



2018 Minerals Yearbook

TANTALUM [ADVANCE RELEASE]

TANTALUM

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In 2018, U.S. tantalum apparent consumption (measured in contained tantalum) was 977 metric tons (t), an increase of 8% compared with that of 2017 (table 1). No domestic mine production of tantalum ore was reported. Estimated world tantalum mine production was 1,890 t, a slight increase from the revised world production in 2017 (tables 1, 4). The United States imported 1,660 t of tantalum contained in alloys, metals, ores, and concentrates, 14% more than that of 2017 (table 1). In the same period, the United States exported 681 t of tantalum contained in tantalum-bearing metal, alloys, ores, and concentrates, 24% more than in 2017. Traded tantalum materials included chemicals, potassium hepta-fluorotantalate (commercially known as K-salt), tantalum metal, residue, scrap, slag, and tantalum ores and concentrates. The principal uses of tantalum were in electronic capacitors and in superalloys for aircraft engines and turbines.

K-salt and tantalum oxide (Ta_2O_5) do not have unique Harmonized Tariff Schedule of the United States (HTS) codes. As a result, a potentially significant part of tantalum material trade is undocumented.

Legislation and Government Programs

Tantalum was first added to the U.S. Government stockpile in 1942 in the form of tantalite ore (DeMille, 1947, p. 479). The Defense Logistics Agency Strategic Materials (DLA Strategic Materials), U.S. Department of Defense, designated a maximum quantity of 1,710 kilograms (kg) of tantalum carbide powder and 86 kg of tantalum scrap for disposal from the National Defense Stockpile under its fiscal year 2019 Annual Materials Plan (Defense Logistics Agency Strategic Materials, 2018b). DLA Strategic Materials designated a maximum quantity of 15.4 t of tantalum for potential acquisition (Defense Logistics Agency Strategic Materials, 2018a).

In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals, including tantalum (U.S. Department of the Interior, 2018). This list was developed to serve as an initial focus, pursuant to Executive Order 13817, “A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals,” issued in December 2017 by the President of the United States aimed at reducing the vulnerability of supply-chain disruptions for critical minerals. The Executive order defined a critical mineral as (1) a nonfuel mineral or mineral material essential to the U.S. economy and national security, (2) vulnerable to supply-chain disruption, and (3) essential in the manufacturing of a product whose absence would have significant consequences for the U.S. economy and national security (Trump, 2017).

Production

Globally, tantalite and columbite-tantalite (also referred to as “coltan”) were the leading minerals mined for tantalum. The primary marketable tantalum materials were tantalum metal (unwrought and wrought alloys, metal, and powder), ore, and scrap. Tantalum resources in the United States were of low grade, some mineralogically complex, and most were not commercially recoverable at 2018 prices. As a result, domestic supply has been a concern. In 2018, no domestic tantalum mine production was reported. Recycled materials and stocks were the only domestic supply sources of tantalum. Companies in the United States produced tantalum alloys, compounds, and metal from imported tantalum-containing materials and from foreign and domestic scrap, but the available information was inadequate for a reliable estimate of output. World tantalum resources and mining capacities were concentrated in Australia, Brazil, Canada, China, Congo (Kinshasa), Nigeria, and Rwanda. Current world tantalum reserves are adequate to meet anticipated global consumption.

Consumption

Domestic consumption data for tantalum materials were developed by the U.S. Geological Survey by means of the “Columbium (Niobium) and Tantalum,” “Consolidated Consumers,” and “Specialty Ferroalloys” surveys. For tantalum materials, no consumers responded to the “Columbium (Niobium) and Tantalum” canvass, 16 responded to the “Consolidated Consumers” canvass, and 1 responded to the “Specialty Ferroalloys” canvass.

U.S. apparent domestic consumption of tantalum was 977 t in 2018, an increase of 8% compared with that of 2017 (table 1). This increase may be attributed to an increase in the domestic use of unwrought tantalum metal, which was 432 t of contained Ta in 2018, compared with 264 t in 2017. ATI Specialty Alloys and Components (Pittsburgh, PA), Global Advanced Metals USA, Inc. (Waltham, MA), H.C. Starck Inc. (Newton, MA), and KEMET Corp. (Simpsonville, SC) consumed tantalum feed materials to produce intermediate tantalum materials used in industrial manufacturing processes and products.

Prices

Trade information on tantalum materials was not publicly available; purchase contracts were confidential between buyer and seller. However, trade journals reported composite prices of tantalite based on interviews with buyers and sellers, and traders declared the value of tantalum materials that they

imported or exported to or from the United States (table 1). In 2018, the annual average price of tantalite ore increased by 11% to \$214 per kilogram of contained Ta_2O_5 , from that of 2017. In December, the average monthly tantalite ore price was \$185 per kilogram of contained Ta_2O_5 , down 4% from \$193 per kilogram of contained Ta_2O_5 in January and down 23% from the 2018 high in July of \$241 per kilogram of contained Ta_2O_5 (fig. 1; CRU Group, 2019). Prior to February 2018, tantalite ore prices had remained at \$193 per kilogram of contained Ta_2O_5 since November 2014. The increases in price in 2018 were thought to have resulted from a combination of increased demand from downstream consumers, increased royalties on exports of columbite-tantalite ore signed into law by the Government of Congo (Kinshasa), and unexpected interruptions in production in 2017 and 2018 that led major tantalum processors to source tantalum raw materials from the spot market (Anderson, 2018; Roskill Information Services Ltd., 2018d). News sources attributed the price decrease in the second half of 2018 to a new supply of low-cost byproduct tantalum concentrates from lithium operations in Australia and decreased consumption by processors in China (Argus Metals International, 2018; Roskill Information Services Ltd., 2018b).

Based on U.S. Census Bureau data, in 2018 the average unit value (gross weight basis) of tantalum materials imported to the United States was \$306 per kilogram for metal and powders; \$58 per kilogram for ores and concentrates, including synthetic concentrates; and \$76 per kilogram for tantalum waste and scrap (table 2). The average price of exported tantalum materials was \$520 per kilogram for metal and powders, \$14 per kilogram for ores and concentrates, and \$103 per kilogram for tantalum waste and scrap.

Foreign Trade

Tantalum material exports from and imports to the United States included tantalum metal, ores, powders, and waste and scrap. Trade of K-salt and Ta_2O_5 was not documented owing to the lack of unique HTS codes for these materials. According to the U.S. Census Bureau, in 2018 the United States exported tantalum materials valued at \$196 million, 24% more than in 2017, and imported tantalum materials valued at \$329 million, an increase of 33% compared with that of 2017 (table 2). Traded tantalum materials included tantalum metal, ores and concentrates, and scrap. In 2018, Rwanda continued to be the leading supplier of tantalum ores and concentrates to the United States (table 3). China continued to be the leading supplier of tantalum metal (wrought and unwrought). Germany replaced Thailand as the leading supplier of tantalum metal powders to the United States; Indonesia was the leading supplier of waste and scrap imports. Germany replaced China as the leading destination of United States exported synthetic concentrates and was the leading destination of waste and scrap. The Republic of Korea was the leading destination for wrought tantalum metal. Mexico continued to be the leading destination of exported tantalum powders (table 2).

World Review

In 2018, world production of tantalum contained in cassiterite, columbite-tantalite, loparite, and tantalite concentrates was 1,890 t (table 4), a slight increase compared with that in 2017. Congo (Kinshasa) and Rwanda were the leading producers of tantalum mineral concentrates. Tantalum-bearing tin slags, which are byproducts from tin smelting, principally from Asia, Australia, and Brazil, were another source of tantalum. The leading tantalum ore and concentrate producers were artisanal mining operations in Congo (Kinshasa) and Rwanda, and the vertically integrated mining operations of AVX Corp. (Fountain Inn, SC) and KEMET in Congo (Kinshasa). Tantalum is also produced as a byproduct from several lithium hard-rock deposits. The Mibra Mine in Brazil, and the Bald Hill Mine, the Greenbushes Mine [owned by Albemarle Corp. (49%) and Chengdu Tianqi Industry Group Co. Ltd. (51%)], the Mt. Cattlin Mine (Galaxy Resources Ltd.), the Mt. Marion Mine [Jiangxi Ganfeng Lithium Co. Ltd. (43.1%), Mineral Resources Ltd. (43.1%), and Neometals Ltd. (13.8%)], and the Pilgangoora project in Western Australia produced tantalum concentrates as a byproduct of hard rock lithium mining operations in 2018 (Brinsden and Sheth, 2018; Roskill Information Services Ltd., 2018a). In 2018, capacitors accounted for an estimated 36% of global tantalum consumption, followed by chemicals (20%), superalloys (16%), sputtering targets (14%), mill products (9%), and cemented carbides (5%) (Roskill Information Services Ltd., 2018c, p. 25).

Australia.—Liontown Resources Ltd. announced measured, indicated, and inferred resources of 21.2 million metric tons (Mt) with an average grade of 0.017% Ta_2O_5 for its wholly owned Kathleen Valley lithium-tantalum project in Western Australia. In addition, the company successfully produced a low-grade preliminary tantalum concentrate from a 300-kg composite lithium-tantalum ore sample during initial metallurgical test work. Liontown planned on including tantalum concentrate recovery in its large-scale testing planned for 2019 (Liontown Resources Ltd., 2018, p. 1–3).

The Bald Hill Mine, in Western Australia, was commissioned in March and began commercial production of lithium concentrates and byproduct tantalum concentrates in July. The first shipment of 20 t of tantalum concentrates with an average content of 31% Ta_2O_5 and 12% niobium oxide (Nb_2O_5) was sent to Europe in November. The Bald Hill Mine produced a total of 43 t of Ta_2O_5 contained in tantalum concentrates in 2018. In December, Tawana Resources NL merged with Alliance Mineral Assets Ltd. (AMAL), its 50–50 joint-venture partner on the Bald Hill lithium-tantalum project. At yearend, AMAL was in negotiations with H.C. Starck Tantalum and Niobium GmbH (Germany) to secure a long-term offtake contract for its tantalum concentrate (Alliance Mineral Assets Ltd., 2018a, 2019, p. 6–7, 10, 18, 21). As of April, the Bald Hill project contained an estimated 5,400 t of Ta_2O_5 in Joint Ore Reserves Committee (JORC)-compliant mineral resources, including 2,450 t of probable and proven mineral reserves (Alliance Mineral Assets Ltd., 2018b, p. 2–4).

In November, Pilbara Minerals Ltd. officially commissioned stage 1 of its wholly owned Pilgangoora lithium-tantalum project in Western Australia. The Pilgangoora stage 1 processing plant had an annual ore processing capacity of 2 Mt and was expected to produce 146 metric tons per year (t/yr) of tantalum concentrates with an average content of 5% Ta₂O₅. Pilbara began producing lithium concentrates along with byproduct tantalum concentrates in August and produced a total of 36 t of tantalum concentrates in 2018. As of September, the Pilgangoora project contained an estimated 26,200 t of Ta₂O₅ in JORC-compliant mineral resources, including 12,900 t of probable and proven mineral reserves. At yearend, Pilgangoora had not yet achieved commercial production (Pilbara Minerals Ltd., 2018, p. 2, 6; 2019, p. 1, 4–6, 9; Henderson, 2019, p. 4).

Brazil.—Mineração Taboca S.A. [a subsidiary of MINSUR S.A. (Peru)] operated the Pitinga-Pirapora Mine complex in the State of Amazonas. The company reported that it produced 3,980 t in gross weight of niobium and tantalum ferroalloys with an average combined niobium and tantalum content of 59%. This represented a 28% increase from total ferroalloy production in 2017 (MINSUR S.A., 2019, p. 28).

AMG Advanced Metallurgical Group N.V. (Netherlands) doubled the production capacity for tantalum concentrates at its Mibra Mine in Minas Gerais to 270 t/yr. The investment was part of a major reconfiguration of mine infrastructure to accommodate its first lithium concentrate processing plant, which was officially commissioned in May (AMG Advanced Metallurgical Group N.V., 2018).

Canada.—In February, Commerce Resources Corp. announced that a 1,300-kg sample of mixed niobium and tantalum ore from its Blue River project in British Columbia was successfully processed into niobium and tantalum products in Estonia using new patented technology. The company expected the new technology to lower operating costs of the project and was working towards acquiring the global rights to the technology (Commerce Resources Corp., 2018).

Congo (Kinshasa).—The Government of Congo (Kinshasa) signed into law a revised mining code in March. Major changes in the revised code included the implementation of an excess profits tax as well as increased royalties on exports all minerals. In addition, the Government officially declared columbite-tantalite a strategic mineral, and further increased the royalty rate on exports of columbite-tantalite to 10% from 3.5% (Argus Metals International, 2018; Mahamba, 2018).

Société Minière de Bisunzu Sarl (SMB), a leading producer of columbite-tantalite ore, owned the mining license for one of the largest columbite-tantalite deposits in the country and ran a mechanized mining operation in North Kivu Province. Under an agreement with a local cooperative, artisanal miners mined ore within the company's licensed areas and SMB retained exclusive rights to purchase that ore. Columbite-tantalite ore produced from SMB's licensed areas was certified conflict-free under the Responsible Minerals Initiative's program for responsible mineral supply chains. However, in May, SMB halted purchases of ore from artisanal miners owing to allegations of illicit activities by members of the local cooperative Cooperama, refusal by the cooperative to implement improved supply-chain traceability mechanisms, and armed

assaults by artisanal miners on SMB and security officials. Following a 102-day suspension, SMB reached an agreement with the cooperative and resumed purchases of the ore in August (Mzamo, 2018).

Greenland.—At yearend 2018, Regency Mines Plc (United Kingdom) surrendered the exploration license for its wholly owned Motzfeldt niobium-tantalum project to the Greenland authorities. Regency stated that the project, located in the Kujalleq Municipality, was no longer a core asset for the company (Regency Mines Plc, 2018). The Motzfeldt project contained an estimated 40,800 t of Ta₂O₅ in JORC-compliant inferred mineral resources (Ram Resources Ltd., 2012).

Japan.—In July, JX Metals Deutschland GmbH (Germany), a newly established subsidiary of JX Nippon Mining & Metals Corp., completed the acquisition of all shares of H.C. Starck Tantalum and Niobium GmbH (Germany). H.C. Starck Tantalum and Niobium operated a processing facility in Lower Saxony State, Germany, where it developed and produced high-purity tantalum metal products. The acquisition also included tantalum processing and manufacturing facilities operated by subsidiaries H.C. Starck Co., Ltd. in Rayong Province, Thailand; H.C. Starck Ltd. in Ibaraki Prefecture, Japan; and H.C. Starck Smelting GmbH & Co. KG in Baden-Württemberg, Germany; as well as assets of H.C. Starck North American Trading, LLC (Newton, MA) related to H.C. Starck's tantalum-niobium business (JX Nippon Mining & Metals Corp., 2018a, b).

Namibia.—African Tantalum Pty. Ltd. (Aftan) [a subsidiary of Kazera Global plc (75%; formerly Kennedy Ventures plc) and Warmbad Investment Holdings (25%)] operated the Namibia Tantalite Investment Mine in the Karas District. Aftan achieved grades of 51% Ta₂O₅ in its production of tantalum concentrates and supplied high-grade concentrate to a single unnamed customer in North America. In July, Aftan commenced a drilling campaign to define JORC-compliant resources for the mine and subsequently suspended all ore-processing operations. The company also announced that it secured a license to extract water from the Orange River for its mining operations and began the tender process for construction of a water pipeline (Kennedy Ventures plc, 2018; Kazera Global plc, 2019).

Russia.—LLC Lovozero GOK operated the Lovozero Mine in the Murmansk region. The company produced loparite mineral concentrates that were used by JSC Solikamsk Magnesium Works to produce tantalum compounds at its facility in the Perm region. Solikamsk reported 44 t of tantalum contained in shipments of tantalum compounds in 2018, essentially the same as in 2017 (JSC Solikamsk Magnesium Works, 2019, p. 12–14).

Rwanda.—Circular, a technology company based in the United Kingdom, in partnership with Power Resources Group Plc, a Malta-based company with columbite-tantalite mining operations in Rwanda and refining operations in Macedonia, completed the first-ever mine-to-manufacturer traceability of tantalum in the fall of 2018. Using the open-source blockchain technology Hyperledger® Fabric, which employed facial recognition and global positioning system tracking via a mobile phone application, the company was able to trace tantalum ore from its origin in Rwanda as it was transported, concentrated, and refined in Macedonia, manufactured into primary products

in the United States, and assembled into consumer products in China under conditions that were free from conflict or child labor and compliant with the Organisation for Economic and Co-operation and Development's Due Diligence Guidance for Responsible Supply Chains (Hyperledger, 2019, p. 1–4).

Venezuela.—In May, the Government of Venezuela exported columbite-tantalite concentrates from artisanal mining for the first time in the country's history. In addition, in October, the Government announced that it commissioned the country's first columbite-tantalite ore concentration mill. The mill, which was located in the state of Bolivar and was operated by state-owned CVG Ferrominera Orinoco C.A., had a daily ore-processing capacity of 160 t (Depablos, 2018a, b). According to the U.S. Census Bureau, the United States imported approximately 13 t of columbite-tantalite concentrates from Venezuela in 2018.

Outlook

Tantalum is produced as a byproduct from many lithium hard-rock deposits, typically spodumene-bearing pegmatites. Global demand for lithium has increased significantly in recent years, especially owing to its increased use in batteries and the rapid growth of the electric vehicle market. Global lithium consumption increased at a compound annual growth rate of 9% from 2006 through 2016, while in the same period consumption of lithium-ion batteries increased by an annual average of 22% (Jaskula, 2018, p. 44.1–44.2). As a result, several new lithium (from spodumene) mining operations started production or are expected to come into production in the next few years, and it is possible that these operations will become significant sources of tantalum as a byproduct.

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TABLE 1
SALIENT TANTALUM STATISTICS¹

		2014	2015	2016	2017	2018
United States:						
Exports:						
Niobium ores and concentrates, gross weight	metric tons	60	73	14	7	5
Synthetic ores and concentrates, gross weight	do.	200	138	379	113	198
Tantalum ores and concentrates, gross weight	do.	225	98	162	109	48
Tantalum-containing ores and concentrates, ² Ta content ^c	do.	136	85	152	65	68
Tantalum, unwrought, Ta content ³	do.	247	235	223	220	185
Tantalum, waste and scrap, Ta content ³	do.	285	280	171	169	305
Tantalum, wrought, Ta content ³	do.	57	57	58	95	124
Total exports, Ta content	do.	725	657	604	549	681
Imports for consumption:						
Niobium ores and concentrates, gross weight	do.	2	--	1	1	31
Synthetic ores and concentrates, gross weight	do.	--	--	9	15	12
Tantalum ores and concentrates, gross weight	do.	897	730	675	1,010	1,050
Tantalum-containing ores and concentrates, ² Ta content ^c	do.	272	221	207	311	330
Tantalum, unwrought, Ta content ³	do.	292	416	320	484 ^r	617
Tantalum, waste and scrap, Ta content ³	do.	625	565	489	586 ^r	610
Tantalum, wrought, Ta content ³	do.	44	42	48	74	101
Total imports, Ta content	do.	1,230	1,240	1,060	1,460	1,660
Apparent consumption, Ta content	do.	508	587	460	907	977
Price, tantalite, ⁴ Ta ₂ O ₅ content	dollars per kilogram	221	193	193	193	214
Value, ⁵ tantalum ores and concentrates, gross weight	do.	69	65	53	39	57
World, production of tantalum concentrates, Ta content	metric tons	1,610 ^r	1,660 ^r	1,570 ^r	1,870 ^r	1,890

^cEstimated. ^rRevised. do. Ditto. -- Zero.

¹Table includes data available through August 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes natural and synthetic tantalum-containing ores and concentrates. Ta content of ores and concentrates is estimated assuming the following Ta₂O₅ contents: 32% in niobium ore, 32% in synthetic concentrates, and 37% in tantalum ore. Ta₂O₅ is 81.897% Ta.

³Tantalum content estimated at 100%.

⁴Average annual price per Ta₂O₅ content as reported by CRU Group.

⁵Weighted average value of imported plus exported materials.

TABLE 2
U.S. FOREIGN TRADE IN TANTALUM-CONTAINING ORE AND CONCENTRATE AND TANTALUM METAL AND ALLOYS, BY CLASS¹

HTS ² code	Class	2017		2018		Principal destinations and sources in 2018 (gross weight in kilograms and values in thousand dollars)
		Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)	
Exports:						
2615.90.3000	Synthetic concentrates	113,000	\$3,300	198,000	\$3,020	Germany 163,000, \$2,640; China 21,100, \$171; Mexico 12,300, \$190.
2615.90.6030	Niobium ores and concentrates	7,460	165	4,510	133	India 3,400, \$98; Russia 499, \$14; France 392, \$11; United Kingdom 204, \$6.
2615.90.6060	Tantalum ores and concentrates	109,000	3,840	48,000	316	China 26,600, \$172; United Kingdom 21,100, \$125; Singapore 227, \$14.
8103.20.0030	Tantalum, unwrought, powders	163,000	60,600	181,000	78,900	Mexico 92,700, \$43,200; El Salvador, 49,300, \$17,500; Israel 18,100, \$9,380.
8103.20.0090	Tantalum, unwrought, other	56,600	17,600	3,900	1,440	Austria 1,940, \$597; Japan 629, \$282; Hong Kong 312, \$101.
8103.30.0000	Tantalum, waste and scrap	169,000	17,500	305,000	31,600	Germany 72,300, \$4,700; Kazakhstan 66,500, \$9,520; United Kingdom 44,400, \$5,130.
8103.90.0000	Tantalum, wrought	95,400	54,400	124,000	80,200	Republic of Korea 30,000, \$23,300; China 30,000, \$20,000; Germany 27,400, \$14,900.
	Total exports	XX	157,000	XX	196,000	
Imports for consumption:						
2615.90.3000	Synthetic concentrates	14,900	\$1,970	11,800	\$186	Switzerland 11,800, \$181; China 27, \$5.
2615.90.6030	Niobium ores and concentrates	1,120	12	30,700	398	Venezuela 16,000, \$80; Canada 13,700, \$291; China 947, \$27.
2615.90.6060	Tantalum ores and concentrates	1,010,000	39,500	1,050,000	62,600	Rwanda 562,000, \$30,100; Australia 176,000, \$10,400; Congo (Kinshasa) 93,900, \$5,880.
8103.20.0030	Tantalum, unwrought, powders	235,000	68,400	322,000	87,500	Germany 110,000, \$25,000; Thailand 96,300, \$28,700; China 69,900, \$27,500.
8103.20.0090	Tantalum, unwrought, other	249,000 ^r	55,200 ^r	296,000	86,100	China 137,000, \$45,500; Kazakhstan 64,400, \$20,800; Israel 28,800, \$612.
8103.30.0000	Tantalum, waste and scrap	586,000 ^r	53,400 ^r	610,000	46,600	Indonesia 126,000, \$3,710; Japan 85,800, \$10,900; Germany 54,200, \$1,320.
8103.90.0000	Tantalum, wrought	74,500	28,700	101,000	45,800	China 76,300, \$32,200; Kazakhstan 8,360, \$4,150; France 5,490, \$2,750.
	Total imports	XX	247,000	XX	329,000	

^rRevised. XX Not applicable.¹Table includes data available through August 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.²Harmonized Tariff Schedule of the United States.

Sources: U.S. Census Bureau and U.S. Geological Survey.

TABLE 3
U.S. IMPORTS FOR CONSUMPTION OF TANTALUM ORES AND CONCENTRATES, BY COUNTRY
OR LOCALITY^{1, 2}

Country or locality	2017		2018	
	Gross weight (kilograms)	Value (thousands)	Gross weight (kilograms)	Value (thousands)
Australia	198,000	\$8,190	176,000	\$10,400
Brazil	75,200	3,870	--	--
Burundi	47,300	1,890	70,300	4,720
China	6,670	583	3,140	74
Congo (Brazzaville)	--	--	20,000	1,070
Congo (Kinshasa)	75,500	3,070	93,900	5,880
Czechia	9,330	317	--	--
India	--	--	9,440	367
Japan	--	--	2,530	571
Kenya	18,000	521	--	--
Korea, Republic of	475	8	--	--
Mozambique	105,000	3,620	64,900	4,580
Netherlands	8	6	--	--
Nigeria	--	--	8,000	532
Rwanda	465,000	16,800	562,000	30,100
Taiwan	720	99	--	--
Tanzania	12,200	489	2,830	593
Thailand	--	--	18,400	847
United Arab Emirates	--	--	22,800	2,890
Total	1,010,000	39,500	1,050,000	62,600

-- Zero.

¹Table includes data available through August 13, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

²Harmonized Tariff Schedule of the United States code 2615.90.6060.

Sources: U.S. Census Bureau and U.S. Geological Survey.

TABLE 4
TANTALUM: WORLD PRODUCTION OF MINERAL CONCENTRATES, BY COUNTRY OR LOCALITY^{1,2}

(Kilograms, tantalum content)

Country or locality ³	2014	2015	2016	2017	2018
Australia, tantalite concentrate	17,000 ^e	68,200 ^r	10,300 ^r	20,200 ^r	22,900
Bolivia, tantalite concentrate	5,640 ^r	314	--	2,100 ^r	16,000 ^e
Brazil, mineral concentrate ⁴	313,000 ^r	268,000 ^r	125,000 ^r	200,000 ^{r,e}	250,000 ^e
Burundi, ore and concentrate	21,000	10,000	6,200	28,000 ^{r,e}	23,000 ^e
China, mineral concentrate	61,000 ^e	63,000 ^{r,e}	65,000 ^r	75,000 ^r	90,000
Congo (Kinshasa):					
Cassiterite concentrate	110,000	125,000	180,000	280,000	240,000
Columbite-tantalite concentrate	250,000	465,000	530,000	480,000	500,000 ^e
Ethiopia, columbite-tantalite concentrate ^e	46,000	59,000	63,000	65,000	70,000
Mozambique, columbite-tantalite concentrate	22,666	12,818	18,767	18,000 ^e	20,000 ^e
Nigeria, columbite-tantalite concentrate	150,000	150,000	210,000 ^r	220,000 ^r	200,000
Russia, loparite concentrates	32,677	25,879	39,966	36,444 ^r	38,000 ^e
Rwanda:					
Cassiterite concentrate	89,000	58,000	53,000	71,000	71,000
Columbite-tantalite concentrate	490,000	350,000	270,000	370,000	350,000
Uganda, ore and concentrate	-- ^{r,e}	1,000 ^r	2,800 ^r	2,500 ^{r,e}	3,000 ^e
Total	1,610,000 ^r	1,660,000 ^r	1,570,000 ^r	1,870,000 ^r	1,890,000

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through July 17, 2019. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Figures for all countries and (or) localities represent marketable output.

³In addition to the countries and (or) localities listed, French Guiana and Venezuela may have produced tantalum mineral concentrates, but available information was inadequate to make reliable estimates of output.

⁴Includes columbite-tantalite and microlite.

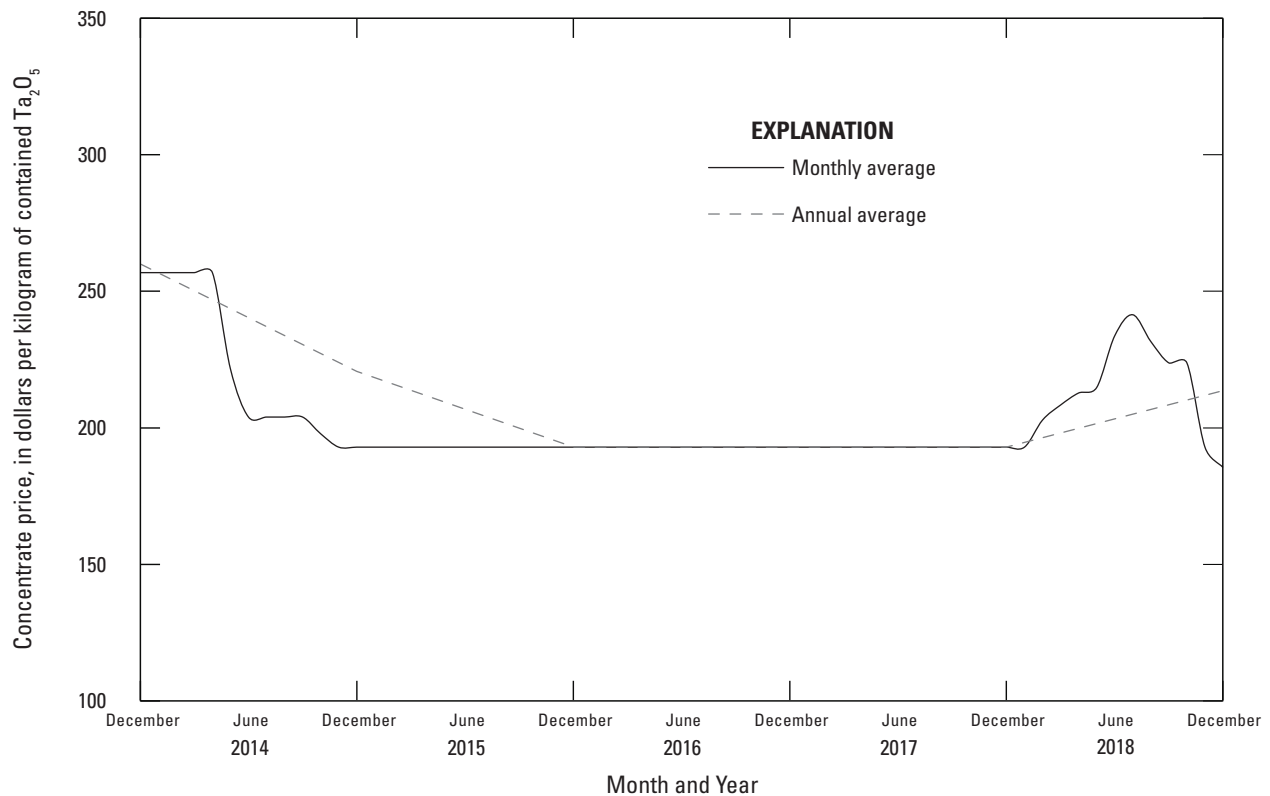


Figure 1. Monthly (solid line) and annual (dotted line) average tantalum concentrate prices (normalized to dollars per kilogram of contained Ta_2O_5 assuming 30% Ta_2O_5 content in the concentrates) from December 2013 through December 2018. Source: CRU Group.