Silicon Metal from China

Investigation No. 731-TA-472 (Fourth Review)

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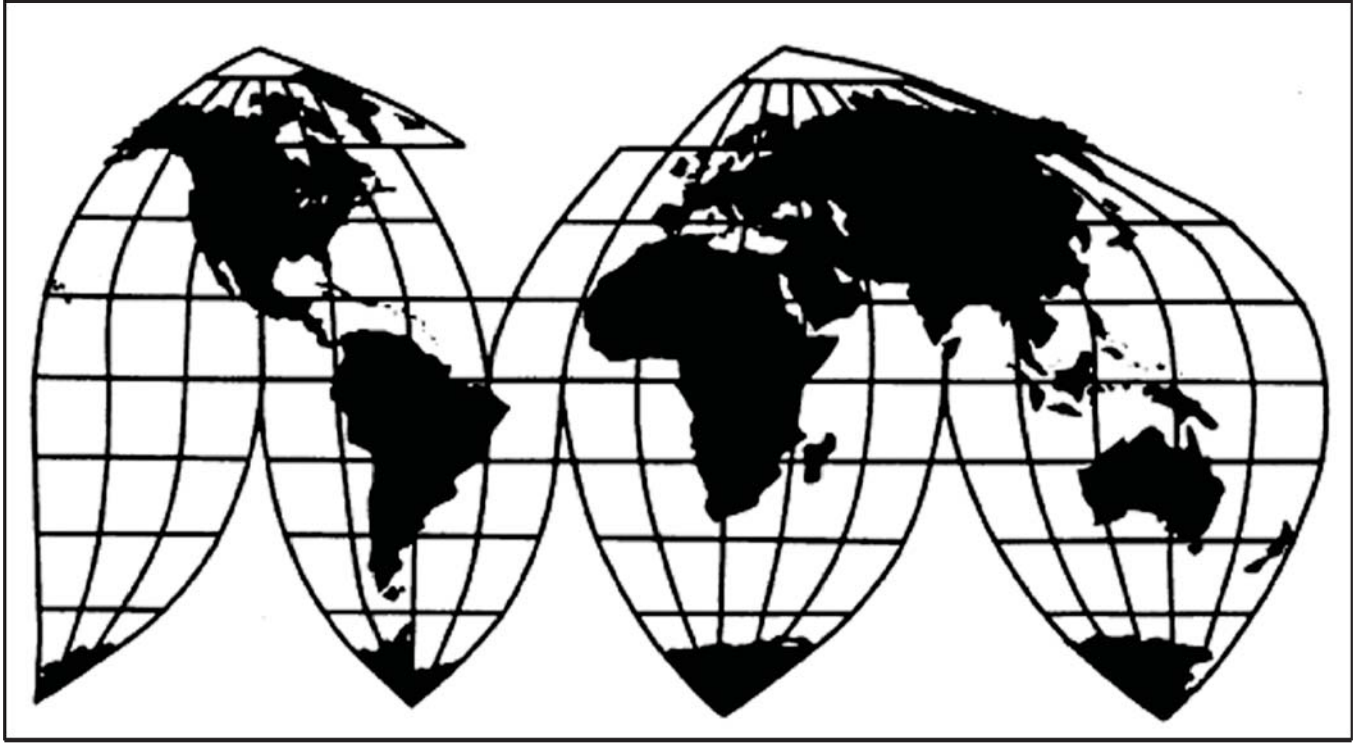

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UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation No. 731-TA-472 (Fourth Review)

Silicon Metal from China

DETERMINATION

On the basis of the record[1] developed in the subject five-year review, the United States International Trade Commission ("Commission") determines, pursuant to the Tariff Act of 1930 ("the Act"), that revocation of the antidumping duty order on silicon metal from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.[2]

BACKGROUND

The Commission, pursuant to section 751(c) of the Act (19 U.S.C. 1675(c)), instituted this review on March 1, 2017 (82 FR 12234) and determined on June 5, 2017 that it would conduct a full review (82 FR 27525, June 15, 2017). Notice of the scheduling of the Commission's review and of a public hearing to be held in connection therewith was given by posting copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and by publishing the notice in the *Federal Register* on November 24, 2017 (82 FR 55858). The hearing was held in Washington, DC, on March 20, 2018, and all persons who requested the opportunity were permitted to appear in person or by counsel.

[1] The record is defined in sec. 207.2(f) of the Commission's Rules of Practice and Procedure (19 CFR 207.2(f)).

[2] Commissioner Jason Kearns not participating.

Views of the Commission

Based on the record in this five-year review, we determine under section 751(c) of the Tariff Act of 1930, as amended ("the Tariff Act"), that revocation of the antidumping duty order on silicon metal from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.[1]

I. Background

Original Investigations: The petitions in the original investigations concerned silicon metal from Argentina, Brazil, and China. On June 3, 1991, the Commission determined that an industry in the United States was materially injured by reason of imports of silicon metal from China sold at less than fair value.[2] On June 10, 1991, Commerce issued an antidumping duty order on subject imports of silicon metal from China.[3] The Commission also made affirmative final injury determinations with respect to subject imports from Argentina on September 19, 1991, and subject imports from Brazil on July 24, 1991.[4] The Brazilian respondents appealed the Commission's affirmative determination with respect to subject imports from Brazil to the U.S. Court of International Trade (CIT); the CIT affirmed.[5]

First Reviews: On November 2, 1999, the Commission instituted the first five-year reviews of the orders on silicon metal from Argentina, Brazil, and China.[6] On February 3, 2000, the Commission determined with respect to the orders on Argentina and Brazil that the individual interested party responses to its notice of institution were adequate and that the domestic interested party and respondent interested party group responses were adequate. As to the order on China, the Commission determined that the domestic interested party group response was adequate but the respondent group response was inadequate. On February 3, 2000, the Commission decided to conduct full reviews for all three orders in the grouped reviews to promote administrative efficiency.[7]

In January 2001, the Commission determined that revocation of the antidumping duty orders on subject imports of silicon metal from Brazil and China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a

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[1] Commissioner Kearns did not participate in this review.

[2] *Silicon Metal from the People's Republic of China,* Inv. No. 731-TA-472 (Final), USITC Pub. 2385 (June 1991).

[3] *Antidumping Duty Order: Silicon Metal from the People's Republic of China*, 56 Fed. Reg. 26649 (June 10, 1991).

[4] *Silicon Metal from Argentina,* Inv. No. 731-TA-470 (Final), USITC Pub. 2429 (Sept. 1991); *Silicon Metal from Brazil,* Inv. No. 731-TA-471 (Final), USITC Pub. 2404 (July 1991) ("*Original Investigations*").

[5] *Camargo Correa Metais, S.A. v. United States*, 17 CIT 35 (1993).

[6] 64 Fed. Reg. 59209 (Nov. 2, 1999).

[7] 65 Fed. Reg. 7891 (Feb. 16, 2000).

reasonably foreseeable time.[8] It also determined that revocation of the order on silicon metal from Argentina would not be likely to lead continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time, and Commerce accordingly revoked this order.[9] Commerce continued the antidumping duty orders on silicon metal from Brazil and China on February 16, 2001.[10]

Second Reviews: On January 3, 2006, the Commission instituted second five-year reviews with respect to the antidumping duty orders on silicon metal from Brazil and China.[11] On April 10, 2006, the Commission found that the domestic interested party group response and the Brazilian respondent interested party group response were adequate and accordingly determined to conduct a full review of the antidumping duty order on subject imports from Brazil. Because no responses were received from any respondent interested party regarding China, the Commission determined that the respondent interested party group response to the notice of institution with respect to China was inadequate. However, the Commission determined to conduct a full review of the antidumping duty order on subject imports from China in order to promote administrative efficiency in light of its decision to conduct a full review with respect to subject imports of silicon metal from Brazil.[12]

In December 2006, the Commission determined that revocation of the antidumping duty order on subject imports of silicon metal from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.[13] Commerce issued a notice of continuation of this order on December 21, 2006.[14]

The Commission also determined that revocation of the order on silicon metal from Brazil would not be likely to lead continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time, and Commerce accordingly revoked the order on silicon metal from Brazil.[15] On March 19, 2008, the CIT affirmed the Commission's negative determination in an appeal brought by domestic producer Globe Metallurgical, Inc. ("Globe").[16]

Third Review: On November 1, 2011, the Commission instituted a third five-year review with respect to the antidumping duty order on silicon metal from China.[17] In March 2012, after

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[8] *Silicon Metal from Argentina, Brazil, and China*, Inv. No. 731-TA-470-472 (Review), USITC Pub. 3385 at 16-20 (Jan. 2001) ("*First Reviews*").

[9] *First Reviews*, USITC Pub. 3385 at 15.

[10] 66 Fed. Reg. 10669 (Feb. 16, 2001).

[11] 71 Fed. Reg. 138 (Jan. 3, 2006).

[12] *Silicon Metal from Brazil and China*, Inv. No. 731-TA-471-472 (Second Review), USITC Pub. 3892 at 3-4 (Dec. 2006) ("*Second Reviews*").

[13] *Second Reviews,* USITC Pub. 3892 at 22-25.

[14] 71 Fed. Reg. 76636 (Dec. 21, 2006).

[15] *Second Reviews,* USITC Pub. 3892 at 15-22.

[16] *Globe Metallurgical Inc. v. United States*, 547 F. Supp. 1371, 1376-80 (Ct. Int'l Trade 2008). The Commission's affirmative determination regarding silicon metal from China was not appealed.

[17] 76 Fed. Reg. 67476 (Nov. 1, 2011).

an expedited review, the Commission determined that revocation of the antidumping duty order on subject imports of silicon metal from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.[18] Commerce issued a notice of continuation of this order on April 20, 2012.[19]

The Current Review: On March 1, 2017, the Commission instituted this fourth five-year review of the antidumping duty order on silicon metal from China.[20] The Commission received an adequate individual response to the notice of institution from Globe and found that the domestic interested party group response was adequate.[21]

The Commission received a joint response to the notice of institution from five producers of silicon metal in China: Changning Zhenyuan Smelting Silicon Co., Ltd. ("Changning Smelting"), Sichuan Linhe Silicon Industrial Co., Ltd. ("Sichuan Linhe"), Mangshi City Yuesheng Silicon Co., Ltd. ("Mangshi Yuesheng"), Mao County Panda Silicon Co., Ltd. ("Panda Silicon") and Hoshine Silicon Industry Co., Ltd. ("Hoshine Silicon"). The Commission unanimously found their individual responses to be adequate. The Commission further determined that the respondent interested party group response was adequate. Accordingly, on June 5, 2017, the Commission determined to conduct a full review of the order.[22]

The Commission received prehearing and posthearing submissions from Globe. The Commission also received prehearing and posthearing submissions filed jointly on behalf of Changning Smelting, Sichuan Linhe, Mangshi Yuesheng, Panda Silicon, Hoshine Silicon, and the China Council for the Promotion of International Trade, a trade association whose members include Chinese producers and exporters of silicon metal (collectively, "Respondents"). Representatives of Globe and Hoshine Silicon, as well as a representative from Wacker Chemie AG, a global company headquartered in Germany with a U.S. subsidiary (Wacker Polysilicon North America) that purchases silicon metal from various sources to produce polysilicon, appeared at the Commission's hearing accompanied by counsel.

U.S. industry data are based on the questionnaire responses of three U.S. producers of silicon metal that are believed to account for all domestic production of silicon metal in 2016.[23] U.S. import data and related information are based on Commerce's official import statistics and the questionnaire responses of 25 U.S. importers of silicon metal that are believed to have accounted for *** percent of subject imports during 2016 and for *** U.S. imports of silicon metal from nonsubject sources during that year.[24] Foreign industry data and related information are based on the questionnaire responses of six producers and exporters of silicon

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[18] *Silicon Metal from China*, Inv. No. 731-TA-472 (Third Review), USITC Pub. 4312 (Mar. 2012) ("*Third Review*").

[19] 77 Fed. Reg. 23660 (April 20, 2012).

[20] *Silicon Metal from China; Institution of a Five-Year Review,* 82 Fed. Reg. 12234 (Mar. 1, 2017).

[21] Explanation of Commission Determination on Adequacy, EDIS Document No. 613743.

[22] Explanation of Commission Determination on Adequacy, EDIS Document No. 613743. Chairman Schmidtlein found the respondent interested party group response to be inadequate and voted to expedite the review. *Id.*

[23] Confidential Report ("CR") at I-20; Public Report ("PR") at I-16.

[24] CR at I-20, IV-1; PR at I-16, IV-1.

metal in China that are estimated to have accounted for *** percent of production of silicon metal in China in 2016, but none of these six firms exported silicon metal to the United States during the January 2014-September 2017 period of review.[25]

II. Domestic Like Product and Industry

A. Domestic Like Product

In making its determination under section 751(c) of the Tariff Act, the Commission defines the "domestic like product" and the "industry."[26] The Tariff Act defines "domestic like product" as "a product which is like, or in the absence of like, most similar in characteristics and uses with, the article subject to an investigation under this subtitle."[27] The Commission's practice in five-year reviews is to examine the domestic like product definition from the original investigation and consider whether the record indicates any reason to revisit the prior findings.[28]

Commerce has defined the scope of the antidumping duty order in this five-year review as follows:

> *silicon metal containing at least 96.00 percent but less than 99.99 percent of silicon by weight. Also covered by the order is silicon metal containing between 89.00 and 96.00 percent silicon by weight but which contains a higher aluminum content than the silicon metal containing at least 96.00 percent but less than 99.99 percent silicon by weight (58 FR 27542, May 10, 1993). Silicon metal is currently provided for under subheadings 2804.69.10 and 2804.69.50 of the Harmonized Tariff Schedule (HTS) as a chemical product, but is commonly referred to as a metal. Semiconductor-grade silicon (silicon metal containing by weight not less than 99.99 percent of silicon and provided for in subheading 2804.61.00 of the HTS) is not subject to this order. Although the HTS subheadings are provided for convenience and customs purposes, the written description of the*

[25] CR at I-20, IV-9 to IV-10; PR at I-16, IV-6.

[26] 19 U.S.C. § 1677(4)(A).

[27] 19 U.S.C. § 1677(10); *see*, *e.g., Cleo Inc. v. United States*, 501 F.3d 1291, 1299 (Fed. Cir. 2007); *NEC Corp. v. Department of Commerce*, 36 F. Supp. 2d 380, 383 (Ct. Int'l Trade 1998); *Nippon Steel Corp. v. United States*, 19 CIT 450, 455 (1995); *Timken Co. v. United States*, 913 F. Supp. 580, 584 (Ct. Int'l Trade 1996); *Torrington Co. v. United States*, 747 F. Supp. 744, 748-49 (Ct. Int'l Trade 1990), *aff'd*, 938 F.2d 1278 (Fed. Cir. 1991); *see also* S. Rep. No. 249, 96th Cong., 1st Sess. 90-91 (1979).

[28] *See*, *e.g.*, *Internal Combustion Industrial Forklift Trucks from Japan*, Inv. No. 731-TA-377 (Second Review), USITC Pub. 3831 at 8-9 (Dec. 2005); *Crawfish Tail Meat from China*, Inv. No. 731-TA-752 (Review), USITC Pub. 3614 at 4 (July 2003); *Steel Concrete Reinforcing Bar from Turkey*, Inv. No. 731-TA-745 (Review), USITC Pub. 3577 at 4 (Feb. 2003).

merchandise is dispositive.[29]

The scope of the order under review is the same as it has been in the three prior five-year reviews, although it is somewhat broader than it was in the original investigations.[30]

Silicon metal is normally composed almost entirely of elemental silicon, along with small amounts of other elements, such as iron, aluminum, and calcium, and is manufactured and sold in various degrees of purity. Silicon metal is principally used as an alloying agent in aluminum production, and as an input in the production of silicones and polysilicon.[31]

1. The Original Investigations

In the original investigations, the Commission found the appropriate domestic like product to be "all silicon metal, regardless of grade, having a silicon content of at least 96.00 percent but less than 99.99 percent of silicon by weight, and excluding semiconductor grade silicon." This was coextensive with the scope of the investigations.[32]

2. Previous Five-Year Reviews

In the full first five-year reviews, no party argued for defining a different domestic like product other than all silicon metal corresponding to the scope of the orders. The Commission therefore defined the domestic like product as "all silicon metal, regardless of grade, corresponding to the current scope of the orders" (which, as the Commission noted, was broader than the scope of the original investigations).[33]

In both the full second five-year reviews and the expedited third five-year review, the Commission stated that there was no new information in the record of those reviews that warranted reconsideration of the domestic like product definition and accordingly continued to

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[29] *Silicon Metal From the People's Republic of China: Final Results of the Expedited Fourth Sunset Review of the Antidumping Duty Order*, 82 Fed. Reg. 30841 (July 3, 2017).

[30] The second sentence of the scope definition quoted above was not included in the scope of the original investigations but was included in the scope definition of the first five-year reviews and all subsequent five-year reviews. This added sentence reflects a determination by Commerce in 1993 in response to a request for clarification of the scope of the order concerning silicon metal from China. *See First Reviews,* USITC Pub. 3385 at 5 n.17; CR at I-22 to I-23; PR at I-19.

[31] CR at I-25 to I-28; PR at I-20 to I-23.

[32] *Original Investigations*, USITC Pub. 2385 at 10. The Commission rejected an argument in the original investigations by purchaser and captive producer Dow Corning Corporation ("Dow Corning") that the Commission find two separate like products of chemical grade silicon and metallurgical grade silicon, noting that "the Commission has generally declined to separate products of different grades into more than one like product" and adding that there were "no facts on the record which warrant a departure from this practice." *Id.* at 10 n.29.

[33] *First Reviews*, USITC Pub. 3385 at 5 and n.17.

define the domestic like product as all silicon metal, regardless of grade, corresponding to the scope of the orders.[34]

3. The Current Review

No party in this review has argued that the Commission should define the domestic like product differently from the previous reviews. In response to the Commission's notice of institution, Globe stated that it agreed with the Commission's definition of the like product in the third review while respondent interested parties indicated that they were not taking a position on the domestic like product definition at that time.[35] No party requested in comments on the Commission's draft questionnaires that the Commission collect data concerning any other possible domestic like products,[36] and no party has addressed the issue of the domestic like product in its prehearing or posthearing briefs. The information in the record regarding the characteristics and uses of silicon metal does not indicate any reason to revisit the domestic like product definition.[37] We accordingly again define the domestic like product as all silicon metal, regardless of grade, corresponding to the current scope of the order.

B. Domestic Industry

Section 771(4)(A) of the Tariff Act defines the relevant industry as the domestic "producers as a whole of a domestic like product, or those producers whose collective output of a domestic like product constitutes a major proportion of the total domestic production of the product."[38] In defining the domestic industry, the Commission's general practice has been to include in the industry producers of all domestic production of the like product, whether toll-produced, captively consumed, or sold in the domestic merchant market.

In the original investigations, the Commission did not exclude any related parties under 19 U.S.C. § 1677(4)(B) because it found the exclusion of those domestic producers that had imported or purchased subject merchandise would present a distorted picture of the domestic industry, and a review of the operating income data of those producers indicated that these imports or purchases were not shielding them from import competition. The Commission further noted that no party argued that any producer should be excluded from the domestic industry as a related party.[39] Thus, the Commission found one domestic industry consisting of

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[34] *Second Reviews,* USITC Pub. 3892 at 5; *Third Review*, USITC Pub. 4312 at 6.

[35] CR at I-36; PR at I-28; Domestic Interested Party's Response to the Notice of Institution, March 31, 2017, at 40; Respondent Interested Parties' Response to the Notice of Institution, March 31, 2017, at 14.

[36] CR at I-36 to 37; PR at I-28.

[37] *See generally* CR at I-25 - I-36; PR at I-20 to I-28.

[38] 19 U.S.C. § 1677(4)(A). The definitions in 19 U.S.C. § 1677 are applicable to the entire subtitle containing the antidumping and countervailing duty laws, including 19 U.S.C. §§ 1675 and 1675a. *See* 19 U.S.C. § 1677.

[39] *Original Investigations,* USITC Pub. 2385 at 11-14.

all domestic producers of silicon metal.[40] In the full first and full second five-year reviews, as well as the expedited third five-year reviews, the Commission made the same finding as to the domestic industry.[41]

In the current reviews, no party has argued that the Commission should define the domestic industry differently than it did in the prior proceedings or argued that any domestic producer should be excluded from the domestic industry.[42]

No domestic producer in this five-year review is a related party. *** is related to Chinese silicon metal producer ***.[43] However, *** reported in its questionnaire response that it *** and that it ***.[44] Since *** is not an importer or exporter of subject merchandise, *** is not a related party under 19 U.S.C. § 1677(4)(B).

U.S. producer Dow Corning Alabama ("DC Alabama"), through its parent Dow Corning, is related to Chinese firm Dalian DC Silicon Co., Ltd. ("Dalian DC"). Dalian DC has a facility in Dalian, China, and both produces and purchases silicon metal.[45] While Globe describes Dalian DC as a "Chinese silicon metal exporter" and one of the largest purchasers of silicon metal in China,[46] the record indicates that ***.[47] Because Dalian DC is not ***, DC Alabama is not a related party under 19 U.S.C. § 1677(4)(B).

Accordingly, we find that the domestic industry consists of all domestic producers of silicon metal.

III. Revocation of the Antidumping Order Would Likely Lead to Continuation or Recurrence of Material Injury Within a Reasonably Foreseeable Time

A. Legal Standards

In a five-year review conducted under section 751(c) of the Tariff Act, Commerce will revoke an antidumping or countervailing duty order unless: (1) it makes a determination that dumping or subsidization is likely to continue or recur and (2) the Commission makes a determination that revocation of the antidumping or countervailing duty order "would be likely to lead to continuation or recurrence of material injury within a reasonably foreseeable time."[48]

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[40] *Original Investigations,* USITC Pub. 2385 at 10-14.

[41] *First Reviews,* USITC Pub. 3385 at 5-6; *Second Reviews,* USITC Pub. 3892 at 5; *Third Review,* USITC Pub. 4312 at 6.

[42] *See* Globe's Response to the Notice of Institution, March 31, 2017, at 32; Respondents' Prehearing Brief at 2; Respondents' Posthearing Brief at 2.

[43] CR/PR at Table I-4.

[44] CR at I-38; PR at I-29.

[45] *See* CR at I-38 and n.105; PR at I-29 and n.105; Transcript of Hearing ("Hearing Tr.") at 52-53 (Schaefermeier); 89-90 (Majumdar).

[46] Globe's Prehearing Brief at 1.

[47] Dalian DC ***. Staff email correspondence with ***. EDIS Document No. 638911.

[48] 19 U.S.C. § 1675a(a).

The Statement of Administrative Action to the Uruguay Round Agreements Act (SAA) states that "under the likelihood standard, the Commission will engage in a counterfactual analysis; it must decide the likely impact in the reasonably foreseeable future of an important change in the status quo – the revocation or termination of a proceeding and the elimination of its restraining effects on volumes and prices of imports."[49] Thus, the likelihood standard is prospective in nature.[50] The U.S. Court of International Trade has found that "likely," as used in the five-year review provisions of the Act, means "probable," and the Commission applies that standard in five-year reviews.[51]

The statute states that "the Commission shall consider that the effects of revocation or termination may not be imminent, but may manifest themselves only over a longer period of time."[52] According to the SAA, a "'reasonably foreseeable time' will vary from case-to-case, but normally will exceed the 'imminent' timeframe applicable in a threat of injury analysis in original investigations."[53]

Although the standard in a five-year review is not the same as the standard applied in an original investigation, it contains some of the same fundamental elements. The statute provides that the Commission is to "consider the likely volume, price effect, and impact of imports of the subject merchandise on the industry if the orders are revoked or the suspended

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[49] SAA, H.R. Rep. No. 103-316, vol. I at 883-84 (1994). The SAA states that "{t}he likelihood of injury standard applies regardless of the nature of the Commission's original determination (material injury, threat of material injury, or material retardation of an industry). Likewise, the standard applies to suspended investigations that were never completed." *Id*. at 883.

[50] While the SAA states that "a separate determination regarding current material injury is not necessary," it indicates that "the Commission may consider relevant factors such as current and likely continued depressed shipment levels and current and likely continued {sic} prices for the domestic like product in the U.S. market in making its determination of the likelihood of continuation or recurrence of material injury if the order is revoked." SAA at 884.

[51] *See NMB Singapore Ltd. v. United States*, 288 F. Supp. 2d 1306, 1352 (Ct. Int'l Trade 2003) ("'likely' means probable within the context of 19 U.S.C. § 1675(c) and 19 U.S.C. § 1675a(a)"), *aff'd mem.*, 140 Fed. Appx. 268 (Fed. Cir. 2005); *Nippon Steel Corp. v. United States*, 26 CIT 1416, 1419 (2002) (same); *Usinor Industeel, S.A. v. United States*, 26 CIT 1402, 1404 nn.3, 6 (2002) ("more likely than not" standard is "consistent with the court's opinion;" "the court has not interpreted 'likely' to imply any particular degree of 'certainty'"); *Indorama Chemicals (Thailand) Ltd. v. United States*, 26 CIT 1059, 1070 (2002) ("standard is based on a likelihood of continuation or recurrence of injury, not a certainty"); *Usinor v. United States*, 26 CIT 767, 794 (2002) ("'likely' is tantamount to 'probable,' not merely 'possible'").

[52] 19 U.S.C. § 1675a(a)(5).

[53] SAA at 887. Among the factors that the Commission should consider in this regard are "the fungibility or differentiation within the product in question, the level of substitutability between the imported and domestic products, the channels of distribution used, the methods of contracting (such as spot sales or long-term contracts), and lead times for delivery of goods, as well as other factors that may only manifest themselves in the longer term, such as planned investment and the shifting of production facilities." *Id*.

investigation is terminated."[54] It directs the Commission to take into account its prior injury determination, whether any improvement in the state of the industry is related to the order or the suspension agreement under review, whether the industry is vulnerable to material injury if an order is revoked or a suspension agreement is terminated, and any findings by Commerce regarding duty absorption pursuant to 19 U.S.C. § 1675(a)(4).[55] The statute further provides that the presence or absence of any factor that the Commission is required to consider shall not necessarily give decisive guidance with respect to the Commission's determination.[56]

In evaluating the likely volume of imports of subject merchandise if an order under review is revoked and/or a suspended investigation is terminated, the Commission is directed to consider whether the likely volume of imports would be significant either in absolute terms or relative to production or consumption in the United States.[57] In doing so, the Commission must consider "all relevant economic factors," including four enumerated factors: (1) any likely increase in production capacity or existing unused production capacity in the exporting country; (2) existing inventories of the subject merchandise, or likely increases in inventories; (3) the existence of barriers to the importation of the subject merchandise into countries other than the United States; and (4) the potential for product shifting if production facilities in the foreign country, which can be used to produce the subject merchandise, are currently being used to produce other products.[58]

In evaluating the likely price effects of subject imports if an order under review is revoked and/or a suspended investigation is terminated, the Commission is directed to consider whether there is likely to be significant underselling by the subject imports as compared to the domestic like product and whether the subject imports are likely to enter the United States at prices that otherwise would have a significant depressing or suppressing effect on the price of the domestic like product.[59]

In evaluating the likely impact of imports of subject merchandise if an order under review is revoked and/or a suspended investigation is terminated, the Commission is directed to consider all relevant economic factors that are likely to have a bearing on the state of the industry in the United States, including but not limited to the following: (1) likely declines in output, sales, market share, profits, productivity, return on investments, and utilization of capacity; (2) likely negative effects on cash flow, inventories, employment, wages, growth,

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[54] 19 U.S.C. § 1675a(a)(1).

[55] 19 U.S.C. § 1675a(a)(1). Commerce has not issued any duty absorption findings since the imposition of the antidumping duty order on imports of silicon metal from China. CR at I-20 n.48; PR at I-16 n.48.

[56] 19 U.S.C. § 1675a(a)(5). Although the Commission must consider all factors, no one factor is necessarily dispositive. SAA at 886.

[57] 19 U.S.C. § 1675a(a)(2).

[58] 19 U.S.C. § 1675a(a)(2)(A-D).

[59] *See* 19 U.S.C. § 1675a(a)(3). The SAA states that "{c}onsistent with its practice in investigations, in considering the likely price effects of imports in the event of revocation and termination, the Commission may rely on circumstantial, as well as direct, evidence of the adverse effects of unfairly traded imports on domestic prices." SAA at 886.

ability to raise capital, and investment; and (3) likely negative effects on the existing development and production efforts of the industry, including efforts to develop a derivative or more advanced version of the domestic like product.[60] All relevant economic factors are to be considered within the context of the business cycle and the conditions of competition that are distinctive to the industry. As instructed by the statute, we have considered the extent to which any improvement in the state of the domestic industry is related to the order under review and whether the industry is vulnerable to material injury upon revocation.[61]

B. Conditions of Competition and the Business Cycle

In evaluating the likely impact of the subject imports on the domestic industry if an order is revoked, the statute directs the Commission to consider all relevant economic factors "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[62] The following conditions of competition inform our determination.

1. The Original Investigations and Prior Five-Year Reviews

Original Investigations. In the original investigations, the Commission did not reference any specific conditions of competition distinctive to the silicon metal market. It noted that the parties agreed that the demand for metallurgical grade silicon metal was inclined to be cyclical because it tended to follow consumption trends in markets of products using large amounts of aluminum, such as the automobile industry. However, the Commission stated that it was more difficult to relate trends in the overall demand for chemical grade silicon metal to trends in the demand for any one product or group of products because of the many uses for silicon metal in the chemical market.[63]

First Reviews. In the full first five-year reviews, the Commission cumulated subject imports from China with subject imports from Brazil, while finding that subject imports from Argentina likely would have no discernible adverse impact on the domestic industry.[64]

The Commission found that demand for silicon metal, which was derived from the demand for other products, such as chemical products and aluminum, had expanded significantly. It stated that the world demand for these end-use products was projected to grow at a strong rate in the foreseeable future.[65] Since the orders were imposed, the domestic

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[60] 19 U.S.C. § 1675a(a)(4).

[61] The SAA states that in assessing whether the domestic industry is vulnerable to injury if the order is revoked, the Commission "considers, in addition to imports, other factors that may be contributing to overall injury. While these factors, in some cases, may account for the injury to the domestic industry, they may also demonstrate that an industry is facing difficulties from a variety of sources and is vulnerable to dumped or subsidized imports." SAA at 885.

[62] 19 U.S.C. § 1675a(a)(4).

[63] *Original Investigations*, USITC Pub. 2385 at 14-15 n.51.

[64] *First Reviews,* USITC Pub. 3385 at 8-10, 15.

[65] *First Reviews*, USITC Pub. 3385 at 14.

industry's capacity, capacity utilization, and shipments had improved. However, a number of U.S. producers had filed for bankruptcy protection since the orders were imposed. During the original investigations, there were eight domestic producers; there were only three at the time of the first reviews. Nonsubject imports supplied a portion of U.S. demand at levels greater than those in the original investigations.[66]

The Commission stated that there were three grades of silicon metal within the scope of the orders: chemical, primary aluminum, and secondary aluminum. Price was an important factor affecting purchases of all grades. Within each grade there was moderate substitutability, assuming certification standards had been met. Chemical and primary aluminum grade silicon metal typically required certification; once a producer was certified, price became an even more important factor in purchasing decisions.[67]

Second Reviews. In the full second five-year reviews, the Commission found that subject imports from Brazil would likely face different conditions of competition in the U.S. market and therefore declined to exercise its discretion to cumulate subject imports from Brazil with those from China.[68]

The Commission stated that there were four broadly defined categories, or grades, of silicon metal, which in descending order of purity were: (1) semiconductor grade; (2) chemical grade; (3) a metallurgical grade used to produce primary aluminum (aluminum produced from ore); and (4) a metallurgical grade used to produce secondary aluminum (aluminum produced from scrap). The Commission observed that higher-grade silicon metal was frequently shipped to a purchaser with a lower specification requirement. The silicon metal content for all four grades was typically at least 98.5 percent. Semiconductor grade silicon, used in the electronics industry, was not covered by the scope of the antidumping duty orders.[69]

The Commission stated that demand for silicon metal was derived from the demand for other products. Silicon metal was used in the chemical industry to produce silanes that were, in turn, used to produce a family of organic chemicals known as silicones. Silicones were used in a wide variety of applications including resins, lubricants, plastomers, anti-foaming agents, and water-repellent compounds, which were employed in the chemical, pharmaceutical, automotive, and aerospace industries.[70] The Commission explained that silicon metal employed in the production of primary and secondary aluminum was used as an alloying agent (it was a required component in aluminum casting alloys) because the silicon increased fluidity and reduced shrinkage while it enhanced strength, castability, and weldability. Primary aluminum applications included the manufacture of components requiring higher purity aluminum, such as automobile wheels, while secondary aluminum applications were primarily automotive castings.[71]

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[66] *First Reviews*, USITC Pub. 3385 at 14.
[67] *First Reviews*, USITC Pub. 3385 at 14-15.
[68] *Second Reviews,* USITC Pub. 3892 at 8-10.
[69] *Second Reviews,* USITC Pub. 3892 at 12 and n.70.
[70] *Second Reviews,* USITC Pub. 3892 at 12.
[71] *Second Reviews,* USITC Pub. 3892 at 12-13.

The Commission observed that most U.S. producers reported that demand for silicon metal generally increased over the 2000-2005 period of review. Questionnaire data indicated that apparent consumption fluctuated over the period.[72]

The Commission stated that there were three domestic producers, Elkem, Globe, and Simcala at the end of the period of the first reviews, but by the end of the second period of review, there were two producers, as Elkem was sold to Globe in 2005. Dow Corning purchased Simcala, which shipped *** of its production to Dow Corning. The domestic industry's market share decreased over the period of review, while the market share of the nonsubject imports increased.[73]

As during the original investigations and first review period, the record for the second reviews indicated that there was moderate substitutability among subject imports and the domestic like product. Price was an important factor in purchasing decisions. The Commission observed that the record contained no evidence that substitutability between silicon metal from different sources had decreased. There was, however, evidence of improvement in the quality of Chinese product.[74]

Third Review. In the expedited third five-year review, the Commission stated that the conditions of competition that it relied upon in making its determinations in the second five-year reviews generally continued to apply. Although there were fluctuations in apparent U.S. consumption during the period of review, the Commission stated that apparent consumption was forecast to continue to grow steadily. It found that nonsubject imports fluctuated but increased overall during the period of review. Subject imports from China fluctuated, but remained below 1,000 short tons during four of the six years in the 2005-2010 period, and many of those imports were temporary importations under bond (TIBs) that were not subject to antidumping duties.[75] The Commission referenced Globe's assertions that silicon metal was a commodity product, domestic and imported silicon metal of the same grade were completely interchangeable, and the U.S. silicon metal market was highly competitive with sales based primarily on price. Based on the record evidence, the Commission found that conditions of competition in the silicon metal market were not likely to change significantly in the reasonably foreseeable future.[76]

2. The Current Review

a. Demand Conditions

Demand for silicon metal is a function of the demand for the downstream products that use silicon metal as an input for production. The primary users of silicon metal are chemical

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[72] *Second Reviews,* USITC Pub. 3892 at 13.
[73] *Second Reviews,* USITC Pub. 3892 at 13-14.
[74] *Second Reviews,* USITC Pub. 3892 at 14-15 and n.95.
[75] *Third Review,* USITC Pub. 4312 at 10.
[76] *Third Review,* USITC Pub. 4312 at 10-11.

and polysilicon producers and primary and secondary aluminum producers. Chemical end uses include chlorosilanes, polycrystalline silicon, polysilicon, sealants, silicones, and silicone adhesive sealants. Aluminum end uses include aluminum alloys, aluminum castings, and various foundry ingots.[77]

A majority of responding market participants reported that overall U.S. silicon metal demand increased since 2012, although market participants provided mixed responses as to whether U.S. demand for silicon metal in the polysilicon sector had increased, fluctuated, or experienced no change since 2012.[78] Apparent U.S. consumption declined overall by *** percent between 2014 and 2016. It declined by *** percent between 2014 and 2015, from *** short tons in 2014 to *** short tons in 2015, and increased *** in 2016 to *** short tons. Apparent consumption was *** short tons in January-September ("interim") 2016 and *** higher, at *** short tons, in interim 2017.[79]

b. Supply Conditions

The U.S. market is supplied by the domestic industry, subject imports, and nonsubject imports. While nonsubject imports had the largest share of apparent U.S. consumption, as measured by quantity, in 2014 and 2015, the domestic industry had the largest share in 2016 and in both interim 2016 and interim 2017. The domestic industry's market share increased from *** percent in 2014 to *** percent in 2015 and *** percent in 2016; it was *** percent in interim 2016 and *** percent in interim 2017.[80]

The domestic industry consists of three producers, Globe, DC Alabama, and Mississippi Silicon.[81] Globe and Mississippi Silicon are merchant market producers, while DC Alabama is a captive supplier of silicon metal for use in affiliate Dow Corning's production processes.[82] Mississippi Silicon is a recent entrant to the U.S. market and ***. The Mississippi facility began production on ***, and it started a ***.[83] Globe and Dow Corning *** in a plant in Alloy, West Virginia.[84] In December 2015, Globe merged with Spain-based Grupo FerroAtlántica to form Ferroglobe PLC.[85]

The domestic industry's production capacity increased from *** short tons in 2014 to *** short tons in 2015 and *** short tons in 2016; it was *** short tons in interim 2016, and higher, at *** short tons, in interim 2017.[86] The domestic industry's capacity was below

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[77] CR at II-10; PR at II-6.
[78] CR/PR at Table II-4.
[79] CR/PR at Tables I-6, C-1.
[80] CR/PR at Tables I-6, C-1.
[81] CR/PR at Table I-3.
[82] CR at III-9; PR at III-6 to III-7
[83] CR/PR at Tables III-1 and III-2.
[84] CR/PR at Table I-3.
[85] CR/PR at Table III-1.
[86] CR/PR at Tables III-6, C-1.

apparent U.S. consumption throughout the period of review.[87] Globe asserts that silicon metal production is capital intensive and domestic producers must maintain high levels of capacity utilization to remain viable.[88] In addition to the changes in Mississippi Silicon's capacity described above, Globe shut down its Selma, Alabama plant from February 2016 to September 2017, resuming operations in October 2017; ***.[89]

Subject imports were essentially absent from the U.S. market during the period of review, with reported U.S. imports of silicon metal from China not exceeding 340 short tons in any year during this period.[90] Many of the imports of silicon metal from China reported in Customs data were in fact imported through the TIB program, pursuant to which they were further processed in the United States and then exported, and were consequently not subject to antidumping duties under the order.[91] Dow Corning and Wacker Chemie AG, a large multinational corporation that is a major purchaser and end user of silicon metal in the United States, have a joint venture in China that operates a large state-of the art plant near Shanghai (Zhangjiangang). Wacker's Chinese affiliate purchases silicon metal from subject producers in China and exports it to the European Union ("EU") for polysilicon production.[92] In addition, Dow Corning has a plant in Dalian, China that produces silicon metal, and its affiliate DC Dalian exports silicon metal produced in China to Dow Corning's facility in Wales.[93]

Nonsubject imports' share of apparent U.S. consumption declined from 2014 to 2016 but was higher in interim 2017 than in interim 2016. Nonsubject imports' share of apparent U.S. consumption declined from *** percent in 2014 to *** percent in 2015, and then to *** percent in 2016. It was *** percent in interim 2016 and *** percent in interim 2017.[94] Brazil, South Africa, and Canada were the three largest sources of nonsubject U.S. silicon metal imports in 2016, while Australia, Kazakhstan, and Norway were also major suppliers of nonsubject imports.[95] There is an outstanding U.S. antidumping duty order against imports of silicon metal from Russia.[96] Ferroglobe, Globe's parent, also has subsidiary producers in Canada, France, South Africa, and Spain, while Mississippi Silicon ***, and DC Alabama *** and its parent company Dow Corning has ***.[97]

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[87] CR/PR at Table C-1.

[88] Globe's Prehearing Brief at 11; Hearing Tr. at 23-25 (Huck).

[89] CR/PR at Table III-2.

[90] CR/PR at Table IV-1.

[91] CR at IV-2; PR at IV-3.

[92] CR at IV-10 to IV-11; PR at IV-8; Hearing Tr. at 88-90 (Majumdar).

[93] CR at IV-11; PR at IV-8; Hearing Tr. at 88-89 (Majumdar).

[94] CR/PR at Table I-6, C-1.

[95] CR at II-9; PR at II-5. In April 2018, the Commission determined that an industry in the United States was not materially injured or threatened with material injury by reason of imports of silicon metal from Australia, Brazil, Kazakhstan, and Norway. *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final), USITC Pub. 4773 (Apr. 2018).

[96] CR at I-10; PR at I-7.

[97] CR/PR at Table I-4.

c. Substitutability and Other Conditions

The record indicates a high degree of substitutability between domestically produced silicon metal and subject imports.[98] The majority of market participants reported that domestically produced silicon metal and subject imports are "always" or "frequently" interchangeable.[99]

The record indicates that price was the factor most frequently ranked as one of the top three factors in purchasing decisions for silicon metal, and over half of reporting purchasers rated price as a "very important" factor. Nevertheless, quality was the factor most frequently named as the most important purchasing factor and more purchasers rated availability, reliability of supply, product consistency, and delivery time than price as "very important" factors.[100] Consequently, while price is an important factor in purchasing decisions, other factors are important as well.

Both the domestic industry and nonsubject imports competed in all segments of the U.S. market. In 2016, *** percent of U.S. producers' U.S. commercial shipments went to polysilicon and chemical producers, *** percent went to secondary aluminum producers, and *** percent went to primary aluminum producers. In 2016, *** percent of U.S. commercial shipments of nonsubject imports went to polysilicon and chemical producers, *** percent went to secondary aluminum producers, and *** percent went to primary aluminum producers.[101] The minimal quantities of commercial shipments of imports from China during 2014-2016 were sold exclusively to *** end users.[102] However, the record indicates that subject producers in China are capable of supplying all segments of the U.S. market, including polysilicon and other chemical industry customers.[103] Moreover, Chinese producers' home market shipments have been divided almost equally between chemical applications (silicones) and aluminum applications (aluminum alloys), with a substantial share also going to polysilicon applications.[104]

The domestic industry's U.S. commercial shipments were primarily based on annual contracts (*** percent) and long-term contracts (*** percent).[105] Contract prices are sometimes determined based on a formula that accounts for data from published price indices, which are readily available to purchasers. While these published indices primarily reflect product sold to secondary aluminum producers, purchasers in all sectors reference these indices.[106]

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[98] CR at II-13; PR at II-8.
[99] CR/PR at Table II-10.
[100] CR/PR at Table II-6, II-7.
[101] CR/PR at Table II-1.
[102] CR at II-2; PR at II-1; CR/PR at Table II-1.
[103] Hearing Tr. at 88-89, 90, 111-12 (Majumdar).
[104] CR at IV-12; PR at IV-9. The available data on this subject are from 2014. *Id*.
[105] CR/PR at Table V-2.
[106] CR at V-3; PR at V-2.

C. Likely Volume of Subject Imports

1. The Original Investigations and Prior Five-Year Reviews

Original Investigations. In the original investigations, the Commission found that cumulated subject imports from Argentina, Brazil, and China increased by 8.0 percent from 1988 to 1989, and 74.6 percent from 1989 to 1990. While the domestic industry's share of U.S. consumption by quantity increased from 71.7 percent in 1988 to 75.2 percent in 1989, it declined to 66.7 percent in 1990. The market share of cumulated subject imports increased, by quantity, substantially throughout the period: from 15.1 percent in 1988 to 17.8 percent in 1989 to 28.0 percent in 1990.[107]

First Reviews. In the full first five-year reviews, the Commission found that the likely volume of cumulated subject imports from Brazil and China would be significant within a reasonably foreseeable time, given the demonstrated ability of producers in the subject countries in the original investigations to increase imports rapidly into the U.S. market and the likelihood that they would shift more of their production to the U.S. market in the event of revocation.[108] The Commission found that the volume of subject imports from China was 3,324 short tons in 1999, as compared with 26,360 short tons in 1990 in the original investigations.[109] The Commission received questionnaire response from only five subject Chinese producers out of 42 producers that had been identified and found that the record indicated that subject producers in China had significant unused capacity, although it did not contain precise capacity data.[110] The Commission stated that the industry in China was export oriented and that almost all subject imports at that time from China were TIBs. The Commission noted that the EU had an antidumping duty order on imports of silicon metal from China, with a 49 percent duty rate.[111]

Second Reviews. In the full second five-year reviews, the Commission found that subject imports from China had declined over the period of review yet remained present in the U.S. market. Although no Chinese producers responded to the Commission's questionnaire, the available data indicated that the subject Chinese industry's capacity was at least *** metric tons per year, which represented approximately *** times the level of apparent U.S. consumption in 2005. The Chinese industry's production *** over the period of review, as did total Chinese export shipments, which were approximately *** percent of total Chinese shipments of silicon metal in 2005. The Commission stated that nothing in the record indicated that the Chinese producers would behave differently upon revocation of the order than they did during the original investigations. In view of the Chinese industry's large capacity, significant excess capacity, high and increasing level of production, and export shipments, the

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[107] *Original Investigations*, USITC Pub. 2385 at 26-27. The market share of subject imports from China increased from 4.5 percent in 1988 to 5.4 percent in 1989 and to 12.1 percent in 1990. *Id*. at A-59.

[108] *First Reviews,* USITC Pub. 3385 at 17-18.

[109] *First Reviews,* USITC Pub. 3385 at 17 n.109.

[110] *First Reviews,* USITC Pub. 3385 at 16 and n.94.

[111] *First Reviews,* USITC Pub. 3385 at 16-17.

Commission found that subject imports from China would likely be significant either in absolute terms or relative to production or consumption in the United States in the reasonably foreseeable future if the order were revoked.[112]

Third Review. In the expedited third five-year review, the Commission observed that the majority of imports of silicon metal from China were imported under the TIB program and were not subject to antidumping duties, while subject (non-TIB) imports were less than 500 tons each year, except in 2008, when they totaled 7,534 short tons. The Commission stated that the low volume of subject imports indicated that the antidumping duty order was having a significant restraining order on the volume of subject imports.[113]

The Commission explained that it had limited information on the Chinese industry in the review because of the lack of participation by producers and importers of subject merchandise. However, the Commission found that public sources of information concerning the Chinese silicon metal industry indicated that the industry was massive relative to apparent U.S. consumption, with capacity estimated at *** short tons in 2010 and significant unused capacity estimated at *** short tons in 2010, which was several times greater than apparent U.S. consumption in that year. In addition, the Commission found that existing plans called for the construction of *** short tons of additional capacity. Moreover, China was the world's largest producer of ferrosilicon, and the record indicated that Chinese producers could shift from production of ferrosilicon to production of silicon metal.[114]

The Commission found that, although there was a market for silicon metal in China, the Chinese industry remained export oriented and the available data indicated that exports of silicon metal from China constituted approximately *** percent of the industry's total output in 2010.[115] The Commission found that the United States was an attractive export market for subject Chinese producers given its size, the antidumping duty order in the EU on imports of silicon metal from China, and Globe's assertion that prices in the U.S. market were higher than those in other markets.[116] Accordingly, given the Chinese silicon metal industry's large and increasing size, significant excess capacity, and export orientation, along with the attractiveness of the U.S. market and import restrictions in the EU, the Commission found that the likely volume of subject imports, both in absolute terms and as a share of the U.S. market, would be significant if the order were revoked.[117]

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[112] *Second Reviews*, USITC Pub. 3892 at 22-23.

[113] *Third Review,* USITC Pub. 4312 at 12-13.

[114] *Third Review,* USITC Pub. 4312 at 13; Confidential Views of the Commission (Third Review) at 20 (EDIS Document No. 6170716).

[115] *Third Review,* USITC Pub. 4312 at 13; Confidential View of the Commission (Third Review) at 20-21 (EDIS Document No. 6170716).

[116] *Third Review,* USITC Pub. 4312 at 13.

[117] *Third Review,* USITC Pub. 4312 at 14.

2. The Current Review

The volume of subject imports was minimal during the period of review, with reported U.S. imports of silicon metal from China not exceeding 340 short tons in any year during this period.[118] However, the record does not contain precise information on the volume of subject imports since a substantial percentage of the reported imports of silicon metal from China during the period were TIB entries not subject to the order.[119]

The Commission received questionnaire responses from six Chinese producers of silicon metal, none of which exported silicon metal to the United States during the period of review. The responding producers estimated that their production of silicon metal accounted for approximately *** percent of overall production of silicon metal in China in 2016.[120] Because of the relatively low coverage, the questionnaire data provide limited information about the overall capabilities of the silicon metal industry in China. The questionnaire data indicate the capacity of the reporting producers to be *** short tons in 2016.[121]

Given the limitations of the questionnaire data, we have also considered other sources of information in the record with respect to the silicon metal industry in China. These sources indicate that the subject industry has very large capacity. Estimates from the U.S. Geological Survey ("USGS") indicate that in 2015 there were approximately 200 producers of silicon metal in China with a production capacity of 4.4 million short tons per year.[122] The China Non-Ferrous Metals Industry Association ("CNIA") has estimated that in 2017 the silicon metal industry in China had a production capacity of 5.3 million short tons.[123] Given these data, the capacity of the silicon metal industry in China far exceeds apparent U.S. consumption, which at its peak annual level during the review period in 2014 was *** short tons.[124]

The questionnaire data indicated that reported unused capacity of the silicon metal industry in China in interim 2017 was *** short tons.[125] According to USGS data, the industry in China had approximately 2.25 million short tons of unused capacity in 2015.[126] According to

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[118] CR/PR at Table IV-1.

[119] CR at IV-2; PR at IV-3. In 2016, *** percent of reported imports of silicon metal from China were through TIB. *Id.*

[120] CR at IV-9 to IV-10; PR at IV-7.

[121] CR/PR at Table IV-8. Reported capacity declined from *** short tons in 2014 and 2015 to *** short tons in 2016; it was *** short tons in interim 2016 and *** higher, at *** short tons, in interim 2017. *Id.*

[122] CR at IV-11; PR at IV-8.

[123] CR at IV-12; PR at IV-8.

[124] *See* CR/PR at Table I-6. The capacity of the subject industry is also far greater than the capacity of Ferroglobe's production facilities worldwide, which are estimated to have a combined production capacity of approximately 543,000 short tons per year. CR at IV-25; PR at IV-15.

[125] Reported unused capacity declined from *** short tons in 2014 to *** short tons in 2015, and then to *** short tons in 2016; it was *** short tons in interim 2016 and *** higher, at *** short tons, in interim 2017. CR/PR at Table IV-8.

[126] CR at IV-11; PR at IV-8.

CNIA data, the industry had approximately 2.9 million short tons of unused capacity in 2017.[127] Thus, the USGS estimate indicates that unused capacity of the industry in China in 2015 was equivalent to approximately *** times apparent U.S. consumption in that year, while the CNIA estimate indicates that the industry's unused capacity in 2017 was equivalent to approximately *** times apparent U.S. consumption in 2016.[128]

Respondents argue that estimates of Chinese capacity "tend to be overstated" in light of policies of the Chinese government to shut down smaller inefficient Chinese producers and promote larger and more efficient producers, and due to the constraints imposed on some facilities due to limited seasonal availability of hydroelectric power in some regions.[129] However, respondents have provided minimal empirical data documenting actual reductions in capacity as a result of shutdowns of production facilities in China, or documenting the extent to which any specific capacity in China has been adversely affected by such production constraints.[130] Moreover, available data indicate that production of silicon metal in China has increased substantially in recent years despite any such shutdowns and constraints, with USGS reporting that estimated silicon metal production in China increased by 44.5 percent between 2011 and 2015 and *** data indicating that estimated production in China increased by *** percent between 2011 and 2016.[131] Moreover, even assuming *arguendo* that respondents are correct in their contention that available estimates of the capacity and unused capacity of the silicon metal industry in China are overstated, this does not change our analysis given the amount by which estimated unused capacity in China exceeds apparent U.S. consumption. Thus, we find that the silicon metal industry in China has very large capacity and unused capacity.

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[127] CR at IV-12; PR at IV-9.

[128] Apparent U.S. consumption was *** short tons in 2014, *** short tons in 2015, and *** short tons in 2016. CR/PR at Table I-6. The amount of unused capacity reported by the responding Chinese producers in interim 2017 was equivalent to approximately *** percent of apparent U.S. consumption during that interim period. Compare *id.* with CR/PR at Table IV-8.

[129] Respondents' Prehearing Brief at 16-18; Respondents' Posthearing Brief at 7-9.

[130] Respondents submitted several documents purporting to show policies by the Chinese government to shut down smaller, less efficient facilities, including lists of "ferroalloy" facilities to be shut down. However, these documents are not in English and do not indicate whether and to what extent the listed ferroalloy facilities produced silicon metal. *See* Respondents' Posthearing Brief at 7-8 and Exhs. 1-3. Moreover, respondents provide no information as to whether any facilities on this list were in fact shut down or how much silicon metal capacity, if any, was actually shut down. A witness from Hoshine Silicon testified that his company had shut down a small, environmentally non-compliant facility in 2016, but did not provide information on the amount of capacity shut down. Hearing Tr. at 110 (Zhang). Respondents have provided no data regarding the effect of the asserted seasonal production constraints on the capacity of the silicon metal industry in China. *See* Respondents' Prehearing Brief at 18 and Attachment 2; Respondents' Posthearing Brief at 8-9.

[131] CR at IV-11 to IV-12; PR at IV-8 to IV-9; CR/PR at Table IV-11. Reported production by the firms that responded to the Commission's questionnaire rose by *** percent from 2014 to 2016, increasing from *** short tons in 2014 to *** short tons in 2015 and *** short tons in 2016; production was *** short tons in interim 2016, and higher, at *** short tons, in interim 2017. CR/PR at Table IV-8.

The available information indicates that the silicon metal industry in China is export oriented. Official statistics indicate that China was by far the largest exporter of silicon metal in the world in 2014, 2015, and 2016, with several times the volume of exports of the next largest exporting country in each year.[132] The reported percentage of shipments that the responding Chinese producers exported reached a period high in 2016 of *** percent.[133] Other information in the record indicates that 51 percent of silicon metal production in China in 2014 was exported.[134]

The additional information that respondents highlight does not detract from our finding of export orientation. We acknowledge that official statistics show that exports of silicon metal from China declined by 26.3 percent between 2014 and 2016.[135] Additionally, information in the record from *** indicates that domestic demand for silicon metal in China has increased, is expected to continue increasing through 2022, and ***.[136] The reported decline in Chinese exports may thus reflect an increase in Chinese home market demand as well as the effects of Chinese government policies that have sometimes sought to discourage Chinese exports of silicon metal.[137] Nevertheless, the data discussed above indicate that the industry's export orientation is high and is projected to remain so.

There are barriers to imports of silicon metal from China into other markets as a result of antidumping duty orders in the EU, Australia, and Canada.[138] Respondents assert that subject producers will have no incentive to divert shipments to the U.S. market, stating that demand has increased and *** in China's largest Asian export markets in Japan, South Korea, and Thailand.[139] We do not agree. While the record indicates that the largest Chinese export markets are in Asia, its exports are worldwide and also include countries such as Germany (notwithstanding the order in the EU), the United Arab Emirates, and Mexico. Moreover, China's exports to its three largest Asian markets declined from 2014 to 2016.[140] Given the very large unused capacity of the silicon metal industry in China, the ability of the Chinese industry to ship worldwide, including to North America, and the reported decline in Chinese exports to

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[132] CR/PR at Table IV-13.

[133] CR/PR at Table IV-8. The percentage of shipments that went to exports was *** percent in 2014, *** percent in 2015, *** percent in 2016; it was *** percent in interim 2016 and *** percent in interim 2017.

[134] CR at IV-12; PR at IV-9; *see Metal Bulletin Events,* 31 March – 2 April 2015, at 20 (EDIS Document No. 641834).

[135] CR/PR at Table IV-10.

[136] CR at IV-19 n.39; PR at IV-11 n.39.

[137] In 2006, the Chinese government abolished the value added tax refund for exports of silicon, which was intended to discourage such exports. CR at IV-12 to IV-13; PR at IV-9. In 2008, the Chinese government placed a duty on exports of silicon metal, which the government removed in 2013 following a WTO dispute settlement proceeding challenging that practice. CR at IV-13; PR at IV-9.

[138] CR at IV-22; PR at IV-14.

[139] Respondents' Posthearing Brief at 14-15.

[140] CR/PR at Table IV-10.

its largest Asian export markets in recent years, subject producers will have both the incentive and ability to direct additional subject imports into the United States in the event of revocation.

Given the barriers to imports from China in other export markets, the large U.S. market will be attractive to subject producers in the event of revocation.[141] Moreover, the existing affiliations between producers and exporters of silicon metal in China with major purchasers and end users of silicon metal in the United States such as Wacker Chemie AG and Dow Corning will facilitate the ability of subject imports to ship large volumes into the U.S. market in the event of revocation.[142]

We find that subject producers in China would likely direct significant volumes of silicon metal to the U.S. market should the antidumping duty order be revoked. As discussed above, the subject industry has large capacity and unused capacity as well as substantial export orientation. In the event of revocation, it would be likely to direct additional exports to the U.S. market in light of barriers to imports from China in other significant export markets, the attractiveness of the United States as an export market given its large size, and existing relationships between producers and exporters of silicon metal in China and large purchasers and end users in the United States. Moreover, the subject imports demonstrated during the original investigations their ability to increase exports to the United States substantially in a short period of time. We therefore conclude that the volume of subject imports would likely be significant, both in absolute terms and relative to U.S. consumption, upon revocation of the order.[143]

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[141] The U.S. market is one of the largest markets for silicon metal in the world, after the Chinese and EU markets. CR/PR at Table IV-12.

[142] CR at IV-10 to IV-11; PR at IV-8.

[143] We have also examined inventories in our analysis of the likely volumes of subject imports. U.S. importers reported no inventories of imports of silicon metal from China during the period of review. CR at IV-7; PR at IV-6. Reported end-of-period inventories of silicon metal in China were *** short tons in 2014, *** short tons in 2015, and *** short tons in 2016. They were *** short tons in interim 2016, and *** short tons in interim 2017. CR/PR at Table IV-8.

With respect to the potential for product shifting, *** responding Chinese producers reported that they were not able to switch production from silicon metal to any other products. CR at II-9; PR at II-3. The available information from USGS estimates that there over 1,000 producers of ferrosilicon in China, with an estimated capacity in 2015 of 12.1 million short tons of ferrosilicon per year. CR at IV-11; PR at IV-8. Globe has produced both silicon metal and ferrosilicon metal at its facilities in the United States, although it did not use the same furnaces for both, and has asserted that conversion from ferrosilicon to silicon production can be done relatively quickly and easily. See CR at I-35 to I-36; PR at I-27. Because there is no information in the record about the ability of ferrosilicon producers in China to convert to production of silicon metal, we do not rely on product shifting as a basis for our likely volume finding.

D. Likely Price Effects

1. The Original Investigations and Prior Five-Year Reviews

Original Investigations. In the original investigations, the Commission found that the average unit value ("AUV") of imports from the three subject countries decreased throughout the period of investigation. Spot prices for sales to secondary aluminum producers by suppliers of domestic product and subject imports fluctuated in 1988 and 1989, but when domestic prices recovered in 1990, import prices generally continued to decline. Spot market prices for domestic sales to primary aluminum producers declined by 4.7 percent during the period of investigation.[144] The Commission found that there was significant underselling by the subject imports throughout the period. In sales of secondary aluminum grade silicon metal, cumulated subject imports undersold the domestic product in 25 out of 35 quarterly price comparisons for which data were available and the Commission found the underselling to be particularly significant in light of the generally declining prices for the domestic product.[145] The Commission found that domestic producers' prices had been suppressed relative to costs, as indicated in the steady increase in the ratio of the cost of goods sold to net sales over the period.[146]

First Reviews. In the full first five-year reviews, the Commission found that the likely significant increased volumes of cumulated subject imports from Brazil and China would likely undersell the domestic like product to a significant degree and have significant price suppressing and depressing effects within a reasonably foreseeable time if the orders were revoked.[147] The Commission found that prices generally trended downward during the period of review, although some grades showed increases toward the end of the period, and that domestic producers had to renegotiate long-term contracts with major customers to adjust prices downward. While the limited pricing data showed that subject imports from Brazil undersold the domestic like product, prices for silicon metal from China were primarily for secondary aluminum, brought into the United States under TIB and not subject to antidumping duties.[148]

Second Reviews. In the full second five-year reviews, there were no pricing comparisons available for subject imports from China, but the Commission stated that the low unit values of the TIB imports from China not subject to duties provided some indication of the likely prices of subject merchandise upon revocation of the order. The Commission also pointed to prices for Chinese silicon metal reported in the publication *Metal Bulletin,* which showed that the price of Chinese silicon metal was below the price of U.S. silicon metal in all months for which such data were available between 2000 and 2006.[149]

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[144] *Original Investigations*, USITC Pub. 2385 at 27.

[145] *Original Investigations,* USITC Pub. 2385 at 27-28. Subject imports from China undersold the domestic product in nine of 12 quarterly comparisons. *Id*. at A-72.

[146] *Original Investigations*, USITC Pub. 2385 at 28.

[147] *First Reviews,* USITC Pub. 3385 at 18.

[148] *First Reviews,* USITC Pub. 3385 at 18.

[149] *Second Reviews*, USITC Pub. 3892 at 24.

The Commission stated that the quality of subject imports from China had improved since the first five-year reviews, which rendered subject imports more interchangeable with the domestic product and made it more likely that U.S. purchasers would buy increased volumes of the lower-priced subject Chinese imports upon revocation of the order. The Commission found that data from the original investigations and first reviews indicated that the likely significant increased volumes of subject imports from China were likely to enter the U.S. market at prices that would significantly undersell the domestic product as well as significantly depress or suppress domestic prices within a reasonably foreseeable time if the order were revoked.[150]

Third Review. In the expedited third five-year review, the Commission observed that the record contained no new product-specific pricing information, but that domestic silicon metal prices fell from 2008 to 2009 because of the economic downturn, and recovered in the second half of 2009 and in 2010. The Commission found that prices of exports of silicon metal from China to all markets were well below prevailing prices in the U.S. market. The Commission found that, if the order were revoked, it was likely that subject producers would resume their pattern of underselling from the original investigations in order to increase their share of the U.S. market.[151] The Commission concluded that, given the likely significant volume of subject imports, the importance of price in the U.S. silicon metal market, the substitutability of subject imports and the domestic like product, and past pricing patterns, it was likely that increased volumes of subject imports from China would enter at prices that would significantly undersell the domestic product as well as significantly depress or suppress domestic prices within a reasonably foreseeable time if the order were revoked.[152]

2. The Current Review

We found above that there is a high degree of substitutability between domestically produced silicon metal and subject imports and that price is an important factor in purchasing decisions for silicon metal.

The Commission received no pricing data with respect to subject imports from China. Accordingly, no comparisons of pricing data between U.S. produced silicon metal and subject imports from China are available in this review.[153] Moreover, *** Chinese subject producers that responded to the Commission's questionnaire, ***.[154] Although respondents assert that prices of Chinese silicon metal producers have been rising in line with international silicon metal prices due to higher production costs in China,[155] we are disinclined to rely on the

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[150] *Second Reviews*, USITC Pub. 3892 at 24.

[151] *Third Review,* USITC Pub. 4312 at 15-16.

[152] *Third Review,* USITC Pub. 4312 at 16.

[153] CR at V-11; PR at V-5.

[154] CR/PR at Table IV-8 n.1. *** was the *** producer of silicon metal of the six Chinese firms that responded to the Commission's questionnaire, accounting for *** percent of total silicon metal production of those six firms in 2016. CR/PR at Table IV-5. Shaote Zhang, a sales director of Hoshine Silicon, testified at the Commission hearing. *See* Hearing Tr. at 70-73 (Zhang).

[155] Respondents' Prehearing Brief at 19-21; Respondents' Posthearing Brief at 9-11.

secondary information provided by respondents regarding the prices of silicon metal producers in China,[156] and accord it little weight in light of the *** requested by the Commission. The record does indicate that eight of nine responding purchasers reported that the price of domestically produced silicon metal is higher than the price of silicon metal reported from China.[157]

Given the importance of price in purchasing decisions and the high degree of substitutability of the products, suppliers of subject merchandise will need to offer silicon metal at low prices in order to increase their sales in the U.S. market and gain market share. Absent the discipline of the order, this will likely cause significant underselling by subject imports, as occurred during the original investigations.[158] With increasing volumes of subject merchandise being offered at low prices, the domestic industry would, in order to retain sales, be forced to cut prices and/or restrain price increases when its costs increase. Consequently, the increasing volumes of subject imports of silicon metal are likely to have a significant effect on prices for the domestic like product.

For the foregoing reasons, we find that subject imports of silicon metal would likely have significant price effects upon revocation of the orders.

E. Likely Impact

1. The Original Investigations and Prior Five-Year Reviews

The Original Investigations. In the original investigations, the Commission noted that the domestic producers had in a number of cases been unable to modernize their facilities, had curtailed expansion, and were experiencing difficulty in raising capital due to the effects of the cumulated subject imports.[159] In addition, the Commission found that the domestic industry's share of apparent U.S. consumption decreased during the period, while production and employment data were mixed. The Commission found that the industry's net sales had declined as had its aggregate gross profit and gross profit margins, and its operating and net return on total assets suffered steep declines during the period.[160] Thus, the Commission found material injury by reason of the subject imports.[161]

First Reviews. In the full first five-year reviews, the Commission found that the domestic industry was vulnerable to material injury should the orders be revoked, noting that several firms had declared bankruptcy and two domestic producers had closed during the period of review. Although the Commission stated that the domestic industry's condition had improved

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[156] *See* Respondents' Posthearing Brief at Exh. 4; *see also* Globe's Posthearing Brief at Exh. 5.

[157] CR at V-12; PR at V-6.

[158] As previously discussed, in the original investigations, subject imports from China undersold the domestic product in nine of 12 quarterly comparisons. *Original Investigations,* USITC Pub. 2385 at A-72.

[159] *Original Investigations*, USITC Pub. 2385 at 28.

[160] *Original Investigations*, USITC Pub. 2385 at 15-18.

[161] *Original Investigations*, USITC Pub. 2385 at 28.

since the orders were imposed, it found that the gains had eroded over the period of review, as the industry experienced declines in capacity utilization, production, shipments, net sales, several employment indicators, and capital expenditures. The Commission found that the domestic industry's likely price and volume declines as a result of cumulated subject imports from Brazil and China would likely have a significant adverse impact on the production, shipment, sales, and revenue levels of the domestic industry, and those reductions would have a direct adverse impact on the industry's profitability as well as its ability to raise capital and maintain necessary capital investments, and would result in commensurate employment declines for domestic firms.[162]

Second Reviews. In the full second five-year reviews, the Commission did not find the domestic industry to be vulnerable, stating that the industry's financial indicators showed significant improvement, especially toward the end of the period of review, which the domestic industry ascribed, at least in part, to the antidumping duty order that was imposed on imports of silicon metal from Russia in 2003.[163] Notwithstanding the Commission's findings that the domestic industry was not vulnerable within the meaning of the statute and that demand was projected to grow, the Commission found that the likely substantial volume and price effects of the subject imports from China would have a significant negative impact on the production, shipment, sales, and revenue levels of the domestic industry. It stated that these reductions were likely to have a direct adverse impact on the industry's profitability as well as its ability to raise capital and maintain necessary capital investments, and it was likely that revocation of the order would also result in commensurate employment declines for domestic firms. Based on the facts available, the Commission concluded that if the order were revoked, the circumstances present during the original investigation and first review period would recur and there would be a significant impact on the domestic industry.[164]

Third Review. In the expedited third five-year review, the Commission observed that it had limited information regarding the domestic industry's financial performance, since it had collected data for only 2010, and stated that the limited record was insufficient for it to make a finding as to whether the domestic industry was vulnerable to material injury.[165] The Commission found that the domestic industry was smaller in size than it was in the original investigations, and its capacity, production, capacity utilization rate, U.S. shipments, and market share were all lower in 2010 than they had been in 2005. However, the Commission stated that the domestic industry was *** and its financial performance was better in 2010 than it had been in 2005.[166]

The Commission concluded that should the order be revoked, the likely adverse volume and price effects would likely have a significant impact on the production, shipment, sales,

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[162] *First Reviews,* USITC Pub. 3385 at 19-20.

[163] *Second Reviews*, USITC Pub. 3892 at 21, 24.

[164] *Second Reviews*, USITC Pub. 3892 at 23.

[165] *Third Review,* USITC Pub. 4312 at 18.

[166] *Third Review,* USITC Pub. 4312 at 18; Confidential Views of the Commission (Third Review) at 29 (EDIS Document No. 6170716).

market share, and revenues of the domestic industry, and that declines in those performance indicators would have a direct adverse impact on the industry's profitability and employment, as well as its ability to raise capital, to make and maintain necessary capital investments, and to fund research and development.[167]

In its analysis of factors other than subject imports, the Commission noted that market share of nonsubject imports was higher, at *** percent, in 2010 than it had been at *** percent in 2005, but it found that this increase ***. Moreover, the Commission found no evidence that the presence of nonsubject imports in the U.S. market would prevent subject imports from entering the U.S. market at injurious levels and prices and found that the expected increase in subject imports would be at the expense of the domestic industry even if nonsubject imports were also impacted. The Commission found that demand was forecast to continue to grow modestly and therefore was not expected to have a negative impact on the domestic industry.[168]

2. The Current Review

Most of the domestic industry's trade and employment indicators increased or remained stable over the period of review. By contrast, the domestic industry's financial indicators deteriorated.

The domestic industry's capacity and production increased during the period of review, while capacity utilization fluctuated within a relatively narrow range.[169] Its U.S. shipments increased overall during the period of review, and its market share also increased, although its market share was *** lower in interim 2017 than interim 2016.[170] Its inventories increased from 2014 to 2016 and were lower in interim 2017 than interim 2016.[171]

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[167] *Third Review,* USITC Pub. 4312 at 19.

[168] *Third Review,* USITC Pub. 4312 at 19; Confidential Views of the Commission (Third Review) at 30-31 (EDIS Document No. 6170716).

[169] The domestic industry's capacity was *** short tons in 2014, *** short tons in 2015, and *** short tons in 2016; it was *** short tons in interim 2016 and *** short tons in interim 2017. Its production was *** short tons in 2014, *** short tons in 2015, and *** short tons in 2016; it was *** short tons in interim 2016 and *** short tons in interim 2017. The domestic industry's capacity utilization rate was *** percent in 2014, *** percent in 2015, and *** percent in 2016; it was *** percent in interim 2016 and *** percent in interim 2017. CR/PR at Table III-4.

[170] U.S. shipments increased from *** short tons in 2014 to *** short tons in 2015 and *** short tons in 2016; they were *** short tons in interim 2016 and *** short tons in interim 2017. CR/PR at Table III-7. The domestic industry's share of apparent U.S. consumption increased from *** percent in 2014 to *** percent in 2015 to *** percent in 2016; it was *** percent in interim 2016 and *** percent in interim 2017. CR/PR at Table I-8.

[171] Ending inventories were *** short tons in 2014, *** short tons in 2015, and *** short tons in 2016; they were *** short tons in interim 2016 and *** short tons in interim 2017. CR/PR at Table III-8.

The number of production related workers, hours worked, and wages paid increased overall from 2014 to 2016.[172] By contrast, productivity declined from 2014 to 2016, although it was higher in interim 2017 than in interim 2016.[173]

The domestic industry's financial indicators deteriorated overall during the period of review and declined sharply in 2016. The quantity of net sales increased overall throughout the period of review.[174] Sales revenues rose in 2015, declined in 2016, and were lower in interim 2017 than interim 2016 on an aggregate basis; average unit sales values followed the same trend.[175] Average unit cost of goods sold ("COGS") showed the same trends as unit sales values.[176] The domestic industry had yearly declines in gross profit, operating income, and net income, and experienced losses in gross profit in interim 2017 and in both operating income and net income in 2016 and interim 2017.[177] Operating margins declined throughout the period of review.[178] Capital expenditures rose in 2015, when Mississippi Silicon was opening its new production facility, fell in 2016, and were *** lower in interim 2017 than in interim 2016.[179]

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[172] The number of production related workers was *** in 2014, *** in 2015, and *** in 2016; it was *** in interim 2016 and *** in interim 2017. Total hours worked were *** in 2014, *** in 2015, and *** in 2016; they were *** in interim 2016 and interim 2017. Wages paid were $*** in 2014, $*** in 2015, and $*** in 2016; they were $*** in interim 2016 and $*** in interim 2017. CR/PR at Table III-10.

[173] Productivity declined from *** short tons per 1,000 hours in 2014 to *** short tons per 1,000 hours in 2015 and *** short tons per 1,000 hours in 2016; it was *** short tons per 1,000 hours in interim 2016 and higher, at *** short tons per 1,000 hours, in interim 2017. CR/PR at Table III-10.

[174] The quantity of net sales was *** short tons in 2014, *** short tons in 2015, and *** short tons in 2016; it was *** short tons in interim 2016 and *** short tons in interim 2017. CR/PR at Table III-13.

[175] Sales revenues were $*** in 2014, $*** in 2015, and $*** in 2016; they were $*** and $*** in interim 2016 and interim 2017, respectively. Average unit sales values were $*** in 2014, $*** in 2015, $*** in 2016, $*** in interim 2016, and $*** in interim 2017. CR/PR at Table III-13.

[176] Unit COGS increased from $*** in 2014 to $*** in 2015, and declined to $*** in 2016; it was $*** in interim 2016 and $*** in interim 2017. CR/PR at Table III-13. The domestic industry's COGS to net sales ratio increased over the period of review, particularly when it increased from *** percent in 2015 to *** percent in 2016. CR/PR at Table C-1.

[177] Gross profit declined from $*** in 2014 to $*** in 2015, and then fell to $*** in 2016; the industry reported gross profit of $*** in interim 2016 and a net loss of $*** in interim 2017. Operating income fell from $*** in 2014 to $*** in 2015, and then fell to an operating loss of $*** in 2016. The industry sustained operating losses of $*** in interim 2016 and $*** in interim 2017. Net income fell from $*** in 2014 to $*** in 2015, and then fell to a net loss of $*** in 2016; the industry reported net losses of $*** and $*** in interim 2016 and interim 2017, respectively. CR/PR at Table III-13.

[178] The industry's ratio of operating income to net sales declined from *** percent in 2014 to *** percent in 2015, and then subsequently to *** percent in 2016. The ratio was *** percent in interim 2016 and *** percent in interim 2017. CR/PR at Table III-13.

[179] Capital expenditures were $*** in 2014, $*** in 2015, and $*** in 2016; they were $*** in interim 2016 and $*** in interim 2017. CR/PR at Table III-17. The domestic industry reported *** research and development expenses during the period of review. CR/PR at Table III-17.

The record indicates that revocation of the order could likely have negative effects on the existing development and production efforts of the domestic industry. *** reported that ***.[180] *** reported that ***.[181]

Respondents argue that there would be attenuated competition between the domestic like product and subject imports in the event of revocation of the order, asserting that domestic producers have focused on chemical and polysilicon end uses, while leaving aluminum end uses to imports.[182] This assertion is unsupported by the record, which reflects that the domestic industry competed in all segments of the U.S. market. In 2016, *** percent of U.S. producers' U.S. commercial shipments went to polysilicon and chemical producers, *** percent went to secondary aluminum producers, and *** percent went to primary aluminum producers. The record further indicates that subject producers in China are capable of supplying all segments of the U.S. market, including polysilicon and other chemical industry customers.[183] Moreover, the available information about silicon metal produced in China that is consumed in the home market indicates that it is divided almost evenly between chemical applications (silicones) and aluminum applications (aluminum alloys), with a substantial share also going to polysilicon applications.[184] Thus, in the event of revocation, subject imports would likely compete with the domestic like product in every segment of the U.S. market, and we accordingly reject respondents' assertion that likely competition upon revocation would be attenuated.

As addressed above, we have found that revocation of the order would likely result in a significant increase in subject import volume that would likely have adverse price effects on the domestic industry. The likely significant volume of the cumulated subject imports would likely have an adverse impact on the production, shipments, sales, market share, and revenues of the domestic industry. These reductions would likely have a direct adverse impact on the industry's profitability and employment, as well as its ability to raise capital and make and maintain necessary capital investments. We therefore conclude that, if the order were revoked, subject imports from China would be likely to have a significant impact on the domestic industry within a reasonably foreseeable time.

We have also considered the role of nonsubject imports in the U.S. market. While nonsubject imports had a substantial presence in the U.S. market during the period of review, the volume and market share of nonsubject imports declined during the period of review, although they were higher in interim 2017 than in interim 2016.[185] As previously noted, the Commission recently concluded antidumping and countervailing duty investigations regarding

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[180] CR/PR at Table D-1.

[181] CR/PR at Table D-1.

[182] Respondents' Prehearing Brief at 5-7.

[183] Hearing Tr. at 88-89, 90, 111-112 (Majumdar).

[184] CR at IV-12; PR at IV-9.

[185] The volume of nonsubject imports declined from 211,438 short tons in 2014 to 179,529 short tons in 2015, and then to 166,348 short tons in 2016; they were 126,427 short tons in interim 2016, and higher, at 132,762 short tons, in interim 2017. Nonsubject imports' share of apparent U.S. consumption declined from *** percent in 2014 to *** percent in 2015, and then to *** percent in 2016; it was *** percent in interim 2016 and higher, at *** percent, in interim 2017. CR/PR at Table I-6.

imports from four of the leading sources of nonsubject imports (Australia, Brazil, and Kazakhstan, and Norway) and determined that an industry in the United States was not materially injured or threatened with material injury by reason of imports of silicon metal from those four countries.[186] Given our conclusion that nonsubject imports from these four sources are neither materially injuring nor threatening the domestic industry, nonsubject imports would not likely be a source of injury to the domestic industry in the event of revocation.[187]

Accordingly, we find that revocation of the antidumping duty order on silicon metal from China would likely have a significant impact on the domestic industry.

IV. Conclusion

For the above-stated reasons, we determine that revocation of the antidumping duty order on silicon metal from China would be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time.

[186] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final), USITC Pub. 4773 (Apr. 2018).

[187] We note that the two other leading sources of nonsubject imports are South Africa and Canada. CR at II-9; PR at II-5. Globe's corporate parent Ferroglobe has subsidiary producers in Canada and South Africa, while Dow Corning has ***, which make it unlikely that those producers in South Africa and Canada would seek to cause material injury to the domestic industry. CR/PR at Table I-4.

PART I: INTRODUCTION

BACKGROUND

On March 1, 2017, the U.S. International Trade Commission ("Commission" or "USITC") gave notice, pursuant to section 751(c) of the Tariff Act of 1930, as amended ("the Act"),[1] that it had instituted a review to determine whether revocation of the antidumping duty order on silicon metal from China would likely lead to the continuation or recurrence of material injury to a domestic industry.[2] [3] On June 5, 2017, the Commission determined that it would conduct a full review pursuant to section 751(c)(5) of the Act.[4] The following tabulation presents information relating to the background and schedule of this proceeding:[5]

[1] 19 U.S.C. 1675(c).

[2] *Silicon Metal From China; Institution of a Five-Year Review,* 82 FR 12234, March 1, 2017. All interested parties were requested to respond to this notice by submitting the information requested by the Commission.

[3] In accordance with section 751(c) of the Act, the U.S. Department of Commerce ("Commerce") published a notice of initiation of five-year review of the subject antidumping duty order concurrently with the Commission's notice of institution. Commerce's initiation notice, which was effective March 1, 2017, was published in the *Federal Register* on March 3, 2017. *Initiation of Five-Year ("Sunset") Reviews;* 82 FR 12438, March 3, 2017.

[4] *Silicon Metal From China; Notice of Commission Determination to Conduct a Full Five-Year Review,* 82 FR 27525, June 15, 2017. The Commission majority found that both the domestic and respondent interested party group responses to its notice of institution were adequate and determined to proceed to a full review. Chairman Rhonda K. Schmidtlein found that the respondent interested party group response was inadequate and voted for an expedited review. Commissioner F. Scott Kieff did not participate.

[5] The Commission's notice of institution, notice to conduct a full review, scheduling notice, and statement on adequacy are referenced in appendix A and may also be found at the Commission's web site (internet address *www.usitc.gov*). Commissioners' votes on whether to conduct an expedited or full reviews may also be found at the web site. A list of witnesses that appeared at the hearing is presented in appendix B of this report.

Effective date	Action
March 1, 2017	Commission's institution of five-year review (82 FR 12234)
March 1, 2017	Commerce's initiation of five-year review (82 FR 12438, March 3, 2017)
June 5, 2017	Commission's determination to conduct full five-year review (82 FR 27525, June 15, 2017)
July 3, 2017	Commerce's final results of expedited five-year review of the antidumping duty order (82 FR 30841)
November 6, 2017	Commission's scheduling of the review (82 FR 55858, November 24,2017)
March 20, 2018	Commission's hearing
May 1, 2018	Commission's vote
May 15, 2018	Commission's determination and views

THE ORIGINAL INVESTIGATIONS AND SUBSEQUENT REVIEWS

The original investigations

The original investigations resulted from a petition filed on August 24, 1990 with Commerce and the Commission by American Alloys, Inc., Pittsburgh, Pennsylvania; Elkem Metals Co., Pittsburgh, Pennsylvania; Silicon Metaltech, Inc., Seattle, Washington; SiMETCO, Inc., Canton, Ohio; and SKW Alloys, Inc., Niagara, New York. On October 3, 1990, the petition was amended to add the following unions as petitioners: Oil, Chemical and Atomic Workers, Local 3-89; International Union of Electrical, Machine and Furniture Workers, AFL-CIO Local 693; Textile Processors, Service Trades, Health Care Professional and Technical Employees International Union, Local 60; and the United Steelworkers of America, Locals 5171, 8538, and 12646. The petition alleged that an industry in the United States was materially injured and threatened with further material injury by reason of subsidized imports of silicon metal from Brazil and less-than-fair-value ("LTFV") imports of silicon metal from Argentina, Brazil, and China.[6]

On June 3, 1991, the Commission determined that an industry in the United States was materially injured by reason of LTFV imports of silicon metal from China.[7] Commerce issued an antidumping duty order on June 10, 1991. The final weighted-average antidumping margin was

[6] On November 27, 1990, Commerce published notice of its preliminary negative countervailing duty determination regarding silicon metal imports from Brazil (55 FR 49322). Commerce published its final negative determination on June 12, 1991 (56 FR 26988).

[7] *Silicon Metal from the People's Republic of China*, *Inv. No. 731-TA-472 (Final*), USITC Publication 2385, June 1991, p. A-3.

139.49 percent ad valorem for all manufacturers, producers, and exporters of silicon metal from China.[8]

On July 24, 1991, the Commission made a final affirmative LTFV determination for Brazil.[9] On July 31, 1991, Commerce issued an antidumping duty order on subject imports from Brazil. The final weighted-average antidumping margin was 87.79 percent ad valorem for Companhia Brasileira Carbureto de Calcio, 93.20 percent ad valorem for Camargo Correa Metais, S.A., and 91.06 percent for all manufacturers, producers, and exporters of silicon metal from Brazil.[10]

On September 19, 1991, the Commission made a final affirmative LTFV determination for Argentina.[11] On September 26, 1991, Commerce issued an antidumping duty order on subject imports from Argentina. The final weighted-average antidumping margin was 8.65 percent ad valorem for Electrometalurgica Andina, S.A.I.C. and all other manufacturers, producers, and exporters of silicon metal from Argentina.[12]

The first five-year reviews

On August 8, 2000, the Commission determined that it would conduct full reviews of the antidumping duty orders on silicon metal from Argentina, Brazil, and China.[13] On June 5, 2000, Commerce published its determination that revocation of the antidumping duty orders on silicon metal from Argentina, Brazil, and China would be likely to lead to continuation or recurrence of dumping.[14] On January 25, 2001, the Commission notified Commerce of its determinations that revocation of the antidumping duty orders on subject imports of silicon metal from Brazil and China would be likely to lead to a continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time and that the revocation of the antidumping duty order on silicon metal from Argentina would not be likely to lead to continuation or recurrence of material injury to an industry in the U.S. within a reasonably foreseeable time.[15] Effective February 16, 2001, Commerce published a notice of

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[8] *Antidumping Duty Order: Silicon Metal from the People's Republic of China*, 56 FR 26649, June 10, 1991.

[9] *Silicon Metal from Brazil*, *Inv. No. 731-TA-471 (Final),* USITC Publication 2404, July 1991, p. A-3.

[10] *Antidumping Duty Order: Silicon Metal from Brazil*, 56 FR 36135, July 31, 1991.

[11] *Silicon Metal from Argentina*, *Inv. No. 731-TA-470 (Final),* USITC Publication 2429, September 1991, p. A-4.

[12] *Antidumping Duty Order: Silicon Metal from Argentina*, 56 FR 48779, September 26, 1991.

[13] *Silicon Metal From Argentina, Brazil, and China and Silicomanganese From Brazil, China, and Ukraine*, 65 FR 49595, August 14, 2000.

[14] *Silicon Metal From Brazil; Final Results of Expedited Sunset Review of Antidumping Duty Order*, 65 FR 35607, June 5, 2000; *Silicon Metal From Argentina; Final Results of Expedited Sunset Review of Antidumping Duty Order*, 65 FR 35608, June 5, 2000; *Silicon Metal From China; Final Results of Expedited Sunset Review of Antidumping Duty Order*, 65 FR 35609, June 5, 2000.

[15] *Silicon Metal From Argentina, Brazil, and China*, 66 FR 8981, February 5, 2001.

continuation of the antidumping duty orders on silicon metal from Brazil and China.[16] Effective January 1, 2000, Commerce revoked the antidumping duty order on silicon metal from Argentina.[17]

The second five-year reviews

On April 10, 2006, the Commission determined that it would conduct full reviews of the antidumping duty orders on silicon metal from Brazil and China.[18] On May 4, 2006, Commerce published its determination that revocation of the antidumping duty orders on silicon metal from Brazil and China would be likely to lead to continuation or recurrence of dumping.[19] On December 6, 2006, the Commission notified Commerce of its determination that revocation of the antidumping duty order on silicon metal from Brazil would not be likely to lead to continuation or recurrence of material injury to an industry in the United States within a reasonably foreseeable time. The Commission also determined that revocation of the antidumping duty order on silicon metal from China would be likely to lead to continuation or recurrence of material injury.[20] Following affirmative determinations in the five-year reviews by Commerce and the Commission, effective, December 21, 2006, Commerce issued a continuation of the antidumping duty order on imports of silicon metal from China.[21] Effective February 16, 2006, Commerce revoked the antidumping duty order on silicon metal from Brazil.[22]

The third five-year review

On February 6, 2012, the Commission determined that it would conduct an expedited review of the antidumping duty order on silicon metal from China.[23] On February 22, 2012, Commerce published its determination that revocation of the antidumping duty order on silicon metal from China would be likely to lead to continuation or recurrence of dumping.[24] On March

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[16] *Continuation of Antidumping Duty Orders on Silicon Metal From Brazil and China and on Silicomanganese From Brazil and China, and Continuation of Suspended Antidumping Duty Investigation on Silicomanganese From Ukraine*, 66 FR 10669, February 16, 2001.

[17] *Revocation of Antidumping Duty Order: Silicon Metal from Argentina*, 66 FR 10669, February 16, 2001.

[18] *Silicon Metal from Brazil and China*, 71 FR 23947, April 25, 2006.

[19] *Silicon Metal from the People's Republic of China and Brazil: Final Results of the Expedited Reviews of the Antidumping Duty Orders*, 71 FR 26334, May 4, 2006.

[20] *Silicon Metal From Brazil and China*, 71 FR 71554, December 11, 2006.

[21] *Silicon Metal from the People's Republic of China: Continuation of Antidumping Duty Order*, 71 FR 76636, December 21, 2006.

[22] *Silicon Metal from Brazil: Revocation of Antidumping Duty Order*, 71 FR 76635, December 21, 2006.

[23] *Silicon Metal From China; Scheduling of an Expedited Five-Year Review*, 77 FR 10774, February 23, 2012.

[24] *Silicon Metal From the People's Republic of China: Final Results of the Expedited Third Sunset Review of the Antidumping Duty Order*, 77 FR 10477, February 22, 2012.

30, 2012, the Commission notified Commerce of its determination that material injury would be likely to continue or recur within a reasonably foreseeable time.[25] Following affirmative determinations in the five-year reviews by Commerce and the Commission, effective, April 20, 2012, Commerce issued a continuation of the antidumping duty order on imports of silicon metal from China.[26]

PRIOR RELATED INVESTIGATIONS

Silicon metal has been the subject of several prior import injury proceedings in the United States. The following tabulation presents information regarding previous antidumping and countervailing duty investigations.

[25] *Silicon Metal From China*, 77 FR 20649, April 5, 2012.

[26] *Silicon Metal From the People's Republic of China: Continuation of Antidumping Duty Order*, 77 FR 23660, April 20, 2012.

Year petition filed	Inv. number	Country	Current status
1990	731-TA-470	Argentina[1]	ITA revoked effective 1/1/2000 (66 FR 10669, 2/16/2001)
1990	731-TA-471	Brazil[1]	ITA revoked effective 2/16/06 (71 FR 76635, 12/21/2006)
1990	731-TA-472	China	ITC fourth review ongoing
2002	731-TA-991	Russia	Continuation of order effective 7/2/2014 (79 FR 37718, 7/2/2014)
2004	701-TA-441	Brazil	Petitions withdrawn on 4/16/2004 (69 FR 23213, 4/28/2004)
2004	731-TA-1081	South Africa	Petitions withdrawn on 4/16/2004 (69 FR 23213, 4/28/2004)
2017	731-TA-1343 and 701-TA-567	Australia[2]	Negative ITC determinations
2017	731-TA-1344 and 701-TA-568	Brazil[2]	Negative ITC determinations
2017	701-TA-569	Kazakhstan[2]	Negative ITC determinations
2017	731-TA-1345	Norway[2]	Negative ITC determinations

[1] Petitions were filed concurrently with the underlying petition related to the current fourth review concerning China (731-TA-472).

[2] Commerce made its final determinations on March 8, 2018, and the Commission made its final negative determinations on April 10, 2018.

Source: *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway,* Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final), USITC Publication 4773, April 2018; *Silicon Metal From Russia, Investigation No. 731-TA-991 (Second Review)*, USITC Publication 4471, June 2014; and cited FR notices.

Silicon Metal from Russia (Inv. No. 731-TA-991)

On March 2, 2002, Globe filed a petition with Commerce and the Commission alleging that an industry in the United States was materially injured and threatened with further material injury by LTFV imports of silicon metal from Russia.[27] On March 19, 2003, the Commission determined that an industry in the United States was materially injured by reason

[27] *Silicon Metal From Russia, Investigation No. 731-TA-991 (Final),* USITC Publication 3584, March 2003, p. I-1.

of LTFV imports of silicon metal from Russia.[28] Commerce issued an antidumping duty order on March 26, 2003.[29]

Respondents Bratsk Aluminum Smelter and Sual Trade Limited ("plaintiffs") appealed the Commission's determination to the U.S. Court of International Trade ("CIT"). The CIT remanded the case to the Commission and on September 15, 2004, the Commission filed its affirmative remand determination with the CIT. The CIT affirmed the Commission and dismissed the case.[30] Plaintiffs appealed the CIT's dismissal to the U.S. Court of Appeals for the Federal Circuit ("CAFC"). The CAFC vacated and remanded the CIT's determination so that the CIT would remand the case back to the Commission.[31]

On August 7, 2006, following its denial of the Commission's petition for rehearing *en banc* and the Commission's motion to stay issuance of the mandate to the CIT, the CAFC remanded the case to the CIT. The CIT, in turn, remanded the case to the Commission. The Commission then filed a motion to stay the remand proceedings at the CIT pending a decision on whether to seek *certiorari*. The CIT granted the stay and on December 20, 2006, the Commission informed the CIT that it would not be seeking *certiorari* at that time. The CIT lifted the stay and instructed the Commission to submit its remand results to the CIT by March 22, 2007.

The Commission determined that an industry in the United States was materially injured by reason of imports of silicon metal from Russia that Commerce found to be sold at LTFV.[32] On January 15, 2008, the CIT affirmed the Commission's affirmative remand determination.[33] That decision was not appealed to the CIT. On February 1, 2008, the Commission instituted its first five-year review on silicon metal from Russia[34] and on May 6, 2008, the Commission determined to conduct an expedited review.[35] On June 19, 2008, the Commission notified Commerce of its determination that material injury would be likely to continue or recur within a reasonably foreseeable time.[36] Following affirmative determinations in the first five-year review by Commerce and the Commission, effective, July 19, 2008, Commerce issued a continuation of the antidumping duty order on imports of silicon metal from Russia.[37]

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[28] *Silicon Metal From Russia, Investigation No. 731-TA-991 (Final)*, 68 FR 14260, March 24, 2003.

[29] *Silicon Metal From Russia: Antidumping Duty Order*, 68 FR 14578, March 26, 2003.

[30] *Bratsk Aluminum Smelter v. United States*, Slip Op. 04-153, CIT 2004, December 3, 2004.

[31] *Bratsk Aluminum Smelter v. United States*, 444 F.3d 1369, 1375 (Fed. Cir. 2006).

[32] Commissioner Deanna Tanner Okun was recused from the investigation. Vice Chairman Aranoff and Commissioners Williamson and Pinkert did not participate in the original investigation or first remand determination, but participated in the second remand proceeding. *Silicon Metal From Russia, Investigation No. 731-TA-991 (Final) (Second Remand)*, USITC Publication 3910, March 2007, pp. 1 and I-1.

[33] *Bratsk Aluminum Smelter v. United States*, Slip Op. 08-5, January 15, 2008.

[34] *Silicon Metal From Russia*, 73 FR 6204, February 1, 2008.

[35] *Silicon Metal From Russia: Determination,* 73 FR 28153, May 15, 2008.

[36] *Silicon Metal from Russia*, *Inv. No. 731-TA-991 (Review)*, USITC Publication 4018, June 2008, p. 1.

[37] *Silicon Metal f*rom *the Russian Federation: Continuation of Antidumping Duty Order,* 73 FR 40848, July 16, 2008.

On June 3, 2013, the Commission instituted its second five-year review on silicon metal from Russia[38] and on September 6, 2013, the Commission determined to conduct a full review.[39] On June 11, 2014, the Commission notified Commerce of its determination that material injury would be likely to continue or recur within a reasonably foreseeable time.[40] Following affirmative determinations in the second five-year reviews by Commerce and the Commission, effective, July 2, 2014, Commerce issued a continuation of the antidumping duty order on imports of silicon metal from Russia.[41]

Silicon Metal from Australia, Brazil, Kazakhstan, and Norway

(Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345)

On March 8, 2017, Globe Specialty Metals ("GSM") filed petitions with Commerce and the Commission alleging that an industry in the United States is materially injured and threatened with material injury by reason of subsidized silicon metal from Australia, Brazil, and Kazakhstan and LTFV imports of silicon metal from Australia, Brazil, and Norway. On April 24, 2017, the Commission reached preliminary determinations that an industry in the United States is materially injured by reason of imports of silicon metal from Australia, Brazil, and Norway and that are alleged to be sold at LTFV and imports of silicon metal alleged to be subsidized by the governments of Australia, Brazil, and Kazakhstan.[42] The Commission published the schedule for the ongoing final phase of those antidumping and countervailing duty investigations in the Federal Register on October 12, 2017.[43]

On March 8, 2018, Commerce published a notice in the Federal Register of the final determinations in its countervailing duty investigations on silicon metal from Australia, Brazil, and Kazakhstan.[44] On April 10, 2018, the Commission transmitted its determinations and views

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[38] *Silicon Metal From Russia; Institution of a Five-Year Review,* 78 FR 33064, June 3, 2013.

[39] *Silicon Metal From Russia; Notice of Commission Determination To Conduct a Full Five-year Review,* 78 FR 61384, October 3, 2013.

[40] *Silicon Metal from Russia,* 79 FR 34551, June 17, 2014.

[41] *Silicon Metal From the Russian Federation: Continuation of Antidumping Duty Order*, 79 FR 37718, July 2, 2014.

[42] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway,* I*nv. Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary)*, USITC Publication 4685, May 2017, pp. 1 and I-1. Globe Metallurgical's parent company Globe Specialty Metals, Inc., is the petitioner in those investigations.

[43] *Silicon Metal From Australia, Brazil, Kazakhstan, and Norway; Scheduling of the Final Phase of Countervailing Duty and Antidumping Duty Investigations,* 82 FR 49848, October 12, 2017.

[44] *Silicon Metal From Australia: Final Affirmative Countervailing Duty Determination,* 83 FR 9834, March 8, 2018; *Silicon Metal From Brazil: Final Affirmative Countervailing Duty Determination,* 83 FR 9838, March 8, 2018; *Silicon Metal From Kazakhstan: Final Affirmative Countervailing Duty Determination,* 83 FR 9831, March 8, 2018; *Silicon Metal From Australia: Affirmative Final Determination of Sales at Less Than Fair Value and Final Affirmative Determination of Critical Circumstances in Part,* 83 FR 9839, March 8, 2018; *Silicon Metal From Brazil: Affirmative Final Determination of Sales at Less Than*

(*continued*...)

to Commerce, finding that an industry in the United States is not materially injured or threatened with material injury by reason of imports of silicon metal from Australia, Brazil, and Norway that Commerce determined are sold in the United States at LTFV and from Australia, Brazil, and Kazakhstan that Commerce determined are subsidized by the governments of those countries.[45]

SUMMARY DATA

Table I-1 and figure I-1 present a summary of terminal year data from the original investigations and previous five-year reviews concerning the antidumping duty order on silicon metal from China, as well as terminal year data collected during this current fourth five-year review.[46] Complete data series are presented in appendix C. Since the original investigations, apparent U.S. consumption of silicon metal has increased, whereas the U.S. producers' share of apparent U.S. consumption in terms of quantity and value has generally decreased. The share of apparent U.S. consumption held by imports from China also declined following the original investigations to *** and accounted for *** percent in 2016. The overall U.S. capacity and production were higher in 2016 than reported in the original investigations, while capacity utilization was *** higher. Since the original investigations, U.S. shipments increased in terms of quantity and value.[47] Likewise, the number of production and related workers increased by *** percent, and the number of hours worked increased by *** percent since the original investigations. However, the aggregate financial data indicate that in 2016, U.S. producers reported aggregate operating *** compared to aggregate operating *** in 1990 and operating *** in 1999, *** in 2005, and *** in 2010. Silicon metal imports from all sources increased by *** percent. This increase in total imports reflects an increase in nonsubject imports, which accounted for *** percent of total imports during the original investigations, and accounted for nearly all imports in 2016.

(…*continued*)
Fair Value, 83 FR 9835, March 8, 2018; *Silicon Metal From Norway: Affirmative Final Determination of Sales at Less Than Fair Value, Final Determination of No Sales, and Final Negative Determination of Critical Circumstances,* 83 FR 9829, March 8, 2018.

[45] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, pp. 1 and A-2.

[46] Quantity data presented in Commission reports from previous proceedings are not precisely comparable to data collected in this current proceeding because quantity data from past reviews and the original investigations were on a gross weight basis, whereas quantity data collected in this fourth five-year review are based on a contained silicon basis. However, according to production data collected in this current review, silicon metal accounted for *** percent of the quantity of gross weight and other elements accounted for *** percent in 2016 (calculated from table III-6).

[47] "In the United States things have changed in that the economic performance of the domestic industry has improved. You have new entrants in the U.S. industry both actual and planned and you have new industry sectors of consumption which really didn't exist in 1991. In 1991, this industry was primarily focused on aluminum. Now we have things like polysilicon." Hearing transcript, p. 12 (Sim).

Table I-1
Silicon metal: Comparative data from the original investigation and subsequent five-year reviews, 1990, 1999, 2005, 2010, and 2016

Item	Original invest-igation	First review	Second review	Third review	Fourth review
	1990	1999	2005	2010	2016
	Quantity (short tons contained silicon)				
U.S. consumption quantity	217,078	329,786	***	***	***
	Share of quantity (percent)				
Share of U.S. consumption: U.S. producers' share	66.7	61.7	***	***	***
U.S. importers' share: Argentina	1.1	([1])	([1])	([1])	([1])
Brazil	14.8	4.3	([2])	([2])	([2])
China	12.1	1.0	***	***	***
Subject sources	28.0	5.3	***	***	***
Nonsubject sources	5.3	33.0	***	***	***
All import sources	33.3	38.3	***	***	***
	Value (1,000 dollars)				
U.S. consumption	242,028	426,073	***	***	***
	Share of value (percent)				
Share of U.S. consumption: U.S. producers' share	71.1	65.2	***	***	***
U.S. importers' share: Argentina	0.9	([1])	([1])	([1])	([1])
Brazil	12.8	4.0	([2])	([2])	([2])
China	9.7	0.7	***	***	***
Subject sources	23.4	4.7	***	***	***
Nonsubject sources	5.5	30.1	***	***	***
All import sources	28.9	34.8	***	***	***

Table continued on next page.

Table I-1--Continued
Silicon metal: Comparative data from the original investigation and subsequent five-year reviews, 1990, 1999, 2005, 2010, and 2016

Item	Original investigation	First review	Second review	Third review	Fourth review
	1990	1999	2005	2010	2016
	Quantity (short tons contained silicon); value (1,000 dollars); and unit value (per STCS)				
U.S. imports from Argentina					
Quantity	2,380	(1)	(1)	(1)	(1)
Value	2,206	(1)	(1)	(1)	(1)
Unit value	$927	(1)	(1)	(1)	(1)
Brazil:					
Quantity	32,083	14,268	(2)	(2)	(2)
Value	30,894	17,203	(2)	(2)	(2)
Unit value	$963	$1,206	(2)	(2)	(2)
China:					
Quantity	26,360	3,324	44	460	339
Value	23,539	2,885	76	913	453
Unit value	$893	$868	$1,727	$1,987	$1,336
Subject sources:					
Quantity	60,823	17,592	44	460	339
Value	56,639	20,088	76	913	453
Unit value	$931	$1,142	$1,727	$1,987	$1,336
Nonsubject sources:					
Quantity	11,525	108,852	162,481	186,810	166,348
Value	13,426	128,344	239,864	465,956	367,127
Unit value	$1,165	$1,179	$1,476	$2,494	$2,207
All import sources:					
Quantity	72,349	126,444	162,525	187,270	166,687
Value	70,064	148,432	239,940	466,870	367,580
Unit value	$968	$1,174	$1,476	$2,493	$2,205

Table continued on next page.

Table I-1--Continued
Silicon metal: Comparative data from the original investigation and subsequent five-year reviews, 1990, 1999, 2005, 2010, and 2016

Item	Original investigation	First review	Second review	Third review	Fourth review
	1990	1999	2005	2010	2016
	Quantity (short tons contained silicon); value (1,000 dollars); and unit value (dollars per STCS)				
U.S. industry:					
Capacity (quantity)	183,174	236,857	***	***	***
Production (quantity)	157,218	209,117	***	***	***
Capacity utilization (percent)	85.8	88.3	***	***	***
U.S. shipments:					
Quantity	144,729	203,342	***	***	***
Value	171,964	277,641	***	***	***
Unit value	$1,188	$1,365	***	***	***
Ending inventory	14,848	9,151	***	(3)	***
Inventories/total shipments	9.9	4.4	***	(3)	***
Production workers	571	770	***	(3)	***
Hours worked (1,000)	1,216	1,750	***	(3)	***
Wages paid (1,000 dollars)	17,413	32,174	***	(3)	***
Hourly wages	$14.32	$18.39	***	(3)	***
Productivity (short tons contained silicon per 1,000 hour)	99.8	119.5	***	(3)	***
Financial data:					
Net sales:					
Quantity	141,451	***	***	(3)	***
Value	168,679	***	***	***	***
Unit value	$1,192	***	***	(3)	***
Cost of goods sold	159,900	***	***	***	***
Gross profit or (loss)	8,779	***	***	***	***
SG&A expense	10,487	***	***	***	***
Operating income or (loss)	(1,708)	***	***	***	***
Unit COGS	$1,130	***	***	***	***
Unit operating income	($12)	***	***	***	***
COGS/ Sales (percent)	94.8	***	***	***	***
Operating income or (loss)/ sales (percent)	(1.0)	***	***	***	***

Table continued on next page.

Table I-1--Continued
Silicon metal: Comparative data from the original investigation and subsequent five-year reviews, 1990, 1999, 2005, 2010, and 2016

[1] At the time of the first reviews, imports from Argentina were still under order. However, the Commission made a negative determination with respect to imports from Argentina in the first reviews and so, consistent with the Commission's analysis in those reviews, imports from Argentina have been grouped as part of imports from nonsubject sources in this table beginning in 1999 forward (although this treatment had no impact on the data reported for 1999 as imports from Argentina were zero in that particular year).

[2] At the time of the second reviews, imports from Brazil were still under order (with several producers in Brazil excluded from the order). However, the Commission made a negative determination with respect to imports from Brazil in the second reviews and so, consistent with the Commission's analysis in those reviews, imports from Brazil have been grouped as part of imports from nonsubject sources in this table beginning in 2005 forward (although this treatment had no impact on the data reported in this table for 2005 as imports from subject sources in Brazil were zero in that particular year).

[3] This data element was not presented in the Commission's report in the third review (an expedited review).

Note.--Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent. Quantity data presented from past reviews and the original investigations were all on a gross weight basis. Data for quantity reported in this review are based on a contained silicon basis.

U.S. import data were based on official Commerce import statistics for the original investigations and first reviews. In the second reviews, the distinction between Temporary Imports under Bond ("TIB") and non-TIB imports from China was made. "Subject" imports from China were imports not brought into the United States under the TIB program; "nonsubject" imports from China were brought in under the TIB program. In this program, the imports are free as articles to be processed under bond for exportation, including processes which result in articles manufactured or produced in the United States. If the imports are subsequently exported (including products made in the United States using the import as a raw material), the bond is refunded and no antidumping duties are levied. Although it is possible that the imports brought in under the TIB program were subsequently entered into the United States for consumption (upon which time antidumping duties would have been levied), staff believed that the great majority, if not all, of these imports were exported and therefore free of the antidumping duties. This distinction between TIB and non-TIB imports from China was not made in the expedited third review.

In this review, one firm *** indicated that it imported silicon metal from China through TIB, which accounted for *** percent of all TIB imports from China in 2016. *** imported *** short tons of silicon metal from China, while 154 short tons of silicon metal were imported from China (through TIB) in 2016. In 2016, 154 short tons of the 339 short tons of all known silicon metal imported from China were through TIB (45.4 percent), from official U.S. imports based on General Imports.

During the original investigations, first full five-year reviews, and second full five-year reviews, the Commission received responses from all known U.S. producers, while in the third five-year review, the Commission received a response from one known domestic producer, Globe. The data presented for the fourth review are from three producers that accounted for all U.S. production during 2016.

Source: Office of Investigations memorandum INV-O-092 (May 21, 1991), memorandum INV-X-254 (December 19, 2000), memorandum INV-DD-146 (October 25, 2006), memorandum INV-KK-021 (March 1, 2012), official U.S. import statistics, compiled from data submitted in response to Commission questionnaires, and the domestic interested parties' prehearing brief, exhibit 2.

Figure I-1
Silicon metal: U.S. producers' U.S. shipments and U.S. import data, 2011-16, January to September 2016, and January to September 2017

* * * * * * *

STATUTORY CRITERIA AND ORGANIZATION OF THE REPORT

Statutory criteria

Section 751(c) of the Act requires Commerce and the Commission to conduct a review no later than five years after the issuance of an antidumping or countervailing duty order or the suspension of an investigation to determine whether revocation of the order or termination of the suspended investigation "would be likely to lead to continuation or recurrence of dumping or a countervailable subsidy (as the case may be) and of material injury."

Section 752(a) of the Act provides that in making its determination of likelihood of continuation or recurrence of material injury—

> *(1) IN GENERAL.-- . . . the Commission shall determine whether revocation of an order, or termination of a suspended investigation, would be likely to lead to continuation or recurrence of material injury within a reasonably foreseeable time. The Commission shall consider the likely volume, price effect, and impact of imports of the subject merchandise on the industry if the order is revoked or the suspended investigation is terminated. The Commission shall take into account--*
>
> *(A) its prior injury determinations, including the volume, price effect, and impact of imports of the subject merchandise on the industry before the order was issued or the suspension agreement was accepted,*
>
> *(B) whether any improvement in the state of the industry is related to the order or the suspension agreement,*
>
> *(C) whether the industry is vulnerable to material injury if the order is revoked or the suspension agreement is terminated, and*
>
> *(D) in an antidumping proceeding . . ., (Commerce's findings) regarding duty absorption . . ..*
>
> *(2) VOLUME.--In evaluating the likely volume of imports of the subject merchandise if the order is revoked or the suspended investigation is terminated, the Commission shall consider whether the likely volume of imports of the subject merchandise would be significant if the order is revoked or the suspended investigation is terminated, either in absolute terms or relative to production or consumption in the United States. In so*

doing, the Commission shall consider all relevant economic factors, including--

(A) any likely increase in production capacity or existing unused production capacity in the exporting country,

(B) existing inventories of the subject merchandise, or likely increases in inventories,

(C) the existence of barriers to the importation of such merchandise into countries other than the United States, and

(D) the potential for product-shifting if production facilities in the foreign country, which can be used to produce the subject merchandise, are currently being used to produce other products.

(3) PRICE.--In evaluating the likely price effects of imports of the subject merchandise if the order is revoked or the suspended investigation is terminated, the Commission shall consider whether--

(A) there is likely to be significant price underselling by imports of the subject merchandise as compared to domestic like products, and

(B) imports of the subject merchandise are likely to enter the United States at prices that otherwise would have a significant depressing or suppressing effect on the price of domestic like products.

(4) IMPACT ON THE INDUSTRY.--In evaluating the likely impact of imports of the subject merchandise on the industry if the order is revoked or the suspended investigation is terminated, the Commission shall consider all relevant economic factors which are likely to have a bearing on the state of the industry in the United States, including, but not limited to–

(A) likely declines in output, sales, market share, profits, productivity, return on investments, and utilization of capacity,

(B) likely negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital, and investment, and

(C) likely negative effects on the existing development and production efforts of the industry, including efforts to develop a derivative or more advanced version of the domestic like product.

The Commission shall evaluate all such relevant economic factors . . . within the context of the business cycle and the conditions of competition that are distinctive to the affected industry.

Section 752(a)(6) of the Act states further that in making its determination, "the Commission may consider the magnitude of the margin of dumping or the magnitude of the net countervailable subsidy. If a countervailable subsidy is involved, the Commission shall consider information regarding the nature of the countervailable subsidy and whether the subsidy is a subsidy described in Article 3 or 6.1 of the Subsidies Agreement."

Organization of report

Information obtained during the course of the review that relates to the statutory criteria is presented throughout this report. A summary of trade and financial data for silicon metal as collected in this review is presented in appendix C. U.S. industry data are based on the questionnaire responses of three U.S. producers of silicon metal that are believed to have accounted for all domestic production of silicon metal in 2016. U.S. import data and related information are based on Commerce's official import statistics and questionnaire responses of 25 U.S. importers of silicon metal that are believed to have accounted for *** percent of the total subject imports from China during 2016. Foreign industry data and related information are based on the questionnaire responses of six producers of silicon metal in China. The six Chinese producers who submitted questionnaire responses accounted for approximately *** percent of total silicon metal production in China during 2016. Responses by U.S. producers, importers, purchasers, and foreign producers of silicon metal to a series of questions concerning the significance of the existing antidumping duty order and the likely effects of revocation of the order are presented in appendix D.

COMMERCE'S REVIEWS

Administrative reviews[48]

Commerce has completed a series of antidumping duty administrative reviews with regard to subject imports of silicon metal from China.[49] The results of the administrative reviews are shown in table I-2.

[48] Commerce has not issued any duty absorption findings or anti-circumvention findings since the imposition of the antidumping duty order concerning imports of silicon metal from China. In addition, there have been no changed circumstances reviews since the imposition of the antidumping duty orders.

[49] For previously reviewed or investigated companies not included in an administrative review, the cash deposit rate continues to be the company-specific rate published for the most recent period.

Table I-2
Silicon metal: Administrative reviews (by effective date) of the antidumping duty order for China

Date results published	Period of review	Producer or exporter	Margin (percent)
July 14, 1998 (63 FR 37850	June 1, 1996 to May 31, 1997	China-wide rate	139.49
June 13, 2003 (68 FR 35383)	June 1, 2001 to May 31, 2002	Groupstars Chemical Co., Ltd. (Shandong)	139.49
		All others	139.49
August 11, 2008 (73 FR 46587)	June 1, 2006 to May 31, 2007	China-wide rate	139.49
July 9, 2009 (74 FR 32885)	June 1, 2007 to May 31, 2008	Shanghai Jinneng International Trade Co. Ltd. ("Shanghai Jinneng")	41.81
		Jiangxi Gangyuan	55.25
		All others	139.49
January 12, 2010 (75 FR 1592)	June 1, 2007 to May 31, 2008	Shanghai Jinneng	23.16
		Jiangxi Gangyuan	50.02
		All others	139.49
January 19, 2011 (76 FR 3084, Partial)	June 1, 2008 to May 31, 2009	Shanghai Jinneng	3.14
		All others	139.49
February 11, 2011 (76 FR 7811, Amended)	June 1, 2008 to May 31, 2009	Shanghai Jinneng	3.30
		All others	139.49
September 5, 2012 (77 FR 54563)	June 1, 2010 to May 31, 2011	Shanghai Jinneng	14.36
		All others	139.49
May 20, 2013 (78 FR 29322)	June 1, 2011 to May 31, 2012	China-wide rate	139.49
July 20, 2016 (81 FR 47157)	June 1, 2014 to May 31, 2015	Shanghai Jinneng	139.49
		Shanghai Jinfeng Hardware Plastics Co. Ltd. ("Shanghai Jinfeng")	139.49
		All others	139.49

Source: Cited Federal Register notices.

New shipper reviews

Commerce has completed a series of new shipper reviews with regard to subject imports of silicon metal from China. Commerce instituted new shipper reviews of the antidumping duty order on silicon metal from China on July 25, 2006. It issued its final results on October 16, 2007 for the period of June 1, 2005 through May 31, 2006. Based on its analysis,

it determined that the antidumping duty margin was 7.93 percent for Shanghai Jinneng; 50.62 percent for Jinagxi Gangyuan; and that the PRC-wide rate was 139.49 percent.[50] Petitioner Globe Metallurgical, Inc. and respondents Jiangxi Gangyuan, and Shanghia Jinneng with its affiliated producer Datong Jinneng, filed lawsuits with the Court of International Trade ("CIT") challenging several aspects of Commerce's final results. On October 1, 2008, the CIT remanded the case to Commerce to obtain better information for valuing silica fume. On February 2, 2009, Commerce submitted its remand results to the CIT. See *Final Results of Redetermination Pursuant to Court Remand,* Court No. 07-00386 (February 2, 2009). The CIT sustained Commerce's remand results on May 5, 2009 and accordingly, Commerce amended its final results and revised the weighted-average dumping margins for Jiangxi Gangyuan and Datong Jinnneng/Shanghai Jinneng. The Jiangxi Gangyuan margin was revised to 71.51 percent, and the Datong Jinneng/Shanghai Jinneng margin was revised to 50.41 percent.[51]

Scope inquiry reviews

Commerce has conducted two scope inquiry reviews with respect to silicon metal from China. American Alloys, Inc.; Elkem Metals Company; Globe Metallurgical, Inc.; Silicon Metaltech Inc.; SiMETCO Inc.; and SKW Alloys, Inc. requested clarification of the scope of the antidumping order from the Department of Commerce. Commerce stated that "silicon metal, with a high aluminum content and a silicon content of at least 89.00 percent but less than 99.99 percent, is within the scope of the order."[52]

On September 30, 2008, Globe Metallurgical Inc. requested that Commerce initiate a scope ruling investigation regarding silicon metal from China for a determination as to whether certain silicon metal exported by Ferro-Alliages et Mineraux to the United States from Canada is within the scope of the antidumping duty order.[53] An investigation was initiated on February 10, 2009, a preliminary rescission was issued on August 11, 2010, a final rescission was issued on November 29, 2010, and the investigation was terminated on February 25, 2011.[54]

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[50] *Silicon Metal from the People's Republic of China: Notice of Final Results of 2005/2006 New Shipper Reviews,* 72 FR 58641, October 16, 2007.

[51] *Silicon Metal From the People's Republic of China: Notice of Amended Final Results of New Shipper Reviews Pursuant to Court Decision,* 75 FR 15412, 15413, March 29, 2010.

[52] *Scope Rulings*, 58 FR 27542, May 10, 1993.

[53] *Silicon Metal from China, Inv. No. 731-TA-472 (Third Review)*, USITC Publication 4312, March 2012, p. I-5.

[54] *See, eg., Notice of Scope Rulings,* 76 FR 31302, May 31, 2011 (listing Silicon Metal Scope among terminated inquiries). Ibid.

Current five-year review

Commerce issued the final results of its expedited review of the antidumping duty order concerning U.S. imports of silicon metal from China on July 3, 2017.[55] Commerce determined that revocation of the antidumping duty order would be likely to lead to the continuation or recurrence of dumping at the weighted dumping margin of 139.49 percent for all exporters.[56]

THE SUBJECT MERCHANDISE

Commerce's scope

Commerce has defined the scope as follows:

> *silicon metal containing at least 96.00 percent but less than 99.99 percent of silicon by weight. Also covered by the order is silicon metal containing between 89.00 and 96.00 percent silicon by weight but which contains a higher aluminum content than the silicon metal containing at least 96.00 percent but less than 99.99 percent silicon by weight (58 FR 27542, May 10, 1993). Silicon metal is currently provided for under subheadings 2804.69.10 and 2804.69.50 of the Harmonized Tariff Schedule (HTS) as a chemical product, but is commonly referred to as a metal. Semiconductor-grade silicon (silicon metal containing by weight not less than 99.99 percent of silicon and provided for in subheading 2804.61.00 of the HTS) is not subject to this order. Although the HTS subheadings are provided for convenience and customs purposes, the written description of the* merchandise is dispositive.[57]

Tariff treatment

The subject silicon metal is provided for in HTS subheading 2804.69.10 (containing by weight less than 99.99 percent but not less than 99 percent of silicon) with a normal trade relations tariff rate of 5.3 percent ad valorem, or under subheading 2804.69.50 (containing by

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[55] *Silicon Metal From the People's Republic of China: Final Results of the Expedited Fourth Sunset Review of the Antidumping Duty Order*, 82 FR 30841, July 3, 2017.

[56] *Silicon Metal from the People's Republic of China: Final Results of the Expedited Fourth Sunset Review of the Antidumping Duty Order*, 82 FR 30841, July 3, 2017.

[57] *Silicon Metal From the People's Republic of China: Final Results of the Expedited Fourth Sunset Review of the Antidumping Duty Order,* 82 FR 30841, July 3, 2017.

weight over 50 percent but less than 99 percent of silicon) with a normal trade relations tariff rate of 5.5 percent ad valorem.[58]

THE PRODUCT

Description and applications[59]

Silicon is a light chemical element with both metallic and nonmetallic characteristics. It is a semiconductor, meaning it does not conduct electricity at room temperature, but does so when it is heated. Silicon is rarely found free in nature; rather, it combines with oxygen and other elements to form silicates, which compose more than 25 percent of the Earth's crust. Silica in the form of quartz or quartzite[60] is used to produce silicon ferroalloys for the iron and steel industries, as well as to make silicon metal that is primarily used by the aluminum and chemical industries.[61] Silicon metal is a product normally composed almost entirely of elemental silicon, along with small amounts of other elements, such as iron, aluminum, and calcium. It is manufactured and sold in various degrees of purity. Whether domestic or imported, it is usually sold in lump form, typically of size designations ranging from 6 inches x ½ inch down to 4 inches x ¼ inch, or in powder form.[62]

Silicon metal is principally used as an alloying agent in aluminum production, as an input in the production of silicones, and to produce polycrystalline silicon ("polysilicon").[63] According to Ferroglobe, the parent company of one of the petitioners from the original investigations, the global distribution of silicon metal consumption in 2017, by major product categories was:

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[58] Decisions on the tariff classification and treatment of imported goods are within the authority of U.S. Customs and Border Protection.

[59] Unless otherwise indicated, information in this section is from *Silicon Metal From Russia: Investigation No. 731-TA-991 (Second Review)*, USITC Publication 4471, June 2014, pp. I-18-21; *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary)*, USITC Publication 4685, May 2017, pp. I-12—I-14; and *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, Publication 4773, April 2018, pp. I-21–I-26.

[60] Quartz is the mineral form of silicon dioxide (SiO_2) and quartzite is a massive, metamorphic rock consisting predominantly of quartz along with small amounts of other minerals. However, only silica with silicon dioxide content in excess of 99 percent and a low iron content (less than one percent) can be used effectively in the production of silicon metal.

[61] Schnebele, Emily K., "Silicon" U.S. Geological Survey, November 2017, p. 67.1, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2015-simet.pdf, retrieved January 11, 2018.

[62] These dimensional designations refer to the maximum and minimum sizes of the silicon metal lumps.

[63] Subject silicon metal can be further processed into ultra-high-purity semiconductor or solar grades whose silicon content is 99.99 percent or greater. Semiconductor-grade silicon metal is not included within the scope of this investigation. However, the subject silicon metal may be used as a starting material for the manufacture of semiconductor-grade silicon metal.

43 percent metallurgical (principally aluminum), 37 percent chemical (silicones), and 20 percent polysilicon (solar and semiconductors).[64] According to Roskill Information Service LLC ("Roskill"), global silicon consumption was 3.1 million short tons in 2016, and during 2010-16, silicon consumption increased at an average rate of 5.8 percent.[65]

As an alloying agent, silicon metal is used in the production of both primary aluminum (produced from ore) and secondary aluminum (produced from scrap). Silicon is a necessary ingredient in aluminum casting alloys, where it improves fluidity, castability, strength, and weldability of the aluminum.[66] Aluminum producers add silicon in lump form to molten aluminum during the refining process. Primary aluminum typically contains 8-12 percent silicon and is used in applications where appearance is important, such as wheels for automobiles. Secondary aluminum typically contains less silicon than primary and is used for internal automobile parts and applications where appearance is not significant. Roskill reportedly expects the amount of silicon metal used in aluminum to increase by an average annual rate of 3.4 percent from 2016 to 2026 owing to anticipated growth in aluminum consumption by the automotive sector.[67] Other applications for silicon metal include the production of brass, bronze, die casting; steel; copper alloys; ceramic powders; and refractory coatings.

Chemical manufacturers consume silicon metal in powder form to produce silicones and polysilicon. The chemical manufacturers that have their own grinding facilities purchase silicon metal in lump form and grind it into powder themselves. Otherwise, firms that do not have grinding facilities purchase silicon metal as a powder.[68] A lower grade of powder called "fines", a by-product of the crushing and sizing process, is sold for ceramic and refractory applications. In the chemicals industry, silicon metal is used as the starting material for the production of silanes, which are used to produce a family of organic compounds known as "silicones". Silicones are used for a variety of applications, including adhesives, resins, lubricants,

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[64] Ferroglobe PLC*, Investor Day Presentation*, October 17, 2017, p. 30, http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=959959&filekey=DA15BBEE-47D1-4E92-9FEF-EB22B3852278&filename=Ferroglobe_Investor_Day_Presentation_17_Oct_2017.pdf, retrieved January 11, 2018.

[65] "Outlook for silicon metal diverges sharply from that for ferrosilicon," Roskill Information Services Ltd., July 17, 2017, https://roskill.com/news/outlook-silicon-metal-diverges-sharply-ferrosilicon/, retrieved January 11, 2018.

[66] Many aluminum alloys are used by the transportation sector as a substitute for heavier metals to reduce weight and improve the efficiency of vehicles and aircraft.

[67] "Outlook for silicon metal diverges sharply from that for ferrosilicon," Roskill Information Services Ltd., July 17, 2017, https://roskill.com/news/outlook-silicon-metal-diverges-sharply-ferrosilicon/ retrieved January 11, 2018.

[68] Size consistency is important to chemical producers that purchase silicon metal in powder form. Suppliers to such customers must qualify their product before bidding to supply the chemical manufacturer. For that reason, there is no difference in terms of size consistency between qualified imports and domestic products.

plastomers, anti-foaming agents, and water-repellent compounds.[69] According to Roskill, there are an estimated 10,000 individual applications for silicones and many are in sectors driven by consumer spending and disposable income. As a consequence, the larger global markets for silicone products are mature economies, such as North America, Western Europe, and Japan, although developing economies will drive future global demand.[70]

Silicon metal is consumed as the base material for making polysilicon, a very high purity form of silicon manufactured by chemicals producers that is primarily used in semiconductors and solar cells.[71] Polysilicon producers typically have very stringent quality standards for silicon and sometimes require low-boron silicon metal.[72] [73] According to Roskill, silicon consumption for use in solar cells had the biggest increase out of the major end-uses for silicon metal during the past decade and is expected to continue to grow, especially in Asia.

According to U.S. producer Globe, although silicon metal is often described in terms of different grades, there is no uniformly accepted grade classification system. Silicon metal "grades" refer to ranges of specifications that are typically sold to particular types of customers.[74] These specifications establish the minimum amounts of silicon and the maximum amounts of other elements, such as boron, iron, calcium, and aluminum that the silicon metal may contain. The ranges of specifications vary depending on the type of end use for the silicon metal and the differences between these ranges of specifications can be relatively small but yet important for type and level of impurities and the silicon content are the principal factors that determine if the silicon metal product can be used in a given application.[75] There are four broadly defined categories, or grades, of silicon metal, which are generally ranked in

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[69] The silicones production process involves reacting silicon metal with methyl chloride in the presence of a copper catalyst to produce a mixture of methylchlorosilanes. Certain of these silanes are then hydrolyzed to produce the basic methylsilicone building block for the various silicone products.

[70] *Outlook for Silicon Metal Diverges Sharply From That for Ferrosilicon*, Roskill Information Services Ltd., July 17, 2017, https://roskill.com/news/outlook-silicon-metal-diverges-sharply-ferrosilicon/, retrieved January 11, 2018.

[71] Polysilicon, which is not within the scope of this review, generally contains over 99.999 percent silicon and is made by reacting high-purity metallurgical silicon with hydrogen chloride gas in the presence of catalysts, producing silicon tetrachloride, which is then purified by fractional distillation. The purified distillate is pyrotically decomposed to produce hyperpure metal and hydrochloric acid.

[72] ***. Staff fieldwork and interview with ***.

[73] ***. Staff fieldwork and interview with ***.

[74] Some suppliers, customers, and publications refer to numerical grade designations, such as "Grade 553" is silicon metal with a maximum iron content of 0.5 percent, a maximum aluminum content of 0.5 percent, and a maximum calcium content of 0.3 percent. Such silicon metal normally has a minimum silicon content of 98.5 percent.

[75] In some cases, higher grade silicon metal is shipped to a purchaser with a lower specification requirement. Moreover, it is not possible to assume that silicon metal imported under HTS subheading 2804.69.10 (silicon containing by weight less than 99.99 percent but not less than 99.00 percent silicon) is necessarily better quality than silicon metal imported under HTS subheading 2804.69.50 (silicon containing by weight less than 99.00 percent silicon), even though the silicon content of the former is higher.

descending order of purity as: (1) semiconductor grade;[76] (2) chemical grade; (3) metallurgical grade used to produce primary aluminum; and (4) metallurgical grade used to produce secondary aluminum.[77] U.S. producer Globe lists its silicon metal product specifications as:[78]

- Chemical grade: silicon 98.50 percent minimum, iron 0.50 percent maximum, calcium 0.07 percent maximum, aluminum 0.20 percent maximum.
- Primary aluminum grade: silicon 98.50 percent minimum, iron 0.35 percent maximum, calcium 0.07 percent maximum.
- Secondary aluminum grade: silicon 98.50 percent minimum, iron 1.00 percent maximum, calcium 0.40 percent maximum.
- High purity grade: silicon 98.50 percent minimum, iron 0.10 percent maximum, calcium 0.07 percent maximum, aluminum 0.20 percent maximum.

Silicon specifications can be customer specific as some customers, such as certain polysilicon producers, require higher grades of silicon than the ones listed by Globe.[79] Some chemical and polysilicon producers require suppliers to go through a qualification process and undergo subsequent monitoring of their manufacturing facilities to ensure that their products are consistent in both size and grade.[80]

Manufacturing process[81]

The basic process for producing silicon has remained essentially unchanged for decades.[82] With one exception,[83] all silicon metal, regardless of specification, is produced using

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[76] Semiconductor grade silicon, used in the electronics industry, is not covered by the scope of this review. It is a high-purity product generally containing over 99.99 percent silicon.

[77] Wacker, a respondent in the investigations concerning Australia, Brazil, Kazakhstan, and Norway, stated that the U.S. market for silicon metal is characterized by the following distinct market segments: (1) polysilicon; (2) chemicals (principally for the manufacture of silicones); and (3) primary and secondary aluminum. These are distinct market segments that (1) each have a unique range of product specifications, which are not generally interchangeable, (2) are produced by specialized manufacturers using different raw materials and processes, (3) have entirely different end-use customers, and (4) have distinct pricing levels. *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary)*, USITC Publication 4685, May 2017, p. I-14.

[78] "Globe Chemical and Metallurgical Grade Silicon Product Information Sheets", Globe Specialty Metals Inc., http://www.glbsm.com/product-information/Globe-Silicon-Metal.pdf, retrieved March 22, 2017.

[79] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary)*, USITC Publication 4685, May 2017, p. I-14.

[80] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary)*, USITC Publication 4685, May 2017, p. I-14.

[81] Unless otherwise indicated, information in this section is from *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary)*, USITC Publication 4685, May 2017, pp. I-14—I-17; and *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, Publication 4773, April 2018, February 2018, pp. I-26–I-32.

essentially the same process and inputs. Silica, in the form of high-purity quartz, [84] is combined in a "charge" with a carbon source such as low-ash coal,[85] charcoal, or petroleum coke; and a bulking agent, usually wood chips produced from hardwood trees. The charge is placed in a submerged electric-arc furnace.[86] A transformer system delivers high-current, low-voltage electricity to the furnace by electrodes made from pre-baked or self-baking amorphous carbon. The electrodes are slowly consumed during the production process. The charge is heated to approximately 3,000 degrees Fahrenheit, at which point the oxygen in the silica separates from the silicon and combines with the carbon in the reductant to form carbon monoxide gas. The simplified chemical reaction is summarized as SiO_2 (silica) + 2C (carbon) → Si (silicon metal) + 2CO (carbon monoxide). This reaction requires a substantial amount of electricity, giving the transformation process its name of "electrometallurgy".[87] The off-gas (primarily carbon dioxide and silicon dioxide) escapes from the furnace and into a baghouse for collection, leaving molten silicon.

The liquid silicon is removed or "tapped" from the bottom of the furnace on either a continuous or an intermittent basis and collected in a refractory lined ladle. In the molten state, the silicon metal is often refined by oxygen injection to remove impurities, principally aluminum and calcium. Some impurities cannot be removed from the liquid silicon and,

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(…*continued*)

[82] Missisippi Silicon LLC website, http://www.missilicon.com/our-process, retrieved March 22, 2017.

[83] Elkem manufacturers Silgrain —a high-purity silicon powder that is produced by refining 90-94 percent ferrosilicon using a proprietary chemical leaching process. Like silicon metal produced using the standard process, Silgrain is used in the production of polysilicon, silicones, and other specialized materials.

[84] Some domestic silicon producers are vertically integrated and own suppliers of input materials. GSM owns Alabama Sand and Gravel Inc., a company that operates quarries in Alabama and produces metallurgical-grade quartz gravel that is used for silicon production. Ferroglobe website, http://www.ferroglobe.com/business-areas/mining/alabama-sand-gravel-inc/?lang=en, retrieved January 11, 2018.

[85] In the United States, silicon producers predominantly use a low-ash bituminous coal for silicon production. The coal needs to be very low in ash because the compounds in the ash are co-smelted into the silicon as impurities. GSM owns Alden Resources, LLC, a company that operates coal mines in Kentucky and Tennessee and produces low-ash coal for silicon production. GSM website, http://www.glbsm.com/aldenresources/, accessed January 11, 2018.

[86] Smelting in an electric arc furnace is accomplished by the conversion of electrical energy to heat. An alternating current applied to the electrodes causes current to flow through the charge between the electrode tips. This provides a reaction zone at temperatures up to 3,632 degrees Fahrenheit. The tip of each electrode changes polarity continuously as the alternating current flows between the tips. To maintain a uniform electric load, electrode depth is continuously varied automatically by mechanical or hydraulic means. In a submerged arc electric furnace, metal is smelted in a refractory-lined cup-shaped steel shell by submerged graphite electrodes. The United States Environmental Protection Agency, pp. 12.4.1–12.4.3, https://www3.epa.gov/ttn/chief/ap42/ch12/final/c12s04.pdf, retrieved March 24, 2017.

[87] "Silicon Metal and Ferrosilicon Production," The European Association of Industrial Silica Producers, http://www.eurosil.eu/silicon-metal-and-ferrosilicon-production, retrieved March 23, 2017.

therefore, must be controlled by raw-material selection.[88] After tapping (or refining), the silicon metal is poured from the ladle into large, flat iron molds or onto beds of silicon metal fines.[89] The resulting ingot or billet is subsequently crushed to the desired size specification. It can be further ground into powder for some customers in the chemicals industry. The silicon is typically delivered to end users in 2,000–3,000-pound super sacks, wooden boxes, or customer-specific packaging.[90] [91] Some customers elect to send their own trucks to the plant to transport the silicon in bulk form.[92]

[88] The quality of silicon metal is a function of the quality of the raw materials, production and furnace expertise, and refining processes. Silicon metal producers therefore generally specialize and aim to produce specific qualities for specific customers, and the production cost of each producer therefore depends also on the quality aimed to be produced by them. ***. Staff fieldwork and interview with ***.

[89] ***. Staff fieldwork and interview with ***.

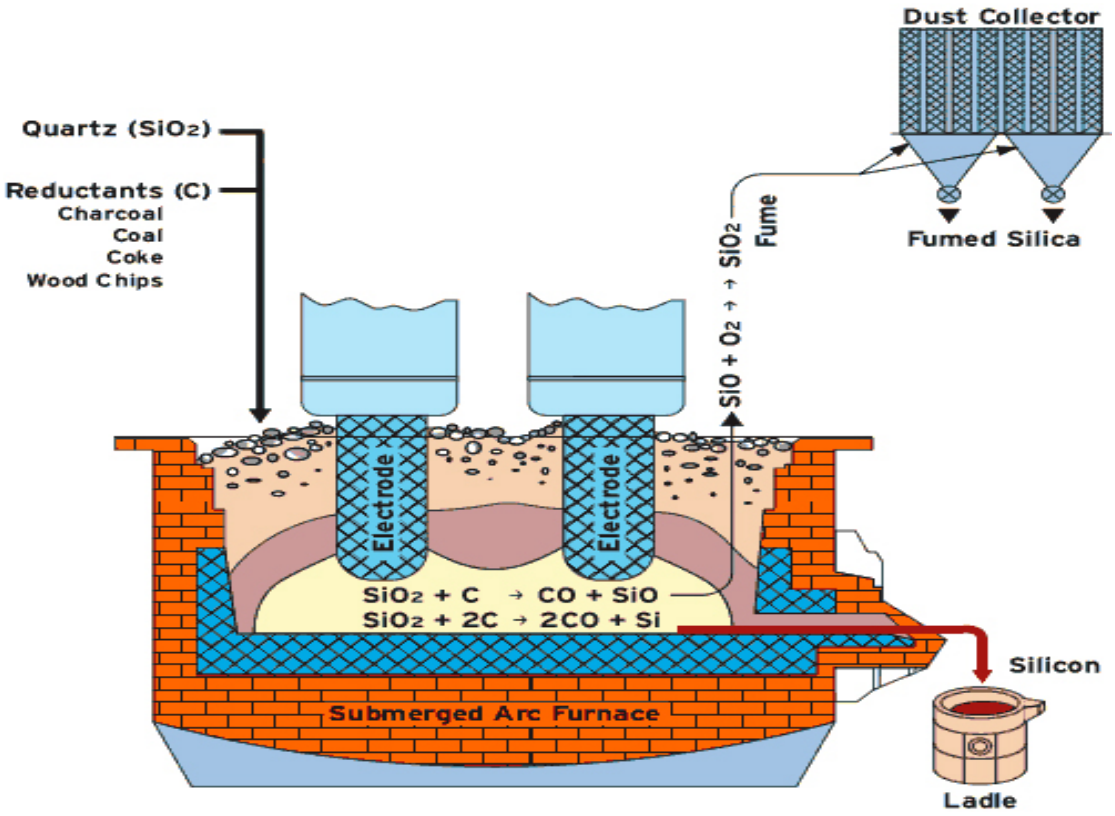
[90] "Globe Chemical and Metallurgical Grade Silicon Product Information Sheets," Globe Specialty Metals Inc., http://www.glbsm.com/product-information/Globe-Silicon-Metal.pdf, retrieved March 22, 2017.

[91] ***. Staff fieldwork and interview with ***.

[92] Staff fieldwork and interview with ***.

Figure I-2 depicts the silicon metal production process (through tapping of molten silicon):

Figure I-2
Silicon metal: Production process



Source: Simcoa Operations Pty. Ltd website, http://www.simcoa.com.au/process-diagram.html.

Silica fume (microsilica) is composed of small particles of unreduced silicon dioxide recovered from the off-gases of silicon metal furnaces and is an important by-product of silicon metal production. Silica fume is used in making concrete, oil well grouts, cementitious repair products, refractories and ceramics, and other products.

Silicon metal plants are typically located at sites that have access to a competitively priced and reliable source of electricity, an ample supply of raw materials, and an adequate labor pool. Given the large amounts of quartz required to produce silicon metal, plants are normally located near quartz sources. Silicon plants typically operate furnaces 24 hours per day, 7 days per week, to maximize efficiency, so they constantly consume raw materials. ***.[93]

[93] Staff fieldwork and interview with ***.

Forty-nine percent of the cost of silicon metal production is attributable to raw materials (coal, woodchips, quartz, and carbon electrodes),[94] 21 percent to energy, 18 percent to labor, and 12 percent to other costs.[95]

Submerged arc furnaces used for silicon production are relatively similar worldwide, but there are some physical differences in furnace designs and the electrodes. In some cases, newer furnaces are more energy efficient. Reportedly, Globe requires about 13,000 to 14,000 kilowatt hours ("kwh") of electricity to produce one short ton of silicon metal, but some plants with newer furnaces, like Mississippi Silicon, can produce the same quantity of silicon metal using only 9,500 to 10,000 kwh of electricity. Purities of the raw materials and the carbon sources used can vary widely. Some producers of silicon metal also produce ferrosilicon, which is used in the production of steel (especially stainless and heat-resisting steels) and cast iron.[96] Ferrosilicon can be produced at lower temperatures than silicon because of the iron, resulting in less power consumption to produce ferrosilicon than silicon. In the United States, Globe produced both silicon metal and ferrosilicon, but did not use the same furnaces for both. Producers can switch production on a furnace between ferrosilicon and silicon metal with varying degrees of cost, downtime, and efficiency loss. It is generally easier for firms to switch from silicon metal production to ferrosilicon production than the reverse. Iron and other elements that may be contained in ferrosilicon tend to remain in a furnace lining and result in impurities intolerable in silicon metal production. In addition, certain furnace designs are more efficient at producing one product than another, leading to possible efficiency loss when switching production.

According to Globe, incentives for converting ferrosilicon furnaces to silicon metal furnaces may exist if the profit margins for silicon metal are sufficiently better than the profit margins for ferrosilicon. Globe indicated that conversion from ferrosilicon to silicon production can be conducted relatively quickly, easily, and "at a relatively moderate cost." Such a conversion would require removal of the material from the furnace, the replacement of the electrodes and possibly the ceramic refractory lining in the furnace, and a change in the raw materials used for production.

DOMESTIC LIKE PRODUCT ISSUES

The domestic like product is defined as the domestically produced product or products, which are like, or in the absence of like, most similar in characteristics and uses with, the subject merchandise. In its original investigations and subsequent five-year reviews, the

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[94] ***. Staff fieldwork and interview with ***.

[95] *Investor Day Presentation*, Ferroglobe PLC, p. 40, http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=959959&filekey=DA15BBEE-47D1-4E92-9FEF-EB22B3852278&filename=Ferroglobe_Investor_Day_Presentation_17_Oct_2017.pdf, retrieved January 11, 2018.

[96] Ferrosilicon is a product used by the steel industry as an alloying agent. Ferrosilicon differs from silicon metal in that it has much lower silicon content and contains 4 percent or more of iron.

Commission defined the domestic like product as silicon metal corresponding to Commerce's scope.[97]

In its notice of institution for this fourth five-year review, the Commission solicited comments from interested parties regarding what they deemed to be the appropriate definition of the domestic like product. According to its response to the notice of institution, the domestic interested party agreed with the Commission's definition of the domestic like product as stated in the last five-year review.[98] Respondent interested parties indicated in their response that they did not take a position on the definition of the domestic like product at that time.[99] Globe, the only party that provided comments on the Commission's draft questionnaires in this proceeding, did not request that the Commission collect data concerning other possible domestic like products.[100]

U.S. MARKET PARTICIPANTS

U.S. producers

During the final phase of the original investigations, there were eight U.S. producers of silicon metal and the Commission received U.S producer questionnaires from all eight firms.[101] During the first five-year reviews, there were five active U.S. producers of silicon metal and the Commission received U.S. producer questionnaires from all five firms.[102] During the second five-year reviews, the Commission received U.S. producer questionnaires from three firms, which accounted for all known U.S. production of silicon metal.[103] During the third five-year review, the Commission received a response to its notice of institution from Globe. Globe reported that there were two U.S. producers of silicon metal.[104] In the current proceeding, the Commission issued U.S. producers' questionnaires to three firms, all of which provided the Commission with information on their production operations. These firms are believed to account for all known

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[97] *Silicon Metal from China, Inv. No. 731-TA-472 (Final)*, USITC Publication 2385, June 1991, pp. 18-19; *Silicon Metal from China, Inv. No. 731-TA-472 (Review),* USITC Publication 3385, January 2001, p. 40; *Silicon Metal from China, Inv. No. 731-TA-472 (Second Review)*, USITC Publication 3892, December 2006, p. 49; *Silicon Metal from China, Inv. No. 731-TA-472 (Third Review)*, USITC Publication 4312, March 2012, p. 32.

[98] *Domestic Interested Party's Response to the Notice of Institution,* March 31, 2017, p. 40.

[99] *Respondent Interested Parties' Response to the Notice of Institution*, March 31, 2017, p. 14.

[100] *Globe Metallurgical Inc. Comments on Draft Questionnaires,* November 21, 2017.

[101] *Silicon Metal from China, Inv. No. 731-TA-472 (Final)*, USITC Publication 2385, June 1991, p. A-19.

[102] *Silicon Metal from Argentina, Brazil, and China, Inv. Nos. 731-TA-470-472 (Review),* USITC Publication 3385, January 2001, p. I-12 and table I-4. By the end of the period of the first five-year reviews, two of the five firms had ceased production. Ibid.

[103] *Silicon Metal from Brazil, and China, Inv. Nos. 731-TA-471-472 (Second Review),* USITC Publication 3892, December 2006, p. I-17.

[104] *Silicon Metal from China, Inv. No. 731-TA-472 (Third Review),* USITC Publication 4312, March 2012, p. I-10.

U.S. production of silicon metal in 2016. Presented in table I-3 is a list of current domestic producers of silicon metal and each company's position on the continuation of the order, production locations, and share of reported U.S. production of silicon metal in 2016.

Table I-3
Silicon metal: U.S. producers, their positions on the order, and U.S. production locations, 2016

Firm	Position on order	Production location(s)	Share of production (percent)
Dow Corning	***	Dow Corning Alabama Inc., Mt. Meigs, AL WVA Manufacturing, Alloy, WV	***
Globe	Support	Beverly, OH Niagara Falls, NY Selma, AL Alloy, WV	***
Mississippi Silicon	***	Burnsville, MS	***
Total			***

Source: Compiled from data submitted in response to Commission questionnaires.

As indicated in table I-4, *** U.S. producers are related to foreign producers of silicon metal, ***. ***, which is under common ownership with ***, responded to the Commission's foreign producer questionnaire in this proceeding but noted that ***. It further noted that it ***. Dow Corning is related to Dalian DC, which is under common ownership with Dow Corning. Dalian DC produces and purchases silicon metal in China.[105] *** U.S. producers are related to U.S. importers/exporters of silicon metal, but none of these firms import the subject merchandise from China. As discussed in greater detail in Part III, *** U.S. producer directly imported silicon metal and *** purchased silicon metal from U.S. importers, none of which was merchandise sourced from China.

Table I-4
Silicon metal: U.S. producers' ownership, related and/or affiliated firms, since January 2011

* * * * * * *

U.S. importers

During the final phase of the original investigations, the Commission received U.S. importer questionnaires from 16 firms, which accounted for greater than 90 percent of total

[105] "DC Dalian operation is basically a team of Dow Corning and local entrepreneurs who source silicon metal useable for chemical process in the Chinese market." Hearing transcript, pp. 89-90 (Majumdar).

U.S. imports of silicon metal from Argentina, Brazil, and China from 1988 through 1990.[106] During the full first five-year reviews, the Commission received U.S. importer questionnaires from 16 firms, which accounted for 87.6 percent of total U.S. imports of silicon metal from Argentina, Brazil, and China in 1999.[107] During the full second five-year reviews, the Commission received U.S. importer questionnaires from 17 firms, which accounted for approximately *** percent of total U.S. imports of silicon metal from Brazil and China during 2005.[108] During the expedited third five-year review, Globe listed two firms as U.S. importers of subject merchandise from China: Momentive Performance Materials and TST Inc., TIMCO/Tandem Division.[109]

In the current proceeding, the Commission issued U.S. importers' questionnaires to 30 firms believed to be importers of silicon metal, as well as to all U.S. producers of silicon metal. Usable questionnaire responses were received from 25 firms, representing *** percent of U.S. imports from China in 2016 and *** U.S. imports from nonsubject sources in 2016.[110] Table I-5 lists all responding U.S. importers of silicon metal from China and other sources, their locations, and their shares of U.S. imports in 2016.

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[106] *Silicon Metal from the People's Republic of China, Inv. No. 731-TA-472 (Final),* USITC Publication 2385, June 1991, p. A-24.

[107] *Silicon Metal from Argentina, Brazil, and China, Inv. Nos. 731-TA-470-472 (Review),* USITC Publication 3385, January 2001, p. I-12.

[108] *Investigation Nos. 731-TA-471-472 (Second Review): Silicon Metal from Brazil and China—Staff Report,* INV-DD-146, p. I-27.

[109] *Silicon Metal from China, Inv. No. 731-TA-472 (Third Review),* USITC Publication 4312, March 2012, p. I-12.

[110] *** were the only firms that imported silicon metal from China from 2014 to 2016. *** did not import silicon metal from China in 2016. U.S. importers' questionnaire response, section II-5a.

Table I-5
Silicon metal: U.S. importers, source(s) of imports, U.S. headquarters, and shares of imports in 2016

Firm	Headquarters	Share of imports by source (percent)		
		China	All other sources	Total
BIT Fondel B.V.	Amstelveen, Netherlands	***	***	***
CBC Americas Corp.	Cary, NC	***	***	***
CCMA, LLC	Amherst, NY	***	***	***
Dow Corning	Midland, MI	***	***	***
Elkem Materials Inc	Moon Township, PA	***	***	***
FCINJ	Glen Rock, NJ	***	***	***
FerroAtlántica	Madrid, Spain	***	***	***
Greenwich Metals	Greenwich, CT	***	***	***
GTAT Corporation	Merrimack, NH	***	***	***
Itochu Metals	Tokyo, Japan	***	***	***
Laurand	Great Neck, NY	***	***	***
Medima	Clarence, NY	***	***	***
MPM	Waterford, OH	***	***	***
MPSAC	Theodore, AL	***	***	***
Ni-Met Metals USA	West Palm Beach, FL	***	***	***
Panadyne Inc.	Montgomeryville, PA	***	***	***
Polymet Alloys	Birmingham, AL	***	***	***
REC Silicon	Moses Lake, WA	***	***	***
S & A Alloys	Mineola, NY	***	***	***
Simcoa	Wellesley, WA	***	***	***
Standard Resources	Cherry Hill, NJ	***	***	***
Tennant	Sheffield, UK	***	***	***
TST Inc.	Fontana, CA	***	***	***
Traxys	New York, NY	***	***	***
Wacker	Charleston, TN	***	***	***
Total		***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

U.S. purchasers

The Commission received 20 usable questionnaire responses from firms that have purchased silicon metal since January 1, 2011.[111] In general, responding U.S. purchasers were located in the Southeast and Midwest. The largest purchasers of silicon metal include primary and secondary aluminum producers and silicon-based chemical producers. Leading purchasers, in order of size, include ***.

[111] Of the 20 responding purchasers, *** purchased the domestic silicon metal, *** purchased imports of the subject merchandise from China, and *** purchased imports of silicon metal from other sources.

APPARENT U.S. CONSUMPTION AND U.S. MARKET SHARES

Table I-6 and figure I-3 present data on apparent U.S. consumption and U.S. market shares for silicon metal during 2014-16, January-September ("interim") 2016, and January-September 2017.[112] Apparent U.S. consumption based on quantity decreased by *** percent from 2014 to 2015, but increased by *** percent from 2015 to 2016. Apparent U.S. consumption based on quantity decreased overall by *** percent from 2014 to 2016, but was higher in interim 2017 than in interim 2016. Apparent U.S. consumption based on value decreased by *** percent from 2014 to 2016 and was lower in interim 2017 than in interim 2016. U.S. imports from China based on quantity increased from 2014 to 2016, but were lower in interim 2017 than in interim 2016. U.S. imports from nonsubject sources decreased by 21.3 percent from 2014 to 2016, but were higher in interim 2017 than in interim 2016.

[112] Table C-2 in appendix C presents data on the merchant market.

Table I-6
Silicon metal: Apparent U.S. consumption and market shares, 2014-16, January to September 2016, and January to September 2017

Item	Calendar year			January to September	
	2014	2015	2016	2016	2017
	Quantity (short tons contained silicon)				
U.S. producers' U.S. shipments	***	***	***	***	***
U.S. imports from.--					
China	120	264	339	269	210
Nonsubject sources	211,438	179,529	166,348	126,427	132,762
All import sources	211,558	179,793	166,687	126,695	132,971
Apparent U.S. consumption: Total market	***	***	***	***	***
	Value (1,000 dollars)				
U.S. producers' U.S. shipments	***	***	***	***	***
U.S. imports from.--					
China	405	362	453	370	315
Nonsubject sources	552,804	479,757	367,127	279,967	285,749
All import sources	553,210	480,118	367,580	280,337	286,064
Apparent U.S. consumption: Total market	***	***	***	***	***
	Share of quantity (percent)				
U.S. producers' U.S. shipments	***	***	***	***	***
U.S. imports from.--					
China	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	***	***	***	***	***
	Share of value (percent)				
U.S. producers' U.S. shipments	***	***	***	***	***
U.S. imports from.--					
China	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	***	***	***	***	***

Note.--Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent.

Source: Compiled from data submitted in response to Commission questionnaires and official U.S. imports based on General Imports using statistical reporting numbers 2804.69.1000 and 2804.69.5000, accessed on January 6, 2017.

Figure I-3
Silicon metal: Apparent U.S. consumption, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

U.S. market share data show that U.S. producers' market share based on quantity increased by *** percentage points from 2014 to 2016,[113] but was lower in interim 2017 than in interim 2016. U.S. producers' market share, based on value, increased by *** percentage points from 2014 to 2016, but was lower in interim 2017 than in interim 2016.[114] [115] The market share based on quantity of imports of silicon metal from China remained at *** during all periods, whereas the market share of imports of silicon metal from nonsubject countries fell overall by *** percentage points from 2014 to 2016, but it was *** percentage points higher in interim 2017 than in interim 2016.

[113] At the Commission's hearing, the respondent interested party Wacker indicated, "Mississippi Silicon also lowered prices to enter the United States market and gained market share. Eventually, continued growth in demand, particularly in the chemical and polysilicon segments absorbed the excess supply and silicon metal prices started picking up again in August 2016." Hearing transcript, p. 83 (Majumdar).

[114] In their posthearing brief, the joint Chinese respondent interested parties contend "Mississippi Silicon entered and provided significant new supply to the market {U.S.}, particularly in the chemical and polysilicon segments of the market. Mississippi Silicon entered the market aggressively to build its business, and Globe responded in kind." Joint Chinese respondent interested party's posthearing brief, pp. 4-5.

[115] In their posthearing brief, the joint Chinese respondent interested parties contend that Ferroglobe has become the dominant player in the market, and due to its consolidation with FerroAtlántica in 2015, "Globe boasts control over 80 percent of the North American silicon metal market capacity." The respondents further allege that Ferroglobe has a leading position in the U.S. market, but its affiliates in Canada and South Africa account for a significant share of imports as well. Joint Chinese respondent interested party's posthearing brief, p. 4.

PART II: CONDITIONS OF COMPETITION IN THE U.S. MARKET

U.S. MARKET CHARACTERISTICS

Silicon metal has four broadly defined categories, or grades (in generally descending order of purity): semiconductor grade (out-of-scope product);[1] chemical grade that is used in the production of polysilicon and other silicone chemical compounds; metallurgical grade that is used to produce primary aluminum (aluminum produced from ore); and a metallurgical grade that is used to produce secondary aluminum (aluminum that may be produced from scrap).[2] Primary and secondary aluminum producers use silicon metal as an alloying agent.[3] Silicon metal can also be used in the production of trichlorocyline and some gases.[4] Demand for silicon metal is derived from the demand for its end uses, and silicon metal is sold in lump and powder form.

Apparent U.S. consumption declined by *** percent from *** short tons in 2014 to *** short tons in 2016. Apparent U.S. consumption in January-September 2017 was *** percent higher at *** short tons than in January-September 2016 at *** short tons.[5]

CHANNELS OF DISTRIBUTION

The vast majority of U.S. producers and importers sold silicon metal primarily to end users (table II-1). During 2014-16, U.S. producers sold mainly to *** end users. The small quantities of imports from China during 2014-16 were sold exclusively to *** end users. Nonsubject imports were sold mainly to chemical end users, although shares varied by nonsubject country.

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[1] Semiconductor-grade silicon is a high purity product generally containing more than 99.99 percent silicon and is used in the electronics industry. However, in-scope silicon metal may be used as a starting material for the manufacture of semiconductor-grade silicon metal.

[2] There is no uniformly accepted grade classification system. Silicon metal "grades" refer to ranges of specifications that are typically required by particular groups of customers. These specifications, which exist within narrow bands and are often proprietary, establish the minimum allowable amount of silicon and the maximum allowable amount of impurities such as iron, calcium, aluminum, or titanium. Chemical sector customers each have their own detailed specifications. Requirements and tolerances for impurities vary widely among primary aluminum industry customers, and even among some secondary aluminum industry customers. The grade and quality of silicon metal are highly dependent on the quality of raw material inputs. The quality of raw materials can vary over large volumes, so regular monitoring and testing during production are often required to ensure consistent product quality.

[3] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. II-1.

[4] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. II-1.

[5] Compiled from data submitted in response to Commission questionnaires and official U.S. import statistics (see table C-1).

Table II-1
Silicon metal: U.S. producers' and importers' share of reported U.S. commercial shipments, by source and channel of distribution, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

GEOGRAPHIC DISTRIBUTION

U.S. producers reported selling silicon metal to all regions in the contiguous United States (table II-2). For U.S. producers, *** percent of sales were within 100 miles of their production facility, *** percent were between 101 and 1,000 miles, and *** percent were over 1,000 miles. *** reported selling silicon metal from China to U.S. purchasers on the Pacific Coast.

Table II-2
Silicon metal: Geographic market areas in the United States served by U.S. producers and importers from China

Region	U.S. producers	Importers from China
Northeast	2	***
Midwest	3	***
Southeast	3	***
Central Southwest	2	***
Mountain	2	***
Pacific Coast	3	***
Other[1]	---	***
All regions (except Other)	2	***
Reporting firms	3	***

[1] All other U.S. markets, including AK, HI, PR, and VI.

Source: Compiled from data submitted in response to Commission questionnaires.

SUPPLY AND DEMAND CONSIDERATIONS

U.S. supply

U.S. supply factors are provided in table II-3.

Table II-3
Silicon metal: Industry factors that affect ability to increase shipments to the United States

* * * * * * *

Domestic production

Based on available information, U.S. producers of silicon metal may have a limited ability to respond to changes in demand with relatively small-to-moderate changes in the quantity of shipments of U.S.-produced silicon metal to the U.S. market. The factors contributing to this degree of responsiveness include some available capacity (mostly consisting of *** during the period of review), limited inventories, and limited production alternatives.

Industry capacity

Domestic capacity utilization decreased slightly from *** percent to *** percent during 2014-16, driven by ***.[6] For efficient production of silicon metal, producers run all operating furnaces as close to full capacity as possible. Future production increases would likely require large capital expenditures in the form of additional furnaces.[7] Unscheduled downtimes typically result in a loss of production that cannot be compensated for by extra production at a later date. This moderately-high level of capacity utilization suggests that U.S. producers may have some ability to increase production of silicon metal in response to an increase in prices.

Alternative markets

During 2014-16, U.S. producers' export shipments fluctuated between *** percent and *** percent of total shipments, indicating that U.S. producers may have a very limited ability to shift shipments between the U.S. market and other markets in response to price changes. U.S. producer *** reported that all silicon metal production is ***, and that it has no ability to shift sales to exports. U.S. producer *** reported that duties and freight costs make markets in Europe unprofitable; and U.S. producer *** reported that freight costs would "be a negative factor."

Inventory levels

U.S. producers' inventories fluctuated during 2014-16, but remained relatively unchanged overall. Relative to total shipments, U.S. producers' inventories increased from *** percent in 2014 to *** percent in 2015, and fell back to *** percent in 2016. These inventory levels suggest that U.S. producers have a limited ability to respond to changes in demand with changes in the quantity shipped from inventories.

Production alternatives

*** responding U.S. producers, ***, stated that *** could theoretically switch production from silicon metal to ferrosilicon, but have never done so. U.S. producer *** reported having the ability to switch production from silicon metal to ferrosilicon or magnesium ferrosilicon, after equipment modifications.[8]

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[6] Overall production capacity of the three U.S. producers in 2016 was *** short tons and actual production was *** short tons.

[7] ***.

[8] Switching production to other grades or alternative products may require downtime for extensive cleaning of machinery and for testing to ensure that impurities have been removed.

Subject imports from China[9]

Based on available information, producers of silicon metal from China may have the ability to respond to changes in demand with large changes in the quantity of shipments of silicon metal to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused and newly constructed capacity, and the ability to shift shipments from alternate markets. Factors mitigating this responsiveness of supply include environmental protection checks instituted by the Chinese government and electrical supply constraints caused by fluctuating hydro-electric and environmental conditions.[10]

China is the largest producer of silicon metal in the world, with an estimated production of approximately *** short tons in 2017.[11] According to the ***, "***," suggesting that Chinese producers may have substantial ability to shift shipments between Chinese home markets or other export markets and the U.S. market in response to price changes.[12]

Industry capacity

According to ***.[13] Based on foreign producer responses to Commission questionnaires, Chinese producers' capacity utilization increased from *** percent in 2014 to *** percent in 2016. According to Respondents, smaller and less efficient silicon metal producers in China are being gradually replaced by larger and more efficient producers.[14] *** reports that ***. *** also confirms that ***.[15] The information collected in questionnaire responses was insufficient to estimate the silicon metal production capacity in China. Overall, *** estimates of Chinese silicon metal capacity and industry information indicate that Chinese producers may have the ability to significantly increase production in response to an increase in prices.[16]

Alternative markets

Based on foreign producer questionnaire responses, *** of six foreign producers reported that demand for silicon metal from Chinese domestic markets increased. *** of six foreign producer firms reported that silicon metal demand had increased in the U.S. market, and *** of six firms also reported that demand had increased in other international markets. Factors cited by firms for the increase in demand included growing demand in the aluminum,

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[9] For data on the share of U.S. imports from China, please refer to Part I, "Summary Data."
[10] *Metal Bulletin Research*, November 2017, p. 3.
[11] ***. *** estimated that China produced ***. For comparison, ***.
[12] ***.
[13] ***.
[14] Hearing transcript, pp. 72-73, (Mr. Zhang).
[15] ***.
[16] ***.

chemical, and polysilicon sectors. Also, in 2013 China eliminated a 15-percent export duty on silicon metal, which eliminated an economic constraint on exports of silicon metal from China.[17]

Inventory levels

Responding Chinese foreign producers' inventories increased during 2014-16. Relative to total shipments, inventory levels increased from *** percent in 2014 to *** percent in 2016. These inventory levels suggest that Chinese producers may have a limited, but increasing ability to respond to changes in demand with changes in the quantity shipped from inventories.

Production alternatives

*** of six Chinese producers reported that they were not able to switch production from silicon metal to any other products.

Imports from nonsubject sources

Major nonsubject silicon metal import sources include Australia, Brazil, Canada, Kazakhstan, Norway, and South Africa. Nonsubject imports accounted for *** percent of total U.S. imports in 2016. The largest three sources of nonsubject imports during 2016 were Brazil, South Africa, and Canada, accounting for 68.6 percent of total U.S. imports.[18]

Supply constraints

Eleven of 20 purchasers reported experiencing supply constraints since 2012. Seven purchasers reported that domestic producers and/or importers were unable to supply desired or contracted volumes of silicon metal. Three purchasers cited problems with U.S. producers meeting quality or grade specifications. Two purchasers cited supply constraints in 2017 related to the uncertain outcome of the antidumping and countervailing duty investigations on imports from nonsubject countries.[19] *** reported that Globe would not sell to distributors.

*** of 19 importers reported supply constraints, and cited issues including insufficient volumes of silicon metal, transformer failure, antidumping duties, and both foreign and domestic producers that declined to sell to U.S. importers.

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[17] Petitioner's prehearing brief, p. 17.

[18] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. II-10.

[19] There were separate antidumping and countervailing duty investigations concerning silicon metal from Australia, Brazil, Kazakhstan, and Norway: *USITC Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*.

New suppliers

Thirteen purchasers reported that Mississippi Silicon entered the U.S. market as a third domestic producer at the end of 2015. Five purchasers identified other new suppliers that included United Silicon (Iceland), PCC (Iceland), RS Silicon (Italy), Tau-Ken (Kazakhstan), Sica New Materials (Thailand), and OFZ (Slovakia). Purchasers also cited general country sources of Brazil, Kazakhstan, Laos, and Thailand.

U.S. demand

Based on available information, the overall demand for silicon metal is likely to experience relatively small changes in response to changes in price. Demand for end-use products is the underlying driver of demand for silicon metal. While silicon metal accounts for a varying share of the total cost of its end-use products, demand responsiveness is constrained by the lack of substitute products.

End uses and cost share

Silicon metal is primarily used by chemical producers in the production of silicones and polysilicon, and by aluminum producers as an alloying agent.[20] Chemical end uses include chlorosilanes, polycrystalline silicon, polysilicon, sealants, silicones, and silicone adhesive sealants. Aluminum end uses include aluminum alloys, aluminum castings, and various foundry ingots.

Silicon metal usually accounts for a small-to-moderate share of the cost of the end-use products in which it is used. Reported cost shares for chemical/polysilicon sector manufacturers ranged from 8 percent to 36 percent of total cost. Reported cost shares for primary and secondary aluminum applications were between 1 and 16 percent.

Business cycles

*** U.S. producers and eight (of 22) responding importers indicated that the market was subject to business cycles and/or changes in conditions of competition since 2012. Specifically, U.S. producers *** reported that the silicon metal market is subject to business cycles that are driven by the aluminum industry and by the many consumer products that use silicones. U.S. producer *** reported that supply increases tend to be “lumpier” as new capacity is added (e.g. new production plants) or less smooth than increases in demand, which can lead to a market that may fluctuate between over- and under-supply. Importers mostly cited fluctuating demand for downstream products.

[20] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. II-15.

Most responding purchasers (13 of 20) reported that the market was not subject to business cycles and/or changes in conditions of competition since 2012. Purchasers that did report business cycles or changing conditions of competition cited price movements in the aluminum industry, changing demand for consumer products containing silicones or polysilicon, the merger of Globe Specialty Metals and FerroAtlantica, the market entry of Mississippi Silicon, antidumping and countervailing duty investigations, the closure or conversion of furnaces from silicon metal to ferrosilicon, and the exchange rate of the U.S. dollar against foreign currencies.

Demand trends

Among U.S. producers, importers, purchasers, and foreign producers, most firms reported that overall demand for silicon metal in the United States increased since 2012 (table II-4). Relatively fewer firms reported no change in demand or fluctuating demand. At the sector level, the demand for polysilicon was influenced by multiple factors including U.S. electricity prices, changing solar power installation incentives, and Chinese trade action toward polysilicon products exported from the United States.[21] Changes in other end-use sectors, including aluminum and other chemical sectors, also affected demand for silicon metal as the demand changed in their respective sectors.

Table II-4
Silicon metal: Firms' responses regarding U.S. demand by sector

Firm type	Demand:	Number of firms reporting			
		Increase	No change	Decrease	Fluctuate
U.S. producers	U.S. polysilicon metal	---	1	---	2
	U.S. other sectors	2	1	---	---
	U.S. overall	2	---	---	1
U.S. importers	U.S. polysilicon metal	9	4	---	3
	U.S. other sectors	8	4	1	2
	U.S. overall	11	3	---	3
U.S. purchasers	U.S. polysilicon metal	4	2	---	2
	U.S. other sectors	4	1	---	---
	U.S. overall	9	---	---	4
Foreign producers	U.S. overall demand	5	---	---	---
	Other market demand	5	---	---	---
	Home market demand (China)	6	---	---	---

Source: Compiled from data submitted in response to Commission questionnaires.

[21] China introduced trade actions against U.S. polysilicon exports after U.S. tariffs were placed on Chinese solar cells. *** purchaser questionnaire response, section III-5(b).

In general, demand for silicon metal fluctuates with the demand for downstream products.[22] U.S. producer *** reported that U.S. demand from polysilicon producers decreased, while there was increased demand among aluminum producers. U.S. producer *** reported that U.S. demand decreased in 2015 due to poor economic conditions, remained at similar levels in 2016, and began to increase in 2017. U.S. producer *** reported an overall increase in demand since 2012, with uneven and occasional annual increases following reductions or "flat" demand. All U.S. producers reported that they anticipate increased demand in both U.S. and world markets in the future.

Nine purchasers reported an increase in overall U.S. demand for silicon metal, and four reported that overall U.S. demand had fluctuated. Changes in demand for silicon metal were attributed to increased demand from the auto sector (partly due to manufacturers increasingly substituting aluminum for steel in order to meet emission requirements), aluminum sector price movements, economic conditions, fluctuation in demand from chemical and polysilicon producers, and decreased availability due to antidumping/countervailing duties.

Substitute products

*** of three U.S. producers, most importers (19 of 20), and most purchasers (17 of 19) reported that there are no substitute products for silicon metal. U.S. producer ***, importer and purchaser ***, and purchaser *** reported that aluminum scrap containing silicon metal can be recycled and substituted for some silicon metal inputs in secondary aluminum products, which then reduces purchases of silicon metal from the secondary aluminum sector.

SUBSTITUTABILITY ISSUES

The degree of substitution between domestic and imported silicon metal depends upon such factors as relative prices, grade, sizing and packaging, reliability of supply, timeliness of delivery, and conditions of sale. Based on available data, staff believes that there is a high degree of substitutability between domestically produced silicon metal and silicon metal imported from China.

Lead times

On average, U.S. producers reported that commercial shipments of silicon metal are produced-to-order for *** percent of shipments, with an average lead time of *** days. The remaining *** percent of commercial shipments were shipped from inventories, with lead times averaging *** days. U.S. producer *** reported that it ***.[23] *** reported that all sales of silicon metal from China were produced-to-order, with an average lead time of 75 days.

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[22] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. II-17.

[23] ***.

Knowledge of country sources

Eighteen purchasers indicated they had market or pricing knowledge of silicon metal produced in the United States, and five purchasers reported having market or pricing knowledge of silicon metal produced in China. Fourteen purchasers reported market or pricing knowledge of silicon metal produced in nonsubject countries, identifying Australia, Brazil, Canada, France, Kazakhstan, Laos, Norway, Russia, South Africa, Spain, Thailand, and the United Kingdom.

As shown in table II-5, most purchasers sometimes or never make purchasing decisions based on the producer. The majority of purchasers (12 of 20) reported that they never make purchase decisions based on country of origin. Most purchasers reported that their customers do not make purchase decisions based on either producers or countries of origin. Of purchasers that reported that they always or usually make decisions based on the producer or country of origin, the primary reasons for doing so included avoiding antidumping or countervailing import duties, supplier qualification and product impurity levels, and diversification of supply.

Table II-5
Silicon metal: Purchasing decisions based on producer and country of origin, by number of reporting firms

Purchaser/customer decision	Number of firms reporting			
	Always	Usually	Sometimes	Never
Purchaser makes decision based on producer	7	2	2	9
Purchaser's customers make decision based on producer	---	---	1	10
Purchaser makes decision based on country	5	1	2	12
Purchaser's customers make decision based on country	---	---	---	11

Source: Compiled from data submitted in response to Commission questionnaires.

Factors affecting purchasing decisions

The most often cited top three factors that firms consider in their purchasing decisions for silicon metal were price (18 firms), quality (15 firms), and availability/supply/reliability (15 firms) as shown in table II-6. Quality was the most frequently cited first-most important factor (cited by 7 firms), followed by price (6 firms). Both quality and availability/supply/reliability were the most frequently reported second-most important factors (8 firms each); and price was the most frequently reported third-most important factor (11 firms).

Table II-6
Silicon metal: Ranking of factors used in purchasing decisions as reported by U.S. purchasers, by factor

Factor	Ranking			Total
	1st	2nd	3rd	
	Number of firms			
Price/cost	6	2	11	19
Quality	7	8	1	16
Availability/supply/reliability	5	8	4	17
All other factors[1]	2	2	3	NA

[1] Other factors include supplier relationships, terms of sale, and diversity of suppliers.

Source: Compiled from data submitted in response to Commission questionnaires.

Importance of specified purchase factors

Purchasers were asked to rate the importance of 15 factors in their purchasing decisions (table II-7). The factors rated as very important by more than half of responding purchasers were availability (20), reliability of supply (19), product consistency (18), delivery time (15), price (14), and quality meets industry standards (14).

Table II-7
Silicon metal: Importance of purchase factors, as reported by U.S. purchasers, by number of reporting firms

Factor	Number of firms reporting		
	Very important	Somewhat important	Not important
Availability	20	---	---
Delivery terms	9	9	2
Delivery time	15	5	---
Discounts offered	6	7	7
Extension of credit	5	11	4
Minimum quantity requirements	4	7	9
Packaging	7	11	2
Price	14	5	1
Product consistency	18	2	---
Product range	1	9	10
Quality meets industry standards	14	4	2
Quality exceeds industry standards	6	9	5
Reliability of supply	19	1	---
Technical support/service	4	13	3
U.S. transportation costs	3	11	6

Source: Compiled from data submitted in response to Commission questionnaires.

Supplier certification

Most purchasers (14 of 20) require supplier certification, with some purchasers requiring stricter standards, laboratory testing, certification processes, and multiple trial loads.

Six purchasers reported that one or more suppliers had failed certification standards on at least one occasion since 2012. All reported certification failures were attributed to shortcomings in chemical quality specifications. Most purchasers reported that the time to qualify a new supplier ranged from 30 to 180 days, although one firm reported 7 days and another firm reported up to 1 or 2 years to qualify a new supplier.

Changes in purchasing patterns

Purchasers were asked about changes in their purchasing patterns from different sources since 2012 (table II-8); reasons reported for changes in sourcing included quality requirements, changes in demand for end-use products, product availability, the market entry of U.S. producer Mississippi Silicon, and the silicon metal antidumping/countervailing duty investigations.

Table II-8
Silicon metal: Changes in purchase patterns from U.S., subject, and nonsubject countries

Source of purchases	Number of firms reporting				
	Did not purchase	Decreased	Increased	Constant	Fluctuated
United States	2	6	8	1	4
China	18	---	---	---	---
All other countries	1	4	9	1	4
Sources unknown	6	1	3	1	---

Source: Compiled from data submitted in response to Commission questionnaires.

Importance of purchasing domestic product

Domestically produced silicon metal is usually not required by purchasers. Nineteen of 20 purchasers reported that none of their purchases in 2016 required domestic product, and one purchaser reported that 96 percent of its purchases in 2016 did not require domestic product.

Comparisons of domestic products, subject imports, and nonsubject imports

Purchasers were asked a number of questions comparing silicon metal produced in the United States, China, and nonsubject countries. The purchasers were asked for a country-by-country comparison on the same 15 factors for which they were asked to rate the importance.

Most responding purchasers reported that domestically produced silicon metal is comparable or superior to silicon metal from China. Of the factors reported to be very important in table II-7 (availability, reliability of supply, product consistency, delivery time, price, and quality meets industry standards), purchasers most frequently reported that U.S. product was superior to Chinese product in availability, product consistency, and delivery time. For the remaining important factors (reliability of supply, price, and quality meets industry standards), purchasers most frequently reported that domestic and Chinese silicon metal were comparable.

Most U.S. purchasers reported that silicon metal from nonsubject sources is comparable to silicon metal from China and the United States (table II-9).

Table II-9
Silicon metal: Purchasers' comparisons between U.S.-produced and imported product

Factor	Number of firms reporting								
	U.S. vs. China			U.S. vs. Nonsubject			China vs. Nonsubject		
	S	C	I	S	C	I	S	C	I
Availability	4	2	---	1	15	---	---	4	2
Delivery terms	4	2	---	3	12	1	---	4	2
Delivery time	5	1	---	5	11	---	---	3	4
Discounts offered	2	3	1	---	13	1	---	4	1
Extension of credit	4	2	---	2	12	---	---	3	3
Minimum quantity requirements	3	3	---	2	13	---	---	4	3
Packaging	3	3	---	3	13	---	---	4	2
Price[1]	1	3	2	1	10	4	3	2	1
Product consistency	4	2	---	4	11	1	1	3	2
Product range	2	4	---	2	12	1	---	5	2
Quality meets industry standards	3	3	---	3	12	---	---	4	2
Quality exceeds industry standards	2	3	---	1	12	2	---	4	2
Reliability of supply	2	3	---	2	14	---	---	3	4
Technical support/service	3	3	---	3	12	1	---	3	4
U.S. transportation costs[1]	3	2	1	2	12	2	---	3	3

[1] A rating of superior means that price/U.S. transportation costs is generally lower. For example, if a firm reported "U.S. superior," it meant that the U.S. product was generally priced lower than the imported product.

Note.--S=first listed country's product is superior; C=both countries' products are comparable; I=first list country's product is inferior.

Source: Compiled from data submitted in response to Commission questionnaires.

Comparison of U.S.-produced and imported silicon metal

In order to determine whether U.S.-produced silicon metal can generally be used in the same applications as imported silicon metal, U.S. producers, importers, and purchasers were asked whether the silicon metal products can always, frequently, sometimes, or never be used interchangeably. U.S. producers reported that domestically produced silicon metal is always or frequently interchangeable with silicon metal from China. Most importers and purchasers reported that domestic silicon metal is always or frequently interchangeable with silicon metal imported from China, and a smaller number of importers and purchasers reported that silicon metal is sometimes interchangeable (table II-10). The extent of interchangeability tends to be greater for metallurgical end uses, and more limited for chemical and polysilicon end uses, which require specific or higher chemical qualities and purity standards. Interchangeability of silicon metal depends mostly on a customer's chemical requirements, and interchangeability may vary based on the producer within a given country.

Table II-10
Silicon metal: Interchangeability between silicon metal produced in the United States and in other countries, by country pair

Country pair	Number of U.S. producers reporting				Number of U.S. importers reporting				Number of purchasers reporting			
	A	F	S	N	A	F	S	N	A	F	S	N
U.S. vs. China	1	2	---	---	7	5	2	---	3	2	2	---
U.S. vs. Other	1	2	---	---	7	7	4	---	6	4	6	---
China vs. Other	1	2	---	---	6	3	2	---	3	2	2	---

Note.--A=Always, F=Frequently, S=Sometimes, N=Never.

Source: Compiled from data submitted in response to Commission questionnaires.

Most responding purchasers generally reported that domestically produced silicon metal always or usually met minimum quality specifications. Few purchasers reported having enough country market and pricing knowledge to rate minimum quality specification of silicon metal from China. Silicon metal produced in nonsubject countries was reported to always or usually meet minimum quality specifications (table II-11).

Table II-11
Silicon metal: Ability to meet minimum quality specifications, by source and number of reporting firms[1]

Source	Number of purchaser firms responding			
	Always	Usually	Sometimes	Rarely or never
United States	8	8	1	---
China	1	2	---	1
Other	11	7	---	---

[1] Purchasers were asked how often domestically produced or imported silicon metal meets minimum quality specifications for their own or their customers' uses.

Source: Compiled from data submitted in response to Commission questionnaires.

In addition, U.S. producers, importers, and purchasers were asked to assess how often differences other than price were significant in sales of silicon metal from the United States, China, and nonsubject countries. As seen in table II-12, responses varied among producers, importers, and purchasers. Significant differences cited by firms included availability, chemical quality/specification, product consistency, and predictability/reliability of supply.

Table II-12
Silicon metal: Significance of differences other than price between silicon metal produced in the United States and in other countries, by country pair

Country pair	Number of U.S. producers reporting				Number of U.S. importers reporting				Number of purchasers reporting			
	A	F	S	N	A	F	S	N	A	F	S	N
U.S. vs. China	1	---	1	1	4	2	2	4	2	1	3	1
U.S. vs. Other	---	1	1	1	4	2	4	6	5	1	8	3
China vs. Other	---	---	2	1	3	2	2	4	1	1	4	1

Note.--A = Always, F = Frequently, S = Sometimes, N = Never.

Source: Compiled from data submitted in response to Commission questionnaires.

ELASTICITY ESTIMATES

This section discusses elasticity estimates; no parties commented on these estimates in the prehearing or posthearing briefs.

U.S. supply elasticity

The domestic supply elasticity for silicon metal measures the sensitivity of the quantity supplied by U.S. producers to changes in the U.S. market price of silicon metal. The elasticity of domestic supply depends on several factors including the level of excess capacity, the ease with which producers can alter capacity, producers' ability to shift to production of other products, the existence of inventories, and the availability of alternate markets for U.S.-produced silicon metal. Analysis of these factors above indicates that the U.S. industry has limited ability to increase or decrease shipments to the U.S. market; an estimate in the range of 1 to 3 is suggested.

U.S. demand elasticity

The U.S. demand elasticity for silicon metal measures the sensitivity of the overall quantity demanded to a change in the U.S. market price of silicon metal. This estimate depends on factors discussed above such as the existence, availability, and commercial viability of substitute products, as well as the component share of silicon metal in the production of any downstream products. Based on the available information, the aggregate demand for silicon metal is likely to be highly inelastic; a range of -0.25 to -0.5 is suggested.

Substitution elasticity

The elasticity of substitution depends upon the extent of product differentiation between the domestic and imported products.[24] Product differentiation, in turn, depends upon such factors as quality (e.g., chemistry, packaging, etc.) and conditions of sale (e.g., availability, sales terms/discounts/promotions, etc.). Based on available information, the elasticity of substitution between U.S.-produced silicon metal and imported silicon metal is high, and estimated in the range of 4 to 7. However, substitution elasticity is likely to have firm specific variation. Firms that require relatively stricter chemical impurity requirements will have lower substitution elasticity.

[24] The substitution elasticity measures the responsiveness of the relative U.S. consumption levels of the subject imports and the domestic like products to changes in their relative prices. This reflects how easily purchasers switch from the U.S. product to the subject products (or vice versa) when prices change.

PART III: CONDITION OF THE U.S. INDUSTRY

OVERVIEW

Important industry events

The information in this section of the report was compiled from responses to the Commission's questionnaires. Three firms, which accounted for virtually all U.S. production of silicon metal during 2016, supplied information on their operations in this review on silicon metal. Important industry events that have occurred in the silicon metal industry since January 1, 2011 are summarized in table III-1.

Table III-1
Silicon metal: Important industry events, since January 1, 2011

Date		Company / Item	Action
Year	Month		
2011	June	Foreign Trade Zones	The Foreign-Trade Zones Board of the U.S. Department of Commerce granted foreign-trade zone (FTZ) subzone status with restrictions to REC Silicon Inc.'s polysilicon and silane gas manufacturing facility in Butte, Montana. The FTZ manufacturing authority could exempt REC Silicon from customs duty payments on imported silicon metal that is used to manufacture polysilicon and silane gas for export. The company was not allowed to import silicon metal duty free if those imports were covered by an antidumping duty or countervailing duty order.[1]
2012	January	U.S.-World Trade Organization (WTO) Chinese Raw Material Export Dispute Settlement Proceedings	In July 2011, a WTO dispute settlement panel agreed with the United States that China's curbs placed on exports of various materials in 2009, including a 15% tax on silicon metal exports, were inconsistent with China's WTO obligations. In January 2012, the WTO Appellate Body affirmed the panel report in pertinent part after China appealed. By doing so, the Appellate Body rejected China's attempts to portray the export restraints as conservation or environmental protection measures or measures taken to manage critical supply shortages.[2]
2012	June	GSM	GSM acquired Becancour Silicon Metals Inc.'s 51% ownership in Quebec Silicon Limited Partnership's (QSLP) (formerly Timminco Ltd.) 51,800 short ton per year silicon metal plant in Becancour, Quebec Province. Dow Corning retained 49% ownership in the plant. With this acquisition, GSM became the sole merchant silicon metal producer in North America at the time.[3]

Table continued on next page.

Table III-1--Continued
Silicon metal: Important industry events, since January 1, 2011

Date		Company / Item	Action
Year	Month		
2013	July	Issuance of AD orders on polysilicon imported to China.	China's Ministry of Commerce imposed anti-dumping duties on polysilicon imported from the United States and South Korea. Chinese importers of U.S. polysilicon have to pay duties ranging from 53.3 to 57 percent, depending on the dumping margin, according to the Commerce Ministry. Imports from South Korea will face rates ranging from 2.4 to 48.7 percent.[4]
2015	June	Issuance of AD orders on silicon metal imported to Australia.	The Australian Anti-Dumping Commission found that silicon metal exported from China to Australia was dumped with margins ranging from 18.3 percent to 27 percent, and subsidized with margins ranging from 6.3 percent to 37.6 percent and the dumped and subsidized exports caused material injury to the Australian industry. The commission imposed an antidumping duty on imports of silicon metal originating in China (Anti-Dumping Notice No. 2015/71). The rate of the duty is 58.3 percent, with the exception of the goods produced by the companies Hua'an Linan Silicon Industry Co., Ltd. and Guizhou Liping Linan Silicon Industry Co., Ltd. and supplied through the company Xiamen K Metal Co., Ltd., which are subject to a duty of 18.3 percent.[5]
2015	December	Ferroglobe PLC	The Spanish firm Grupo FerroAtlántica merged with Globe Specialty Metals ("GSM") (the parent company of Globe Metallurgical) to become Ferroglobe PLC, reportedly the leading producer of silicon metal and silicon-based alloys in the world. Collectively, Ferroglobe's silicon metal production capacity was about 543,000 short tons per year and is distributed as follows: Europe, 40 percent; North America, 40 percent; Africa, 14 percent; and Asia, 7 percent.[7] [8]
2015	September	Mississippi Silicon	Mississippi Silicon, LLC , a partnership between Rima Holdings USA Inc. and domestic investor group Clean Tech LLC, opened a new $200 million silicon metal plant in Burnsville, Mississippi. It was the first new silicon metal plant built in the United States in 40 years.[6]
2016	January	***	***.[9]
2016	April	Wacker Chemie AG	Wacker Chemie AG opened a new $2.5 billion polysilicon[10] plant in Charleston, Tennessee. Wacker planned to gradually ramp up production and expected to reach full polysilicon production capacity of 22,000 short tons per year by the third quarter of 2016.[11]

Table continued on next page.

Table III-1--Continued
Silicon metal: Important industry events, since January 1, 2011

Date		Company / Item	Action
Year	**Month**		
2016	October	HiTest Sand	***.[12]
2017	February	The Canadian International Trade Tribunal ("CITT") Issuance of AD/CVD investigation on silicon metal imported to Canada.	CITT initiated a preliminary injury inquiry into a complaint by Québec Silicon Limited Partnership and its affiliate QSIP Canada ULC, of Bécancour, Quebec, that they have suffered injury as a result of the dumping of silicon metal from Brazil, Kazakhstan, Laos, Malaysia, Norway, Russia, and Thailand, and subsidizing of the above-mentioned goods from Brazil, Kazakhstan, Malaysia, Norway and Thailand.[13]
2017	September	Wacker Chemie AG	A "technical defect" caused a chemical release and explosion at Wacker Chemie AG's polysilicon plant in Charleston, Tennessee. The explosion damaged pipes and resulted in the closure of the plant. A spokesman from the company stated that "production will not start until a thorough inspection is completed and it is certain that the facility is safe." The plant was expected to remain closed for several months.[14] [15]
2017	November	Findings in AD/CVD investigation on silicon metal imported to Canada.	The CITT concluded its AD/CVD investigations, finding that the dumping and/or subsidizing of silicon metal originating in or exported from Brazil, Kazakhstan, Laos, Malaysia, Norway, and Thailand did not cause injury and were not threatening to cause injury to the domestic industry.[16]
2018	April	USITC final negative determinations for AD/CVD investigations of silicon metal from Australia, Brazil, Kazakhstan, and Norway	The USITC determined an industry in the United States is not materially injured or threatened with material injury, and the establishment of an industry in the United States is not materially retarded by reason of imports of silicon metal from Australia, Brazil, Kazakhstan, and Norway.[17]

Table continued on next page.

Table III-1--Continued
Silicon metal: Important industry events, since January 1, 2011

[1] Corathers, Lisa, A., "Silicon," U.S. Geological Survey, February 2013, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2011-simet.pdf, accessed February 26, 2018.

[2] Corathers, Lisa, A., "Silicon," U.S. Geological Survey, February 2013, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2011-simet.pdf, accessed February 26, 2018.

[3] Corathers, Lisa, A., "Silicon," U.S. Geological Survey, August 2016, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2012-simet.pdf, accessed February 26, 2018.

[4] "China imposes anti-dumping duties on US, South Korean polysilicon." PV Magazine, July 18, 2013, https://www.pv-magazine.com/2013/07/18/china-imposes-anti-dumping-duties-on-us-south-korean-polysilicon_100012085/, retrieved January 19, 2017.

[5] Anti-dumping notice no. 2015/71, Australian Anti-Dumping Commission, June 3, 2015, http://www.adcommission.gov.au/cases/EPR%20193%20%20250/EPR%20237%20-%20archived%2012Nov2015/043-ADN-201571%20-%20Findings%20in%20relation%20to%20a%20dumping%20and%20subsidisation%20investigation-Case237.pdf, retrieved May 12, 2017.

[6] "Mississippi Silicon opens new facility in Burnsville," Business Xpansion Journal, October 30, 2015, http://bxjmag.com/mississippi-silicon-opens-new-facility-in-burnsville/, retrieved May 11, 2017.

[7] The other leading global silicon metal producers, in descending order of production capacity, were Dow Corning (228,000 short tons), Elkem (175,000 short tons), and Rima (114,000 short tons). Ferroglobe PLC*, "Investor Presentation, January 2017," p.,4.* http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=890793&filekey=CFE050BE-EFCF-45C5-B36E-E2175021C697&filename=Ferroglobe_-_Investor_Presentation.pdf, retrieved March 24, 2017.

[8] Ferroglobe PLC*, "Investor Presentation, January 2017,"* p.7, http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=890793&filekey=CFE050BE-EFCF-45C5-B36E-E2175021C697&filename=Ferroglobe_-_Investor_Presentation.pdf, retrieved March 24, 2017.

[9] ***.

[10] Polysilicon is a high-purity form of silicon made from subject silicon metal.

[11] Wacker Chemie AG website, https://www.wacker.com/cms/en/wacker_group/wacker_facts/sites/charleston/charleston.jsp, retrieved May 11, 2017.

[12] ***.

[13] "Tribunal Initiates Injury—Silicon Metal from Brazil, Kazakhstan, Laos, Malaysia, Norway, Russia, and Thailand," Government of Canada news release, February 21, 2017, https://www.canada.ca/en/international-trade-tribunal/news/2017/02/tribunal_initiatesinquirysiliconmetalfrombrazilkazakhstanlaosmal.html, retrieved February 20, 2018.

[14] "Technical Defect Caused Chemical Release and Explosion at US Site in Charleston," Wacker Chemie AG, September 8, 2017, https://www.wacker.com/cms/en/press_media/press-releases/pressinformation-detail_84288.jsp?from_all_summary=true, retrieved February 13, 2018.

[15] "Root-cause investigation at Wacker's Charleston plant underway" Wacker Chemie AG, September 20, 2017, https://www.wacker.com/cms/en/press_media/press-releases/pressinformation-detail_84544.jsp?from_all_summary=true, retrieved February 13, 2018.

[16] "Silicon Metal Inquiry No. NQ-2017-001," Anti-Dumping Injury Inquiries Inquiries (section 42) Findings and Reasons, The Canadian International Trade Tribunal, November 17, 2017, http://www.citt.gc.ca/en/node/8185, retrieved February 15, 2018.

[17] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345* (Final), USITC Publication 4773, April 2018.

Changes experienced by the industry

Domestic producers were asked to indicate whether their firm had experienced any plant openings, relocations, expansions, acquisitions, consolidations, closures, or prolonged shutdowns because of strikes or equipment failure; curtailment of production because of shortages of materials or other reasons, including revision of labor agreements; or any other change in the character of their operations or organization relating to the production of silicon metal since 2011. All of the domestic producers (which provided responses in this review) indicated that they had experienced such changes; their responses are presented in table III-2.

Table III-2
Silicon metal: U.S. producers' changes in operations since January 1, 2011, and anticipated changes in operations

* * * * * * *

Anticipated changes in operations

The Commission asked domestic producers to report anticipated changes in the character of their operations relating to the production of silicon metal. ***. Its response appears in table III-3.

Table III-3
Silicon metal: Anticipated changes in the character of U.S. operations since 2014

* * * * * * *

U.S. PRODUCTION, CAPACITY, AND CAPACITY UTILIZATION

Table III-4 and figure III-1 present U.S. producers' production, capacity, and capacity utilization. Domestic producers' capacity (for silicon metal production) increased by *** percent from 2014 to 2016. Total production increased by *** percent from 2014 to 2016.[1] U.S. producers' production and capacity, based on quantity, were higher during January to September ("interim") 2017 than in interim 2016, while capacity utilization was *** lower. The main reason for these higher levels of capacity and production is ***. Capacity utilization decreased from *** percent in 2014 to *** percent in 2015, and further decreased to *** percent in 2016.

[1] Despite this overall increase, ***. Staff field trip report, ***.

Table III-4
Silicon metal: U.S. producers' silicon metal, capacity, and capacity utilization, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

Figure III-1
Silicon metal: U.S. producers' silicon metal, capacity, and capacity utilization, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

Constraints on capacity

Producers were also asked to describe the constraints that set the limits of their production capacity. All of the U.S. producers reported constraints in the silicon metal manufacturing process. Table III-5 presents U.S. producers' production constraints since 2014.

Table III-5
Silicon metal: U.S. producers' production constraints, since January 1, 2014

* * * * * * *

Alternative products

As shown in table III-6, U.S. producers reported that a majority of their production consisted of silicon metal. Production of in-scope silicon metal accounted for *** percent of total production during 2016. Two firms, ***, reported that they do not produce alternative products on the same equipment or using the same employees, while *** reported producing out-of-scope items on the same equipment as in-scope silicon metal. Production of out-of-scope products accounted for *** percent of total U.S. production during 2016. These out-of-scope products include ***.[2]

Table III-6
Silicon metal: U.S. producers' overall plant capacity and production on the same equipment as subject production, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

U.S. PRODUCERS' U.S. SHIPMENTS AND EXPORTS

Table III-7 presents U.S. producers' U.S. shipments, export shipments, and total shipments. Globe and Mississippi Silicon are merchant market producers while DC Alabama is a

[2] Between 2014 and 2016, ***. *** U.S. producer questionnaire response, section II-3f.

captive supplier for use of silicon metal in its own production processes.[3] From 2014 to 2016, the quantity of U.S. producers' total shipments, increased by *** percent. The value of U.S. producers' total shipments increased by *** percent from 2014 to 2015, but then decreased by *** percent from 2015 to 2016. The value of U.S. producers' total shipments decreased overall by *** percent from 2014 to 2016. The average unit value of U.S. producers' total shipments increased by *** percent from 2014 to 2015, but decreased by *** percent from 2015 to 2016. The average unit value of U.S. producers' total shipments decreased overall by *** percent from 2014 to 2016 and was lower during interim 2017 than in interim 2016. U.S. producers' total shipments based on quantity were *** higher in interim 2017 than in interim 2016, but *** percent lower based on value.[4]

During 2014-16 and the interim periods of 2016 and 2017, *** of domestic producers' total shipments of silicon metal were U.S. commercial shipments and *** were transfers to related firms. *** accounted for all reported transfers to related firms.[5] Export shipments fluctuated during 2014-16 and the interim periods, but ***. The principal export markets include ***.

Table III-7
Silicon metal: U.S. producers' U.S. shipments, transfers to related firms, exports shipments, and total shipments, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

U.S. PRODUCERS' INVENTORIES

Table III-8 presents U.S. producers' end-of-period inventories and the ratio of these inventories to U.S. producers' production, U.S. shipments, and total shipments**.** These data show that U.S. producers' inventories increased by *** percent from 2014 to 2015, but decreased by *** percent from 2015 to 2016 and were *** percent lower interim in 2017 than in the comparable period of 2016. U.S. producers' inventories increased overall by *** percent from 2014 to 2016. U.S. producers' inventories were equivalent to between *** and *** percent of U.S. producers' total shipments during 2014-16 and the interim periods in 2016 and 2017. In 2015 and 2016, all domestic producers reported holding end-of-period inventories of silicon metal ***. *** held lower inventories in December 2016 than in December 2014 and *** held higher inventories in December 2016 than in December 2014.

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[3] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Preliminary),* USITC Publication 4685, May 2017, p. III-7.

[4] *** U.S. producer questionnaire response, section II-7.

[5] The vast majority of *** U.S. shipments were transfers to related firms, while the majority of *** U.S. shipments were U.S. commercial shipments. *** U.S. producer questionnaire responses, section II-7.

Table III-8
Silicon metal: U.S. producers' inventories, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

U.S. PRODUCERS' IMPORTS AND PURCHASES

Two U.S. producers *** reported purchases of silicon metal in the United States during 2014-16 and the interim periods in 2016 and 2017. ***.[6] ***.[7]

Direct U.S. imports of silicon metal by U.S. producers and affiliated companies are presented in table III-9. U.S. producer *** is related to ***. *** imported silicon metal from ***. *** indicated its reason for importing was "***."[8] U.S. producer *** is related to ***. *** imported silicon metal from ***.[9] ***.[10]

Table III-9
Silicon metal: U.S. producers' U.S. production and imports, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

U.S. EMPLOYMENT, WAGES, AND PRODUCTIVITY

Table III-10 shows U.S. producers' employment-related data. U.S. producers' employment measured by production and related workers ("PRWs") increased by *** percent from 2014 to 2015, but decreased by *** percent from 2015 to 2016.[11] U.S. producers' employment measured by PRWs increased overall by *** percent from 2014 to 2016. U.S. producers' total hours worked increased by *** percent from 2014 to 2016. U.S. producers' hourly wages decreased by *** percent from 2014 to 2016.

Unit labor costs increased by *** percent from 2014 to 2015, but decreased by *** percent from 2015 to 2016. Unit labor costs increased overall by *** percent from 2014 to 2016. Productivity decreased by *** percent from 2014 to 2016. Despite the increases with the U.S. producers' employment-related data during 2014-16, the 2017 interim period data were

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[6] ***. *** U.S. producer questionnaire response, section II-8.

[7] *** U.S. producer questionnaire response, section II-8.

[8] *** added that "***." *** U.S. importer questionnaire response, section II-4.

[9] *** U.S. importer questionnaire response, section II-6a.

[10] *** U.S. producer questionnaire response, section II-8, and *** U.S. importer questionnaire response, section II-8.

[11] At the Commission's hearing, Globe indicated that "between 2015 and 2016, more than 18 percent of our production-related workers lost their jobs." Hearing transcript, p. 26 (Huck).

lower than the 2016 interim period data for all employment-related data, with the exceptions of ***.[12] [13]

Table III-10
Silicon metal: Average number of production and related workers, hours worked, wages paid to such employees, hourly wages, productivity, and unit labor costs, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

[12] *** indicated that "***". ***. *** U.S. producer questionnaire response, section II-6, and Staff field trip report, ***.

[13] *** indicated that the "***. ***. *** U.S. producer questionnaire response, section II-6, and Staff field trip report, ***.

FINANCIAL EXPERIENCE OF U.S. PRODUCERS

Background

Three firms, DC Alabama, Globe, and Mississippi Silicon, reported financial results on their U.S. silicon metal operations.[14] For the period as a whole and with regard to overall silicon metal operations (i.e., operations reflecting both commercial sales and transfers), *** accounted for *** percent of total silicon metal sales quantity, *** accounted for *** percent, and *** accounted for *** percent. When considering open market silicon metal operations (i.e., operations reflecting only commercial sales), *** accounted for *** percent of commercial silicon metal sales quantity, *** accounted for *** percent, and *** accounted for *** percent.[15]

To varying degrees and with the exception of the ***,[16] the following changes/events directly or indirectly impacted the U.S. industry's silicon metal financial results during the period: Mississippi Silicon began silicon metal operations at its newly-established Burnsville, Mississippi plant in 2015, Globe Specialty Metals (Globe's previous stand-alone parent company) and FerroAtlantica merged to form Ferroglobe in late 2015, and Dow Corning became a wholly-owned subsidiary of Dow Chemical in 2016.[17] ***.[18] ***.[19] ***.[20]

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[14] All three U.S. producers reported their silicon metal financial results on a GAAP basis and for calendar-year periods.

[15] While the underlying production process is essentially the same, U.S. producers vary in terms of their focus on commercial sales versus transfers. ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor. ***. Verification report, p. 4. Transfer valuation of Dow Corning's share of the Alloy, West Virginia plant joint venture is described further below. ***.

Consistent with its normal practice, the Commission collected financial results in a manner that did not explicitly identify the Alloy, West Virginia joint venture as a separate entity and/or by joint venture partner share. In the absence of corresponding modifications to the Commission's U.S. producer questionnaire format, stand-alone joint venture financial results are not directly compatible with the financial results information gathered in the Commission's questionnaire.

[16] ***. *** U.S. producer questionnaire, response to III-11.

[17] Globe's silicon metal operations are part of parent company Ferroglobe's Electrometallurgy—North America segment. Ferroglobe 2016 20-F, p. 66. Verification report, p. 3. Ferroglobe was created pursuant to the merger of Globe Specialty Metals and FerroAtlantica on December 23, 2015. Ferroglobe 2016 20-F, p. F-27. Dow Corning is part of DowDuPont's Performance Materials & Coatings segment. DowDuPont 2017 10Q (Q3), p. 68. Dow Corning became a wholly-owned subsidiary of Dow Chemical on June 1, 2016. Dow Chemical and DuPont subsequently merged to form DowDuPont on September 1, 2017.

[18] ***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor. ***. Ibid. Verification report, p. 6.

[19] ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.

[20] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

Operations on silicon metal

Income-and-loss data for the U.S. producers' total operations on silicon metal operations are presented in table III-11. Table III-12 presents corresponding changes in average per short ton values.[21] Table III-13 presents company-specific financial information for total operations. Income-and-loss data for the U.S. producers' open market operations are presented in table III-14. Table III-15 presents corresponding changes in average per short ton values. Table III-16 presents company-specific financial information for open market operations.[22]

Table III-11
Silicon metal: Results of overall operations of U.S. producers, 2014-16, January-September 2016, and January-September 2017

* * * * * * *

Table III-12
Silicon metal: Changes in the U.S. producers' average per short ton contained silicon values reported for overall operations 2014-16, January-September 2016, and January-September 2017

* * * * * * *

Table III-13
Silicon metal: Results of operations of U.S. producers' overall operations, by firm, 2014-16, January-September 2016, and January-September 2017

* * * * * * *

Table III-14
Silicon metal: Results of open market operations of U.S. producers, 2014-16, January-September 2016, and January-September 2017

* * * * * * *

[21] Mississippi Silicon's entry to the market impacts the pattern of period-to-period volume and calculated average values for silicon metal sales, cost of goods sold (COGS), and sales, general and administrative (SG&A) expenses. Accordingly, a variance analysis of financial results on overall operations or open market operations is not presented in this report.

[22] ***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor. ***. Verification report, p. 4. Because of these differences, direct extrapolation of transfer-only financial results is not possible.

Table III-15
Silicon metal: Changes in the U.S. producers' average per short ton contained silicon values reported for open market operations 2014-16, January-September 2016, and January-September 2017

* * * * * * *

Table III-16
Silicon metal: Results of operations of U.S. producers' open market operations, by firm, 2014-16, January-September 2016, and January-September 2017

* * * * * * *

Net sales

Commercial sales represent the majority of the U.S. industry's overall silicon metal revenue during 2014 through interim 2017 (*** percent of total sales quantity). Transfers, which were reported by ***, accounted for *** percent total sales quantity.[23]

Quantity

Total silicon metal sales quantities for overall operations and open market operations increased in each fullyear and were higher in interim 2017 compared to interim 2016 (see table III-11 and table III-14). The increase in the U.S. industry's total sales quantity in 2015 primarily reflects *** relatively large increase in transfer sales quantity, attributed to improved operating conditions,[24] and to a lesser degree the ***. The further increase in 2016 total sales quantity reflects *** transition from start-up to commercial production. Reflecting alternating declines in transfer and commercial sales quantities, *** total net sales quantity declined throughout the period, with its largest decline ocurring in 2016 (see table III-13).[25]

Value

According to U.S. producers, silicon metal pricing/sales values are not directly tied to the cost of underlying material inputs or other manufacturing costs. ***, however, noted an indirect connection between silicon metal sales values and production costs inasmuch as the cost of material inputs can be impacted, to some extent, by changes in the demand for silicon metal.[26]

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[23] ***. Verification report, p. 4. ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.

[24] ***. Ibid.

[25] ***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor.

[26] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

On an overall basis, average sales value (see table III-11) increased more notably in 2015 compared to open market sales (see table III-14). Both groups reported declines in average sales values in 2016 and interim 2017. To the extent that company-specific product mix did not change substantially during the period, overall declines in average sales value were primarily a function of declines in silicon metal prices.

While reporting the same directional trend in average sales value for the majority of the period (see table III-13), U.S. producers varied in terms of the magnitude of change in average sales value. ***, which reported minimal commercial sales in 2015, reported a large decline in average sales value in 2016 followed by a somewhat higher average sales value in interim 2017 compared to interim 2016.[27] Table III-13 shows that *** reported the lowest company-specific average commercial sales value throughout the period (see footnote 15).

Transfer valuation

As noted previously (see footnote 23), ***. Reflecting different reporting structures and operations, the underlying transfer valuations adopted by *** were based on different assumptions.[28] ***.[29]

Cost of goods sold and gross profit

While U.S. producers generally indicated that they all use the same underlying production process, there are company-specific differences with respect to silicon metal operations.[30] In terms of vertical integration, *** U.S. producer that reported input purchases from related suppliers.[31]

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[27] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

[28] ***. December 18, 2017 letter with attachment from Counsel on behalf of *** to USITC auditor. ***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor. Verification report, p. 4.

[29] ***. March 5, 2018 e-mail with attachment from Counsel on behalf of *** to USITC auditor. USITC auditor posthearing notes. The decision to revise *** transfer values was specific to an evaluation of issues related to the financial section of the staff report and the measurement of the U.S. industry's financial results. Because overall trends in the trade section are not impacted by revaluation of transfers, these changes were not applied to the trade data for U.S. producers presented in this section of the report.

[30] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

[31] ***. *** U.S. producer questionnaire, response to III-7. ***. Verification report, p. 5.

The information submitted by *** and *** indicated that neither purchase inputs from related suppliers. *** U.S. producer questionnaire, response to III-7. *** U.S. producer questionnaire, response to III-7.

Raw materials

In addition to other identified inputs, total raw material cost represents several primary items, which were common to all U.S. producers: electrodes, coal, quartz, and woodchips. For all companies, coal accounts for the largest share of raw material costs, followed by electrodes, quartz, and woodchips.[32] On an average basis, ***.[33] *** average unit costs for these inputs reflect a mix of increases and decreases, with *** higher at the end of the period and *** lower. *** average coal and electrode cost declined during the period, while its average quartz cost increased.[34]

On an overall basis, *** average raw material cost fluctuated and increased to its highest level in interim 2017, while *** average raw material costs declined throughout the period (see table III-13). Direct comparability of *** average raw material cost to those of the other U.S. producers is limited, at least to some extent, due to *** deduction of byproduct revenue from raw material cost (see *Byproducts* section below). In contrast, *** deducted byproduct revenue from other factory costs.

Electricity

On an overall basis (see table III-11), electricity's share of total COGS declined somewhat during the period from *** percent in 2014 to *** percent in interim 2017. Open market operations (see table III-14) reflect the same trend and similar cost shares.

On a company-specific basis, average electricity cost for overall operations reflects somewhat different patterns: *** average electricity cost declined substantially in 2016, largely reflecting ***,[35] *** average electricity cost fluctuated somewhat but generally remained within a relatively narrow range throughout the period, and *** average electricity cost declined during the full-year period.[36]

Direct labor and other factory costs

For overall operations and open market operations, direct labor as a share of COGS declined during 2014 through interim 2017, while the share of other factory costs increased (see table III-11 and table III-14). The increase in other factory costs reflects the initiation of ***,[37] as well as increasing full-year average other factory costs reported by ***.[38] [39] While ***

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[32] *** U.S. producer questionnaire, response to III-9b. *** U.S. producer questionnaire, response to III-9b. *** U.S. producer questionnaire, response to III-9b. USITC auditor prehearing notes.

[33] As calculated based on questionnaire information, total average raw material cost and average costs for specific inputs reflect the average cost incurred to produce and sell the silicon metal reported as revenue. As such, these averages do not directly reflect the price paid for a specific input.

[34] ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.

[35] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

[36] ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.

[37] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

other factory costs were somewhat lower in interim 2017 compared to interim 2016, *** other factory costs were at their highest level of the period in interim 2017.[40]

Byproducts

All three U.S. producers reported similar byproducts (fume, dross, and fines) generated during the production of silicon metal, but varied somewhat in terms of how byproducts are recognized.[41] In *** financial results, the byproduct deduction was to raw material cost, while *** byproduct deductions were to other factory costs.[42] The extent to which byproducts are sold can also vary by producer. For example, *** noted that fines can be either recycled into the production process or sold and *** indicated that in 2017 some of its fume byproduct was not sold due to impurities.[43] [44]

Cost of goods sold

For overall operations and open market operations (see table III-11 and table III-14), the U.S. industry's average full-year COGS increased to its highest level in 2015 and then declined somewhat in 2016. Higher 2015 average COGS reflects ***, as well as higher average COGS reported by ***. In contrast, *** average COGS declined in 2015 (see footnote 24). In 2016, the decrease in average COGS, partially offset by *** higher average COGS, reflects a continued decline in *** average COGS and a substantial decline in *** average COGS, generally reflecting ***. At the end of the period and with respect to overall operations, the higher level of average COGS in interim 2017 compared to interim 2016 is generally attributable to *** (see footnote 40); i.e., *** reported essentially the same average COGS in each interim period and *** reported modestly lower average COGS in interim 2017 compared to interim 2016.

(…*continued*)

[38] ***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor.
***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor.

[39] ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.

[40] *. Ibid.

[41] In general, the distinction between joint products, also called main products, and byproducts is largely dependent on the market value of the products in question and their contribution to overall revenue. As such, a product's designation as a byproduct or a main product can change over time given market conditions. For cost accounting purposes the market value of a byproduct is generally treated as a deduction to arrive at the cost of the main product. *Cost Accounting: Using a Cost Management Approach*, L. Gayle Rayburn, Irwin, 1993, pp. 258-259.

[42] ***. USITC auditor prehearing notes.

[43] December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor.

[44] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

Gross profit or loss

Gross profit for overall operations and open market operations contracted throughout the period (see table III-11 and table III-14). For both sets of financial results, the decline in gross profit in 2015 reflects an increase in average COGS, which was only partially offset by higher average sales value. In contrast, the much larger contraction in average gross profit in 2016 reflects a substantial decline in average sales value, which was only partially offset by lower average COGS. At the end of the period, the two sets of financial results diverged: average COGS for overall operations increased somewhat, which amplified the negative impact of lower average sales value in interim 2017 compared to interim 2016, while average COGS for open market operations declined somewhat and partially offset lower average sales value. On an overall and open market basis, table III-11 and table III-14 show that the U.S. industry generated a gross profit in 2014 and 2015, a marginal gross profit for overall operations and a gross loss for open market operations in 2016, respectively, and gross losses of differing magnitudes in interim 2017 for both sets of financial results.

SG&A expenses and operating income or loss

SG&A expenses

For overall operations and open market operations (see table III-11 and table III-14), total SG&A expenses increased throughout the full-year period and were lower in interim 2017 compared to interim 2016. During the full-year period, this pattern reflects *** and higher levels of SG&A expenses reported by ***, which offset relatively large declines in *** SG&A expenses. At the end of the period, lower SG&A expenses in interim 2017 compared to interim 2016 reflect reduced SG&A expenses reported by ***, which were partially offset by higher SG&A expenses reported by ***.

Lower SG&A expense ratios (total SG&A expenses divided by total revenue) for overall operations compared to open market operations generally reflect the larger presence of ***, which reported the lowest company-specific SG&A expense ratios throughout the period (see table III-13).[45] *** SG&A expense ratios for its overall operations were in the same general range as its open market SG&A ratios.[46] *** SG&A expense ratios, which were notably high in 2015, subsequently declined but remained the highest on a company-specific basis throughout the period.[47]

Operating income or loss

During the full-year period, the pattern of higher SG&A expense ratios reported for overall operations and open market operations amplified the negative impact of declining gross

[45] ***. December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.
[46] ***. December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor.
[47] ***. December 18, 2017 e-mail with attachments from *** to USITC auditor.

results. In contrast and to a modest degree, the lower SG&A expense ratio in interim 2017 compared to interim 2016 partially offset the gross loss ratios reported for overall operations (table III-11) and open market operations (table III-14).

In general, the level and pattern of SG&A expenses played a limited role in terms of explaining the U.S. industry's operating results; i.e., the factors that determined financial results at the gross level were more important.

Interest expense, other expenses, and net income or loss

For overall operations and open market operations (see table III-11 and table III-14), the directional trend of operating results and net results was the same throughout the period. The absolute amounts reported for operating results and net results, however, diverged more notably in 2016 due to higher levels of interest expense and other expenses, reflected in net results, which were only partially offset by corresponding other income.

While *** reported interest expense throughout the period and *** reported small amounts in 2014 and 2015, *** accounts for the large increase in total interest expense during the period.[48] Other expenses were reported throughout the period by *** and by *** in 2016.[49] *** reported no other expenses during the period. While *** and *** reported other income, the large increase in other income in 2016 and interim 2017 primarily reflects ***.[50]

Capital expenditures and research and development expenses

Table III-17 presents the U.S. producers' capital expenditures and research and development (R&D) expenses related to silicon metal operations.

Table III-17
Silicon metal: U.S. producers' capital expenditures and research and development (R&D) expenses, by firm, 2014-16, January-September 2016, and January-September 2017

* * * * * * *

Overall capital expenditures increased to their highest level in 2015 and then declined to their lowest full-year level in 2016. While *** reported modest increases, the large overall increase in the U.S. industry's total capital expenditures in 2015 primarily reflects ***.[51] For the period as a whole, *** accounted for *** percent of total capital expenditures, followed by *** (*** percent),[52] and *** (*** percent).[53]

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[48] ***. Ibid.
[49] ***. *** U.S. producer questionnaire, response to III-10a.
[50] ***. *** U.S. producer questionnaire, response to III-10a.
[51] ***. *** U.S. producer questionnaire, response to III-13 (note 1).
[52] ***. *** U.S. producer questionnaire, response to III-13 (note 1).

Table III-17 shows that *** of the U.S. producers reported R&D expenses. ***.[54] *** provided a similar response.[55] With the regard to the *** of R&D expenses, ***.[56]

Assets and return on assets

Table III-18 presents the U.S. producers' silicon metal-related total assets and operating return on assets.[57]

Table III-18
Silicon metal: U.S. producers' total assets and return on assets, 2014-16

* * * * * * *

The increase in the U.S. industry's total assets in 2015 primarily reflects ***.[58] In 2016, the higher level of total assets primarily reflects the ***.[59]

(…*continued*)

[53] ***. *** U.S. producer questionnaire, response to III-13 (note 1).

[54] December 18, 2017 e-mail with attachments from Counsel on behalf of *** to USITC auditor.

[55] December 18, 2017 letter with attachments from Counsel on behalf of *** to USITC auditor.

[56] December 18, 2017 e-mail with attachments from *** to USITC auditor.

[57] Total asset value (i.e., the bottom line value on the asset side of a company's balance sheet) reflects an aggregation of a number of assets, which in many instances are not product specific. Accordingly, high-level allocation factors were likely required, to some extent, in order to report a total asset value (i.e., current and non-current assets) specific to silicon metal operations. As such, it should be noted that the pattern of total asset values reported can reflect changes in underlying asset account balances, as well as period-to-period variations in relevant allocation factors. The ability of U.S. producers to assign total asset values to discrete product lines affects the meaningfulness of calculated return on assets.

[58] ***. *** U.S. producer questionnaire, response to III-12 (note 1).

[59] ***. *** U.S. producer questionnaire, response to III-12 (note 1).

PART IV: U.S. IMPORTS AND THE FOREIGN INDUSTRIES

U.S. IMPORTS

Overview

The Commission issued questionnaires to 30 firms believed to have imported silicon metal from January 1, 2011 to September 30, 2017, as well as to all U.S. producers of silicon metal. Usable questionnaire responses were received from 25 firms, while three firms indicated that they had not imported product during the period for which data were collected.[1] Based on official Commerce statistics for imports of silicon metal, importers' questionnaire data accounted for *** of total U.S. imports from nonsubject countries during 2016 [2] and *** percent of total subject imports from China during 2016.[3]

In light of the subject import data coverage by the Commission's questionnaires, import data in this report are from official Commerce statistics based on General Imports for silicon metal.[4]

[1] The Commission issued questionnaires to those firms identified in the response to the notice of institution, along with firms, that based on a review of data provided by U.S. Customs and Border Protection ("Customs"), may have accounted for more than one percent of total imports under HTS statistical reporting numbers 2804.69.1000 and 2804.69.5000 in 2016.

[2] Staff did not receive a questionnaire response from ***, a U.S. importer that represented approximately *** percent of total U.S. imports in 2016. Staff reached out to this firm on numerous occasions, but did not receive an adequate response.

[3] According to proprietary *** records, ***. Compared to official import statistics, ***. *** indicated that it had not imported silicon metal since May 2012, and it specifically did not import silicon metal from China in 2016. Email message from ***, received on February 12, 2018.

[4] General Imports measures the total physical arrivals of merchandise from foreign countries, whether such merchandise enters the U.S. customs territory immediately or is entered into bonded warehouses or Foreign Trade Zones ("FTZs") under Customs custody. U.S. import statistics presented in this report are based on General Imports (as opposed to imports for consumption) due to issues with country of origin reporting and product classification reporting that result from certain U.S. importers' use of FTZs for their importation of silicon metal. Since U.S. import statistics are presented on the basis of General Imports, values are reported on a CIF (cost, insurance, freight) value basis, as opposed to a LDPV (landed, duty-paid value) basis.

Imports from subject and nonsubject countries

Table IV-1 and figure IV-1 present data for U.S imports of silicon metal, by source from 2014-16, January through September 2016, and January through September 2017.[5]

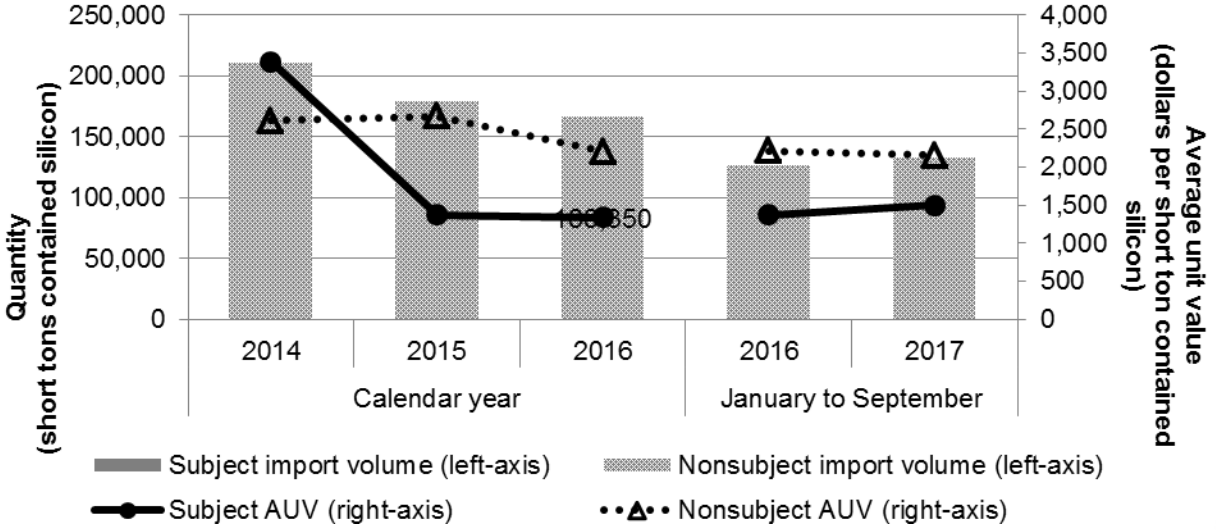
Table IV-1
Silicon metal: U.S. imports by source, 2014-16, January to September 2016, and January to September 2017

Item	Calendar year			January to September	
	2014	2015	2016	2016	2017
	Quantity (short tons contained silicon)				
U.S. imports from.-- China	120	264	339	269	210
Nonsubject sources	211,440	179,531	166,350	126,427	132,762
All import sources	211,560	179,795	166,689	126,696	132,972
	Value (1,000 dollars)				
U.S. imports from.-- China	405	362	453	370	315
Nonsubject sources	552,804	479,757	367,127	279,967	285,749
All import sources	553,210	480,118	367,580	280,337	286,064
	Unit value (dollars per STCS)				
U.S. imports from.-- China	3,384	1,370	1,336	1,377	1,497
Nonsubject sources	2,614	2,672	2,207	2,214	2,152
All import sources	2,615	2,670	2,205	2,213	2,151
	Share of quantity (percent)				
U.S. imports from.-- China	0.1	0.1	0.2	0.2	0.2
Nonsubject sources	99.9	99.9	99.8	99.8	99.8
All import sources	100.0	100.0	100.0	100.0	100.0
	Share of value (percent)				
U.S. imports from.-- China	0.1	0.1	0.1	0.1	0.1
Nonsubject sources	99.9	99.9	99.9	99.9	99.9
All import sources	100.0	100.0	100.0	100.0	100.0
	Ratio to U.S. production (percent)				
U.S. imports from.-- China	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	***	***	***	***	***

Source: Official U.S. imports based on General Imports using statistical reporting numbers 2804.69.1000 and 2804.69.5000, accessed on January 6, 2017.

[5] At the Commission's hearing, Globe indicated that "many domestic and import supplies compete in the U.S. silicon metal market, making it highly competitive. These suppliers include three U.S. producers and multiple import sources. With respect to imports of silicon metal, in 2017, 14 countries supplied the U.S. market. The domestic product and imports compete in all segments of the market and no segment is insulated from import competition." Hearing transcript, p. 31 (Lutz).

Figure IV-1
Silicon metal: U.S. imports by source, 2014-16, January to September 2016, and January to September 2017



Source: Official U.S. imports based on General Imports using statistical reporting numbers 2804.69.1000 and 2804.69.5000, accessed on January 6, 2017.

From 2014 to 2016, the quantity of total imports of silicon metal decreased by 21.2 percent and the value decreased by 33.6 percent, but both were higher in January to September ("interim") 2017 than in interim 2016. Subject imports from China accounted for *** percent or less of total U.S. imports of silicon metal during every year examined in this review. From 2014 to 2016, the annual quantity of imports of silicon metal from China increased by 182.5 percent, but was lower in interim 2017 than in interim 2016. The unit value of imports of silicon metal from China fluctuated, but decreased from 2014 to 2016, and was lower in interim 2017 than in interim 2016. The quantity and value of imports of silicon metal from nonsubject sources both decreased, but were higher in interim 2017 than in interim 2016. The ratio of subject Chinese import volume to U.S. production remained at *** during 2014-16 and the interim periods in 2016 and 2017.

Temporary importation under bond

In this review, one firm *** indicated that it imported silicon metal from China through Temporary Importation under Bond ("TIB"), which accounted for *** percent of all TIB imports from China in 2016. *** imported *** short tons of silicon metal from China, while 154 short tons of silicon metal were imported from China (through TIB) in 2016.[6] In 2016, 154 short tons

[6] In 2014, *** accounted for *** percent of the 110 short tons of silicon metal imported from China through TIB. In 2015, *** accounted for *** percent of the 44 short tons of silicon metal imported from (*continued*...)

of the 339 short tons of all known silicon metal imported from China were through TIB (45.4 percent). ***, an aluminum ingot, billet, and slab manufacturer indicated that all of its silicon metal imports were further processed and exported to ***.[7] [8]

Nonsubject U.S. imports

Table IV-2 presents data for nonsubject U.S imports of silicon metal, by source, from 2014-16, January through September 2016, and January through September 2017. From 2014 to 2016, nonsubject imports decreased by 21.3 percent, but were higher in interim 2017 than in interim 2016. In 2016, the leading sources for nonsubject imports of silicon metal were Brazil (including ***), South Africa (including ***), and Canada (including ***). Other leading sources of nonsubject U.S. imports include Australia, Kazakhstan, and Norway, which, along with Brazil, were recently the subject of antidumping and countervailing duty investigations.[9]

(…*continued*)
China through TIB. In 2014, 91.7 percent of the 120 short tons of silicon metal imported from China were through TIB. In 2015, 16.7 percent of the 264 short tons of silicon metal imported from China were through TIB. Official U.S. imports based on General Imports using statistical reporting numbers 2804.69.1000 and 2804.69.5000, accessed on January 6, 2017, and Domestic interested party's prehearing brief, exhibit 2.

[7] *** U.S. importer questionnaire response, section II-5a.

[8] *** indicated that it purchased silicon metal from China through ***. Email message from *** April 12, 2018.

[9] On April 10, 2018, the Commission transmitted its views and final determinations to Commerce, finding that the U.S. industry is not materially injured or threatened with material injury by reason of imports of silicon metal from Australia, Brazil, and Norway that Commerce determined are sold at LTFV and from Australia, Brazil, and Kazakhstan that Commerce determined are subsidized by the governments of those countries. *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway, Inv. Nos. 701-TA-567-569 and 731-TA-1343-1345* (Final), USITC Publication 4773, April 2018.

Table IV-2
Silicon metal: Nonsubject U.S. imports by source, 2014-16, January to September 2016, and January to September 2017

Item	Calendar year			January to September	
	2014	2015	2016	2016	2017
	Quantity (short tons contained silicon)				
U.S. imports from.--					
Australia	19,977	22,046	18,459	14,674	20,053
Brazil	83,725	51,888	68,340	47,124	60,450
Canada	20,933	23,470	21,542	17,195	21,023
France	7,631	5,378	1,029	1,029	856
Kazakhstan	0	3,006	10,367	7,640	10,360
Norway	14,753	14,441	14,432	11,430	10,392
South Africa	44,100	42,886	24,196	20,750	1,624
Thailand	15,396	7,528	748	172	4,533
All other nonsubject sources	4,925	8,888	7,237	6,415	3,471
Nonsubject sources	211,440	179,531	166,350	126,427	132,762
	Ratio to total U.S. imports (percent)				
U.S. imports from.--					
Australia	9.4	12.3	11.1	11.6	15.1
Brazil	39.6	28.9	41.0	37.2	45.5
Canada	9.9	13.1	12.9	13.6	15.8
France	3.6	3.0	0.6	0.8	0.6
Kazakhstan	---	1.7	6.2	6.0	7.8
Norway	7.0	8.0	8.7	9.0	7.8
South Africa	20.8	23.9	14.5	16.4	1.2
Thailand	7.3	4.2	0.4	0.1	3.4
All other nonsubject sources	2.3	4.9	4.3	5.1	2.6
Nonsubject sources	99.9	99.9	99.8	99.8	99.8

Source: Official U.S. imports based on General Imports using statistical reporting numbers 2804.69.1000 and 2804.69.5000, accessed on January 6, 2017.

U.S. IMPORTERS' IMPORTS SUBSEQUENT TO SEPTEMBER 30, 2017

The Commission requested importers to indicate whether they had imported or arranged for the importation of silicon metal from China and all other sources for delivery after September 30, 2017. Table IV-3 presents U.S. importers' responses regarding arranged imports. From October 2017 to September 2018, *** of all imports entering into the United States are expected to originate from China. In fact, the only reported arranged imports of silicon metal from China during October 2017-September 2018 amounted to *** short tons contained silicon during ***.

Table IV-3
Silicon metal: U.S. importers' arranged imports, October 2017 through September 2018

* * * * * * *

U.S. IMPORTERS' INVENTORIES

Table IV-4 presents data for inventories of U.S. imports of silicon metal from China and all other sources held in the United States. From 2014 through 2016, and during interim 2016 and 2017, there were no reported U.S. inventories of subject silicon metal imports from China. U.S. importers' end-of-period inventories of imports from nonsubject countries increased from 2014 to 2015, but fell in 2016 to a level lower than reported in 2014. These inventories were lower during interim 2017 than the comparable period in 2016.

Table IV-4
Silicon metal: U.S. importers' end-of-period inventories of imports, by source, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

THE INDUSTRY IN CHINA

Overview

During the final phase of the original investigations, the Commission did not receive Chinese producer/exporter questionnaires. Commerce identified at least 17 producers of silicon metal in China.[10] During the first five-year reviews, U.S. producers and unions identified 42 Chinese producers of silicon metal and five of those firms provided data in response to the Commission questionnaires.[11] Exports to the United States from the five responding firms accounted for *** percent of imports from China of silicon metal in 1999.[12] During the second five-year reviews, there was no valid data available on the number for silicon producers nor on the amount of production capacity in China.[13] In the third five-year review, the Commission did not receive responses from any Chinese producer. Globe provided a list of 18 firms that they believed produced silicon metal in China.[14]

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[10] *Silicon Metal from the People's Republic of China, Inv. No. 731-TA-472 (Final)*, USITC Publication 2385, June 1991, p. A-55.

[11] *Silicon Metal from Argentina, Brazil, and China, Inv. Nos. 731-TA-470-472 (Review)*, USITC Publication 3385, January 2001, IV-8.

[12] *Investigation Nos. 731-TA-470-472 (Review): Silicon Metal from Argentina, Brazil, and China—Staff Report, INV-X-254,* January 2001, IV-8.

[13] *Silicon Metal from Brazil and China, Invs. Nos. 731-TA-471-472 (Second Review)*, USITC Publication 3892, December 2006, p. IV-9. The only data on the record consisted of a ***. *Investigation Nos. 731-TA-471-472 (Second Review): Silicon Metal from Brazil and China—Staff Report,* INV-DD-146, October 25, 2006, p. IV-18.

[14] *Silicon Metal from China, Inv. No. 731-TA-472 (Third Review)*, USITC Publication 4312, March 2012, p. I-14. Globe reported that it believed the Chinese industry consisted of as many as *** silicon metal

(*continued*...)

The Commission issued questionnaires to 90 firms in China identified as possible silicon metal producers in this fourth five-year review. Usable responses to the Commission's questionnaire were received from six firms: Mao County Panda Silicon Co. Ltd. ("Panda Silicon"), Sichuan Linhe Silicon Industrial Co., Ltd. ("Sichuan Linhe"), Hoshine Silicon Industry Co., ("Hoshine Silicon"), Changning Zhenyuan Smelting Silicon Co., Ltd. ("Changning Smelting"), Mangshi Yuesheng Silicon Co., ("Mangshi Yuesheng"), and Mangshi Sinice Silicon Industry Company ("Mangshi Sinice").[15] [16] Table IV-5 presents information on silicon metal operations of the responding producers and exporters in China. These firms did not export silicon metal to the United States over the period examined.[17] [18] According to estimates requested of the responding Chinese producers, the production of silicon metal in China reported in questionnaires accounts for approximately *** percent of overall production of silicon metal in China in 2016.

Table IV-5
Silicon metal: Summary data for producers in China, 2016

Firm	Production (short tons contained silicon)	Share of reported production (percent)	Exports to the United States (short tons contained silicon)	Share of reported exports to the United States (percent)	Total shipments (short tons contained silicon)	Share of firm's total shipments exported to the United States (percent)
Changning Smelting	***	***	***	***	***	***
Hoshine Silicon	***	***	***	***	***	***
Linhe Silicon	***	***	***	***	***	***
Mangshi Sinice	***	***	***	***	***	***
Mangshi Yuesheng	***	***	***	***	***	***
Panda Silicon	***	***	***	***	***	***
Total	***	***	***	***	***	***

Source: Compiled from data submitted in response to Commission questionnaires.

(…*continued*)
producers with an annual production capacity of *** short tons per year. *Investigation Nos. 731-TA-472 (Third Review): Silicon Metal from China-Staff Report*, INV-KK-021, March 1, 2012, p. I-21.

[15] At the Commission's hearing, respondent interested party Wacker alleged "it is widely known that FerroAtlantica, a European subsidiary of Ferroglobe, entered the Chinese market in 2008 with a joint venture that created the Ganzi project in Tibet, which aimed at constructing the world's largest silicon metal factory. Furthermore in 2010, the same company Ferroglobe, acquired a Chinese company Mangshi Sinice Silicon Industry in Hunan Province and invested millions of Euros into that company." The Mangshi Sinice plant ceased production in 2015. Hearing transcript, p. 85 (Majudur).

[16] ***. *** foreign producer questionnaire response, sections I-4 and II-2a.

[17] ***. Foreign producer questionnaire responses, section II-9.

[18] ***. Foreign producer questionnaire responses, section II-9.

At the Commission's hearing, a representative from Wacker indicated that it has a joint venture with Dow Silicones in China, and it operates a very large, state-of-the-art plant near Shanghai (Zhangjiangang), China. Wacker further stated that it buys directly from Chinese producers as a purchaser in China, and that it exports silicon metal purchased in China to the European Union for polysilicon production.[19] Dow Corning has an additional plant that produces silicon metal in China-(Dow Corning Dalian plant), which was started by Dow Corning in the 1990s for the specific purpose of serving the Chinese market. Hearing testimony indicated (according to the Wacker representative) that Dow Corning wanted to source silicon metal for its production in China and invested resources into it, and that's what the operation is today; to ensure that DC Dalian secures supply to its plant in China.[20]

According to the most recent data available (through 2015) from the U.S. Geological Survey ("USGS"), China led the world in ferrosilicon and silicon metal production with a combined total of 7.36 million short tons in 2015. The USGS estimated that there were approximately 200 individual producers of silicon metal and 1,000 producers of ferrosilicon in China with a total production capacity of approximately 4.4 million short tons per year and 12.1 million short tons per year, respectively. In 2014, the 10 leading producers in China accounted for 1.05 million short tons of silicon metal production capacity and produced 572,000 short tons of silicon metal.[21] In 2015, China produced 2.15 million short tons of silicon metal, about 15 percent more than in the previous year and 44 percent more than in 2011.[22] Table IV-6 presents the USGS's estimate of Chinese silicon metal production from 2011 to 2015. These data show that estimated silicon metal production in China increased by 44.5 percent from 1.5 million short tons in 2011 to 2.2 million short tons in 2015.

Table IV-6
Silicon metal: Production in China, 2011–15

Country	2011	2012	2013	2014	2015
Quantity (1,000 short tons)					
China	1,488	1,246	1,598	1,874	2,150

Source: U.S. Geological Survey, 2015 Minerals Yearbook.

China was, by far, the leading producer of silicon metal in the world in 2015, accounting for 77 percent of the world's total silicon metal production. The China Non-Ferrous Metals Industry Association ("CNIA") estimates that in 2017 China produced 2.4 million short tons of silicon metal and had the capacity to produce 5.3 million short tons of silicon metal.[23]

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[19] Hearing transcript, pp. 88-90 (Majumdar).

[20] Hearing transcript, pp. 88-89 (Majumdar).

[21] Liu, Karl, "China Silicon Metal Overview and Prospect", Metal Bulletin 16th Asian Ferro-alloys conference, March 31–April 2, 2015, http://www.metalbulletin.com/events/download.ashx/document/speaker/7742/a0ID000000X0kCmMAJ/Presentation, accessed April 3, 2018.

[22] Schnebele, Emily K., "Silicon," U.S. Geological Survey, November 2017.

[23] Hearing transcript, pp. 33-34 (Lutz).

In 2014, 51 percent of the silicon metal produced in China was exported. The main applications for the silicon metal consumed in China were–silicones, 20 percent; aluminum alloys, 19 percent; polysilicon, 8 percent; and other, 2 percent.[24] From 2012 to 2017, Chinese exports of silicon metal increased by more than 74 percent.[25] In 2017, China was the world's largest exporter of silicon metal and exported nearly 924,000 short tons of silicon metal, which constituted nearly *** percent of China's total output for the year.[26]

During the original 1991 investigation period, silicon qualified for a value added tax ("VAT") refund. The Chinese VAT rate of 17 percent was applied to domestic purchases of inputs. When the goods were exported, the producer qualified for a full or partial refund of the VAT paid, with the refund varying by product. In 2006, the Chinese government abolished the VAT refund for exports of silicon. The removal of the VAT refund was intended to discourage the export of silicon and encourage value-added production in China, which resulted in the increase of production of silicones and polysilicon.[27]

Separately, the Central Government of China placed a 10 percent duty on silicon metal exports, initially effective January 1, 2008. With these duties, the Chinese Government aimed to reduce exports of these materials from the country so that more material would be available for the domestic market.[28] The Central Government of China raised the export duty to 15 percent on silicon metal with a maximum silicon content of 99.99 percent, effective December 1, 2008.[29] On July 5, 2011, a World Trade Organization ("WTO") dispute settlement panel agreed with the United States that China's curbs placed on exports of various materials in 2009, including a 15 percent tax on silicon metal exports, were inconsistent with China's WTO obligations.[30] On January 1, 2013, China removed the 15 percent export duty on silicon metal as part of the dispute settlement with the WTO.[31] [32] ***.[33]

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[24] Liu, Karl, "China Silicon Metal Overview and Prospect," Metal Bulletin 16th Asian Ferro-alloys conference, March 31–April 2, 2015, http://www.metalbulletin.com/events/download.ashx/document/speaker/7742/a0ID000000X0kCmMAJ/Presentation, accessed April 3, 2018.

[25] Hearing transcript, p. 9 (Kramer).

[26] Petitioner's prehearing brief, p. 31.

[27] Chinese respondents' prehearing brief, pp. 25-26.

[28] Corathers, Lisa, A., "Silicon," U.S. Geological Survey, May 2010, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2007-simet.pdf, accessed April 2, 2018.

[29] Corathers, Lisa, A., "Silicon," U.S. Geological Survey, October 2010, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2008-simet.pdf, accessed April 2, 2018.

[30] Corathers, Lisa, A., "Silicon," U.S. Geological Survey, December 2013, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2011-simet.pdf, accessed April 2, 2018.

[31] Petitioner's prehearing brief, exhibit 5.

[32] According to ***, "***." ***.

[33] ***.

Changes in operations

As presented in table IV-7 producers in China reported several operational and organizational changes since January 1, 2014.[34]

Table IV-7
Silicon metal: Chinese producers' reported changes in operations, since January 1, 2014

* * * * * * *

Operations on silicon metal

Table IV-8 presents information on the silicon metal operations of the responding producers in China for 2014-16, January through September 2016, and January through September 2017. Aggregate capacity of the responding producers in China decreased by *** percent from 2014 to 2016, but was higher in interim 2017 than in interim 2016. Production increased by *** percent from 2014 to 2016, and was higher in interim 2017 than in interim 2016. Capacity utilization increased by *** percentage points from 2014 to 2016, but was lower in interim 2017 than in interim 2016.[35] In addition, end-of-period inventories increased by *** percent from 2014 to 2016, but were lower in interim 2017 than in interim 2016.

Total shipments of the responding Chinese producers increased by *** percent from 2014 to 2016, and were higher in interim 2017 than in interim 2016. Home market shipments increased from *** percent of total shipments in 2014 to *** percent of total shipments in 2015, but decreased to *** percent of total shipments in 2016.[36] Home market shipments decreased by *** percentage points (as a share of total shipments) from 2014 to 2016, but were higher in interim 2017 than in interim 2016. There were no exports from China of silicon metal to the United States reported by the responding Chinese producers. Exports of silicon metal from China to countries other than the United States accounted for approximately *** of total shipments during 2016. Other large export markets identified include Japan and Korea,[37] along with ***.[38]

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[34] At the Commission's hearing, a representative from Hoshine indicated that the future of the silicon metal industry in China will be dominated by larger, more efficient silicon metal producers, and that the Chinese silicon metal industry will be a rationalized industry for the domestic market. Hearing transcript, p. 73 (Zhang).

[35] *** Foreign producer questionnaire responses, section II-3d.

[36] At the Commission's hearing, Chinese producer Hoshine indicated that its production of silicon metal is devoted to the company's downstream production of silicons, and that it's also sold to the polysilicon and the aluminum industry in China. A representative from Hoshine stated that it has always been primarily focused on the domestic market in China. Hearing transcript, p. 71 (Zhang).

[37] Hearing transcript, p. 132 (Lutz).

[38] *** foreign producer questionnaire responses, section II-9.

Table IV-8
Silicon metal: Data on industry in China, 2014-16, January to September 2016, and January to September 2017

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Alternative products

As shown in table IV-9, responding Chinese firms reported that *** production capacity was devoted to in-scope silicon metal production. The six Chinese firms reported that elements other than silicon accounted for approximately *** percent of the total weight of in-scope silicon metal production in 2016.

Table IV-9
Silicon metal: Overall capacity and production on the same equipment as in-scope production for firms in China, 2014-16, January to September 2016, and January to September 2017

* * * * * * *

Exports

According to GTA, the leading export markets for silicon metal from China are Japan, Korea, and Thailand (table IV-10). During 2016, exports of silicon metal from China to the United States were less than one percent of total silicon metal exports from China. Japan was the top export market for silicon metal from China in 2016, accounting for 23.1 percent, followed by Korea, accounting for 20.0 percent.[39]

[39] According to *** notes, ***. ***.

Table IV-10
Silicon metal: Exports from China by destination market, 2014-16

Item	Calendar year		
	2014	2015	2016
	Quantity (short tons contained silicon)		
Exports from China to the United States	2,239	895	226
Exports from China to other major destination markets.--			
Japan	176,157	185,415	163,334
Korea	196,642	164,877	141,236
Thailand	69,000	56,195	54,828
Germany	48,989	72,153	45,870
India	42,077	41,944	41,556
United Arab Emirates	40,374	41,582	36,352
Mexico	26,357	30,173	32,185
Malaysia	17,709	23,940	30,705
All other destination markets	340,849	237,645	161,164
Total exports from China	960,394	854,819	707,456
	Value (1,000 dollars)		
Exports from China to the United States	4,422	1,814	302
China's exports to other major destination markets.--			
Japan	369,499	389,419	290,349
Korea	412,845	363,779	248,430
Thailand	145,121	116,216	93,176
Germany	107,203	151,838	78,166
India	80,642	78,696	71,487
United Arab Emirates	83,387	85,401	59,017
Mexico	50,293	56,711	49,968
Malaysia	38,693	50,828	56,593
All other destination markets	686,540	482,753	275,566
Total exports from China	1,978,644	1,777,455	1,223,053

Table continued on next page.

Table IV-10--Continued
Silicon metal: Exports from China by destination market, 2014-16

Item	Calendar year		
	2014	2015	2016
	Unit value (dollars per STCS)		
Exports from China to the United States	1,975	2,026	1,335
Exports from China to other major destination markets.--			
Japan	2,098	2,100	1,778
Korea	2,099	2,206	1,759
Thailand	2,103	2,068	1,699
Germany	2,188	2,104	1,704
India	1,917	1,876	1,720
United Arab Emirates	2,065	2,054	1,623
Mexico	1,908	1,880	1,552
Malaysia	2,185	2,123	1,843
All other destination markets	2,014	2,031	1,710
Total exports from China	2,060	2,079	1,729
	Share of quantity (percent)		
Exports from China to the United States	0.2	0.1	0.0
Exports from China to other major destination markets.--			
Japan	18.3	21.7	23.1
Korea	20.5	19.3	20.0
Thailand	7.2	6.6	7.8
Germany	5.1	8.4	6.5
India	4.4	4.9	5.9
United Arab Emirates	4.2	4.9	5.1
Mexico	2.7	3.5	4.5
Malaysia	1.8	2.8	4.3
All other destination markets	35.5	27.8	22.8
Total exports from China	100.0	100.0	100.0

Note.—The domestic interested party asserts that exports from China quantities were 854,887 short tons of silicon metal in 2015 and 787,832 short tons in 2016 based on the data (IHS/GTA from the website) it had access to, which when compared to the data presented above would have resulted in a 18.0 percent decline from 2014 to 2016 compared to the 26.3 percent decline presented above. Staff contacted IHS/GTA to determine the differences in the data collected. ***, a representative from IHS Markit indicated that the differences in data were due to how the data was pulled (one of three choices). Staff pulled the GTA/GTIS data that was a combination of the EU 28 reporting countries supplemented with the United Nations (UN) comptrade data. In this format, the data presented includes the 28 EU member states' imports and exports and the UN data combined. According to IHS staff, this is the most accurate and reliable data from GTA/GTIS for the purposes of this review. Staff has also included an alternative export table presented in appendix E that shows exports constructed from all other countries' reported imports from China. Email from *** DLA Piper, counsel for the domestic interested party, April 4, 2018, Email from *** IHS Markit representative April 12, 2018, and domestic interested party's posthearing brief, exhibit 6.

Source: Official Chinese exports statistics under HTS subheading 2804.69 as reported by China Customs in the IHS/GTA database, accessed January 9, 2018.

ANTIDUMPING OR COUNTERVAILING DUTY ORDERS IN THIRD-COUNTRY MARKETS

Based on available information, silicon metal from China is currently subject to antidumping duties in the European Union,[40] Australia,[41] and Canada.[42]

GLOBAL MARKET

Global production[43]

In 2016, global production of silicon metal was nearly *** short tons. Table IV-10 shows production of silicon metal, by country and region during 2011–16. China was the leading producer with about *** short tons accounting for *** percent of global production, followed, in descending order of production, by ***. According to Roskill (a market research firm), global silicon metal capacity utilization was estimated at 51 percent in 2016, a marginal increase compared to that in recent years. Reportedly, the low utilization rate primarily reflected overcapacity and underutilization in China's silicon metal industry.[44] ***.[45]

Table IV-11
Silicon metal: Global production, by country, 2011-16

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In late 2015, the Spanish firm Grupo FerroAtlántica merged with GSM to become Ferroglobe PLC, the world's leading producer of silicon metal and silicon-based alloys.[46]

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[40] *Domestic Interested Parties' Response to the Notice of Institution*, March, 31, 2017, p. 2.

[41] Anti-dumping notice no. 2015/71, Australian Anti-Dumping Commission, June 3, 2015, http://www.adcommission.gov.au/cases/EPR%20193%20%20250/EPR%20237%20-%20archived%2012Nov2015/043-ADN-201571%20-%20Findings%20in%20relation%20to%20a%20dumping%20and%20subsidisation%20investigation-Case237.pdf, retrieved May 12, 2017.

[42] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, Public Version of the Prehearing Report, EDIS Document Id. No. 635918, February 2018, pp. VII-38.

[43] Unless otherwise indicated, information in this section is from *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, Public Version of the Prehearing Report, EDIS Document Id. No. 635918, February 2018, pp. VII-46–VII-50.

[44] "Outlook for Silicon Metal Diverges Sharply From That for Ferrosilicon," Roskill Information Services Ltd., July 17, 2017, https://roskill.com/news/outlook-silicon-metal-diverges-sharply-ferrosilicon/, retrieved January 11, 2018.

[45] ***.

[46] Ferroglobe PLC ,"Globe Specialty Metals and Grupo FerroAtlántica Clear Regulatory Process and Complete Business Combination," December 23, 2015, http://www.ferroatlantica.es/press/news/globe-

(*continued*...)

Collectively, Ferroglobe's silicon metal production capacity is about 543,000 short tons per year and is distributed as follows: Europe, 40 percent; North America, 40 percent; Africa, 14 percent; and Asia, 7 percent. The other leading global silicon metal producers, in descending order of annual production capacity, were Dow Corning (228,000 short tons), Elkem (175,000 short tons), and Rima (114,000 short tons).[47]

The silicon metal industry in China was discussed earlier in this part of the report. Whereas the silicon metal industries in certain other countries that are not the subject of this review are discussed below.

Australia

Simcoa Operations Pty. Ltd. operates the only silicon metal facility in Australia. The Simcoa plant consists of two charcoal retorts, three submerged-arc electrical furnaces, a filter plant for cleaning the furnace off-gases, and packaging and distribution facilities. Simcoa produces enough silicon to meet Australia's total silicon demand and exports most of its production to the rest of the world. The company stated that it is primarily export-oriented, with approximately 95 percent of its 55,000 short tons annual production allocated to customers in Japan, Germany, the United Arab Emirates, the United States, and New Zealand.[48]

Brazil

There are five silicon metal producers that operate seven plants in Brazil: Dow Corning Silicio do Brasil (two plants), Ligas de Aluminio S.A., Rima Industrial S.A. (also with two plants), Companhia Ferroligas Minas Gerais – Minasligas, and Italmagnesio Nordeste SIA. In 2016, the total silicon metal production capacity for the five producers was *** short tons.[49] Silicon metal production declines from 2014 to 2015 were partially attributed to droughts during that time period. Brazil, which generates more than 70 percent of its energy from hydroelectric dams, experienced its worst drought in decades, which led to significant increases in electricity costs. The resulting high cost of electricity caused many ferrosilicon and silicon metal producers to slow or stop production as the government imposed energy restrictions.[50]

(…*continued*)
specialty-metals-and-grupo-ferroatl%C3%A1ntica-clear-regulatory-process-and-complete-business-combination/?lang=en, accessed March 24, 2017.

[47] Ferroglobe PLC, *Investor Presentation*, January 2017, p. 7, http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=890793&filekey=CFE050BE-EFCF-45C5-B36E-E2175021C697&filename=Ferroglobe_-_Investor_Presentation.pdf, accessed March 24, 2017.

[48] Simcoa Operations Pty. Ltd. website, http://www.simcoa.com.au/, and http://www.simcoa.com.au/contact.html, accessed February 9, 2018.

[49] ***.

[50] Schnebele, Emily K., "Silicon," U.S. Geological Survey, March 2016, https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2014-simet.pdf , accessed February 8, 2018, and Schnebele, Emily K., "Silicon," U.S. Geological Survey, November 2017,

(*continued*...)

Canada

There is one producer of silicon metal in Canada, Quebec Silicon Limited Partnership ("QSLP"), owned jointly by GSM and Dow Corning. GSM acquired a 51-percent share of QSLP in 2012. QSLP has the capacity to produce about 52,000 short tons of silicon metal per year.[51]

France

Ferroglobe operates five plants in France (Laudun, Anglefort, Les Clavaux, Montricher, and Chateau Feuillet) with a combined silicon metal production capacity of about 164,000 short tons per year.[52]

Iceland

Silicon metal production is expected to increase in Iceland owing to a new smelter that opened in late 2016 and other smelters that are in different stages of development. Iceland has abundant hydropower and geothermal resources, which make the country an economically attractive location for power-intensive smelter operations.[53]

In early 2015, Petro Carbo Chem BakkiSilicon HF began construction on its new silicon metal smelter in Husavik. The plant was expected to open in 2018, and have the capacity to produce about 35,000 short tons of silicon metal per year. The company expected that the majority of the silicon produced would be sold to customers in Germany.[54]

In September 2015, Silicor Materials Inc., secured $105 million in equity capital agreements to support the construction of its $1 billion commercial-scale, solar-grade silicon metal manufacturing operation in Grundartangi.[55] The company expected that at full capacity, the plant would produce about 21,000 short tons of solar grade silicon metal per year.

(…*continued*)
https://minerals.usgs.gov/minerals/pubs/commodity/silicon/myb1-2015-simet.pdf, accessed February 8, 2018.

[51] Globe Specialty Metals Inc., http://www.glbsm.com/quebecsilicon/, accessed March 28, 2017.

[52] Ferroglobe PLC, *Investor Presentation*, May 2016, http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=925388&filekey=06493FD0-3C33-49AE-A17E-63A4ED53FEB3&filename=Ferroglobe_-_Investor_Presentation.pdf, accessed March 28, 2017.

[53] Perez, Alberto, A., "The Mineral Industry of Iceland," U.S. Geological Survey, November 2017, https://minerals.usgs.gov/minerals/pubs/country/2014/myb3-2014-ei.pdf, accessed February 20, 2018.

[54] PCC SE, "Official Start of Construction for PCC's Silicon Metal Project in Iceland," February 15, 2016, http://www.pcc.eu/official-start-of-construction-for-pccs-silicon-metal-project-in-iceland/?lang=en, accessed March 24, 2017.

[55] Silicor Materials, Inc., "Silicor Materials Closes $105M in Equity Capital Commitments for Iceland Manufacturing Plant," September 16, 2016, http://www.silicormaterials.com/news-a-event/press-releases/92-silicor-materials-closes-105m-in-equity-capital-commitments-for-iceland-manufacturing-plant.html, accessed March 24, 2017.

Construction of the plant was expected to take about two years but a start date had not yet been announced.[56]

In November 2016, United Silicon HF ("USi"), opened a silicon metal smelter, near Helguvik.[57] It was the first silicon smelter built in Iceland. The company uses geothermal and hydropower sources to run the plant and imports selected quartz and reductants. At full production capacity, the plant can produce 24,000 short tons of silicon metal per year. The company planned to expand production capacity in the future.[58]

Thorsil ehf is planning to build a new silicon metal plant in Helguvik. The company acquired financing for two submerged-arc furnaces but it was not clear when construction would begin.[59]

Norway

There are two silicon metal producers that operate five plants in Norway: Elkem (with three plants) and Wacker Chemicals Norway. In 2016, the total silicon metal production capacity for the two producers was *** short tons.[60] On March 8, 2017, Wacker announced that it was expanding production capacity (by an unspecified amount) of its silicon metal plant in Holla, Norway. The expansion was expected to be completed during the first half of 2019.[61]

South Africa

There are two plants producing silicon metal in South Africa, both owned by Ferroglobe and its subsidiaries. The plants have the capacity to produce about 74,000 short tons of silicon metal per year.[62] The eMalahleni plant in the province of Mpumalanga, purchased by

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[56] Bloomberg, "Silicor Sees Cost Advantage in $1 Billion Icelandic Solar Plant," August 31, 2016, https://www.bloomberg.com/news/articles/2016-09-01/silicor-sees-cost-advantage-in-1-billion-icelandic-solar-plant, accessed March 24, 2017.

[57] Fondel, "First Silicon Metal casting in Iceland," November 2016, https://fondel.com/news/first-silicon-metal-casting-in-iceland, accessed March 24, 2017.

[58] United Silicon website, https://fondel.com/companies/united-silicon, accessed March 24, 2017.

[59] Export Credit Norway, "Thorsil Metallurgical Grade Silicon Plant, Helguvik, Iceland," June 27, 2016, http://www.eksportkreditt.no/en-GB/52ABOUT-EXPORT-CREDIT-NORWAY/CSR-Engelsk/Category-A-and-B-projects/Thorsil-Metallurgical-Grade-Silicon-Plant-Helguvik-Iceland-Category-A/, accessed March 4, 2017.

[60] ***.

[61] Wacker Chemie AG, "WACKER Expands Silicon-Metal Capacity at Norwegian Production Site in Holla," March 8, 2017, *https://www.wacker.com/cms/en/press_media/press-releases/pressinformation-detail_78912.jsp*, accessed March 8, 2017.

[62] Ferroglobe, Investor Presentation, May 2016, http://investor.ferroglobe.com/common/download/download.cfm?companyid=AMDA-5STP82&fileid=925388&filekey=06493FD0-3C33-49AE-A17E-63A4ED53FEB3&filename=Ferroglobe_-_Investor_Presentation.pdf, accessed March 28, 2017.

FerroAtlantica (now Ferroglobe) in 2009 produces silicon metal with one of its three furnaces,[63] and the Polokwane silicon plant in the province of Limpopo produces silicon with three furnaces.[64] In 2016, the United States and Korea were the leading destinations for silicon metal exported from South Africa, accounting for about 63.1 percent and 20.8 percent, respectively, of total exports.

Thailand

In Thailand, G.S. Energy Co., Ltd. began operations in 2008. The company has manufacturing facilities in Ratchaburi with capacity to produce 49,600 short tons of silicon metal per year. [65] Output is almost all exported to Asia and the United States.

In 2015, Sica New Materials Co., Ltd. began producing silicon metal at its facilities in Kanchanaburi. The company was adding production capacity in phases and planned to have the capacity to produce about 99,200 short tons of silicon per year once the project was completed.[66]

United Arab Emirates

Silicon Metal of Abu Dhabi plans to build a silicon plant in the Khalifa Port Industrial Zone, Taweelah. The plant would be the first silicon metal smelter in the Middle East, initially producing 36,000 short tons of silicon per year, though the company plans to double that capacity in the future. [67]

Consumption

Table IV-12 shows consumption of silicon metal by country and region during 2011–16. In 2016, China (*** percent of total consumption), the European Union (***), the United States (*** percent), and Japan (*** percent) were the leading consumers of silicon metal. Although the growth in Chinese silicon metal demand has slowed during the past few years, it remains higher than in most other countries. China's share of global silicon consumption reached *** in 2016, *** percentage points more than its *** percent share in 2011. From 2011 to 2016, China's silicon metal consumption increased by *** percent.

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[63] Ferroglobe website, http://www.ferroglobe.com/business-areas/electrometallurgical/emalahleni/?lang=en, accessed January 17, 2018.

[64] Ferroglobe website, http://www.ferroglobe.com/business-areas/electrometallurgical/polokwane/?lang=en, accessed January 17, 2018.

[65] G.S. Energy Co., Ltd. website, http://www.gsi99g.com/en/, accessed March 28, 2017.

[66] Sica New Materials Co., Ltd. website, http://www.sica-mtl.com/index.php, accessed March 28, 2017.

[67] Al-Braik Investments LLC website, http://www.albraik.ae/Silicon Metal.html, accessed April 5, 2017.

Table IV-12
Silicon metal: Global consumption, by country or region, 2011-16

* * * * * * *

Global exports

Table IV-13 presents the leading exporting countries of silicon metal from 2014 to 2016. Total world exports decreased by 9.3 percent by quantity and 24.0 percent by value from 2014 to 2016. Exports of silicon metal from China were 707,456 short tons in 2016, 26.3 percent less than those in 2014. Conversely, exports from Brazil increased by 41.7 percent during that time period. China accounted for the largest share of global exports by quantity in 2016 (45.5 percent), followed by Norway (13.6 percent), and Brazil (13.1 percent).

Table IV-13
Silicon metal: Global exports by exporter, 2014-16

Item	Calendar year		
	2014	2015	2016
	Quantity (short tons contained silicon)		
United States	3,756	2,999	5,704
China	960,394	854,819	707,456
Norway	205,314	200,653	211,059
Brazil	143,755	109,007	203,630
Netherlands	77,638	130,549	162,911
Australia	56,384	52,856	52,848
South Africa	54,285	57,114	29,803
Bosnia & Herzegovina	18,757	19,730	24,153
Canada	25,493	25,009	21,869
Russia	28,341	29,847	21,677
Kazakhstan	1,808	12,792	20,073
All other exporters	137,912	102,703	93,636
Total global exports	1,713,836	1,598,080	1,554,819
	Value (1,000 dollars)		
United States	9,357	7,347	8,800
China	1,978,644	1,777,455	1,223,053
Norway	471,844	429,000	387,480
Brazil	340,793	263,149	385,275
Netherlands	192,459	271,326	282,901
Australia	123,649	122,313	92,771
South Africa	136,541	149,949	61,089
Bosnia & Herzegovina	44,770	45,315	41,958
Canada	59,985	62,704	52,272
Russia	54,391	57,180	34,470
Kazakhstan	4,139	26,895	31,453
All other exporters	699,846	627,877	528,793
Total global exports	4,116,417	3,840,508	3,130,315

Table continued.

Table IV-13--Continued
Silicon metal: Global exports by exporter, 2014-16

Item	Calendar year		
	2014	2015	2016
	Unit value (dollars per STCS)		
United States	2,491	2,449	1,543
China	2,060	2,079	1,729
Norway	2,298	2,138	1,836
Brazil	2,371	2,414	1,892
Netherlands	2,479	2,078	1,737
Australia	2,193	2,314	1,755
South Africa	2,515	2,625	2,050
Bosnia & Herzegovina	2,387	2,297	1,737
Canada	2,353	2,507	2,390
Russia	1,919	1,916	1,590
Kazakhstan	2,289	2,102	1,567
All other exporters	5,075	6,114	5,647
Total global exports	2,402	2,403	2,013
	Share of quantity (percent)		
United States	0.2	0.2	0.4
China	56.0	53.5	45.5
Norway	12.0	12.6	13.6
Brazil	8.4	6.8	13.1
Netherlands	4.5	8.2	10.5
Australia	3.3	3.3	3.4
South Africa	3.2	3.6	1.9
Bosnia & Herzegovina	1.1	1.2	1.6
Canada	1.5	1.6	1.4
Russia	1.7	1.9	1.4
Kazakhstan	0.1	0.8	1.3
All other exporters	8.0	6.4	6.0
Total global exports	100.0	100.0	100.0

Source: GTIS/GTA database. Official Chinese exports statistics under HTS subheading 2804.69 as reported by China Customs in the IHS/GTA database, accessed January 9, 2018.

PART V: PRICING DATA

FACTORS AFFECTING PRICES

Raw material costs

Silicon metal is composed almost entirely of elemental silicon with very small amounts of impurities, such as iron, calcium, and aluminum. Silicon metal is produced from mined quartz. Other inputs to the production process include coal or charcoal, woodchips, and electrodes. Electricity is an important input cost. The quality of raw materials used in the production of silicon metal determines the quality of silicon metal, and thus whether silicon metal meets specific end-user requirements. Grade quality can vary over large volumes, and silicon metal production may require monitoring and testing to ensure product consistency and quality. [1]

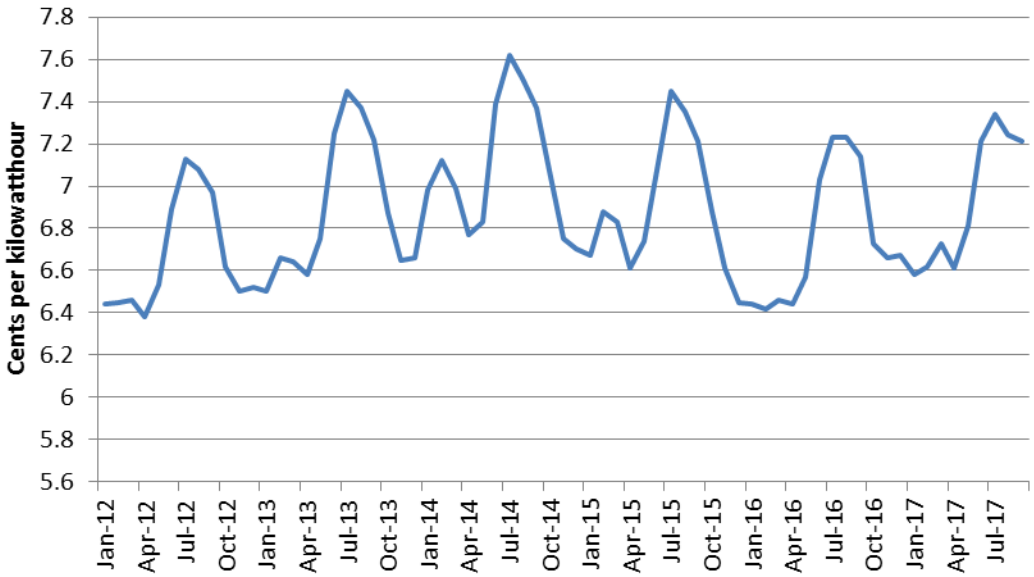
U.S. producers reported that raw material prices varied depending on the input. U.S. producer *** reported that total raw material costs have increased since 2012, with increases in the cost of quartz and coal being partly offset by declines in electrodes and woodchips. In contrast, U.S. producer *** reported that quartz costs have increased slightly while coal costs have decreased significantly. U.S. producer *** stated that silicon metal prices do not move in concert with raw material prices, and that raw material price changes have had no effect on its selling prices of silicon metal. Most U.S. producers anticipated that raw material prices would fluctuate and generally increase at or above the rate of inflation.

U.S. producers were asked to explain if changes in electricity prices have affected producer's selling prices for silicon metal. *** stated that the decrease in electricity costs since 2014 contributed to a lower cost of production and allowed for more profitable sales. *** reported that electricity costs have decreased since 2012, but that electricity prices do not affect silicon metal prices. Overall, electricity prices increased (when compared to the same month in the prior year) during 2012-2014, then declined during 2014-16, and then began to increase in late 2016 and into 2017 (figure V-1).

[1] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. V-1. See Parts I and II for further discussion of raw material quality.

Figure V-1

Electricity costs: U.S. average retail price of electricity, Industrial, monthly, January 2012-September 2017



Source: U.S. Energy Information Administration.

U.S. inland transportation costs

All U.S. producers reported that they typically arrange transportation to their customers. U.S. producers reported that their U.S. inland transportation costs were between 2 percent and 3 percent. *** responding importers reported that they typically arrange transportation to their customers, and *** importer reported that the purchaser typically arranges transportation. Estimated inland transportation costs were *** percent of the total delivered cost, and the product may be either sold and shipped from the point of importation or sold from storage.

PRICING PRACTICES

Pricing methods

Contract prices are sometimes determined based on a formula that accounts for published price indexes (figure V-2). These published price data are readily available to purchasers, and purchasers may share competing prices during negotiations with suppliers. The published indices reflect a product that is likely to be sold to secondary aluminum producers,

but purchasers in all sectors refer to these indices. There are no published price series data for chemical or polysilicon grade silicon metal.[2]

Figure V-2
Silicon metal: Published price index of silicon metal, *, average price reported, cents per pound, for all transactions during the month, January 2014–January 2018**

* * * * * * *

U.S. producers and importers reported using transaction-by-transaction negotiations and contracts as their primary pricing methods (table V-1).

Table V-1
Silicon metal: U.S. producers' and importers' reported price setting methods, by number of responding firms[1]

Method	U.S. producers	Importers
Transaction-by-transaction	3	13
Contract	2	11
Set price list	---	---
Other	1	3
Responding firms	3	17

[1] The sum of responses down may not add up to the total number of responding firms as each firm was instructed to check all applicable price setting methods employed.

Source: Compiled from data submitted in response to Commission questionnaires.

U.S. producers *** reported selling the majority of their production under annual or long-term contracts in 2016, with some contracts lasting as long as three years (table V-2). Short-term contracts were generally for six months or less. ***.

Table V-2
Silicon metal: U.S. producers' and subject importers' shares of U.S. commercial shipments by type of sale, 2016

Type of sale	U.S. producers	Importers from China
Long-term contracts	***	***
Annual contracts	***	***
Short-term contracts	***	***
Spot sales	***	***

Note.--Because of rounding, figures may not add to the totals shown.

Source: Compiled from data submitted in response to Commission questionnaires.

[2] *Silicon Metal from Australia, Brazil, Kazakhstan, and Norway*, *Investigation Nos. 701-TA-567-569 and 731-TA-1343-1345 (Final)*, USITC Publication 4773, April 2018, p. V-5.

Three purchasers reported that they purchase product weekly, four purchase monthly, three purchase quarterly, and four purchase on an annual basis. Sixteen of 20 responding purchasers reported that they did not expect their purchasing patterns to change in the next two years. Purchasers reported contacting between 1 and 15 suppliers before making a purchase, with a majority of purchasers (11 of 20) contacting between 2 and 10 suppliers.

Sales terms and discounts

U.S. producers *** quote prices on a delivered basis, while *** quotes prices on an f.o.b. basis. Two importers, ***, reported quoting prices on a delivered basis. All U.S. producers and 14 responding importers reported having no discount policy. One importer reported offering discounts based on annual contract volumes. All U.S. producers and responding importers reported sales terms of net 30 days, with some variation.[3]

Price leadership

Eleven purchasers reported that Globe is a price leader. Some purchasers also noted that Globe's merger with FerroAtlantica during the fourth quarter of 2015 allowed the recently merged company to have greater influence on market pricing.

PRICE DATA

The Commission requested U.S. producers and importers to provide quarterly data for the total quantity and f.o.b. value of the following silicon metal products shipped to unrelated U.S. customers during January 2014-September 2017.

Product 1.-- Sold to primary aluminum producers; silicon metal less than 99.99% pure that contains a minimum of 98.5% silicon, a maximum of 1.00% iron, a maximum of 0.07% calcium, and no restriction of the aluminum content.

Product 2.-- Sold to secondary aluminum producers; silicon metal less than 99.99% pure that contains a minimum of 97.0% silicon, a maximum of 2.00% iron, a maximum of 0.4% calcium, and no restriction of the aluminum content.

Product 3.-- Sold to chemical and/or polysilicon manufacturers; silicon metal less than 99.99% pure that contains a minimum of 98.0% silicon, a maximum of 1.50% iron, a maximum of 0.2% calcium, and a maximum of 0.4% aluminum.

[3] U.S. producers *** additionally reported sales terms of net 45 days.

All three U.S. producers provided usable pricing data for sales of the requested products.[4] Pricing data reported by these firms accounted for approximately 95.7 percent of U.S. producers' shipments of silicon metal in 2016. One importer reported commercial shipments of silicon metal from China.[5] Price data for products 1-3 are presented in table V-3 and figures V-4 to V-6.

Table V-3
Silicon metal: Weighted-average f.o.b. prices and quantities of domestic product 1, 2, and 3, by quarters, January 2014-September 2017

* * * * * * *

Figure V-3
Silicon metal: Weighted-average f.o.b. prices and quantities of domestic product 1, by quarters, January 2014-September 2017

* * * * * * *

Figure V-4
Silicon metal: Weighted-average f.o.b. prices and quantities of domestic product 2, by quarters, January 2014-September 2017

* * * * * * *

Figure V-5
Silicon metal: Weighted-average f.o.b. prices and quantities of domestic product 3, by quarters, January 2014-September 2017

* * * * * * *

Price trends and price comparisons

During January 2014-September 2017, prices declined overall. The specific timing of price movements varied by product, but in general, prices increased in 2014, stabilized or began to decline in 2015, declined further in 2016, and then stabilized or increased in 2017. Table V-4 summarizes the price trends by product. As shown in the table, domestic price decreases ranged from *** percent to *** percent from January 2014 to September 2017.

No pricing data were reported for imports from China, and no comparisons of price data between U.S.-produced silicon metal and silicon metal imported from China are available.[6]

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[4] Per-unit pricing data are calculated from total quantity and total value data provided by U.S. producers and importers. The precision and variation of these figures may be affected by rounding, limited quantities, and producer or importer estimates.

[5] ***. ***.

[6] In the original investigations, subject imports of silicon metal from China were reported for the secondary-aluminum market, and were priced lower than domestic product in 9 of 12 quarters, with

(*continued*...)

Table V-4
Silicon metal: Number of quarters containing observations, low price, high price and change in

* * * * * * *

Purchasers' perceptions of relative price trends

Purchasers were asked how the prices of silicon metal from the United States had changed relative to the prices of silicon metal from China since 2012. Eight purchasers reported that the price of U.S.-produced silicon metal is relatively higher than the price of silicon metal imported from China, while one purchaser reported that U.S.-produced silicon metal is relatively lower priced.

In providing additional information, most responding purchasers explained that they do not purchase subject merchandise imported from China, and that their perceptions of relative price trends may be based on industry reports or customer feedback from sales outside of the United States.

(…*continued*)
underselling margins ranging from 1.9 to 28.7 percent lower, and overselling margins ranging from 0.7 to 3.7 percent higher; *Silicon Metal from the People's Republic of China, Inv. Nos. 731-TA-472 (Final)*, USITC Publication 2385, June 1991, p. A-72.

APPENDIX A

FEDERAL REGISTER NOTICES

The Commission makes available notices relevant to its investigations and reviews on its website, www.usitc.gov. In addition, the following tabulation presents, in chronological order, *Federal Register* notices issued by the Commission and Commerce during the current proceeding.

Citation	Title	Link
82 FR 12234, March 1, 2017	*Commission's Institution of five-year review*	https://www.federalregister.gov/d/2017-03785
82 FR 12438, March 3, 2017	*Commerce's Initiation of five-year review*	https://www.federalregister.gov/d/2017-04274
82 FR 27525, June 15, 2017	*Commission's determination to conduct full five-year review*	https://www.federalregister.gov/d/2017-12378
82 FR 30841, July 3, 2017	*Commerce's final result of expedited fourth sunset review of the antidumping duty order*	https://www.federalregister.gov/d/2017-13940
82 FR 55858, November 24, 2017	*Commission's scheduling of full five-year review*	https://www.federalregister.gov/d/2017-25432

APPENDIX B

HEARING WITNESSES

CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject: Silicon Metal from China

Inv. Nos.: 731-TA-472 (Fourth Review)

Date and Time: March 20, 2018 - 9:30 a.m.

Sessions were held in connection with this review in the Main Hearing Room (Room 101), 500 E Street, SW, Washington, DC.

OPENING REMARKS:	**TIME ALLOCATION:**
In Support to Continuation (**William D. Kramer,** DLA Piper)	5 minutes
In Opposition of Continuation (**Edmund W. Sim,** Appleton Luff)	5 minutes

In Support to the Continuation of Antidumping Duty Order:

TIME ALLOCATION:

DLA Piper
Washington, DC
on behalf of

60 minutes

Globe Metallurgical Inc. ("Globe")

J. Marlin Perkins, Vice President – Sales, Globe Metallurgical Inc.

Duane Huck, Corporate Manager, IT & Business Information Systems, Globe Metallurgical Inc.

Jennifer Lutz, Vice President, Economic Consulting Services, LLC

William D. Kramer)
Mary E. Gately) – OF COUNSEL
Martin Schaefermeier)

In Opposition of the Continuation of
Antidumping Duty Order:

TIME ALLOCATION:

60 minutes total

Appleton Luff PTE. Ltd.
Washington, DC
on behalf of

Changning Zhenyuan Smelting Silicon Co., Ltd.
Sichuan Linhe Silicon Industrial Co., Ltd.
Mang City Yuesheng Silicon Co., Ltd.
Mao County Panda Silicon Co., Ltd.
Hoshine Silicon Industry Co., Ltd.
China Council for the Promotion of International Trade

Shaote Zhang, Sales Director, Hoshine Silicon Industry Co., Ltd.

Oliver Majumdar, Director, Raw Materials Procurement,
Wacker Chemie AG

Edmund W. Sim)
) – OF COUNSEL
Kelly A. Slater)

REBUTTAL/CLOSING REMARKS:

In Support to Continuation (**William D. Kramer,** DLA Piper)
In Opposition of Continuation (**Kelly A. Slater,** Appleton Luff)

-END-

APPENDIX C

SUMMARY DATA

Table C-1
Silicon metal: Summary data concerning the U.S. market, 2014-16, January to September 2016, and January to September 2017
(Quantity=short tons contained silicon; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per STCS; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to September		Calendar year			Jan-Sep
	2014	2015	2016	2016	2017	2014-16	2014-15	2015-16	2016-17
U.S. consumption quantity:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share (fn1)	***	***	***	***	***	***	***	***	***
Importers' share (fn1):	***	***	***	***	***	***	***	***	***
China	***	***	***	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***	***	***	***
All import sources	***	***	***	***	***	***	***	***	***
U.S. consumption value:									
Amount	***	***	***	***	***	***	***	***	***
Producers' share (fn1)	***	***	***	***	***	***	***	***	***
Importers' share (fn1):	***	***	***	***	***	***	***	***	***
China	***	***	***	***	***	***	***	***	***
Nonsubject sources	***	***	***	***	***	***	***	***	***
All import sources	***	***	***	***	***	***	***	***	***
U.S. imports from:									
China:									
Quantity	120	264	339	269	210	183.0	120.4	28.4	(21.7)
Value	405	362	453	370	315	11.7	(10.8)	25.2	(14.9)
Unit value	$3,384	$1,370	$1,336	$1,377	$1,497	(60.5)	(59.5)	(2.5)	8.8
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Nonsubject sources:									
Quantity	211,438	179,529	166,348	126,427	132,762	(21.3)	(15.1)	(7.3)	5.0
Value	552,804	479,757	367,127	279,967	285,749	(33.6)	(13.2)	(23.5)	2.1
Unit value	$2,614	$2,672	$2,207	$2,214	$2,152	(15.6)	2.2	(17.4)	(2.8)
Ending inventory quantity	***	***	***	***	***	***	***	***	***
All import sources:									
Quantity	211,558	179,793	166,687	126,695	132,971	(21.2)	(15.0)	(7.3)	5.0
Value	553,210	480,118	367,580	280,337	286,064	(33.6)	(13.2)	(23.4)	2.0
Unit value	$2,615	$2,670	$2,205	$2,213	$2,151	(15.7)	2.1	(17.4)	(2.8)
Ending inventory quantity	***	***	***	***	***	***	***	***	***
U.S. producers':									
Average capacity quantity	***	***	***	***	***	***	***	***	***
Production quantity	***	***	***	***	***	***	***	***	***
Capacity utilization (fn1)	***	***	***	***	***	***	***	***	***
U.S. shipments:	***	***	***	***	***	***	***	***	***
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Export shipments:	***	***	***	***	***	***	***	***	***
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Inventories/total shipments (fn1)	***	***	***	***	***	***	***	***	***
Production workers	***	***	***	***	***	***	***	***	***
Hours worked (1,000s)	***	***	***	***	***	***	***	***	***
Wages paid ($1,000)	***	***	***	***	***	***	***	***	***
Hourly wages (dollars)	***	***	***	***	***	***	***	***	***
Productivity (short tons 1,000 per hour)	***	***	***	***	***	***	***	***	***
Unit labor costs	***	***	***	***	***	***	***	***	***
Net sales:	***	***	***	***	***	***	***	***	***
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Cost of goods sold (COGS)	***	***	***	***	***	***	***	***	***
Gross profit or (loss)	***	***	***	***	***	***	***	***	***
SG&A expenses	***	***	***	***	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***	***	***	***	***
Net income or (loss)	***	***	***	***	***	***	***	***	***
Capital expenditures	***	***	***	***	***	***	***	***	***
Unit COGS	***	***	***	***	***	***	***	***	***
Unit SG&A expenses	***	***	***	***	***	***	***	***	***
Unit operating income or (loss)	***	***	***	***	***	***	***	***	***
Unit net income or (loss)	***	***	***	***	***	***	***	***	***
COGS/sales (fn1)	***	***	***	***	***	***	***	***	***
Operating income or (loss)/sales (fn1)	***	***	***	***	***	***	***	***	***
Net income or (loss)/sales (fn1)	***	***	***	***	***	***	***	***	***

Note.--Shares and ratios shown as "0.0" represent values greater than zero, but less than "0.05" percent.

fn1.--Reported data are in percent and period changes are in percentage points.
fn2.--Undefined.

Source: Official U.S. imports based on General Imports using statistical reporting numbers 2804.69.1000 and 2804.69.5000, accessed on January 9, 2018.

HISTORICAL DATA

Table C-1
Silicon metal: Summary data concerning the U.S. market, 1997-99, January-June 1999, and January-June 2000

(Quantity=gross short tons, value=1,000 dollars, unit values, unit labor costs, and unit expenses are per gross short ton; period changes=percent, except where noted)

	Reported data					Period changes			
				January-June					Jan.-June
Item	1997	1998	1999	1999	2000	1997-99	1997-98	1998-99	1999-00
U.S. consumption quantity:									
Amount	338,951	320,683	329,786	165,658	179,223	-2.7	-5.4	2.8	8.2
Producers' share (1)	61.0	64.5	61.7	62.9	56.8	0.7	3.5	-2.8	-6.1
Importers' share (1):									
Argentina	0.0	(2)	0.0	0.0	0.0	0.0	(3)	(3)	0.0
Brazil	3.2	2.0	4.3	3.2	5.8	1.1	-1.2	2.3	2.6
China	0.9	1.0	1.0	1.0	1.0	0.1	0.0	0.1	(3)
Subtotal	4.1	2.9	5.3	4.2	6.8	1.2	-1.2	2.4	2.6
Other sources	34.9	32.6	33.0	32.9	36.3	-1.9	-2.3	0.4	3.5
Total imports	39.0	35.5	38.3	37.1	43.2	-0.7	-3.5	2.8	6.1
U.S. consumption value:									
Amount	519,337	458,509	426,073	216,543	216,095	-18.0	-11.7	-7.1	-0.2
Producers' share (1)	61.8	67.6	65.2	66.1	61.6	3.4	5.8	-2.4	-4.5
Importers' share (1):									
Argentina	0.0	(2)	0.0	0.0	0.0	0.0	(3)	(3)	0.0
Brazil	3.3	1.8	4.0	3.0	6.1	0.8	-1.5	2.2	3.1
China	0.6	0.6	0.7	0.7	0.7	0.0	-0.1	0.1	(3)
Subtotal	3.9	2.4	4.7	3.6	6.8	0.8	-1.6	2.3	3.1
Other sources	34.3	30.0	30.1	30.3	31.6	-4.2	-4.3	0.1	1.3
Total imports	38.2	32.4	34.8	33.9	38.4	-3.4	-5.8	2.4	4.5
U.S. imports from:									
Argentina:									
Quantity	0	44	0	0	0	(4)	(4)	-100.0	(4)
Value	0	61	0	0	0	(4)	(4)	-100.0	(4)
Unit value	(4)	$1,406	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Brazil:									
Quantity	10,795	6,341	14,268	5,324	10,411	32.2	-41.3	125.0	95.5
Value	17,010	8,251	17,203	6,425	13,083	1.1	-51.5	108.5	103.6
Unit value	$1,576	$1,301	$1,206	$1,207	$1,257	-23.5	-17.4	-7.3	4.2
Ending inventory quantity	***	***	***	***	***	***	***	***	***
China:									
Quantity	3,214	3,058	3,324	1,673	1,812	3.4	-4.9	8.7	8.3
Value	3,373	2,559	2,885	1,471	1,522	-14.5	-24.1	12.7	3.5
Unit value	$1,050	$837	$868	$879	$840	-17.3	-20.3	3.7	-4.4
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Subtotal:									
Quantity	14,009	9,442	17,592	6,997	12,222	25.6	-32.6	86.3	74.7
Value	20,383	10,872	20,088	7,895	14,606	-1.5	-46.7	84.8	85.0
Unit value	$1,455	$1,151	$1,142	$1,128	$1,195	-21.5	-20.9	-0.8	5.9
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Other sources:									
Quantity	118,250	104,453	108,852	54,463	65,130	-7.9	-11.7	4.2	19.6
Value	178,206	137,765	128,344	65,530	68,311	-28.0	-22.7	-6.8	4.2
Unit value	$1,507	$1,319	$1,179	$1,203	$1,049	-21.8	-12.5	-10.6	-12.8
Ending inventory quantity	***	***	***	***	***	***	***	***	***
All sources:									
Quantity	132,259	113,895	126,444	61,460	77,353	-4.4	-13.9	11.0	25.9
Value	198,589	148,637	148,432	73,426	82,917	-25.3	-25.2	-0.1	12.9
Unit value	$1,502	$1,305	$1,174	$1,195	$1,072	-21.8	-13.1	-10.0	-10.3
Ending inventory quantity	***	***	***	***	***	***	***	***	***

Table continued on next page.

Table C-1--Continued
Silicon metal: Summary data concerning the U.S. market, 1997-99, January-June 1999, and January-June 2000

(Quantity=gross short tons, value=1,000 dollars, unit values, unit labor costs, and unit expenses are per gross short ton; period changes=percent, except where noted)

	Reported data					Period changes			
				January-June					Jan.-June
Item	1997	1998	1999	1999	2000	1997-99	1997-98	1998-99	1999-00
U.S. producers':									
Average capacity quantity	225,690	234,099	236,857	119,952	110,769	4.9	3.7	1.2	-7.7
Production quantity	213,010	213,274	209,117	107,009	106,744	-1.8	0.1	-1.9	-0.2
Capacity utilization (1)	94.4	91.1	88.3	89.2	96.4	-6.1	-3.3	-2.8	7.2
U.S. shipments:									
Quantity	206,692	206,788	203,342	104,198	101,870	-1.8	(2)	-1.7	-2.2
Value	320,748	309,872	277,641	143,117	133,178	-13.4	-3.4	-10.4	-6.9
Unit value	$1,552	$1,499	$1,365	$1,374	$1,307	-12.0	-3.4	-8.9	-4.8
Export shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory quantity	11,174	10,982	9,151	8,056	9,679	-18.1	-1.7	-16.7	20.1
Inventories/total shipments (1)	5.3	5.2	4.4	3.8	4.6	-1.0	-0.1	-0.9	0.9
Production workers	816	816	770	771	719	-5.6	0.0	-5.6	-6.7
Hours worked (1,000s)	1,936	1,801	1,750	911	835	-9.6	-7.0	-2.8	-8.3
Wages paid ($1,000s)	31,474	31,829	32,174	16,440	15,626	2.2	1.1	1.1	-5.0
Hourly wages	$16.26	$17.67	$18.39	$18.05	$18.71	13.1	8.7	4.0	3.7
Productivity (gross short tons 1000/hrs.)	110.0	118.4	119.5	117.5	127.8	8.6	7.6	0.9	8.8
Unit labor costs	$147.78	$149.24	$153.86	$153.63	$146.39	4.1	1.0	3.1	-4.7
Net sales:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Cost of goods sold (COGS)	***	***	***	***	***	***	***	***	***
Gross profit or (loss)	***	***	***	***	***	***	***	***	***
SG&A expenses	***	***	***	***	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***	***	***	***	***
Capital expenditures	***	***	***	***	***	***	***	***	***
Unit COGS	***	***	***	***	***	***	***	***	***
Unit SG&A expenses	***	***	***	***	***	***	***	***	***
Unit operating income or (loss)	***	***	***	***	***	***	***	***	***
COGS/sales (1)	***	***	***	***	***	***	***	***	***
Operating income or (loss)/ sales (1)	***	***	***	***	***	***	***	***	***

(1) "Reported data" are in percent and "period changes" are in percentage points.
(2) Less than 0.05 percent.
(3) Less than 0.05 percentage points absolute difference.
(4) Not applicable.

Note.--Financial data are reported on a fiscal year basis and may not necessarily be comparable to data reported on a calendar year basis. Because of rounding, figures may not add to the totals shown. Unit values and shares are calculated from the unrounded figures.

Source: Compiled from data submitted in response to Commerce questionnaries and offical statistcs of the U.S. Department of Commerce.

Table C-1

Silicon metal: Summary data concerning the U.S. market, 2000-05

(Quantity=gross short tons, value=1,000 dollars, unit values, unit labor costs, and unit expenses are per short ton, period changes=percent except where noted)

	Reported data						Period changes					
Item	2000	2001	2002	2003	2004	2005	2000-05	2000-01	2001-02	2002-03	2003-04	2004-05
U.S. consumption quantity:												
Amount	***	***	***	***	***	***	***	***	***	***	***	***
Producers' share (1)	***	***	***	***	***	***	***	***	***	***	***	***
Importers' share (1):												
Brazil (subject)	***	***	***	***	***	***	***	***	***	***	***	***
China (subject)	***	***	***	***	***	***	***	***	***	***	***	***
Subtotal (subject)	***	***	***	***	***	***	***	***	***	***	***	***
Brazil (non-subject)	***	***	***	***	***	***	***	***	***	***	***	***
China (non-subject)	***	***	***	***	***	***	***	***	***	***	***	***
All other sources	***	***	***	***	***	***	***	***	***	***	***	***
Subtotal (non-subject)	***	***	***	***	***	***	***	***	***	***	***	***
Total imports	***	***	***	***	***	***	***	***	***	***	***	***
U.S. consumption value:												
Amount	***	***	***	***	***	***	***	***	***	***	***	***
Producers' share (1)	***	***	***	***	***	***	***	***	***	***	***	***
Importers' share (1):												
Brazil (subject)	***	***	***	***	***	***	***	***	***	***	***	***
China (subject)	***	***	***	***	***	***	***	***	***	***	***	***
Subtotal (subject)	***	***	***	***	***	***	***	***	***	***	***	***
Brazil (non-subject)	***	***	***	***	***	***	***	***	***	***	***	***
China (non-subject)	***	***	***	***	***	***	***	***	***	***	***	***
All other sources	***	***	***	***	***	***	***	***	***	***	***	***
Subtotal (non-subject)	***	***	***	***	***	***	***	***	***	***	***	***
Total imports	***	***	***	***	***	***	***	***	***	***	***	***
U.S. imports from:												
Brazil (subject):												
Quantity	22,797	***	***	***	***	***	***	***	***	***	***	***
Value	29,520	***	***	***	***	***	***	***	***	***	***	***
Unit value	$1,295	***	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity	0	***	***	***	***	***	***	***	***	***	***	***
China (subject):												
Quantity	52	1,177	33	22	118	44	-15.4	2163.5	-97.2	-33.3	427.3	-62.1
Value	55	1,109	39	23	117	76	38.2	1916.4	-96.5	-41.0	408.7	-35.0
Unit value	$1,058	$942	$1,182	$1,045	$1,009	$1,727	63.3	-10.9	25.4	-11.5	-3.5	71.3
Ending inventory quantity	0	0	0	0	0	0	(2)	(2)	(2)	(2)	(2)	(2)
Subtotal (subject):												
Quantity	22,849	***	***	***	***	***	***	***	***	***	***	***
Value	29,575	***	***	***	***	***	***	***	***	***	***	***
Unit value	$1,294	***	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity	0	***	***	***	***	***	***	***	***	***	***	***
Brazil (non-subject)												
Quantity	0	***	***	***	***	***	***	***	***	***	***	***
Value	0	***	***	***	***	***	***	***	***	***	***	***
Unit value	(2)	***	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity	0	***	***	***	***	***	***	***	***	***	***	***
China (non-subject)												
Quantity	4,878	3,196	5,478	3,074	3,022	2,681	-45.0	-35.3	73.6	-43.9	-1.7	-11.3
Value	3,897	2,273	4,152	2,637	3,379	2,855	-26.2	-41.2	82.7	-36.5	28.1	-15.5
Unit value	$793	$720	$758	$858	$1,118	$1,065	34.3	-9.1	5.2	13.2	30.3	-4.8
Ending inventory quantity	0	0	0	0	0	0	(2)	(2)	(2)	(2)	(2)	(2)
All other sources:												
Quantity	113,040	107,766	111,651	79,042	97,449	90,467	-20.0	-4.7	3.6	-29.3	23.3	-7.2
Value	123,848	112,764	114,387	86,818	127,481	109,163	12.4	-8.9	1.4	-22.3	42.5	9.2
Unit value	$1,096	$1,047	$1,022	$1,124	$1,308	$1,538	40.4	-4.5	-2.3	9.9	16.4	17.6
Ending inventory quantity	2,110	2,897	5,268	5,919	8,056	2,656	25.9	37.3	81.8	12.4	36.1	-67.0
Subtotal (non-subject):												
Quantity	117,918	***	***	***	***	***	***	***	***	***	***	***
Value	127,713	***	***	***	***	***	***	***	***	***	***	***
Unit value	$1,083	***	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity	2,110	***	***	***	***	***	***	***	***	***	***	***
All sources:												
Quantity	140,766	129,544	159,589	138,395	176,511	162,525	15.5	-8.0	23.2	-13.3	27.5	-7.9
Value	157,287	138,823	173,191	157,572	223,549	239,940	52.5	-11.7	24.8	-9.0	41.9	7.3
Unit value	$1,117	$1,072	$1,085	$1,139	$1,266	$1,476	32.1	-4.1	1.3	4.9	11.2	16.6
Ending inventory quantity	2,110	2,897	5,268	7,843	9,606	6,488	207.4	37.3	81.8	46.9	22.5	-32.5
U.S. producers':												
Average capacity quantity	***	***	***	***	***	***	***	***	***	***	***	***
Production quantity	***	***	***	***	***	***	***	***	***	***	***	***
Capacity utilization (1)	***	***	***	***	***	***	***	***	***	***	***	***
U.S. shipments:												
Quantity	***	***	***	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***	***	***	***
Export shipments:												
Quantity	***	***	***	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***	***	***	***
Ending inventory quantity	***	***	***	***	***	***	***	***	***	***	***	***
Inventories/total shipments (1)	***	***	***	***	***	***	***	***	***	***	***	***
Production workers	***	***	***	***	***	***	***	***	***	***	***	***
Hours worked (1,000s)	***	***	***	***	***	***	***	***	***	***	***	***
Wages paid ($1,000s)	***	***	***	***	***	***	***	***	***	***	***	***
Hourly wages	***	***	***	***	***	***	***	***	***	***	***	***
Productivity (tons/1,000 hours)	***	***	***	***	***	***	***	***	***	***	***	***
Unit labor costs	***	***	***	***	***	***	***	***	***	***	***	***
Net sales:												
Quantity	***	***	***	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***	***	***	***
Cost of goods sold (COGS)	***	***	***	***	***	***	***	***	***	***	***	***
Impairment	***	***	***	***	***	***	***	***	***	***	***	***
Gross profit or (loss)	***	***	***	***	***	***	***	***	***	***	***	***
SG&A expenses	***	***	***	***	***	***	***	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***	***	***	***	***	***	***	***
Capital expenditures	***	***	***	***	***	***	***	***	***	***	***	***
Unit COGS	***	***	***	***	***	***	***	***	***	***	***	***
Unit SG&A expenses	***	***	***	***	***	***	***	***	***	***	***	***
Unit operating income or (loss)	***	***	***	***	***	***	***	***	***	***	***	***
COGS/sales (1)	***	***	***	***	***	***	***	***	***	***	***	***
Operating income or (loss)/ sales (1)	***	***	***	***	***	***	***	***	***	***	***	***

(1) "Reported data" are in percent and "period changes" are in percentage points.

(2) Not applicable.

Note.--Financial data are reported on a fiscal year basis and may not necessarily be comparable to data reported on a calendar year basis. Because of rounding, figures may not add to the totals shown. Unit values and shares are calculated from the unrounded figures.

Source: Compiled from data submitted in response to Commission questionnaires.

APPENDIX D

COMMENTS ON THE EFFECTS OF ORDERS AND THE LIKELY EFFECTS OF REVOCATION

Appendix D presents data on firms' narratives on the impact of the order and the likely impact of revocation.

Table D-1
Silicon metal: Firms' narratives on the impact of the order and the likely impact of revocation

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APPENDIX E

CONSTRUCTED EXPORTS FROM CHINA

Table E-1 presents data on exports from China (constructed) by destination market during 2014-16.

Table E-1
Silicon metal: Exports from China (constructed) by destination market, 2014-16

Item	Calendar year		
	2014	2015	2016
	Quantity (short tons)		
China's (constructed) exports to the United States	281	274	349
China's (constructed) exports to other major destination markets.--			
Japan	199,005	196,024	181,809
Korea	148,809	154,136	154,190
Thailand	66,054	58,460	58,160
United Arab Emirates	47,454	46,359	46,075
Germany	48,503	74,691	44,999
Mexico	30,189	36,314	40,331
Malaysia	5,070	16,770	38,976
Norway	25,843	24,131	23,806
All other destination markets	205,626	164,170	168,808
Total China (constructed) exports	776,834	771,331	757,502
	Value (1,000 dollars)		
China's (constructed) exports to the United States	364	338	416
China's (constructed) exports to other major destination markets.--			
Japan	411,768	378,913	281,561
Korea	343,822	351,195	267,298
Thailand	142,011	116,758	92,849
United Arab Emirates	104,050	103,324	78,111
Germany	105,859	160,190	79,315
Mexico	61,475	68,280	60,219
Malaysia	18,373	31,061	62,812
Norway	56,349	52,534	41,297
All other destination markets	433,370	320,849	260,901
Total China (constructed) exports	1,677,442	1,583,443	1,224,778

Table continued on next page.

Table E-1--Continued
Silicon metal: Exports from China (constructed) by destination market, 2014-16

Item	Calendar year		
	2014	2015	2016
	Unit value (dollars per short ton)		
China's (constructed) exports to the United States	1,296	1,233	1,192
China's (constructed) exports to other major destination markets.--			
Japan	2,069	1,933	1,549
Korea	2,310	2,278	1,734
Thailand	2,150	1,997	1,596
United Arab Emirates	2,193	2,229	1,695
Germany	2,183	2,145	1,763
Mexico	2,036	1,880	1,493
Malaysia	3,624	1,852	1,612
Norway	2,180	2,177	1,735
All other destination markets	2,108	1,954	1,546
Total China (constructed) exports	2,159	2,053	1,617
	Share of quantity (percent)		
China's (constructed) exports to the United States	0.0	0.0	0.0
China's (constructed) exports to other major destination markets.--			
Japan	25.6	25.4	24.0
Korea	19.2	20.0	20.4
Thailand	8.5	7.6	7.7
United Arab Emirates	6.1	6.0	6.1
Germany	6.2	9.7	5.9
Mexico	3.9	4.7	5.3
Malaysia	0.7	2.2	5.1
Norway	3.3	3.1	3.1
All other destination markets	26.5	21.3	22.3
Total China (constructed) exports	100.0	100.0	100.0

Source: Imports from China of merchandise under HTS subheading 2804.69 by reporting country as reported by various national statistical authorities ("constructed exports") in the IHS/GTA database, accessed April 4, 2018.