Section 232 of the Trade Expansion Act of 1962, as amended.

The principal goal of this survey is to assist the U.S. Department of Commerce in determining whether vanadium imports are being imported into the United States in such quantities or under such circumstances as to threaten to impair the national security. Information collected will include facilities and production data, capacity utilization, customers, sales and demand data, employment information, conditions of domestic and global competition, research and development, and other factors. The resulting data will provide the U.S. Department of Commerce detailed vanadium industry information that is otherwise not publicly available and needed to effectively conduct this Section 232 investigation.

RESPONSE TO THIS SURVEY IS REQUIRED BY LAW

A response to this survey is required by law (50 U.S.C. Sec. 4555). Failure to respond can result in a maximum fine of $10,000, imprisonment of up to one year, or both. Information furnished herewith is deemed confidential and will not be published or disclosed except in accordance with Section 705 of the Defense Production Act of 1950, as amended (50 U.S.C. Sec. 4555). Section 705 prohibits the publication or disclosure of this information unless the President determines that its withholding is contrary to the national defense. Information will not be shared with any non-government entity, other than in aggregate form. The information will be protected pursuant to the appropriate exemptions from disclosure under the Freedom of Information Act (FOIA), should it be the subject of a FOIA request.

Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number.

BURDEN ESTIMATE AND REQUEST FOR COMMENT

Public reporting burden for this collection of information is estimated to average 10 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information to BIS Information Collection Officer, Room 6883, Bureau of Industry and Security, U.S. Department of Commerce, Washington, D.C. 20230, and to the Office of Management and Budget, Paperwork Reduction Project (OMB Control No. 0694-0120), Washington, D.C. 20503.

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	General Instructions
A.	Your organization is required to complete this survey of the U.S. vanadium industry, which can be downloaded from the BIS website: http://www.bis.doc.gov/Vanadium232 If you are unable to download the survey document, at your request, BIS survey support staff will e-mail the Excel survey template directly to you. For your convenience, a PDF version of the survey and required drop-down content is available on the BIS website to aid internal data collection. **DO NOT SUBMIT** the PDF version of the survey as your response to BIS. Should this occur, your organization will be required to resubmit the survey in the requested Excel format.
B.	Respond to every question. Surveys that are not fully completed will be returned for completion. Use the comment boxes to provide any information to supplement responses provided in the survey form. Make sure to record a complete answer in the space provided, even if the space does not appear to expand to fit all of the information. **DO NOT CUT AND PASTE RESPONSES WITHIN THIS SURVEY OR PASTE IN RESPONSES FROM OUTSIDE THE SURVEY**. Survey inputs should be completed by typing in responses or by using a drop-down menu. The use of cut and paste can corrupt the survey template. If your survey response is corrupted as a result of cut and paste response, your survey will be rejected and your organization must immediately resubmit the survey.
C.	**Do not disclose any USG classified information in this survey form.**
D.	Upon completion of the survey, final review, and certification, **transmit the survey document via e-mail to**: Vanadium232@bis.doc.gov
E.	Questions related to the survey should be directed to BIS survey support staff at Vanadium232@bis.doc.gov E-mail is the preferred method of contact. You may speak with a member of the BIS survey support staff by calling (202) 482-5481.
F.	For questions related to the overall scope of this Section 232 Investigation, contact Vanadium232@bis.doc.gov or: Jason D. Bolton Program Manager, Industrial Studies BIS/Export Administration/Office of Technology Evaluation 1401 Constitution Avenue, NW, Room 1093 Washington, DC 20230 **DO NOT** submit completed surveys to Mr. Bolton's postal or personal e-mail address. All surveys must be submitted electronically to: Vanadium232@bis.doc.gov

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Definitions

Term	Definition
Authorizing Official	An executive officer of the organization or business unit or another individual who has the authority to execute this survey on behalf of the organization.
Capital Expenditures	Investments made by an organization in buildings, equipment, property, and systems where the expense is depreciated. This does not include expenditures for consumable materials, other operating expenses, and salaries associated with normal business operations.
Co-Production	The process of extracting vanadium from titaniferous magnetite ores during steel production.
Critical Infrastructure	Sectors whose assets, systems, and networks, whether physical or virtual, are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health and safety, or any combination thereof.
Customer	Any organization (external or internal entity) for which your organization manufactures/processes any product comprised of, or containing, steel in any form.
Defense-related Sales/Activities	Any product or service that your organization produces that is ultimately used by the U.S. Government for defense purposes, whether by the armed services, the Department of Defense, or any other U.S. Government entity.
Development	The design, simulation, and testing of a prototype, including experimental software or hardware systems, to validate technological feasibility or concept of operation in order to reduce technological risk, or provide test systems prior to production approval.
Distributor	An independent selling agent who has a contract to sell the products of a manufacturer.
Exports	Shipments to destinations outside the United States.
Facility	A building or the minimum complex of buildings or parts of buildings that conduct steel production, in which an organization operates to serve a particular function, producing revenue, and incurring costs for the company. A facility may produce an item of tangible or intangible property or may perform a service. It may encompass a floor or group of floors within a building, a single building, or a group of buildings or structures. Often, a facility is a group of related locations at which organization employees work, together constituting a profit-and-loss center for the company, and it may be identified by a unique DUNS number.
Full Time Equivalent (FTE) Employees	Employees who work for 40 hours in a normal work week. Convert part-time employees into "full time equivalents" by taking their work hours as a fraction of 40 hours.
Global Headquarters	A location that serves as the organization’s hub of worldwide operations with all global branches or divisions reporting to it.
Harmonized Tariff Schedule (HTS)	A 10-digit numbering system that classifies a good based on its name, use, and/or the material used in its construction. The number provides Customs and Border Protection (CBP) with a standardized method of tracking all merchandise imported into the United States and sets out the tariff rates and statistical categories.
High Purity Vanadium Pentoxide	Vanadium pentoxide of at least 99% percent purity.
Import Value	Values reported should be landed, duty-paid values at the U.S. port of entry, including ocean freight and insurance costs, brokerage charges, and import duties (i.e., all charges except inland freight in the United States).
Inventory	The goods or materials an organization holds for its own use or for the ultimate goal of sale.

Definitions	
Term	**Definition**
Non-U.S. Facility	A facility that is physically located outside of the United States.
Organization	A company, firm, laboratory, or other entity that owns or controls one or more U.S. establishment or facility capable of designing and/or manufacturing steel products.
Primary/By-Product Production	The process of producing vanadium products from mining operations or in conjunction with mining operations for other minerals.
Product/Process Development	Conceptualization and development of steel product or steel production techniques prior to the production of the product for customers (i.e., utilities, governmental agencies etc.).
Production	The process of transforming inputs (raw materials, semi-finished goods, subassemblies, ideas, information, knowledge) into goods or services.
Research & Development	Basic and applied research in the engineering sciences, as well as design and development of prototype products and processes. Efforts that an organization conducts towards innovating, introducing and/or improving products and processes.
Sales	All reported and unreported sales of steel, including sales to end-users, producers, financial entities, intermediaries, traders, distributors, et al.
Secondary Production	The process of transforming waste materials (spent catalyst, slag, ash, residues, etc.) into vanadium products, including vanadium pentoxide, ferrovanadium, vanadium metals, and metal alloys that contain vanadium.
Single Source	An organization that is designated as the only accepted source for the supply of parts, components, materials, or services, even though other source with equivalent technical know-how and production capability may exist.
Sole Source	An organization that is the only source for the supply of parts, components, or services. No alternative U.S. or non-U.S. based suppliers exist other than the current supplier.
Supplier	An entity from which your organization obtains inputs, which may be goods or services. A supplier may be another organization with which you have a contractual relationship, or it may be another facility owned by the same parent organization.
Tipping/Recycling Fees	Fees collected for the recycling of waste or other vanadium-bearing products (Ash, Residues, Spent Catalysts, Vanadium Slag, Etc.) into vanadium products. This includes fees collected by secondary vanadium producers during the recycling of vanadium-bearing feedstocks into vanadium products.
Toll Production/Conversion Services	The process of converting one form of vanadium, typically vanadium pentoxide, into another form of vanadium, typically ferrovanadium.
Tollee	The firm who furnished inputs (i.e. vanadium pentoxide) to the Toller for conversion into a different vanadium product (i.e. ferrovanadium).
Toller	The firm who converted/produced vanadium inputs (i.e. vanadium pentoxide) into a different vanadium product (i.e. ferrovanadium) for the Tollee.
Vanadium Master Alloys	Master alloys produced from high purity vanadium pentoxide, including Aluminum-Vanadium master alloys (often containing 35% aluminum and 64.5% vanadium).
United States	The "United States" or "U.S." includes the 50 states, Puerto Rico, the District of Columbia, Guam, the Trust Territories, and the U.S. Virgin Islands.
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1. Organization Information

A.

Provide the following information for your organization	
Organization Name	
Street Address	
City	
State	
ZIP Code	
Country of Global Headquarters	
U.S. Point of Contact Name	
U.S. Point of Contact Email	
U.S. Point of Contact Phone	

B. Is this organization owned, in whole or in part, by any other entity? Indicate Yes/No, then identify the entities below, if applicable. List entities with at least 5% ownership.

Entity Name	Global Headquarters Street Address	Global Headquarters City	Global Headquarters State/Province	Global Headquarters Country	Ownership %

C. Identify the vanadium products that your organization currently uses/sources and sells/provides

Subject Products	Uses/Sources	Sells/Provides	HTSUS Code (10-digit level) Used for Import/Export
Vanadium Ores and Concentrates			
Vanadates			
Vanadium Carbides			
Vanadium Sulfates			
Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides			
Vanadium Pentoxide - Up to 99% purity			
High Purity Vanadium Pentoxide - 99%+ purity			
Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)			
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Vanadium Slag, Etc.)			
Ferrovanadium - Under 80% Vanadium			
Ferrovanadium - 80%+ Vanadium			
Vanadium Master Alloys			
Vanadium, Wrought and Unwrought (Excluding Master Alloys)			
Other (specify)			

Uses/Sources options: Import Only; Source Domestically Only; Source Domestically and Import; Not Applicable

Sells/Provides options: Export Only; Sell Domestically Only; Sell Domestically and Export; Not Applicable

D. At the global headquarters level, identify the total number of facilities that your organization currently operates, including standby/idle facilities, inside and outside the U.S., that manufacture and/or distribute any of the subject products listed below.

Subject Products	Number of U.S. Facilities		Number of Non-U.S. Facilities	
	Manufacture	Distribute Only	Manufacture	Distribute Only
Vanadium Ores and Concentrates				
Vanadates				
Vanadium Carbides				
Vanadium Sulfates				
Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides				
Vanadium Pentoxide - Up to 99% purity				
High Purity Vanadium Pentoxide - 99%+ purity				
Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)				
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Vanadium Slag, Etc.)				
Ferrovanadium - Under 80% Vanadium				
Ferrovanadium - 80%+ Vanadium				
Vanadium Master Alloys				
Vanadium, Wrought and Unwrought (Excluding Master Alloys)				
Other (Specify)				

Comments:	

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2. Facility Information

First, indicate in the box to the right how many of your organization's U.S. based facilities [including those idle, on standby, or under construction] are involved in the importation, distribution, production, or exploration of vanadium products.
Facilities supporting multiple product categories should be counted just once for the total number but duplicated for each product category supported in the facility description below.

Then, in accordance with the header, describe each U.S facility [including those idle, on standby, or under construction] involved in the importation, distribution or production of vanadium products.
Remember to duplicate the facility in a dedicated row for each product category supported. In addition to standby or idle facilities, include any facilities shut down since 2010 and facilities under construction.

A.

	Facility Name	City	State	Type of Facility	Product Category Supported	Current Operating Status			Reconstitution from Standby/Idle/Shutdown		Future Operating Status	Comments
						Current Operating Status	Start Date of Standby/Idle or Shutdown (MM/DD/YYYY)	Primary Reason for Standby/Idle or Shutdown	Months to Reconstitute	Estimated Cost to Reconstitute (Thousands USD)	Primary Change in 2020-2023	
1												
2												
3												
4												
5												
6												
7												
8												
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10												
11												
12												
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16												
17												
18												
19												
20												

Primary/By-Product Production
Secondary Production
Co-Production
Conversion Services
Master Alloy Production
Distribution Only
Other

Vanadium Ores and Concentrates
Vanadates
Vanadium Carbides
Vanadium Sulfates
Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides
Vanadium Pentoxide - Up to 99% Vanadium
High Purity Vanadium Pentoxide - 99%+ Vanadium
Other Vanadium Oxides and Hydroxides (excluding Pentoxide)
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.
Ferrovanadium - 40-60% Vanadium
Ferrovanadium - 80%+ Vanadium
Vanadium Master Alloys
Vanadium, Wrought and Unwrought (Excluding Master Alloys)
Other Vanadium-Related

Operating
Idle/Standby
Under Construction
Shutdown

Vanadium Price
Loss of Market Share to Imports
Loss of Market Share to Domestic Competition
Declining Demand
High Costs
Firm Restructuring
COVID-19/Pandemic
Other

Expansion
Upgrade
Starting Operations
Restarting Operations
Standby/Idle
Significant Modernization
Closure
None

B.

1	Briefly explain the scope of your organization's vanadium-related activities.
2	For each identified facility scheduled to incur a change in operating status in 2020-2023, describe the circumstances behind your decision.
3	For each identified idle/standby facility scheduled [or considering to schedule] for restart in 2020-2023, describe the circumstances behind your decision.

Comments:	

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3a. U.S. Production

In Part A, identify which vanadium products your organization has capabilites in, or could develop capabilities. Provide the requested details on production requirements.
In Part B, record the total annual quantity of each subject product your organization produced from 2016-2020 (YTD July). Remember to confirm the units of measurement. If your organization toll-produces any material, include the type and quantity produced here. If your organization is a tollee (i.e. provides material to a toller for conversion), do not record this production below.

If you only distribute and do not manufacture or plan to manufacture any of the subject vanadium products, indicate so here and move to the next section.		Do not include data on subject products that your organization only distributes.

A.

	Current Capability	If Interested/Idle, Time to Develop Capability (Months)	Investment Required to Develop Capability (Thousands USD)	Current Annual Production Capacity (Kg contained V)	Expected Future (2023) Annual Production Capacity (Kg contained V)	Utilization Rate Required to Remain Profitable	Average Cost to Produce per Kg contained Vanadium	Price V2O5 per Kg Required to Continue Operations
Vanadium Ores and Concentrates								
Vanadates								
Vanadium Carbides								
Vanadium Sulfates								
Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides								
Vanadium Pentoxide - Up to 99% purity								
High Purity Vanadium Pentoxide - 99%+ purity								
Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)								
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)								
Ferrovanadium - Under 80% Vanadium								
Ferrovanadium - 80%+ Vanadium								
Vanadium Master Alloys								
Vanadium, Wrought and Unwrought (Excluding Master Alloys)								

Yes
No
Idle
Interested in Developing

Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here:		

B.

	U.S. Production (Kg contained Vanadium)						
	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)	Comments
Vanadium Ores and Concentrates							
Vanadates							
Vanadium Carbides							
Vanadium Sulfates							
Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides							
Vanadium Pentoxide - Up to 99% purity							
High Purity Vanadium Pentoxide - 99%+ purity							
Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)							
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)							
Ferrovanadium - Under 80% Vanadium							
Ferrovanadium - 80%+ Vanadium							
Vanadium Master Alloys							
Vanadium, Wrought and Unwrought (Excluding Master Alloys)							

Comments:	

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3b. U.S. Sales and Exports

For your organization's U.S. operations, answer the following questions about revenues, sales, and exports. Record Sales $ in Thousands USD, e.g. $12,000.00 = survey input of $12. Average sales price per unit should be in USD. **If your organization is a toll producer, do not include sales of third-party converted vanadium materials below; if your organization is a tollee, record any vanadium sales below.**

For your organization's U.S. operations, by subject product category, record both your U.S. sales and exports (shipments from the U.S. to destinations outside the U.S.) from 2016-2020 (YTD July). Distributors must complete this section.

Vanadium Ores and Concentrates

	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
A.	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Kg ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Kg ($)						
	Percentage of Total 2019 Sales Attributable to Product						

Vanadates

	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
B.	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Kg ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Kg ($)						
	Percentage of Total 2019 Sales Attributable to Product						

Vanadium Carbides

	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
C.	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						

D.	**Vanadium Sulfates**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
E.	**Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
F.	**Vanadium Pentoxide - Up to 99% purity**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
G.	**High Purity Vanadium Pentoxide - 99%+ purity**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
H.	**Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
I.	**Vanadium Bearing Feedstocks (Ash, Residue, Spent Catalysts, Slag, Etc.)**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
J.	**Ferrovanadium - Under 80% Vanadium**						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						

	Ferrovanadium - 80%+ Vanadium						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
K.	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
	Vanadium Master Alloys						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
L.	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
	Vanadium, Wrought and Unwrought (Excluding Master Alloys)						
	Select 'Not Applicable' if category is not relevant to your operations						
	Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here						
M.	U.S. and Export Sales	2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
	U.S. Sales (Kg)						
	U.S. Sales (Thousands USD)						
	Average U.S. Sales Price per Unit ($)						
	Export Sales (Kg)						
	Export Sales (Thousands USD)						
	Average Export Sales Price per Unit ($)						
	Percentage of Total 2019 Sales Attributable to Product						
	Comments:						

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3c. Production Feedstock, End Uses, Substitutes, and Supply Disruptions

Answer the following questions related to your organization's manufacturing inputs and market end uses.

A. Estimate your organization's vanadium product end uses and associated end use attributes. If your organization solely distributes vanadium products and does not have insight into vanadium product end-uses, indicate so in the "Unknown" box in Row 9.

	Vanadium End Use	Percent of 2019 Production Attributable to End Use	Average Percent Cost of Vanadium Attributable to End Product Total Cost	Average Percent Vanadium Content Attributable to End Product	Primary Vanadium Product/Grade Needed for End Use	Substitutes Available for Vanadium Usage?	Indicate Primary Substitute, if relevant	Comments
1	Steel - High Strength Low Alloy							
2	Steel - Full Alloy							
3	Steel - Carbon							
4	Steel - Other							
5	Vanadium-Redox Flow Battery							
6	Aerospace (Master Alloys)							
7	Chemical							
8	Other - specify							
9	Unknown							
	Total of 1-9 (must equal 100%):	0%						

Vanadium Ores and Concentrates
Vanadates
Vanadium Carbides
Vanadium Sulfates
Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides
Vanadium Pentoxide - Up to 99% Vanadium
High Purity Vanadium Pentoxide - 99%+ Vanadium
Other Vanadium Oxides and Hydroxides (excluding Pentoxide)
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.
Ferrovanadium - 40-60% Vanadium
Ferrovanadium - 80%+ Vanadium
Vanadium Master Alloys
Vanadium, Wrought and Unwrought (Excluding Master Alloys)
Other Vanadium-Related

Yes, Substitute Preferred
Yes, Vanadium Preferred
No Substitute

Indicate whether your organization uses vanadium or vanadium-bearing feedstock to produce and/or sell other vanadium products. (including Toll production and recycling).

If you indicated Yes, answer the following questions:

B.

	Subject Product	Primary Feedstock Used to Produce Subject Product	Primary Original Country Source of Feedstock	Primary Reason for Sourcing Choice	Primary Alternate Feedstock, if Possible	Domestic Feedstock Sources Available?	Supply Disruption or Shortage Experienced?	Explain
1	Vanadates							
2	Vanadium Carbides							
3	Vanadium Sulfates							
4	Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides							
5	Vanadium Pentoxide - Up to 99% purity							
6	High Purity Vanadium Pentoxide - 99%+ purity							
7	Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)							
8	Ferrovanadium - Under 80% Vanadium							
9	Ferrovanadium - 80%+ Vanadium							
10	Vanadium Master Alloys							
11	Vanadium, Wrought and Unwrought (Excluding Master Alloys)							
	Since 2016, have feedstock sourcing issues impacted your organization's ability to fulfill contracts for vanadium products?		Explain:					
	Comments:							

Vanadium Ore and Concentrate
Vanadium Slag
Ash
Residues
Spent Catalysts
Vanadium Pentoxide - Up to 99% purity
High Purity Vanadium Pentoxide - 99%+ purity
Vanadates
Vanadium Carbides
Vanadium Sulfates
Vanadium Hydrides, Nitrides, Silicides, and Borides
Other
Not Applicable

Financial Consideration
Technical Specification
Relationship
Delivery
Other

Significant Domestic Sources
Limited Domestic Sources
No Domestic Sources

Ongoing
Past
Future Expected
None

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3d. Secondary and Toll Production (Conversion Services)

Answer the following questions regarding your organization's secondary production/recycling or toll production operations. **Record $ in Thousands USD, e.g. $12,000.00 = survey input of $12**

Tipping Fees and Other Processing/Recycling Fees

If your organization accrues tipping fees due to recycling or processing any vanadium-bearing materials, complete this question for the years 2016-2020 (YTD July).

Select 'Not Applicable' if your organization does not recycle/process vanadium-bearing materials, and continue to question 2.

1

		2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
Average Tipping/Recycling Fee Charged per Kg							
Total Tipping/Recycling Fees Accrued (Thousands USD)							
Net Tipping/Recycling Fees Accrued (Less Metals Credits) (Thousands USD)							
Total Facility Operating Costs (Thousands USD)							
Percent of Total Revenues Attributable to Tipping Fees							
Percent of Total Revenues Attributable to Vanadium Product Sales							
Average Vanadium Price Needed for Metals Credit to go to Refinery	(specify vanadium type)						
Average Percent of Sales Price Lost to Metals Credit/Refinery	(specify vanadium type)						

Vanadium Ores and Concentrates
Vanadates
Vanadium Carbides
Vanadium Sulfates
Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides
Vanadium Pentoxide - Up to 99% Vanadium
High Purity Vanadium Pentoxide - 99%+ Vanadium
Other Vanadium Oxides and Hydroxides (excluding Pentoxide)
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.
Ferrovanadium - 40-60% Vanadium
Ferrovanadium - 80%+ Vanadium
Vanadium Master Alloys
Vanadium, Wrought and Unwrought (Excluding Master Alloys)
Other Vanadium-Related

Do vanadium prices impact your organization's decision to perform recycling/processing operations?	Yes / No	Explain:
Does your organization's profitability depend on vanadium prices being above a certain level?		Explain:
Comments:		

Toll Production - Toller

Answer the following questions related to your organization's toll production operations, including the total tolling fees accrued, the total raw materials supplied, and the subsequent total end product quantity produced with the supplied feedstocks. Then, list your top ten customers (in descending order by volume) for 2019, the average percent revenue attributable to each, the quantity produced for each, and the primary country of feedstock origin for material supplied by each customer.

Select 'Not Applicable' if your organization does not operate as a toll producer, and continue to question 3.

Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here

2

		2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
Total Tolling Fees Accrued (Thousands USD)							
Raw Material Supplied	(Specify Type)						
Quantity Produced from Above Input	(Specify Type)						
Raw Material Supplied	(Specify Type)						
Quantity Produced from Above Input	(Specify Type)						

Customer Name	Percent Revenue Attributable to Customer	Total Quantity Produced - 2019	Primary Country of Feedstock Origin	Comments

Vanadium Ores and Concentrates
Vanadates
Vanadium Carbides
Vanadium Sulfates
Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides
Vanadium Pentoxide - Up to 99% Vanadium
High Purity Vanadium Pentoxide - 99%+ Vanadium
Other Vanadium Oxides and Hydroxides (excluding Pentoxide)
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.
Ferrovanadium - 40-60% Vanadium
Ferrovanadium - 80%+ Vanadium
Vanadium Master Alloys
Vanadium, Wrought and Unwrought (Excluding Master Alloys)
Other Vanadium-Related

Comments:

Toll Production - Tollee

Answer the following questions related to your organization's U.S. tollee operations including the total conversion/tolling fees paid, the total raw materials supplied, and the subsequent total end product quantity returned and available for sale from the converted feedstocks. Then, list the top three toll organization's used to convert material in 2019, and the total percent quantity attributable to each organization.

Select 'Not Applicable' if your organization does not operate as a tollee firm, and continue to the next section.

Record data in Kg contained vanadium. If unable to record data in Kg contained vanadium, indicate unit used here

3

		2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
Total Conversion/Tolling Fees Paid (Thousands USD)							
Total Raw Material Supplied to Toller	(Specify Type)						
Total Material Available for Sale (Returned by Toller)	(Specify Type)						
Total Raw Material Supplied to Toller	(Specify Type)						
Total Material Available for Sale (Returned by Toller)	(Specify Type)						

Toller Name	Percent Tolled Attributable to Toller

Comments:

Comments:

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4. Suppliers/Imports

For each product category involving purchases by your organization from 2016-2020 (YTD July), including both U.S., non-U.S., and import purchases, record all header criteria describing said procurements. If your organization operates conversion services/toll produces vanadium material, do not include material supplied by customers for conversion here. **Record $ in Thousands USD, e.g. $12,000.00 = survey input of $12**

Vanadium Ores and Concentrates

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

Percentage of Purchases that are Imported

A.

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Yes
No

Customs/Port Issue
Disease/Quarantine
Labor Disruption
Natural Disaster
Supplier Ended Production
Supplier Production Delays
Supplier Went Out of Business
Trade Dispute/Tariffs
Transportation Issue
Other

Single Source
Sole Source
Neither

Steel - High Strength Low Alloy
Steel - Full Alloy
Steel - Carbon
Steel - Other
Vanadium-Redox Flow Battery
Aerospace (Master Alloys)
Other

Financial Consideration
Technical Specification
Relationship
Delivery
Other

Vanadates

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

Percentage of Purchases that are Imported

B.

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Vanadium Carbides

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

Percentage of Purchases that are Imported

C.

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Vanadium Sulfates

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

Percentage of Purchases that are Imported

D.

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides

E.

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)

Percentage of Purchases that are Imported

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Vanadium Pentoxide - Up to 99% purity

F.

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)

Percentage of Purchases that are Imported

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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High Purity Vanadium Pentoxide - 99%+ purity

G.

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)

Percentage of Purchases that are Imported

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)

H.

Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)

Percentage of Purchases that are Imported

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)

I. Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
Percentage of Purchases that are Imported												

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Ferrovanadium - Under 80% Vanadium

J. Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
Percentage of Purchases that are Imported												

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Ferrovanadium - 80%+ Vanadium

K. Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
Percentage of Purchases that are Imported												

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Vanadium Master Alloys

L. Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
Percentage of Purchases that are Imported												

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Vanadium, Wrought and Unwrought (Excluding Master Alloys)

M. Identify your total number of suppliers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide in Kg contained vanadium, indicate unit used here:

Record your total purchases for this product category by volume and value for each applicable year.

	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
Percentage of Purchases that are Imported												

	Supplier Name (in descending order by period volume)	Country of Fabrication	Country of Feedstock Origin	Common Ownership With Your Organization?	Primary Source of Disruption Experienced, If Applicable	Single/Sole Source?	Primary End-Use	Top Factor Influencing Purchase from Supplier	2016 Volume	2016 Value ($000)	2017 Volume	2017 Value ($000)	2018 Volume	2018 Value ($000)	2019 Volume	2019 Value ($000)	2019 (YTD July) Volume	2019 (YTD July) Value ($000)	2020 (YTD July) Volume	2020 (YTD July) Value ($000)
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Comments:

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5. Customers/Exports

For each product category involving shipments by your organization from 2016-2020 (YTD July), including U.S. internal and U.S. export shipment but excluding shipments from non-U.S. locations, record all header criteria describing the shipments. *Find your location's North American Industry Classification System (NAICS) codes at http://www.census.gov/epcd/www/naics.html.

Record $ in Thousands USD, e.g. $12,000.00 = survey input of $12

Vanadium Ores and Concentrates

Identify your total number of current customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

A.

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Primary Industry/Sector Represented by Customer (NAICS - 6-Digit Code)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Yes
No

Steel - High Strength Low Alloy
Steel - Full Alloy
Steel - Carbon
Steel - Other
Vanadium-Redox Flow Battery
Aerospace (Master Alloys)
Other

Vanadates

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

B.

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium Carbides

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

C.

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium Sulfates

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

D.

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides

E.

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium Pentoxide - Up to 99% purity

F.

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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High Purity Vanadium Pentoxide - 99%+ purity

G.

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)

H.

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)

I.

Identify your total number of customers for this product category. If none, input 0.

Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:

	Customer Name (in descending order by period volume)	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Ferrovanadium - Under 80% Vanadium

J.

Identify your total number of customers for this product category. If none, input 0.	
Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:	

	Customer Name	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Ferrovanadium - 80%+ Vanadium

K.

Identify your total number of customers for this product category. If none, input 0.	
Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:	

	Customer Name	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium Master Alloys

L.

Identify your total number of customers for this product category. If none, input 0.	
Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:	

	Customer Name	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Vanadium, Wrought and Unwrought (Excluding Master Alloys)

M.

Identify your total number of customers for this product category. If none, input 0.	
Record data in Kg contained vanadium. If unable to provide data in Kg contained vanadium, indicate unit used here:	

	Customer Name	Country Destination	Common Ownership With Your Organization?	Primary End Use of Product	Industry/Sector Represented by Customer (NAICS)	2016		2017		2018		2019		2019 (YTD July)		2020 (YTD July)	
						Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)	Volume	Value ($000)
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Comments:	

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6. Financials

Provide the following financial line items for your location for the 2016 - 2020 (YTD July) period. For 2019 (YTD July) and 2020 (YTD July), record the closest possible numbers for the requested time period.

Source of Income Statement Items:

Income Statement (Select Line Items) — **Record $ in Thousands, e.g. $12,000.00 = survey input of $12**

			2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
1	A.	Net Sales (and other revenue)						
	1	*Defense-Related Sales Percentage*						
	2	*Non-U.S. Sales Percentage*						
	B.	Cost of Sales / Cost of Goods Sold						
	C.	Depreciation and Amortization						
	D.	Total Operating Income (Loss)						
	E.	Earnings Before Interest and Taxes						
	F.	Net Income						

Source of Balance Statement Items:

Balance Sheet (Select Line Items) — **Record $ in Thousands, e.g. $12,000.00 = survey input of $12**

			2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
2	A.	Cash						
	B.	Inventories						
	C.	Current Assets						
	D.	Total Assets						
	E.	Current Liabilities						
	F.	Total Liabilities						
	G.	Retained Earnings						
	H.	Total Owner's Equity						

Source of Other Items:

Other Select Items — **Record $ in Thousands, e.g. $12,000.00 = survey input of $12**

			2016	2017	2018	2019	2019 (YTD July)	2020 (YTD July)
3	A.	Research & Development (R&D) Expenditure						
	1	*National Security/Critical Infrastructure-Related R&D Percentage (see Definitions tab)*						
	B.	Capital Expenditure (CapEx)						
	1	*National Security/Critical Infrastructure-Related CapEx Percentage (see Definitions tab)*						
	C.	Total Security Expenditures						
	1	*Cybersecurity Expenditures Percentage*						
	2	*Physical Security Expenditures Percentage*						

Is your organization involved in any R&D work with the U.S. Department of Defense?		If yes, answer the following questions.

		Program Name	Contract Number
4	A.		
	B.		
	C.		

Comment:	

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Data Confirmation
2019 Net Sales
None

Location
Division/Business Unit
Corporate/Whole Organization

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7. Employment

Record the total number of full time equivalent (FTE) employees and contractors for the 2016 to 2020 period for U.S. facilities that produce subject products.

		2016	2017	2018	2019	2020 (Current)
A	FTE Employees					
	FTE Contractors					
	Production Line FTE Employees or Contractors					

Identify the key workforce issues your organization has experienced or anticipates in the next five years.

	Issue		Primary Occupation Affected	Timeframe	Explain
B	Attracting Workers to Location				
	Employee Turnover				
	Finding Experienced Workers				
	Finding Qualified Workers				
	Finding U.S. Citizens				
	Significant Portion of Workforce Retiring				
	Other	(specify)			
	Other	(specify)			
C	For 2019, indicate the percentage of your organization's total operating costs represented by personnel-related expenditures.				
D	Describe any significant changes in the recruitment, hiring and/or retension of human capital as a consequence of volatile vanadium prices.				
E	If you resumed operations at an idled or shutdown facility, do you reasonably anticipate being able to hire or rehire workers? Provide an estimate of how long it would take to restore requisite personnel levels in the Explain box.			Explain:	

Ongoing, Expected to Continue
Past Only (Resolved)
Expected In Future
No or Not Applicable

Engineers
Information Technology Workers
Production Line workers
Scientists
Testing Operators, QC, & Support
Technicians
Other
None

Comments:	

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8. National Defense Support

A	Since 2016, has your organization directly or indirectly supplied any of the subject product categories for incorporation into U.S. defense systems or related installations? If no, proceed to the next tab. If yes, complete sections B, C and D.	

B — From the list of U.S. Government agencies below, select those whose systems you supported between 2016 and 2020 YTD.

U.S. Air Force		U.S. Coast Guard		Department of Energy (including National Labs)	
U.S. Army		U.S. Intelligence Community (such as CIA, NGA, NRO, NSA)		Other	(Identify Agency)
U.S. Marine Corps		Missile Defense Agency (MDA)		Other	(Identify Agency)
U.S. Navy		Defense Logistics Agency		Other	(Write-In)

C — In accordance with the header criteria, indicate which product categories you directly or indirectly provide for U.S. defense systems, installations or known U.S. defense end uses.

	Product	Defense Support?	Percentage of 2019 Sales Attributable to Defense Sales	Primary DOD ACAT/MDAP Supported, if known*	Comments
1	Vanadium Ores and Concentrates				
2	Vanadates				
3	Vanadium Carbides				
4	Vanadium Sulfates				
5	Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides				
6	Vanadium Pentoxide - Up to 99% purity				
7	High Purity Vanadium Pentoxide - 99%+ purity				
8	Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)				
9	Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)				
10	Ferrovanadium - Under 80% Vanadium				
11	Ferrovanadium - 80%+ Vanadium				
12	Vanadium Master Alloys				
13	Vanadium, Wrought and Unwrought (Excluding Master Alloys)				

Defense Support? dropdown: Direct; Indirect; Both; None; Unknown

Primary DOD ACAT/MDAP Supported, if known* dropdown: Vanadium Ores and Concentrates; Vanadates; Vanadium Carbides; Vanadium Sulfates; Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides; Vanadium Pentoxide - Up to 99% Vanadium; High Purity Vanadium Pentoxide - 99%+ Vanadium; Other Vanadium Oxides and Hydroxides (excluding Pentoxide); Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.; Ferrovanadium - 40-60% Vanadium; Ferrovanadium - 80%+ Vanadium; Vanadium Master Alloys; Vanadium, Wrought and Unwrought (Excluding Master Alloys); Other Vanadium-Related

*U.S. Department of Defense Acquisition Category (ACAT) and Major Defense Acquisition Program (MDAP)

D.

		DO Rated	DX Rated
1	Since 2018, provide the number of priority rated contracts or orders under the Defense Priorities and Allocations System (DPAS) regulation (15 CFR part 700) that you have received by their level of priority (DO or DX).		
2	Since 2018, provide the number of priority rated contracts or orders you have placed with other entities by their level of priority.		
3	Since 2018, indicate which of your subject product categories has most frequently received a priority rated contract or order.		

Comments:	

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9. Critical Infrastructure

A

Describe your organization's support for each Critical Infrastructure Sector in accordance with the header criteria.

Definitions of each sector may be found at: https://www.dhs.gov/cisa/critical-infrastructure-sectorsectors

Critical Infrastructure Sector	Sector Support	Primary Product Support	Primary Customer Associated with Sector/Product Support	Explain
Chemical Sector				
Commercial Facilites Sector				
Communications Sector				
Critical Manufacturing Sector				
Dams Sector				
Defense Industrial Base Sector				
Emergency Services Sector				
Energy Sector				
Financial Services Sector				
Food and Agriculture Sector				
Government and Facilities Sector				
Healthcare and Public Health Sector				
Information Technology Sector				
Nuclear Reactors, Materials, and Waste Sector				
Transportation Systems Sector				
Waste and Wastewater Systems Sector				

Vanadium Ores and Concentrates
Vanadates
Vanadium Carbides
Vanadium Sulfates
Vanadium Hydrides, Sulfides, Nitrides, Silicides, and Borides
Vanadium Pentoxide - Up to 99% Vanadium
High Purity Vanadium Pentoxide - 99%+ Vanadium
Other Vanadium Oxides and Hydroxides (excluding Pentoxide)
Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.
Ferrovanadium - 40-60% Vanadium
Ferrovanadium - 80%+ Vanadium
Vanadium Master Alloys
Vanadium, Wrought and Unwrought (Excluding Master Alloys)
Other Vanadium-Related

B. How have current market conditions involving the subject product categories affected your ability to meet current Critical Infrastructure Sector requirements?

C. Do you recommend any actions by the U.S. Government to better facilitate your ability to meet current Critical Infrastructure Sector requirements?

Comments:

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10. Competition and Trade

A. Since 2018, by subject product category and in accordance with the header criteria, has there been a significant change in import competition? Do not limit your organization's response to the categories in which you operate if you also have visibility into other product category imports.

	Product Category	Change in Import Competition	Primary Source Country of Import Competition	Impact on Your Organization	Explain
1	Vanadium Ores and Concentrates				
2	Vanadates				
3	Vanadium Carbides				
4	Vanadium Sulfates				
5	Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides				
6	Vanadium Pentoxide - Up to 99% purity				
7	High Purity Vanadium Pentoxide - 99%+ purity				
8	Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)				
9	Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)				
10	Ferrovanadium - 40-60% Vanadium				
11	Ferrovanadium - 80%+ Vanadium				
12	Vanadium Master Alloys				
13	Vanadium, Wrought and Unwrought (Excluding Master Alloys)				

Increase
Decrease
No Change

Positive
Negative
Neutral

B. Do you anticipate any impact on your business due to future imports of subject products into the United States from any country? Indicate your anticipated primary future source of import competition, the impact this competition will likely have on your organization, and explain.

	Product Category	Primary Future Source of Import Competition	Primary Impact from Import Competition	Explain
1	Vanadium Ores and Concentrates			
2	Vanadates			
3	Vanadium Carbides			
4	Vanadium Sulfates			
5	Vanadium Hydrides, Nitrides, Azides, Silicides, and Borides			
6	Vanadium Pentoxide - Up to 99% purity			
7	High Purity Vanadium Pentoxide - 99%+ purity			
8	Other Vanadium Oxides and Hydroxides (Excluding Pentoxide)			
9	Vanadium-Bearing Feedstocks (Ash, Residues, Spent Catalysts, Slag, Etc.)			
10	Ferrovanadium - 40-60% Vanadium			
8	Ferrovanadium - 80%+ Vanadium			
9	Vanadium Master Alloys			
10	Vanadium, Wrought and Unwrought (Excluding Master Alloys)			

C. Identify the primary challenges/issues affecting your competitive position in the overall [U.S. and non-U.S.] subject product markets. Rank the leading 5 most significant challenges (1 being the most important issue/impact; 2 being the next most important issue/impact, etc.). Explain your response.

	Challenge/Issue	Challenge Experienced?	Rank Top 5	Explain
1	Aging equipment, facilities, or infrastructure			
2	Aging workforce			
3	Counterfeit parts			
4	Cyber security			
5	Domestic competition			
6	Environmental regulations/remediation			
7	Export controls/ITAR & EAR			
8	Financing/credit availability			
9	Foreign competition			
10	Government acquisition process			
11	Government purchasing volatility			
12	Government regulatory burden			
13	Healthcare			
14	Industrial espionage - domestic			
15	Industrial espionage - foreign			
16	Input availability			
17	Intellectual property/patent infringement			
18	Labor availability/costs			
19	Natural disasters (including disease/quarantine)			
20	Obsolescence			
21	Pension costs			
22	Proximity to customers			
23	Proximity to suppliers			
24	Qualifications/certifications			
25	Quality of inputs			
26	R&D costs			
27	Reduction in USG demand			
28	Taxes			
29	Trade disputes/tariffs			
30	Worker/skills retention			
31	Other (specify)			
32	Other (specify)			

D. Describe one of the five leading challenges/issues affecting your organization's competitive position in the marketplace for subject product categories. Then, describe in detail both how long and in what manner this leading challenge/issue has affected your competitive position in the marketplace.

	Challenge/Issue	How long and in what manner has this affected your competitive position in the market for subject products? Describe.
1	(specify)	
2	How can the U.S. Government aid in the response to/mitigation of this challenge?	

Comments:	

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11. COVID-19 Impacts

A. Identify any impacts or actions resulting from the COVID-19 pandemic at your organization, ranking the three most significant impacts and three most important actions (1 being the most important impact/action; 2 being the next most important impact/action, etc.):

Impacts Experienced		-Yes/No-	Rank Top 3	Actions Taken		Short Term/ Long Term	Rank Top 3
Increased cost of materials				Reduce workforce			
Inability to access work location				Increase online/remote work capabilities			
Inability to fulfill contracts				Seek government assistance			
Reduced sales				Delay or reject new contracts			
Foreign supplier manufacturing delays				Begin to produce pandemic-related products			
Domestic supplier manufacturing delays				Increase use of domestic suppliers			
Increased demand				Reduce use of suppliers located in China			
Transportation-based disruptions				Reduce use of suppliers located outside the U.S. and China			
Financing difficulties				Increase inventories			
Labor shortages				Increase supplier redundancy			
Other	(specify)			Other	(specify)		
Other	(specify)			Other	(specify)		

Identify any USG actions that could have better mitigated/prevented COVID-19 impacts to your organization:	
Identify any USG actions that will limit future COVID-19-related impacts to your organization:	
Comments:	

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12. Certification

The undersigned certifies that the information herein supplied in response to this questionnaire is complete and correct to the best of his/her knowledge. It is a criminal offense to willfully make a false statement or representation to any department or agency of the United States Government as to any matter within its jurisdiction (18 U.S.C. 1001 (1984 & SUPP. 1197)).

Once your organization has completed this survey, save a copy and submit it via email to Vanadium232@bis.doc.gov. Be sure to retain your survey for your records and to facilitate any necessary edits or clarifications.

Organization Name	
Organization's Internet Address	
Name of Authorizing Official	
Title of Authorizing Official	
E-mail Address	
Phone Number and Extension	
Date Certified	

In the box below, provide any additional comments or any other information you wish to include regarding this survey assessment.

How many hours did it take to complete this survey?	

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