Ultra-High Molecular Weight Polyethylene from Korea

Investigation No. 731-TA-1474 (Final)

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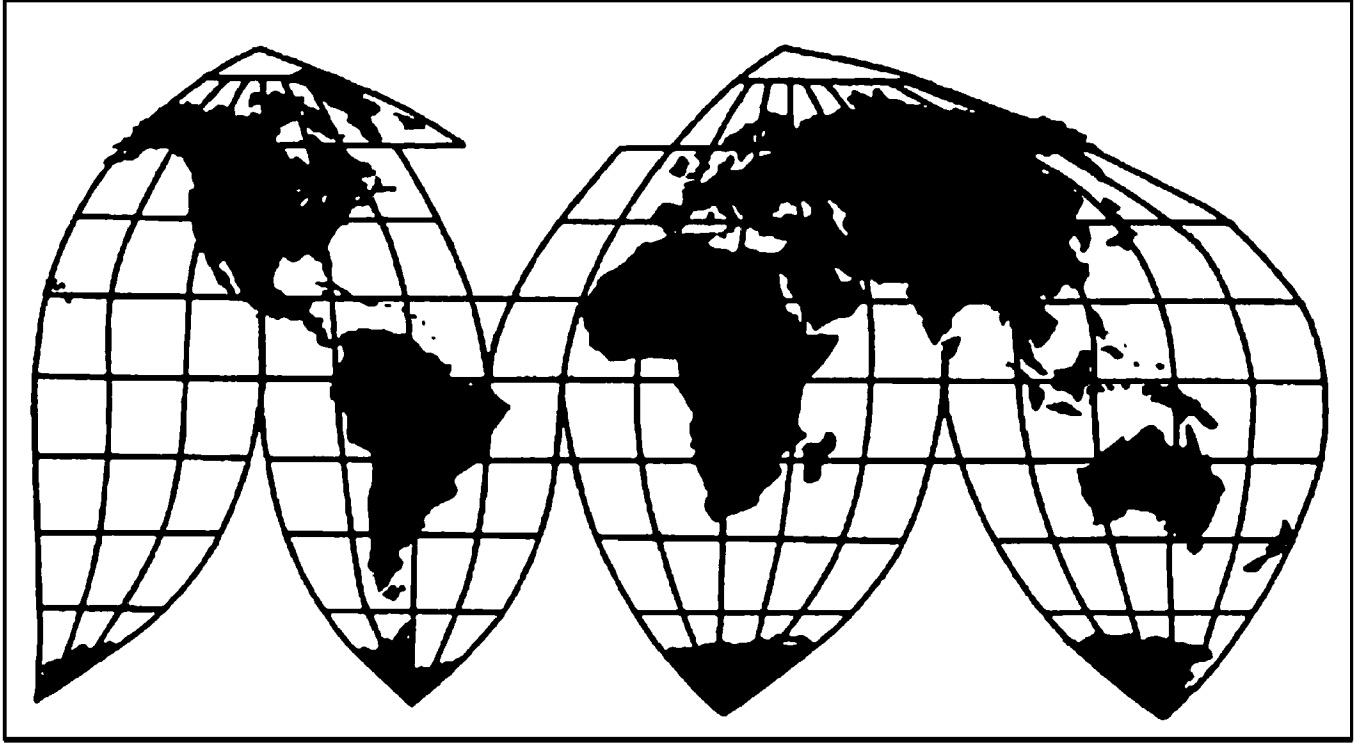
U.S. International Trade Commission



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UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation No. 731-TA-1474 (Final)

Ultra-High Molecular Weight Polyethylene from Korea

DETERMINATION

On the basis of the record[1] developed in the subject investigation, the United States International Trade Commission ("Commission") determines, pursuant to the Tariff Act of 1930 ("the Act"), that 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 ultra-high molecular weight polyethylene from Korea, provided for in subheadings 3901.10.10 and 3901.20.10 of the Harmonized Tariff Schedule of the United States, that have been found by the U.S. Department of Commerce ("Commerce") to be sold in the United States at less than fair value ("LTFV").[2]

BACKGROUND

The Commission instituted this investigation effective March 4, 2020, following receipt of a petition filed with the Commission and Commerce by Celanese Corporation, Irving, Texas. The Commission scheduled the final phase of the investigation following notification of a preliminary determination by Commerce that imports of ultra-high molecular weight polyethylene from Korea were being sold at LTFV within the meaning of section 733(b) of the Act (19 U.S.C. 1673b(b)). Notice of the scheduling of the final phase of the Commission's investigation 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* of October 20, 2020 (85 FR 66576). In light of the restrictions on access to the Commission building due to the COVID–19 pandemic, the Commission conducted its hearing through written testimony and video

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

[2] 86 FR 11497 (February 25, 2021).

conference on February 18, 2021. All persons who requested the opportunity were permitted to participate.

Views of the Commission

Based on the record in the final phase of this investigation, we determine that an industry in the United States is neither materially injured nor threatened with material injury by reason of imports of ultra-high molecular weight polyethylene ("UHMWPE") from Korea found by the U.S. Department of Commerce ("Commerce") to be sold in the United States at less than fair value.[1]

I. Background

Celanese Corporation ("Celanese" or "Petitioner"), a U.S. producer of UHMWPE, filed the petition in this investigation on March 4, 2020.[2] Petitioner's representatives appeared at the hearing, accompanied by counsel, and submitted prehearing and posthearing briefs as well as final comments.[3] Korea Petrochemical Ind. Co., Ltd. ("KPIC" or "Respondent"), a Korean producer and exporter of UHMWPE, also participated in the final phase of this investigation. Respondent's representatives appeared at the hearing, accompanied by counsel, and submitted prehearing and posthearing briefs as well as final comments.

U.S. industry data are based on the questionnaire responses from two domestic producers that accounted for all known domestic production of UHMWPE in 2019.[4] U.S. import data are based on questionnaire responses from ten U.S. importers of UHMWPE, accounting for the large majority of U.S. imports of UHMWPE in 2019, including all such imports from Korea.[5] Data concerning the subject foreign industry are based on the questionnaire response from KPIC, the foreign producer that reportedly accounted for all production of UHMWPE in Korea and all exports of UHMWPE from Korea to the United States in 2019.[6]

[1] Whether the establishment of a domestic industry is materially retarded is not at issue in this investigation.

[2] Confidential Report ("CR"), Memorandum INV-TT-038 at I-1; Public Report, *Ultra-High Molecular Weight Polyethylene from Korea*, Inv. No. 731-TA-1474 (Final), USITC Pub. 5178 (April 2021) ("PR") at I-1.

[3] In light of restrictions on access to the Commission building due to the COVID-19 pandemic, the Commission conducted its hearing through a video teleconference held on February 18, 2021, as set forth in procedures provided to the parties.

[4] CR/PR at I-4 and Table III-1.

[5] CR/PR at I-4 and IV-1.

[6] CR/PR at I-4 and VII-3.

II. Domestic Like Product

A. In General

In determining whether an industry in the United States is materially injured or threatened with material injury by reason of imports of subject merchandise, the Commission first defines the "domestic like product" and the "industry."[7] Section 771(4)(A) of the Tariff Act of 1930, as amended ("the Tariff Act"), defines the relevant domestic industry as the "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."[8] In turn, 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."[9]

By statute, the Commission's "domestic like product" analysis begins with the "article subject to an investigation," *i.e.*, the subject merchandise as determined by Commerce.[10] Therefore, Commerce's determination as to the scope of the imported merchandise that is subsidized and/or sold at less than fair value is "necessarily the starting point of the Commission's like product analysis."[11] The Commission then defines the domestic like product in light of the imported articles Commerce has identified.[12] The decision regarding the appropriate domestic like product(s) in an investigation is a factual determination, and the Commission has applied the statutory standard of "like" or "most similar in characteristics and

[7] 19 U.S.C. § 1677(4)(A).

[8] 19 U.S.C. § 1677(4)(A).

[9] 19 U.S.C. § 1677(10).

[10] 19 U.S.C. § 1677(10). The Commission must accept Commerce's determination as to the scope of the imported merchandise that is subsidized and/or sold at less than fair value. *See*, *e.g.*, *USEC, Inc. v. United States*, 34 Fed. App'x 725, 730 (Fed. Cir. 2002) ("The ITC may not modify the class or kind of imported merchandise examined by Commerce."); *Algoma Steel Corp. v. United States,* 688 F. Supp. 639, 644 (Ct. Int'l Trade 1988), *aff'd*, 865 F.3d 240 (Fed. Cir.), *cert. denied*, 492 U.S. 919 (1989).

[11] *Cleo Inc. v. United States*, 501 F.3d 1291, 1298 (Fed. Cir. 2007); *see also Hitachi Metals, Ltd. v. United States*, Case No. 19-1289, slip op. at 8–9 (Fed. Circ. Feb. 7, 2020) (the statute requires the Commission to start with Commerce's subject merchandise in reaching its own like product determination).

[12] *Cleo*, 501 F.3d at 1298, n.1 ("Commerce's {scope} finding does not control the Commission's {like product} determination."); *Hosiden Corp. v. Advanced Display Mfrs*., 85 F.3d 1561, 1568 (Fed. Cir. 1996) (the Commission may find a single like product corresponding to several different classes or kinds defined by Commerce); *Torrington Co. v. United States*, 747 F. Supp. 744, 748–52 (Ct. Int'l Trade 1990), *aff'd*, 938 F.2d 1278 (Fed. Cir. 1991) (affirming the Commission's determination defining six like products in investigations where Commerce found five classes or kinds).

uses" on a case-by-case basis.[13] No single factor is dispositive, and the Commission may consider other factors it deems relevant based on the facts of a particular investigation.[14] The Commission looks for clear dividing lines among possible like products and disregards minor variations.[15]

B. Product Description

Commerce defined the scope of the imported merchandise under investigation as follows:

> {U}ltra-high molecular weight polyethylene. Ultra-high molecular weight polyethylene is a linear polyethylene, in granular or powder form is defined by its molecular weight, as defined by Margolie's Equation, of greater than 1.0×10^6 g/mol. Ultra-high molecular weight polyethylene may also be defined by its melt mass-flow rate of <0.1 g/10 min, measured at 190 °C and 21.6 kg load, based on the methods and calculations set forth in the International Organization for Standardization (ISO) standards 21304-1 and 21304-2. Ultra-high molecular weight polyethylene has a Chemical Abstract Service (CAS) registry number of 9002-88-4.
>
> The scope includes all ultra-high molecular weight polyethylene in granular or powder forms meeting the above specifications

[13] *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); *Torrington Co. v. United States*, 747 F. Supp. 744, 749 n.3 (Ct. Int'l Trade 1990), aff'd, 938 F.2d 1278 (Fed. Cir. 1991) ("every like product determination 'must be made on the particular record at issue' and the 'unique facts of each case'"). The Commission generally considers a number of factors, including the following: (1) physical characteristics and uses; (2) interchangeability; (3) channels of distribution; (4) customer and producer perceptions of the products; (5) common manufacturing facilities, production processes, and production employees; and, where appropriate, (6) price. *See Nippon,* 19 CIT at 455 n.4; *Timken Co. v. United States*, 913 F. Supp. 580, 584 (Ct. Int'l Trade 1996).

[14] *See*, *e.g.*, S. Rep. No. 96-249 at 90–91 (1979).

[15] *Nippon*, 19 CIT at 455; *Torrington*, 747 F. Supp. at 748-49; *see also* S. Rep. No. 96-249 at 90-91 (Congress has indicated that the like product standard should not be interpreted in "such a narrow fashion as to permit minor differences in physical characteristics or uses to lead to the conclusion that the product and article are not 'like' each other, nor should the definition of 'like product' be interpreted in such a fashion as to prevent consideration of an industry adversely affected by the imports under consideration.").

regardless of additives introduced in the manufacturing process. Ultra-high molecular weight polyethylene blended with other products is included in the scope of this investigation where ultra-high molecular weight polyethylene accounts for more than 50 percent, by actual weight, of the blend and the resulting blend maintains a molecular weight, as defined by Margolie's Equation, of greater than 1.0×10^6 g/mol and/or a melt mass-flow rate of <0.1 g/10 min.

Excluded from the scope of the investigation is medical-grade ultra-high molecular weight polyethylene. Medical grade ultra-high molecular weight polyethylene has a minimum viscosity of 2,000 ml/g at a concentration of 0.02% at 135 °C (275 °F) in decahydronaphthalene and an elongational stress of 0.2 MPa or greater. Medical-grade ultra-high molecular weight polyethylene is further defined by its ash and trace element content, which shall not exceed the following maximum quantities as set forth in ISO-5834-1: Ash (125 mg/kg), titanium (40 mg/kg), calcium (5 mg/kg), chlorine (30 mg/kg), and aluminum (20 mg/kg). ISO 5834-1 further defines medical grade ultra-high molecular weight polyethylene by its particulate matter content, which requires that there shall be no more than three particles of contaminant per 300 ± 20 g tested. Each of the above criteria is calculated based on the standards and methods used in ISO 5834-1.

Ultra-high molecular weight polyethylene is classifiable under the HTSUS subheadings 3901.10.1000 and 3901.20.1000. Although the HTSUS subheadings and CAS registry number are provided for convenience and customs purposes, the written description of the scope is dispositive.[16]

[16] *Ultra-High Molecular Weight Polyethylene From the Republic of Korea: Final Determination of Sales at Less Than Fair Value*, 86 Fed. Reg. 11497, 11498 (Feb. 25, 2021).

UHMWPE is an extremely high viscosity, linear polyethylene, typically in the form of a granule or powder.[17] UHMWPE belongs to the polyethylene family of polymers, which includes high density polyethylene, low density polyethylene, linear low density polyethylene, high molecular weight polyethylene, and very-high molecular weight polyethylene; UHMWPE has a higher molecular weight than these other types of polyethylene polymers.[18] UHMWPE has extremely long polymer chains, which serve to transfer load more effectively to the polymer backbone by strengthening intermolecular interactions.[19] This causes UHWMPE to be very tough and gives it the highest impact strength of the various polyethylene polymers.[20]

UHMWPE has a low coefficient of friction, a nonstick surface, and favorable characteristics with regard to chemical resistance, energy absorption, and abrasion resistance.[21] UHMWPE can be molded by downstream end users for processing into various finished products and is used for distinct applications and end uses compared to those for other polyethylene products, including applications that require a higher level of durability and resistance.[22]

UHMWPE can replace steel in certain applications and is especially well suited as a replacement in applications where wear resistance, toughness, and weight and noise reduction are key considerations.[23] Sheets of UHMWPE (*e.g.*, 8–20 mm thickness) are often used for lining silos, bunkers, chutes, truck loading platforms, dump trucks, rail wagons, and ships' holds.[24] UHMWPE also is used as a safer and stronger alternative to steel wire rope for heavy duty rigging and other maritime uses.[25]

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[17] CR/PR at I-7.

[18] CR/PR at I-7. The molecular weight of HDPE typically ranges from 50,000 to 250,000 grams per mole while the molecular weight of UHMWPE produced by Petitioner ranges from 3.4 million to 10.2 million grams per mole. *Id*.

[19] CR/PR at I-7–8.

[20] CR/PR at I-8.

[21] CR/PR at I-8. UHMWPE is 15 times more resistant to abrasion than carbon steel. *Id*.

[22] CR/PR at I-8. Specifically, UHMWPE is used in certain high-strength applications in the construction, agriculture, material handling, transportation, textile, pulp and paper, food and beverage, mining, marine, porous plastics, oil and gas, high performance fiber, battery separator, and wastewater treatment industries. UHMWPE can also be used to produce fibers for demanding high-strength applications such as ballistic and slash-proof armor and in high-performance sporting equipment. *Id*.

[23] CR/PR at I-9. These include chain and belt drivers, curved guides, chain and belt deflecting and tensioning devices, bearing bushes, track disks, and impact-absorbing elements. *Id*.

[24] CR/PR at I-9.

[25] CR/PR at I-9.

UHMWPE can be characterized by high, medium, and low ranges of molecular weight.[26] While UHMWPE generally has high wear resistance, high impact resistance, low friction, high chemical resistance, no moisture absorption, and good electrical insulation, each of these characteristics are generally more pronounced the higher the molecular weight.[27] The higher the molecular weight of UHMWPE, however, the more viscous and less processable the product generally becomes.[28]

C. Domestic Like Product Analysis

Based on the record in the final phase of this investigation, we define a single domestic like product consisting of UHMWPE, coextensive with the scope. Petitioner contends that the domestic like product analysis remains the same in the final phase of this investigation as it was in the preliminary phase and that the Commission should define a single domestic like product that is coextensive with to the scope.[29] Respondent does not oppose this domestic like product definition.[30]

[26] CR/PR at I-9 and n.25. The parties agree that these are not industry standard categories or terms generally used in the market. Celanese Posthearing Br., Responses to Commissioner Questions at 38–39. KPIC Posthearing Br., Responses to Commissioner Questions at 75–76.

[27] CR/PR at I-9.

[28] CR/PR at I-9–10.

[29] Petitioner's Prehearing Brief, EDIS Doc. 733436 (Feb. 9, 2021) ("Celanese Prehearing Br.") at 4.

[30] Respondent's Prehearing Brief, EDIS Doc. 733425 (Feb. 9, 2021) ("KPIC Prehearing Br.") at 12.

In its preliminary determination, the Commission defined a single domestic like product consisting of UHMWPE, coextensive with the scope of the investigation.[31] No party has proposed a different domestic like product definition.[32]

The record in this final phase of the investigation concerning the characteristics and uses of domestically produced UHMWPE is not materially different from that of the preliminary phase of the investigation.[33] In light of this, and in the absence of any argument to the contrary, we again define a single domestic like product consisting of all UHMWPE, coextensive with the scope of the investigation.

III. Domestic Industry

The domestic industry is defined 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."[34] 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.

The record in this final phase of the investigation indicates that no domestic producer imported subject merchandise during the January 2017 to September 2020 period of investigation ("POI"), is related to or controls an exporter or importer of subject merchandise,

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[31] *Ultra-High Molecular Weight Polyethylene from Korea*, Inv. Nos. 731-TA-1474 (Preliminary), USITC Pub. 5048 (Apr. 2020) ("*Preliminary Determination*") at 10–11. The Commission found that all in-scope UHMWPE has the same basic physical characteristics in that it is a type of linear polyethylene produced from ethylene to industry standards and is typically sold in powdered or granule form. *Id.* at 8–9. It found that in-scope UHMWPE exhibits extremely high viscosity, abrasion resistance, impact resistance, chemical resistance, and nonsticking and self-lubricating properties and that in-scope UHMWPE is used in a wide range of demanding, high-strength applications. *Id.* Moreover, the Commission found that in-scope UHMWPE is made using the same manufacturing facilities, production processes (bonding ethylene together under pressure with a catalyst through a compression molding or ram extrusion process), and employees. *Id.* at 9. The Commission observed that both domestic producers utilize a similar type of ***. *Id.* at 9 n.42; *Confidential Preliminary Determination*, EDIS Doc. 709206 at 11, n.42. It found that the domestic industry sells in-scope UHMWPE through a single channel of distribution, to end users, and that customers and producers perceive all in-scope UHMWPE as comprising a single product category, with all types of in-scope UHMWPE interchangeable to some degree. *Preliminary Determination* at 10. Based on these factors, and the absence of any argument to the contrary, the Commission defined a single domestic like product coextensive with the scope of the investigation. *Id.* at 10–11.

[32] *Preliminary Determination* at 8.

[33] *See generally* CR/PR at I-7–12.

[34] 19 U.S.C. § 1677(4)(A).

or otherwise implicates the related party provision.[35] Consequently, there are no related party issues in the final phase of this investigation.

In addition, there are no other domestic industry issues. Both Petitioner and Respondent agree that the domestic industry should be defined to consist of all domestic producers of the domestic like product.[36] We therefore define the domestic industry to include all domestic producers of UHWMPE: Celanese and Braskem America, Inc. ("Braskem").[37]

IV. No Material Injury by Reason of Subject Imports[38]

Based on the record in the final phase of this investigation, we find that an industry in the United States is not materially injured by reason of imports of UHMWPE from Korea that Commerce has found to be sold in the United States at less than fair value.

A. Legal Standards

In the final phase of antidumping and countervailing duty investigations, the Commission determines whether an industry in the United States is materially injured or threatened with material injury by reason of the imports under investigation.[39] In making this determination, the Commission must consider the volume of subject imports, their effect on prices for the domestic like product, and their impact on domestic producers of the domestic like product, but only in the context of U.S. production operations.[40] The statute defines "material injury" as "harm which is not inconsequential, immaterial, or unimportant."[41] In assessing whether the domestic industry is materially injured by reason of subject imports, we consider all relevant economic factors that bear on the state of the industry in the United

[35] CR/PR at III-2, Table III-2.

[36] Celanese Prehearing Br. at 6; KPIC Prehearing Br. at 15.

[37] CR/PR at Table III-1.

[38] Section 771(24) of the Tariff Act, which defines "negligibility," generally provides that imports from a subject country that are less than 3 percent of the volume of all such merchandise imported into the United States in the most recent 12-month period for which data are available that precedes the filing of the petition or self-initiation, as the case may be, shall be deemed negligible. 19 U.S.C. § 1677(24)(A)(i).

Subject imports from Korea accounted for *** percent of total imports of UHMWPE in the 12-month period (March 2019 through February 2020) preceding the filing of the petition. CR/PR at Table IV-3. We consequently find that subject imports from Korea are not negligible.

[39] 19 U.S.C. §§ 1671d(b), 1673d(b).

[40] 19 U.S.C. § 1677(7)(B). The Commission "may consider such other economic factors as are relevant to the determination" but shall "identify each {such} factor ... and explain in full its relevance to the determination." 19 U.S.C. § 1677(7)(B).

[41] 19 U.S.C. § 1677(7)(A).

States.[42] No single factor is dispositive, and all relevant factors are considered "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[43]

Although the statute requires the Commission to determine whether the domestic industry is "materially injured or threatened with material injury by reason of" unfairly traded imports,[44] it does not define the phrase "by reason of," indicating that this aspect of the injury analysis is left to the Commission's reasonable exercise of its discretion.[45] In identifying a causal link, if any, between subject imports and material injury to the domestic industry, the Commission examines the facts of record that relate to the significance of the volume and price effects of the subject imports and any impact of those imports on the condition of the domestic industry. This evaluation under the "by reason of" standard must ensure that subject imports are more than a minimal or tangential cause of injury and that there is a sufficient causal, not merely a temporal, nexus between subject imports and material injury.[46]

In many investigations, there are other economic factors at work, some or all of which may also be having adverse effects on the domestic industry. Such economic factors might include nonsubject imports; changes in technology, demand, or consumer tastes; competition among domestic producers; or management decisions by domestic producers. The legislative history explains that the Commission must examine factors other than subject imports to ensure that it is not attributing injury from other factors to the subject imports, thereby inflating an otherwise tangential cause of injury into one that satisfies the statutory material injury threshold.[47] In performing its examination, however, the Commission need not isolate

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[42] 19 U.S.C. § 1677(7)(C)(iii).

[43] 19 U.S.C. § 1677(7)(C)(iii).

[44] 19 U.S.C. §§ 1671d(b), 1673d(b).

[45] *Angus Chemical Co. v. United States*, 140 F.3d 1478, 1484-85 (Fed. Cir. 1998) ("{T}he statute does not 'compel the commissioners' to employ {a particular methodology}."), *aff'g,* 944 F. Supp. 943, 951 (Ct. Int'l Trade 1996).

[46] The Federal Circuit, in addressing the causation standard of the statute, observed that "{a}s long as its effects are not merely incidental, tangential, or trivial, the foreign product sold at less than fair value meets the causation requirement." *Nippon Steel Corp. v. USITC*, 345 F.3d 1379, 1384 (Fed. Cir. 2003). This was further ratified in *Mittal Steel Point Lisas Ltd. v. United States*, 542 F.3d 867, 873 (Fed. Cir. 2008), where the Federal Circuit, quoting *Gerald Metals, Inc. v. United States*, 132 F.3d 716, 722 (Fed. Cir. 1997), stated that "this court requires evidence in the record 'to show that the harm occurred "by reason of" the LTFV imports, not by reason of a minimal or tangential contribution to material harm caused by LTFV goods.'" *See also Nippon Steel Corp. v. United States*, 458 F.3d 1345, 1357 (Fed. Cir. 2006); *Taiwan Semiconductor Industry Ass'n v. USITC*, 266 F.3d 1339, 1345 (Fed. Cir. 2001).

[47] SAA at 851–52 ("{T}he Commission must examine other factors to ensure that it is not attributing injury from other sources to the subject imports."); S. Rep. 96-249 at 75 (1979) (the

the injury caused by other factors from injury caused by unfairly traded imports.[48] Nor does the "by reason of" standard require that unfairly traded imports be the "principal" cause of injury or contemplate that injury from unfairly traded imports be weighed against other factors, such as nonsubject imports, which may be contributing to overall injury to an industry.[49] It is clear that the existence of injury caused by other factors does not compel a negative determination.[50]

Assessment of whether material injury to the domestic industry is "by reason of" subject imports "does not require the Commission to address the causation issue in any particular way" as long as "the injury to the domestic industry can reasonably be attributed to the subject imports."[51] The Commission ensures that it has "evidence in the record" to "show that the

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Commission "will consider information which indicates that harm is caused by factors other than less-than-fair-value imports."); H.R. Rep. 96-317 at 47 (1979) ("in examining the overall injury being experienced by a domestic industry, the ITC will take into account evidence presented to it which demonstrates that the harm attributed by the petitioner to the subsidized or dumped imports is attributable to such other factors;" those factors include "the volume and prices of nonsubsidized imports or imports sold at fair value, contraction in demand or changes in patterns of consumption, trade restrictive practices of and competition between the foreign and domestic producers, developments in technology and the export performance and productivity of the domestic industry"); *accord Mittal Steel*, 542 F.3d at 877.

[48] SAA at 851–52 ("{T}he Commission need not isolate the injury caused by other factors from injury caused by unfair imports."); *Taiwan Semiconductor Industry Ass'n,* 266 F.3d at 1345 ("{T}he Commission need not isolate the injury caused by other factors from injury caused by unfair imports ... . Rather, the Commission must examine other factors to ensure that it is not attributing injury from other sources to the subject imports." (emphasis in original)); *Asociacion de Productores de Salmon y Trucha de Chile AG v. United States*, 180 F. Supp. 2d 1360, 1375 (Ct. Int'l Trade 2002) ("{t}he Commission is not required to isolate the effects of subject imports from other factors contributing to injury" or make "bright-line distinctions" between the effects of subject imports and other causes.); *see also Softwood Lumber from Canada*, Inv. Nos. 701-TA-414 and 731-TA-928 (Remand), USITC Pub. 3658 at 100–01 (Dec. 2003) (Commission recognized that "{i}f an alleged other factor is found not to have or threaten to have injurious effects to the domestic industry, *i.e*., it is not an 'other causal factor,' then there is nothing to further examine regarding attribution to injury"), *citing Gerald Metals,* 132 F.3d at 722 (the statute "does not suggest that an importer of LTFV goods can escape countervailing duties by finding some tangential or minor cause unrelated to the LTFV goods that contributed to the harmful effects on domestic market prices.").

[49] S. Rep. 96-249 at 74–75; H.R. Rep. 96-317 at 47.

[50] *See Nippon Steel Corp*., 345 F.3d at 1381 ("an affirmative material-injury determination under the statute requires no more than a substantial-factor showing. That is, the 'dumping' need not be the sole or principal cause of injury.").

[51] *Mittal Steel*, 542 F.3d at 876 &78; *see also id.* at 873 ("While the Commission may not enter an affirmative determination unless it finds that a domestic industry is materially injured 'by reason of' subject imports, the Commission is not required to follow a single methodology for making that determination ... {and has} broad discretion with respect to its choice of methodology.") *citing United*

harm occurred 'by reason of' the LTFV imports," and that it is "not attributing injury from other sources to the subject imports." [52] The Federal Circuit has examined and affirmed various Commission methodologies and has disavowed "rigid adherence to a specific formula."[53]

The question of whether the material injury threshold for subject imports is satisfied notwithstanding any injury from other factors is factual, subject to review under the substantial evidence standard.[54] Congress has delegated this factual finding to the Commission because of the agency's institutional expertise in resolving injury issues.[55]

B. Conditions of Competition and the Business Cycle

The following conditions of competition inform our analysis of whether there is material injury by reason of subject imports.

1. Demand Considerations

Demand for UHMWPE in the United States depends on the demand of U.S.-produced downstream products used in certain high-strength applications in the construction, agriculture, material handling, transportation, textile, pulp and paper, food and beverage, mining, marine, porous plastics, oil and gas, high performance fiber, battery separator, and wastewater treatment industries.[56] Most responding firms reported that the UHMWPE market was not subject to distinct business cycles, although Respondent indicated that each downstream product in which UHMWPE is used may have specific growth cycles.[57] The vast

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States Steel Group v. United States, 96 F.3d 1352, 1362 (Fed. Cir. 1996) and S. Rep. 96-249 at 75. In its decision in *Swiff-Train v. United States*, 793 F.3d 1355 (Fed. Cir. 2015), the Federal Circuit affirmed the Commission's causation analysis as comporting with the Court's guidance in *Mittal*.

[52] *Mittal Steel*, 542 F.3d at 873 (quoting from *Gerald Metals*, 132 F.3d at 722), 877–79. We note that one relevant "other factor" may involve the presence of significant volumes of price-competitive nonsubject imports in the U.S. market, particularly when a commodity product is at issue. In appropriate cases, the Commission collects information regarding nonsubject imports and producers in nonsubject countries in order to conduct its analysis.

[53] *Nucor Corp. v. United States*, 414 F.3d 1331, 1336, 1341 (Fed. Cir. 2005); *see also Mittal Steel*, 542 F.3d at 879 ("*Bratsk* did not read into the antidumping statute a Procrustean formula for determining whether a domestic injury was 'by reason' of subject imports.").

[54] We provide in our discussion below a full analysis of other factors alleged to have caused any material injury experienced by the domestic industry.

[55] *Mittal Steel*, 542 F.3d at 873; *Nippon Steel Corp*., 458 F.3d at 1350, *citing U.S. Steel Group*, 96 F.3d at 1357; S. Rep. 96-249 at 75 ("The determination of the ITC with respect to causation is ... complex and difficult, and is a matter for the judgment of the ITC.").

[56] CR/PR at I-8.

[57] CR/PR at II-8.

majority of responding domestic producers, importers, and purchasers indicated that U.S. demand for UHMWPE had increased since January 1, 2017.[58] Petitioner and Respondent agree that future demand for UHMWPE is likely to increase, driven by increases in electric vehicle ("EV") production and associated increases in demand for lithium-ion batteries.[59]

Apparent U.S. consumption of UHMWPE increased irregularly from 2017 to 2019, increasing from *** pounds in 2017 to *** pounds in 2018 before declining to *** pounds in 2019, a level that is *** percent higher than in 2017.[60] Apparent U.S. consumption was *** pounds in January–September ("interim") 2020, which was lower than the *** pounds in interim 2019.[61]

2. Supply Considerations

Domestic producers' U.S. shipments were the largest source of supply throughout the POI and increased as a share of the quantity of apparent U.S. consumption between 2017 and 2019, from *** percent of apparent U.S. consumption in 2017 to *** percent in 2018 and 2019; domestic industry market share was slightly lower (*** percent) in interim 2020, compared to interim 2019 (*** percent).[62]

Nonsubject imports were the second largest source of supply in each year of the POI but declined as a share of apparent U.S. consumption between 2017 and 2019, from *** percent of apparent U.S. consumption in 2017 to *** percent in 2018, and to *** percent in 2019; nonsubject imports accounted for *** percent of the market in interim 2019 and *** percent in interim 2020.[63]

Subject imports increased as a share of apparent U.S. consumption from *** percent in 2017 to *** percent in 2018, and to *** percent in 2019; subject imports accounted for a higher share (*** percent) in interim 2020 than in interim 2019 (*** percent).[64]

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[58] CR/PR at Table II-4. One importer and one purchaser reported that demand had fluctuated. *Id.*

[59] CR/PR at II-11. UHMWPE is commonly used as a battery separator in EV batteries. *Id.*

[60] CR/PR at Tables IV-4 and Table C-1.

[61] CR/PR at Tables IV-4 and Table C-1.

[62] CR/PR at Tables IV-5 and C-1.

[63] CR/PR at Tables IV-5 and C-1. The largest source of nonsubject imports in 2019 was Japan followed by the Netherlands, Germany, and Brazil. Brazil was the largest source of nonsubject imports at the beginning of POI, but as noted below nonsubject imports from Brazil declined as ***. CR/PR at Tables III-8 and IV-2.

[64] CR/PR at Tables IV-5 and C-1.

Braskem commenced production of UHMWPE at its new U.S. production facility in Texas in January 2017.[65] Prior to opening a U.S. production facility, Braskem had supplied the U.S. market through imports from its facility in ***. Thus, as Braskem increased production at its U.S. facility, there was a decline in nonsubject imports from ***.[66] Braskem reported *** as a supply constraint during the POI.[67] Generally, responding U.S. producers, importers, and purchasers reported *** of supply constraints; *** reported that they had experienced supply constraints during the POI,[68] while *** reported that they had not experienced such constraints.[69]

3. Substitutability and Other Conditions

We find that there is a moderate-to-high level of substitutability between domestically produced UHMWPE and subject imports and that price is one of several important purchasing factors.[70] *** responding U.S. producers, *** responding importers, and *** responding purchasers reported that domestically produced UHMWPE and subject imports are always or frequently interchangeable.[71] Most responding purchasers also reported that domestically produced UHMWPE is comparable to subject imports across 15 purchasing factors with the exception of technical support/service, for which most purchasers reported U.S.-produced UHMWPE as superior to subject imports.[72] Most responding purchasers (five of six) also

[65] CR/PR at II-1, n.2, Table III-3.

[66] *See* CR/PR at III-9 and Table IV-2. As Braskem ramped up its domestic operations and reduced its imports of nonsubject merchandise from ***, domestic producers' share of apparent U.S. consumption increased by *** percentage points from 2017 to 2018, while the market share occupied by imports from *** declined by *** percentage points for the same period. CR/PR at III-8, Tables IV-5 and C-1. *** imports from *** decreased by *** percent from 2017 to 2018 and its ratio of imports to domestic production decreased from *** to ***, as it transitioned to primarily serving the U.S. market from its facility in the United States. CR/PR at Tables III-8 and C-1.

[67] CR/PR at II-6–7. ***. *Id.* at VII-10.

[68] Importer *** reported supply capacity constraints, and importer *** reported lead time issues. *** reported delivery, supply, and qualification issues. Purchaser *** reported price and availability issues. *** reported in its preliminary phase questionnaire that it ***. CR/PR at II-7, n.18.

[69] CR/PR at II-7.

[70] CR/PR at II-12. The degree of substitution between domestic and imported UHMWPE depends upon such factors as relative prices, quality (e.g., grade standards, chemistry, etc.), and conditions of sale (e.g., price discounts/rebates, lead times between order and delivery dates, reliability of supply, product services, availability of certain product types from different sources, etc.). *Id*.

[71] CR/PR at Table II-10. *** reported that domestically produced UHMWPE and subject imports are sometimes interchangeable. *Id.*

[72] CR/PR at Table II-9. Nearly all (*** percent or more) subject imports were of high molecular weight UHMWPE, which accounted for *** percent of domestic industry shipments. CR/PR at Table D-1.

reported that they require their suppliers to become certified to sell UHMWPE to their firm.[73] Braskem's ability to serve the U.S. market during the POI was constrained by ***. Purchaser *** reported that it ***.[74] Purchaser *** reported that it ***.[75] *** also reported that ***.[76] *** also reported that *** and *** reported that it had qualified ***.[77]

Although responding purchasers ranked quality as the top factor they considered in purchasing decisions for UHMWPE, price is also an important factor in purchasing decisions.[78] Five of six responding purchasers ranked price as among their top three purchasing factors, and five of six rated price as very important to their purchasing decisions.[79] Furthermore, all responding purchasers rated domestically produced UHMWPE as comparable to subject imports with respect to quality, and five of six responding purchasers reported that domestic producers are always or usually able to meet minimum quality specifications.[80]

Ethylene accounts for 99 percent of the raw material used in the production of UHMWPE, and raw materials accounted for *** percent of the domestic industry's cost of goods sold ("COGS") in 2019.[81] The price for ethylene decreased irregularly over most of the POI from $0.33 per pound in January 2017 to a period-low of $0.08 per pound in April 2020, a decline of 75 percent, before increasing to $0.25 per pound in September 2020 and $0.32 per

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While there may be some interchangeability between UHMWPE of different molecular weights at the design stage, Respondent states that once the end-use customer sets the specifications for the downstream product, the required molecular weight of the UHMWPE stock shape is fixed. Respondent's Posthearing Brief, EDIS Doc. 735218 (Feb 25, 2021) ("KPIC Posthearing Br."), Responses to Commissioner Questions at 22.

[73] CR/PR at II-16.

[74] CR/PR at II-16.

[75] CR/PR at II-16.

[76] CR/PR at II-16 and n.38, and II-7, n.18. Specifically, ***. *** Questionnaire Follow-Up with USITC Staff, EDIS Doc. *** (Mar. 1, 2021). *** also reported ***, implying that *** prior to 2020. *** LSLR Survey Response, EDIS Doc. *** (Mar. 20, 2020) at 7.

[77] CR/PR at II-16.

[78] CR/PR at Table II-6.

[79] CR/PR at Tables II-6–7.

[80] CR/PR at Tables II-9 and II-11. One responding purchaser reported that domestic producers are sometimes able to meet minimum quality specifications. *Id*. at Table II-11. Although four of five responding purchasers reported that subject imports are always or usually able to meet minimum quality specifications, one purchaser reported that subject imports are never able to meet such specifications. *Id*.

[81] CR/PR at I-13, VI-4, Table VI-1.

pound in December 2020.[82] The U.S. Gulf ethylene prices are forecast to increase through 2025 as compared to prices in 2018, 2019, and 2020.[83]

Most UHMWPE is sold pursuant to contracts. Domestic producers sold *** percent of their commercial U.S. shipments through long-term contracts, *** percent though annual contracts, and *** percent though spot sales.[84] U.S. importers of subject merchandise sold *** percent of their commercial U.S. shipments through annual contracts, *** percent through short-term contracts, and *** percent through spot sales.[85] Two of six responding purchasers reported that raw material prices affect negotiations of contract terms.[86]

The UHMWPE production process is highly automated and capital intensive, which requires high capacity utilization rates in order to maintain operating efficiencies.[87]

C. Volume of Subject Imports

Section 771(7)(C)(i) of the Tariff Act provides that the "Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States, is significant."[88]

The volume of subject imports increased from *** pounds in 2017, to *** pounds in 2018, and *** pounds in 2019; subject import volume was steady at *** pounds in both interim 2019 and interim 2020.[89] As a share of apparent U.S. consumption, subject imports increased from *** percent in 2017 to *** percent in 2018 and *** percent in 2019.[90] Subject import market share was higher in interim 2020 (*** percent) than in interim 2019 (*** percent).[91]

We find that the volume and increase in volume of subject imports is significant in absolute terms and relative to consumption in the United States. For the reasons discussed below, however, we do not find that subject imports caused significant price effects or had a significant impact on the domestic industry.

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[82] CR/PR at V-1.

[83] Petitioner's Posthearing Brief, EDIS Doc. 735210 (Feb. 25, 2021) ("Celanese Posthearing Br."), Exh. 2 at 21, *citing* IHS Markit World Analysis Report, published Oct. 2020.

[84] CR/PR at Table V-2.

[85] CR/PR at Table V-2.

[86] CR/PR at V-3. *** reported that it utilizes index pricing based on ethylene costs and *** reported that raw material price changes have led to market price erosion and affected sales mix. *Id.* *** were the largest responding purchasers of UHMWPE during the POI. CR/PR at I-3.

[87] KPIC Prehearing Br. at 19; Hearing Tr. at 89–90 (Kelly).

[88] 19 U.S.C. § 1677(7)(C)(i).

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

[90] CR/PR at Table IV-5.

[91] CR/PR at Table IV-5.

D. Price Effects of the Subject Imports

Section 771(7)(C)(ii) of the Tariff Act provides that, in evaluating the price effects of the subject imports, the Commission shall consider whether

> (I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and
>
> (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.[92]

As discussed above in section IV.B.3., there is a moderate-to-high degree of substitutability between domestically produced UHMWPE and subject imports and price is an important factor in purchasing decisions, among others.

The Commission collected quarterly pricing data from U.S. producers and importers for five UHMWPE pricing products.[93] Two U.S. producers (***) and two importers *** provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.[94] Price data reported by these firms accounted for *** percent

[92] 19 U.S.C. § 1677(7)(C)(ii).

[93] The pricing products are: **Product 1** – UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in individual packaging with a net weight of 25 kg; **Product 2** – UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT; **Product 3** – UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT); **Product 4** – UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT; **Product 5** – UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT). CR/PR at V-7. Products 2, 4, and 5 were added in the final phase of this investigation at the request of KPIC, while the definitions for products 1 and 3 were not changed from the preliminary phase; products 1–3 and 4–5 are of the same molecular weight, respectively, but packaged in different quantities. CR/PR at V-7, n.10.

[94] CR/PR at V-8. *** provided pricing data for *** while *** provided pricing data for ***. CR/PR at V-8.

of U.S. producers' U.S. shipments of UHMWPE and *** percent of U.S. shipments of subject imports in 2019.[95]

Subject imports undersold the domestic like product in 21 of 22 quarterly price comparisons for products ***, the only products for which subject import sales were reported, involving *** pounds of subject imports, with underselling margins that ranged from *** percent to *** percent and averaged *** percent.[96] The *** was associated with *** pounds of subject imports at an overselling margin of *** percent.[97] Overall, underselling accounted for 95 percent of comparisons, encompassing *** percent of the volume covered.[98] The Commission notes that the underselling by subject imports was almost wholly concentrated in product *** (accounting for *** percent of the total volume of undersold product).[99]

The Commission also collected purchase cost data for the same five pricing products imported from Korea. One importer, ***, reported purchase cost data for imports of product *** from Korea.[100] Import purchase cost data reported by this firm accounted for *** percent of subject imports in 2019.[101] Based on these data, landed duty-paid ("LDP") costs for subject imports of product *** were below the sales prices for domestically produced product *** in *** quarterly comparisons, involving *** pounds of subject imports at price-cost differentials that ranged from *** percent to *** percent and averaged *** percent.[102]

Given the moderate-to-high degree of substitutability between the domestic product and subject imports and the predominance of underselling by the subject imports, we find the underselling to be significant. As detailed below, however, we do not find that the underselling resulted in significant lost sales due to lower prices or a shift in market share for the domestic industry.[103]

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[95] CR/PR at V-8.

[96] CR/PR at Table V-10.

[97] CR/PR at Table V-10.

[98] CR/PR at Table V-10.

[99] CR/PR at Table V-10. Quarterly price comparisons were only available for products ***, with the vast majority of comparisons for product ***. *See* CR/PR at Tables V-3 and V-6.

[100] CR/PR at V-19.

[101] CR/PR at V-19.

[102] CR/PR at Table V-11. We recognize that the import purchase cost data may not reflect the total cost of importing and therefore requested that importers provide additional information regarding the costs and benefits of directly importing UHMWPE. *** reported that it incurred additional costs beyond the LDP cost, including ***. CR/PR at V-22. *** reported that the cost of its direct imports was not lower than its cost for purchasing from domestic producers or importers and explained that because ***. CR/PR at V-22.

[103] Indeed, the domestic industry gained market share between 2017 and 2019. While this gain partly reflected Braskem shifting production to the U.S., the increase in domestic industry shipments was also greater than the decrease in nonsubject imports from Brazil. CR/PR at Table IV-4.

With respect to lost sales and revenues, *** responding purchasers reported purchasing subject imports instead of domestically produced UHMWPE, *** reported that subject imports were priced lower, and *** reported that price was a primary reason for purchasing *** pounds of subject imports instead of domestically-produced product.[104] The *** purchaser, ***, reported that ***.[105] The *** purchaser, ***, reported that price was a *** for purchasing ***.[106] Yet, in the same response, *** also reported that it ***, ***[107] In addition, other record evidence indicates that non-price reasons motivated *** purchases of subject imports. *** reported that it *** during the POI in order to ***[108] *** and therefore was not a viable alternate source of *** during most of the POI, compelling ***.[109] With no other alternative sources of domestic UHMWPE available, *** began ***.[110]

Celanese emphasizes the fact that a growing share of *** purchases went to KPIC over the POI,[111] but the record shows that *** reported it had encountered *** during the POI.[112]

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[104] CR/PR at V-27, Table V-13. The total quantity of imported product purchased by the company that identified price as a primary reason (***) was *** pounds. *** reported the *** pounds as a sum of annual and interim 2020 purchases over the period between January 2017 and September 2020. This amount is ***, indicating that ***. CR/PR at V-27, n.31.

[105] CR/PR at Table V-13. Contrary to Petitioner's claim that it lost sales and revenues to *** due to low-priced subject import competition, *** reported that price was a primary reason for its decision to purchase subject imports instead of the domestic product. Celanese Prehearing Br.at 41–45; Celanese Posthearing Br. at 2–7; CR/PR at Table V-13. ***," and ***. CR/PR at Table V-13. Additionally, *** reported that domestic producers reduced their prices to compete with lower-priced subject imports. *Id.* at V-27.

[106] CR/PR at V-27, Table V-13. The total quantity of imported product purchased by the company that identified price as a primary reason (***) was *** pounds. *** reported the *** pounds as a sum of annual and interim 2020 purchases over the period between January 2017 and September 2020. This amount is ***, indicating that ***. CR/PR at V-27, n.31.

[107] CR/PR at Tables IV-12–13. The questionnaire asked purchasers whether price was a primary reason for purchasing subject imports rather than domestic product and ***. *** Purchaser Questionnaire, EDIS Doc. *** (Dec. 7, 2020) at 19. *** non-price reason for purchasing subject imports is consistent with other evidence that hedging against supply interruptions through qualification of a dual-source for UHMWPE was a significant factor influencing purchasing decisions. *See* CR/PR at Table V-13; Hearing Tr. at 105 and 176 (Trymbiski) and 120 and 139 (Anderson).

[108] *** Purchaser Questionnaire, EDIS Doc. *** (Dec. 7, 2020) at 16.

[109] *** Questionnaire Follow-Up with USITC Staff, EDIS Doc. *** (Mar. 1, 2021) at 1–2; CR/PR at II-7 & n.18, II-10 & n.38.

[110] *** Questionnaire Follow-Up with USITC Staff, EDIS Doc. *** (Mar. 1, 2021) at 1.

[111] Celanese Posthearing Br. at 4.

[112] CR/PR at II-7, n.18. In the preliminary phase of the investigation, *** indicated that price was *** for purchasing subject imports and cited *** and reported that ***. *** LSLR Survey Response, EDIS Doc. *** (Mar. 20, 2020) at 5–6.

*** also reported that ***.[113] Based on the totality of evidence, we do not consider the *** million pounds of subject imports *** reported purchasing instead of domestic product, which accounts for a *** of the total subject import volume in the market during the POI, to be attributable to the lower price of subject imports.

Therefore, while we find that subject imports predominantly undersold the domestic product, this underselling did not result in significant lost sales due primarily to price or shifts in market share from the domestic industry to subject imports.

We have also examined price trends. Prices for domestically produced UHMWPE declined over the POI for *** pricing products, but increased for ***.[114] Between the first and last quarters for which pricing data are available, prices for the domestic like product *** by *** percent for product ***, *** percent for product ***, *** percent for product ***, and *** percent for product ***.[115] With respect to pricing product ***, prices for domestically produced product ***, which accounted for more than *** percent of the total pricing product sales volume reported by domestic producers, increased by *** percent over the POI.[116]

We find a lack of correlation between prices for the domestic like product and subject imports during the POI. Domestic prices for products *** and *** declined over the POI despite the *** reported subject import sales of the products.[117] Contradicting Petitioner's claim that price declines on one pricing product can lead to price declines on other pricing products through contract negotiations,[118] domestic prices for product ***, which accounted for the *** of the domestic industry's reported sales of pricing products, increased *** over the POI.[119] Given this, and the absence of any clear correlation between price trends across the

[113] *** Questionnaire Follow-Up with USITC Staff, EDIS Doc. *** (Mar. 1, 2021) at 2; CR/PR at II-20. *** also reported that price leaders are ***. CR/PR at V-7.

[114] CR/PR at Table V-9. One purchaser (***) reported that domestic producers had lowered prices to compete with lower priced subject imports. CR/PR at V-27.

[115] CR/PR at Table V-9.

[116] CR/PR at Table V-9.

[117] CR/PR at Table V-10. As explained above, raw material costs for ethylene declined irregularly by 75 percent from $0.33 per pound in January 2017 to a period-low of $0.08 per pound in April 2020, before rising again through the end of 2020. CR/PR at V-1. The record presents mixed evidence regarding whether raw material costs may have played a role in price declines for U.S.-produced UHMWPE; the record indicates that while most purchasers are familiar with raw material prices, only *** utilizes price indexing based on ethylene costs in its contracts. *** did, however, report that raw material price changes have led to market price erosion. CR/PR at V-3.

[118] Hearing Tr. at 58–59 (Cannistra and Lee), Celanese Posthearing Br., Exh. 2 at 7.

[119] CR/PR at Table V-9.

pricing products, we cannot attribute the domestic price declines for products *** and *** to subject imports.[120]

We also find little correlation between subject import and domestic price trends for products *** and ***, which were the only pricing products for which subject import sales were reported. In the third quarter of 2017, when there were *** reported sales of subject imports, the *** in domestic prices for product *** coincided with *** sales of product *** at prices lower than those from any other source.[121] Between the first quarter of 2018 and the second quarter of 2019, when most subject import sales were reported, domestic prices *** irregularly.[122] After the second quarter of 2019, when there were no further sales of subject imports, domestic prices ***.[123] With respect to product ***, while domestic producers' prices *** from 2017 to mid-2019, they *** from the first quarter of 2019 through the third quarter of 2020, despite continued ***.[124] Based on the absence of any clear correlation between subject imports and domestic price declines, and the price increases that occurred for the domestic

[120] We note that because of their different average molecular weight/volume which convey different physical, mechanical, thermal and electrical characteristics, products *** are not generally interchangeable with products ***. We are unpersuaded by Petitioner's argument that customer call sheets show that price competition from subject imports led to price declines across their portfolio offerings. Celanese Posthearing Br., Responses to Commissioner Questions at 7, Exh. 3. While some of these call sheets appear to reflect pricing pressure from subject imports during negotiations between Celanese and purchasers, the sheets do not show that this resulted in price declines across the portfolio of products offered by Petitioner or that any requested price concessions were actually implemented. *See id.* Indeed, notwithstanding the call sheets, the pricing data on the record show that domestic prices *** for product ***, and generally *** for other products in the absence of subject import competition. Furthermore, ***. *See* KPIC Posthearing Br., Responses to Commissioner Questions at 56, Exhs. 12–13. The record also reflects that, while there may be limited price transparency via market participants' discussions of prices, the published price lists that are often available in commodity markets are not available in the UHMWPE market, which undercuts Petitioner's assertion that prices move together across different product categories. Hearing Tr. at 41–42 (Lee) and 200–201 (Trymbiski, Okun, and Anderson).

[121] *Compare* *** Domestic Producer Questionnaire, EDIS Doc. *** (Dec. 1, 2020) at 33 *with* *** Domestic Producer Questionnaire, EDIS Doc. *** (Dec. 1, 2020) at 35 *and with* *** Importer Questionnaire, EDIS Doc *** (Dec. 3, 2020) at 15. Hearing Tr. at 79–81 (Lee) (indicating that Braskem's prices are occasionally used to pressure Celanese's prices in purchaser contract negotiations); Hearing Tr. at 145 (Szamosszegi) (". . . KPIC is not the low price leader in the market").

[122] CR/PR at Table V-3.

[123] CR/PR at Table V-3.

[124] CR/PR at Figure V-6. Product *** is comprised of high molecular weight UHMWPE; domestic shipment AUVs for high molecular weight UHMWPE increased from $*** in 2017 to $*** in 2019, and were $*** in January – September 2020. CR/PR at Table D-1. As discussed above, more than *** percent of U.S. shipments of UHMWPE from Korea were of high molecular weight. CR/PR at Table D-2.

industry's largest volume product, we find that subject imports did not depress prices of the domestic like product to a significant degree.[125]

We have also considered whether subject imports prevented price increases that otherwise would have occurred. The domestic industry's COGS to net sales ratio increased from *** percent in 2017 to *** percent in 2018, and to *** percent in 2019; it was higher in interim 2020 (*** percent) than in interim 2019 (*** percent).[126] While we examine the domestic industry as a whole, we note certain variances in the financial performance of the two domestic producers, Celanese and Braskem. Specifically, the increase in the industry's COGS to net sales ratio was driven entirely by *** from 2017 to 2019.[127] *** COGS to net sales ratio *** from *** percent in 2017 to *** percent in 2018, and *** percent in 2019, while *** COGS to net sales ratio *** from *** percent in 2017 to *** percent in 2018, and *** percent in 2019.[128] We do not attribute *** COGS to net sales ratio to subject imports because *** reported sales of pricing products were for product ***, which faced *** subject import competition, and its prices for product *** fluctuated within a narrow band, ***.[129] Additionally, the record does not suggest cross-effects among the pricing products given their differing trends, and therefore we cannot conclude that subject imports were a significant factor in ***. We also note that ***'s *** COGS to net sales ratio resulted from ***.[130]

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[125] Of the six responding purchasers, the *** provided differing responses on whether domestic producers reduced prices to compete with subject imports. *** reported that U.S. producers had reduced prices in order to compete with lower-priced imports from Korea by an estimated *** percent; *** reported that they did not. The remaining *** purchasers reported that they did not know. CR/PR at V-27. Further, we note that the average unit value of U.S. producers' U.S. shipments increased by *** percent between 2017 and 2019, and by *** percent between the 2019 and 2020 interim periods. In addition, Appendix D of the Commission Report sets forth quantity/value/AUV data for U.S. shipments, broken down by molecular weight (low, medium, high) and by packaging (in packaging less than 100 kg, in packaging from 100 kg to 1,000 kg, and in packaging over 1,000 kg). For the two groupings that accounted for the large majority of U.S. shipments by quantity throughout the POI (medium molecular weight – in packaging over 1,000 kg and high molecular weight – in packaging over 1,000 kg), the average unit value of U.S. producers' U.S. shipments increased in each full year of the POI. Over the interim periods, the average unit value for one of these product groupings *** while the average unit value of the other product grouping was ***. CR/PR at Table D-1.

[126] CR/PR at Tables VI-3 and C-1.

[127] CR/PR at Table VI-3.

[128] CR/PR at Table VI-3.

[129] *** Producer Questionnaire, EDIS Doc. *** at 33; CR/PR at Table V-3.

[130] *** unit other factory costs *** from $*** in 2017, to $*** in 2018, and $*** in 2019, while its unit direct labor cost *** from $*** in 2017, to $*** in 2018, and to $*** in 2019, which was driven by ***. CR/PR at VI-11, n, 8, Table VI-3. In response to follow-up questions from Commission staff about the change in its other factor costs over the POI, *** stated that its other factory costs as

Although *** COGS to net sales ratio was *** in interim 2020, at *** percent, compared to interim 2019, at *** percent, this was driven primarily by *** in interim 2020 relative to 2019 due to its $***.[131] Indeed, ***.[132] We also note that trends in raw material costs would not have supported price increases during the POI because raw material costs declined irregularly during most of the period.[133] For all these reasons, we find that subject imports did not prevent price increases that otherwise would have occurred to a significant degree.

In view of the foregoing, notwithstanding significant subject import underselling and *** decision to source a portion of its UHMWPE requirements from KPIC, we find that this underselling did not result in significant lost sales due primarily to price or to a market share shift for the domestic industry. Moreover, we find that subject imports did not depress prices or prevent price increases for the domestic like product that would otherwise have occurred to a significant degree. Accordingly, we find that the subject imports did not cause significant price effects.

E. Impact of the Subject Imports[134]

Section 771(7)(C)(iii) of the Tariff Act provides that examining the impact of subject imports, the Commission "shall evaluate all relevant economic factors which have a bearing on the state of the industry."[135] These factors include output, sales, inventories, capacity utilization, market share, employment, wages, productivity, gross profits, net profits, operating profits, cash flow, return on investment, return on capital, ability to raise capital, ability to

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reported *** Braskem Responses to Follow-Up Questions from Commission Staff, EDIS Doc. *** (February 25, 2021). Braskem further explained ***. *Id; see also* CR/PR at VI-11, n.7.

[131] CR/PR at VI-10, n.7; VI-11, n.8; Table VI-3.

[132] Celanese Posthearing Br., Exh. 6.

[133] CR/PR at V-1.

[134] The statute instructs the Commission to consider the "magnitude of the dumping margin" in an antidumping proceeding as part of its consideration of the impact of imports. 19 U.S.C. § 1677(7)(C)(iii)(V). In its final determination of sales at less value found a dumping margin of 7.84 percent for KPIC, the only investigated exporter and producer, and an all others rate of 7.84 percent. We take into account in our analysis the fact that Commerce has made a final finding that sole producer of subject merchandise in Korea is selling subject imports in the United States at less than fair value. In addition to this consideration, our impact analysis has considered other factors affecting domestic prices. Our analysis of the underselling of subject imports, described in both the price effects discussion and below, is particularly probative to an assessment of the impact of the subject imports.

[135] 19 U.S.C. § 1677(7)(C)(iii); *see also* SAA at 851 and 885 ("In material injury determinations, 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 also may demonstrate that an industry is facing difficulties from a variety of sources and is vulnerable to dumped or subsidized imports.").

service debts, research and development, and factors affecting domestic prices. No single factor is dispositive and all relevant factors are considered "within the context of the business cycle and conditions of competition that are distinctive to the affected industry."[136]

Measures of the domestic industry's trade-related indicators generally improved irregularly over the POI. The domestic industry's capacity increased from *** pounds in 2017 to *** pounds in 2018, and decreased to *** pounds in 2019; it was *** pounds in interim 2019 and in interim 2020.[137] The industry's production volume increased from *** pounds in 2017 to *** pounds in 2018, before declining to *** pounds in 2019; it was *** pounds in interim 2019 and *** pounds in interim 2020.[138] The industry's capacity utilization rate was relatively stable at *** percent in 2017 and *** percent in 2018 and 2019; it was *** percent in interim 2019 and *** percent in interim 2020.[139]

The industry's U.S. shipments increased from *** pounds in 2017 to *** pounds in 2018, before declining to *** pounds in 2019; it was *** pounds in interim 2019 and *** pounds in interim 2020.[140] The industry's U.S. shipments as a share of apparent U.S. consumption increased from *** percent in 2017 to *** percent in 2018 and 2019; it was *** percent in interim 2019 and *** percent in interim 2020.[141]

The domestic industry's end-of-period inventories increased irregularly during the POI from *** pounds in 2017 to *** pounds in 2019 and were *** pounds in interim 2019 and *** pounds in interim 2020.[142] The industry's inventories as a share total shipments decreased irregularly from *** percent in 2017 to *** percent in 2019 and were *** in interim 2019 and *** in interim 2020.[143]

The domestic industry's employment-related indicators generally improved irregularly during the POI. Its number of production related workers increased from *** in 2017 to *** in 2018, before declining slightly to *** in 2019; it was *** in interim 2019 and *** in interim

[136] 19 U.S.C. § 1677(7)(C)(iii). This provision was amended by the Trade Preferences Extension Act of 2015, Pub. L. 114-27.

[137] CR/PR at Tables III-4 and C-1.

[138] CR/PR at Tables III-4 and C-1.

[139] CR/PR at Tables III-4 and C-1. Though the domestic industry's capacity utilization appears relatively low, this is largely a function of the its large production capacity as compared to apparent U.S. consumption. CR/PR at III-4. Moreover, the decline in the domestic industry's capacity utilization rate from interim 2019 to interim 2020 is likely due to a decline in overall industrial production due to the effects of the COVID-19 pandemic. CR/PR at Figure II-1.

[140] CR/PR at Tables III-6 and C-1.

[141] CR/PR at Tables VI-5 and C-1.

[142] CR/PR at Tables III-7 and C-1.

[143] CR/PR at Tables III-7 and C-1.

2020.[144] Its total hours worked increased from *** in 2017 to *** in 2018 and *** in 2019; it was *** hours in interim 2019 and *** hours in interim 2020.[145] Its total wages paid increased from $*** in 2017 to $*** in 2018 and $*** in 2019; it was $*** in interim 2019 and $*** in interim 2020. Its level of productivity decreased from *** pounds per hour in 2017 to *** pounds per hour in 2018, and to *** pounds per hour in 2019; it was *** pounds per hour in interim 2019 and was *** pounds per hour in interim 2020.[146]

The domestic industry's financial performance indicators also generally improved over the POI. The domestic industry's total net sales value increased from $*** in 2017 to $*** in 2018, before declining to $*** in 2019 (an overall increase of *** percent between 2017 and 2019); it was $*** in interim 2019 and $*** in interim 2020 (an increase of *** percent).[147] Its gross profit increased from $*** in 2017 to $*** in 2018, before declining to $*** in 2019 (an overall increase of *** percent between 2017 and 2019); it was $*** in interim 2019 and $*** in interim 2020 (*** percent lower).[148] Its operating income increased from $*** in 2017 to $*** in 2018, before declining to $*** in 2019 (an overall increase of *** percent between 2017 and 2019); its operating income was $*** in interim 2019 and $*** in interim 2020 (*** percent lower).[149] Its operating margin to net sales ratio increased from *** percent in 2017 to *** percent in 2018, before declining to *** percent in 2019; its operating income margins were *** percent in interim 2019 and *** percent in interim 2020.[150]

The domestic industry's level of capital investments increased from $*** in 2017 to $*** in 2018 and to $*** in 2019 (an increase of *** percent between 2017 and 2019); capital expenditures totaled $*** in interim 2019 and $*** in interim 2020 (*** percent higher).[151]

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[144] CR/PR at Tables III-9 and C-1.

[145] CR/PR at Tables III-9 and C-1.

[146] CR/PR at Tables III-9 and C-1.

[147] CR/PR at Tables VI-1 and C-1.

[148] CR/PR at Tables VI-1 and C-1. The domestic industry's average unit COGS and COGS to net sales ratio increased from $*** and *** percent in 2017 to $*** and *** percent in 2018, and to $*** and *** percent in 2019, respectively; values were $*** and *** percent in interim 2019 and were $*** and *** percent in interim 2020. CR/PR at Tables VI-1 and C-1.

[149] CR/PR at Tables VI-1 and C-1. The domestic industry's net income increased from $*** in 2017 to $*** in 2018, before declining to $*** in 2019; it was $*** in interim 2019 and $*** in interim 2020. *Id*.

[150] CR/PR at Tables VI-1 and C-1. The domestic industry's net income margin increased from *** percent in 2017 to *** percent in 2018, before declining to *** percent in 2019; it was *** percent in interim 2019 and *** percent in interim 2020. *Id*.

[151] CR/PR at Tables VI-1 and C-1. The domestic industry's return on assets increased from *** percent in 2017 to *** percent in 2018, before declining to *** percent in 2019. *Id*. The industry's cash flow increased from $*** in 2017 to $*** in 2018, before declining to $*** in 2019; it was $*** in interim 2019 and $*** in interim 2020.

The domestic industry reported no research and development expenses.[152] Although *** reported that subject imports had negative effects on its investment and growth and development,[153] *** reported that subject imports had no such effects.[154]

The domestic industry performance generally improved during the POI, including the successful establishment of a new production entity, despite increasing volumes of low-priced subject imports. The increase in subject import volume and market share over the POI did not prevent the domestic industry from increasing its market share by *** percentage points between 2017 and 2019, from *** percent in 2017 to *** percent in 2018 and 2019.[155] All of the increase in subject import market share between 2017 and 2019 was at the expense of nonsubject imports, not the domestic industry.[156] Indeed, the record reflects that both subject imports and U.S. producers gained market share from nonsubject imports over the POI; as the market share of nonsubject imports *** from *** percent in 2017 to *** percent in 2019, a *** percentage points, the market share of subject imports *** by *** percentage points, with the balance captured by domestic producers.[157] Furthermore, while over *** percent of subject imports were high molecular weight UHMWPE, the domestic industry continued to exhibit year-over-year growth in its U.S. shipment volumes of high molecular weight UHMWPE from 2017 to 2019.[158]

In addition, both domestic producers performed well over the POI despite the increase in subject imports. As explained below, any decrease in the industry's performance from 2018 to 2019 was solely the result of ***. From 2017 to 2019, *** competed with subject imports for sales of pricing product ***, which accounted for *** subject import pricing product data,

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[152] CR/PR at Tables VI-4 and C-1.

[153] While Celanese's capital expenditures *** from *** in 2017 to *** in 2019, its capital expenditures totaled nearly *** for a reactor in its plant in Bishop, TX. CR/PR at Table VI-4.

[154] CR/PR at Tables VI-6–7.

[155] CR/PR at Table IV-5.

[156] CR/PR at Tables IV-5 and C-1. The domestic industry's market share in interim 2020 was *** percent, down *** percentage points from *** percent in interim 2019. *Id*. While much of the increase in the domestic industry's U.S. shipments and market share ***, the increase in the domestic industry's U.S. shipments between 2017 and 2019, *** pounds, was greater than the decrease in U.S. shipments of imports from Brazil, *** pounds over this time, and *** over this time. CR/PR at Table IV-4.

[157] CR/PR at Tables IV-5 and C-1. While the domestic industry held a *** market share in interim 2020 as compared to interim 2019, it remained much higher than in 2017. CR/PR at Table IV-5. While subject imports gained *** percentage points of market share from interim 2019 to interim 2020, the majority of the increase came at the expense of nonsubject imports. CR/PR at Tables IV-5 and C-1.

[158] CR/PR at Table D-1. Indeed, this high molecular weight product category was the only product category in which domestic producers continued to experience growth over this time period. As previously discussed, ***. ***. *** Questionnaire Follow-Up with USITC Staff, EDIS Doc. *** (Mar. 1, 2021) at 2.

and for sales to ***, which accounted for ***.[159] Yet, during this period, ***.[160] Neither the increase in subject imports nor significant subject import underselling ***.[161]

As for Braskem, it successfully commenced U.S. operations in January 2017, comprising *** percent of U.S. production and *** percent of the U.S. industry's total net sales in just three years.[162] Although ***.[163] While Braskem's performance *** between 2018 and 2019, the record does not support that this was driven by subject imports. In particular, the *** in Braskem's U.S. shipments was driven predominantly by ***.[164] Specifically, Braskem's quantity of *** U.S. shipments *** from *** pounds in 2018 to *** pounds in 2019 while its quantity of *** U.S. shipments *** from *** pounds to *** pounds.[165] Rather, the record shows that Braskem's *** performance is attributable to factors other than subject imports. In particular, ***.[166] Braskem's performance was further impacted by *** and ***.[167] Because *** resulted from factors other than subject imports, the resulting decline in the domestic industry's performance during the period was also unrelated to subject imports.[168]

We also find that the domestic industry's *** weaker performance in interim 2020 relative to interim 2019 was unrelated to subject imports. As previously discussed, the domestic industry's market share and financial performance remained near period highs in interim 2020, despite increased volumes of low-priced subject imports.[169] Even so, many measures of the industry's performance were adversely impacted in interim 2020 by the COVID-19 pandemic, which reduced demand in interim 2020 relative to interim 2019.[170]

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[159] CR/PR at V-8, V-27 n.31, Tables V-3–7 and Table VI-3.

[160] CR/PR at Table VI-3.

[161] Between the beginning and end of the POI, ***. CR/PR at Table VI-4.

[162] CR/PR at Tables III-4 and VI-3.

[163] *See* CR/PR at II-6–7, Table VI-3.

[164] *Compare* CR/PR at Table D-1 *with* *** Producer Questionnaire, EDIS Doc. *** at 15. ***. *** Producer Questionnaire at Table II-9. The medium and low molecular weight product categories accounted for *** percent of total U.S. importers' U.S. shipments of UHMWPE from Korea (by quantity) over the POI. *See* CR/PR at Table D-2.

[165] *** Producer Questionnaire, EDIS Doc. *** at 15.

[166] CR/PR at VII-10; *see also* CR/PR at Table III-8.

[167] CR/PR at II-16; *** Producer Questionnaire, EDIS Doc. *** at 41. ***, as discussed above in section IV.D. *Calculated from* CR/PR at Table VI-3. In particular we note that ***. *Id*. As a result of all these factors, ***. CR/PR at Table VI-3. In contrast, ***. CR/PR at Table VI-3.

[168] In 2019, Braskem ***. In addition, in 2019 for the first and only time, ***. CR/PR at VI-12, n.9.

[169] CR/PR at Tables IV-5 and VI-1.

[170] CR/PR at VI-12, n.9 and VII-7, n.7, Tables IV-4, C-1 (apparent U.S. consumption was *** percent lower in interim 2020 compared to interim 2019); Hearing Tr. at 105 (Trymbiski) ("The COVID-19 pandemic substantially affected the resin market in 2020, especially in the first half of the year. Initially,

Furthermore, the industry's weaker financial performance in interim 2020 relative to interim 2019 resulted entirely from ***, which reported factors other than subject imports as contributing to the decline.[171] As discussed in section IV.D, *** COGS to net sales ratio was *** in interim 2020 compared to interim 2019 due to *** associated with its $***.[172] Consequently, we do not find that subject imports had a material impact on the industry's declining performance in interim 2020.

For the reasons discussed above, we find that subject imports have not had a significant impact on the domestic industry. Accordingly, we find that the domestic industry is not materially injured by reason of subject imports of UHMWPE from Korea.

V. Threat of Material Injury by Reason of Subject Imports

A. Legal Standard

Section 771(7)(F) of the Tariff Act directs the Commission to determine whether the U.S. industry is threatened with material injury by reason of the subject imports by analyzing whether "further dumped or subsidized imports are imminent and whether material injury by reason of imports would occur unless an order is issued or a suspension agreement is accepted."[173] The Commission may not make such a determination "on the basis of mere conjecture or supposition," and considers the threat factors "as a whole" in making its determination whether dumped or subsidized imports are imminent and whether material injury by reason of subject imports would occur unless an order is issued.[174] In making our determination, we consider all statutory threat factors that are relevant to these investigations.[175]

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demand dropped significantly as factories in the U.S. were idled or slowed temporarily in response to the COVID-19 safety measures.").

[171] *See* CR/PR at Table VI-3 and V-11, n.8. ***. *Id.*

[172] CR/PR at Table VI-3. ***. CR/PR at VI-11, n.8. The firm also explained that the increases in other factory and labor costs reflect a selling out of inventory. Reported costs are on a cost of goods sales basis, rather than a production costs basis. Because Celanese was drawing down its inventory in 2020, its costs increased as those previously produced units were sold in 2020 and the associated costs were carried into 2020 from earlier periods as the product was sold. CR/PR at VI-10, n.7.

[173] 19 U.S.C. § 1677(7)(F)(ii).

[174] 19 U.S.C. § 1677(7)(F)(ii).

[175] These factors are as follows:

(I) if a countervailable subsidy is involved, such information as may be presented to it by the administering authority as to the nature of the subsidy (particularly as to whether the countervailable

B. Likely Volume

In section IV.B above, we found subject import volume and the increase in that volume to be significant, both in absolute terms and relative to apparent U.S. consumption. As explained in section IV.D, however, the increase in subject import volume and market share did not occur at the expense of the domestic industry, which increased its market share *** percentage points between 2017 and 2019 and maintained nearly all of these market share gains in interim 2020.[176]

The record indicates that the subject industry, consisting of KPIC, possessed little unused capacity at the end of the POI with which it could significantly increase exports to the United States. Although KPIC's production capacity increased from *** pounds in 2017 to *** pounds in 2019, it was *** lower in interim 2020 (*** pounds) than in interim 2019 (*** pounds) and is projected to increase only to *** pounds in 2021.[177] Furthermore, KPIC's rate of

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subsidy is a subsidy described in Article 3 or 6.1 of the Subsidies Agreement) and whether imports of the subject merchandise are likely to increase,

(II) any existing unused production capacity or imminent, substantial increase in production capacity in the exporting country indicating the likelihood of substantially increased imports of the subject merchandise into the United States, taking into account the availability of other export markets to absorb any additional exports,

(III) a significant rate of increase of the volume or market penetration of imports of the subject merchandise indicating the likelihood of substantially increased imports,

(IV) whether imports of the subject merchandise are entering at prices that are likely to have a significant depressing or suppressing effect on domestic prices and are likely to increase demand for further imports,

(V) inventories of the subject merchandise,

(VI) 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,

…

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

(IX) any other demonstrable adverse trends that indicate the probability that there is likely to be material injury by reason of imports (or sale for importation) of the subject merchandise (whether or not it is actually being imported at the time).

19 U.S.C. § 1677(7)(F)(i). To organize our analysis, we discuss the applicable statutory threat factors using the same volume/price/impact framework that applies to our material injury analysis. Statutory threat factors (I), (II), (III), (V), and (VI) are discussed in the analysis of subject import volume. Statutory threat factor (IV) is discussed in the analysis of subject import price effects. Statutory factors (VIII) and (IX) are discussed in the analysis of impact. Statutory factor (VII) concerning agricultural products is inapplicable to this investigation.

[176] CR/PR at Table IV-5.

[177] CR/PR at Table VII-3. KPIC *** but also reported ***. *Id*. at Table VII-2.

capacity utilization was a high *** percent in 2019 and *** percent in interim 2020, leaving little unused capacity, and is projected to remain over *** percent through 2021.[178] The record also indicates that KPIC has no plans to expand its UHMWPE production capacity.[179]

We also observe that the vast majority of KPIC's total shipments during the POI, ranging from *** to *** percent, were directed to its home market or exported to third country markets.[180] Although KPIC is export oriented, exporting between *** percent and *** percent of its total shipments over the POI,[181] KPIC's exports to the U.S. market accounted for a maximum of *** percent of its total shipments during the POI, and this ratio is projected to increase little through 2021.[182] Consistent with this projection, both Respondent's and Petitioner's representatives testified at the hearing that prices for UHMWPE do not vary substantially across global markets, providing KPIC with little or no economic incentive to break its contractual commitments with customers in third country markets to shift exports to the U.S. market.[183]

The record also reflects that, while KPIC's production lines are flexible, any product shifting from the production out-of-scope merchandise to in-scope UHMWPE would impose substantial costs, such as production shutdowns and increased incidents of off-spec production following the shift.[184] As previously discussed in section IV.B.3., UHMWPE producers must operate their production facilities continuously at optimum levels to maximize their profitability. Accordingly, the potential for production interruptions would serve as a deterrent to KPIC shifting production from out-of-scope to in-scope merchandise. Moreover, a representative of KPIC testified that there are high growth opportunities for sales of out-of-scope polyethylene, such as very high molecular weight polyethylene, in third country markets, which would further disincentivize KPIC from shifting production away from out-of-scope merchandise in favor of UHMWPE.[185]

U.S. inventories of subject imports increased irregularly from *** pounds in 2017 to *** pounds in 2019, but were lower in interim 2020 (*** pounds) than in interim 2019 (***).[186]

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[178] CR/PR at Table VII-3.

[179] CR/PR at Table VII-2, note; Hearing Tr. at 111 (Kim).

[180] CR/PR at Table VII-3.

[181] CR/PR at Tables VII-3 and VII-5.

[182] CR/PR at Table VII-3.

[183] Hearing Tr. at 95 (Kelly) and 180 (Cho); *see* KPIC Posthearing Br., Exhs. 22–24. There are no known antidumping or countervailing duty orders on UHMWPE imported from Korea in third country markets. CR/PR at VII-12.

[184] KPIC Prehearing Br. at 78–79; Hearing Tr. at 109 (Kim).

[185] KPIC Prehearing Br. at 74–75; Hearing Tr. at 180 (Cho).

[186] CR/PR at Table VII-6.

Although KPIC's end-of-period inventories also increased from *** pounds in 2017 to *** pounds in 2019, they were also lower in interim 2020 (*** pounds) than in interim 2019 (*** pounds) and are projected to be at *** the level of 2019 in 2020 and 2021.[187] Increased subject import inventories between 2017 and 2019 did not correspond to an injurious increase in subject import volume, and the declining trend in such inventories towards the end of the POI does not indicate a likelihood of increased subject imports.

Further decreasing the likelihood of any imminent increase in subject import volume, Braskem's certification by an increasing number of purchasers will provide U.S. purchasers with an additional source of domestic supply with which to dual source UHMWPE as a hedge against supply interruptions.[188] Moreover, ***.[189]

In sum, the record shows that KPIC lacks the unused capacity to significantly increase its volume of exports to the United States, that it would have difficulty shifting production from out-of-scope merchandise to in-scope merchandise, and that it would have little incentive to do so. KPIC also has little incentive to shift exports from third country markets[190] to the United States, given its substantial exports and contractual commitments to customers in third-country markets and the similar pricing across markets.[191] Furthermore, in light of the experience during the POI, any potential increase in subject import volume is likely to come primarily at the expense of nonsubject imports, which held *** percent of U.S. apparent domestic consumption in 2019 and *** percent of consumption in the interim 2020 period, and not the domestic industry. For these reasons, we find that subject imports are unlikely to increase significantly in the imminent future.

C. Likely Price Effects of Subject Imports

In section IV.D above, we found predominant underselling by the subject imports. However, we also found that, notwithstanding the presence of a significant volume of subject imports, subject imports did not have price depressing or suppressing effects, nor did lower priced subject imports result in significant lost sales or market share for domestic producers. We accordingly found that subject imports did not have significant effects on prices for the domestic like product.

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[187] CR/PR at Table VII-3.

[188] CR/PR at II-16 and n.38.

[189] Affidavit of Brian Trymbiski, KPIC Prehearing Br. at Exh. 1 (explaining that ***.).

[190] KPIC Posthearing Br., Response to Commission's Questions at 73 and Exhs. 22–24.

[191] KPIC Posthearing Br., Exhs. 22–24. Petitioner did not allege that KPIC would shift exports from third-country destinations to the U.S. market.

The evidence of record does not indicate that subject import underselling is likely to intensify.[192] Nor is there any evidence of a likely imminent change in conditions of competition that would result in subject imports having price depressive or suppressive effects on domestic industry prices. Contrary to Petitioner's claims that low contract prices will prevent the domestic industry from raising prices to cover increasing ethylene costs,[193] increasing volumes of subject imports did not prevent domestic producers from *** the sales price of their ***, during the POI or Celanese from ***.[194]

We are unpersuaded by Petitioner's argument that prices negotiated in long term contracts are affected by subject import competition.[195] As discussed in section IV.D., we do not find that subject imports had a significant depressive or suppressive effect on domestic prices during the POI. And, as previously discussed, we do not find that underselling by subject imports led to lost sales due primarily to price or to lost market share. Furthermore, while some of the call sheets submitted by Petitioner appear to reflect pricing pressure from subject imports during contract negotiations, Petitioner failed to submit documentation reflecting that contracts had been completed at lower prices pursuant to these negotiations.[196]

Accordingly, we find that subject imports are unlikely to enter at prices that would be likely to have a significant depressing or suppressing effect on domestic prices or that would be likely to increase demand for further subject imports in the imminent future. In addition, in light of our finding above regarding the absence of lost sales or market share due to the lower price of subject imports and the absence of evidence that the non-price reasons for the purchase of subject imports are likely to change in the imminent future, we find that subject imports are also unlikely to result in significant lost sales or market share for domestic producers in the imminent future.

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[192] ***. Such price negotiations do not support that subject import underselling will worsen in future. *** Questionnaire Follow-Up with USITC Staff, EDIS Doc. *** (Mar. 1, 2021) at 1; Hearing Tr. at 159-160 (Trymbiski).

[193] Celanese Prehearing Br. at 38–39, 50–51. Large purchaser ***, indicating that at least with respect to some sales there is the opportunity to directly pass on rising raw material costs. CR/PR at V-5.

[194] CR/PR at Tables V-9 and VI-3. As discussed in section IV.D., above, Braskem's rising COGS to net sales ratio was attributable to factors other than low priced subject imports.

[195] Celanese Prehearing Br. at 46–48.

[196] *See* Celanese Posthearing Br., Exh. 3.

D. Likely Impact of Subject Imports

We found in section IV.E above that the domestic industry's performance improved by many measures during the POI. Notwithstanding increases in subject imports throughout the POI, the industry's operating income to net sales ratio increased from *** percent at the beginning of the period to *** in interim 2020.[197] Additionally, despite reporting in its questionnaire response that subject imports ***, Petitioner was able to make a $***[198] and *** was able to successfully initiate and ramp up production in the United States. At the end of the POI, the domestic industry was healthy and well positioned to capitalize on projected demand growth, particularly in the EV market segment.[199]

In light of our findings that there is not likely to be a significant increase in subject import volume during the imminent future and that subject imports will not likely have significant price effects, we find that subject imports will not likely have a significant impact on the domestic industry in the imminent future.

VI. Conclusion

For the reasons stated above, we determine that an industry in the United States is neither materially injured nor threatened with material injury by reason of subject imports of UHMWPE from Korea that are sold in the United States at less than fair value.

[197] CR/PR at Tables VI-3 and C-1.

[198] CR/PR at VI-11 n.8, VI-15, Table VI-7; Celanese Posthearing Br. at Exh. 6. ***, *id*. at Table VI-7, we find such negative effects unlikely given ***. *See id.* at II-16 and n.38, Table VI-3. Indeed, ***. *Id.* at II-16.

[199] CR/PR at II-11; Hearing Tr. at 23 (Kelly) ("Additional end use innovations ensure that U.S. demand will grow. The North American market is expected to grow at a compound annual growth rate of over 6 percent, reaching sales of 270 million by 2026. Worldwide demand for ultra-high is also forecasted to grow significantly over the next 10 years, due to its use in lithium ion battery separators, which will grow as the electric vehicle market grows, both in the U.S. and around the world.").

Part I: Introduction

Background

This investigation results from a petition filed with the U.S. Department of Commerce ("Commerce") and the U.S. International Trade Commission ("USITC" or "Commission") by Celanese Corporation, Irving, Texas, effective March 4, 2020, alleging that an industry in the United States is materially injured and threatened with material injury by reason of less-than-fair-value ("LTFV") imports of ultra-high molecular weight polyethylene ("UHMWPE")[1] from Korea. The following tabulation provides information relating to the background of this investigations.[2] [3]

Effective date	Action
March 4, 2020	Petition filed with Commerce and the Commission; institution of the Commission's investigation (85 FR 13922, March 10, 2020)
March 24, 2020	Commerce's notice of initiation (85 FR 17861, March 31, 2020)
April 20, 2020	Commission's preliminary determinations (85 FR 23063, April 24, 2020)
October 6, 2020	Commerce's preliminary determination (85 FR 63095, October 6, 2020); scheduling of final phase of the Commission's investigation (85 FR 66576, October 20, 2020)
February 18, 2021	Commission's hearing
February 25, 2021	Commerce's final determination (86 FR 11497, February 25, 2021)
March 22, 2021	Commission's vote
April 12, 2021	Commission's views

[1] See the section entitled "The subject merchandise" in Part I of this report for a complete description of the merchandise subject in this proceeding.

[2] Pertinent *Federal Register* notices are referenced in appendix A, and may be found at the Commission's website (www.usitc.gov).

[3] Appendix B presents the witnesses who participated in the Commission's hearing.

Statutory criteria

Section 771(7)(B) of the Tariff Act of 1930 (the "Act") (19 U.S.C. § 1677(7)(B)) provides that in making its determinations of injury to an industry in the United States, the Commission--

> *shall consider (I) the volume of imports of the subject merchandise, (II) the effect of imports of that merchandise on prices in the United States for domestic like products, and (III) the impact of imports of such merchandise on domestic producers of domestic like products, but only in the context of production operations within the United States; and. . . may consider such other economic factors as are relevant to the determination regarding whether there is material injury by reason of imports.*

Section 771(7)(C) of the Act (19 U.S.C. § 1677(7)(C)) further provides that--[4]

> *In evaluating the volume of imports of merchandise, the Commission shall consider whether the volume of imports of the merchandise, or any increase in that volume, either in absolute terms or relative to production or consumption in the United States is significant.. . .In evaluating the effect of imports of such merchandise on prices, the Commission shall consider whether. . .(I) there has been significant price underselling by the imported merchandise as compared with the price of domestic like products of the United States, and (II) the effect of imports of such merchandise otherwise depresses prices to a significant degree or prevents price increases, which otherwise would have occurred, to a significant degree.. . . In examining the impact required to be considered under subparagraph (B)(i)(III), the Commission shall evaluate (within the context of the business cycle and conditions of competition that are distinctive to the affected industry) all relevant economic factors which have a bearing on the state of the industry in the United States, including, but not limited to. . . (I) actual and potential decline in output, sales, market share, gross profits, operating profits, net profits, ability to service debt, productivity, return on investments, return on assets, and utilization of capacity, (II) factors affecting domestic prices, (III) actual and potential negative effects on cash flow, inventories, employment, wages, growth, ability to raise capital, and investment, (IV) actual and potential negative effects on the existing development and production efforts of the domestic industry, including efforts to develop a derivative or more advanced version of the domestic like product, and (V) in {an antidumping investigation}, the magnitude of the margin of dumping.*

[4] Amended by PL 114-27 (as signed, June 29, 2015), Trade Preferences Extension Act of 2015.

In addition, Section 771(7)(J) of the Act (19 U.S.C. § 1677(7)(J)) provides that—[5]

(J) EFFECT OF PROFITABILITY.—The Commission may not determine that there is no material injury or threat of material injury to an industry in the United States merely because that industry is profitable or because the performance of that industry has recently improved.

Organization of report

Part I of this report presents information on the subject merchandise, dumping margins, and domestic like product. Part II of this report presents information on conditions of competition and other relevant economic factors. Part III presents information on the condition of the U.S. industry, including data on capacity, production, shipments, inventories, and employment. Parts IV and V present the volume of subject imports and pricing of domestic and imported products, respectively. Part VI presents information on the financial experience of U.S. producers. Part VII presents the statutory requirements and information obtained for use in the Commission's consideration of the question of threat of material injury as well as information regarding nonsubject countries.

Market summary

UHMWPE is incorporated into a wide-variety of applications in multiple industries, including construction, agriculture, material handling, transportation, textile, pulp and paper, food and beverage, mining, marine, plastics, oil and gas, high performance fibers, battery separators, and wastewater treatment. Some of the latest and fastest growing applications for UHMWPE include battery separators for lithium ion batteries used in electric vehicles and ballistic grade protective gear, such as helmets and body armor. The two known U.S. producers of UHMWPE are Celanese Corp. ("Celanese") and Braskem America, Inc. ("Braskem"), while the single known producer of UHMWPE in Korea is Korea Petrochemical Ind. Co., Ltd. ("KPIC"). The leading U.S. importers of UHMWPE from Korea are *** and ***. Leading importers of UHMWPE from nonsubject countries (primarily Belgium, Brazil, Germany and the Netherlands) include ***, ***, ***, and ***. Leading purchasers include *** and ***.

[5] Amended by PL 114-27 (as signed, June 29, 2015), Trade Preferences Extension Act of 2015.

Apparent U.S. consumption of UHMWPE totaled approximately *** pounds *** in 2019. Currently, Celanese and Braskem are the only known producers UHMWPE in the United States. U.S. producers' U.S. shipments of UHMWPE totaled *** pounds *** in 2019, and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value. U.S. importers' U.S. shipments of UHMWPE from Korea totaled *** pounds *** in 2019 and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value. U.S. importers' U.S. shipments from nonsubject sources totaled *** pounds *** in 2019 and accounted for *** percent of apparent U.S. consumption by quantity and *** percent by value.

Summary data and data sources

A summary of data collected in this investigation is presented in appendix C, table C-1. Except as noted, U.S. industry data are based on questionnaire responses of two firms that accounted all known U.S. production of UHMWPE during 2019.[6] U.S. imports are based on the questionnaire responses of ten firms accounting for the large majority of U.S. imports of UHMWPE in 2019, including all such imports from Korea.[7] Foreign industry data were provided by KPIC, the firm solely responsible for UHMWPE production in Korea and exportation from Korea to the United States.

Previous and related investigations

UHMWPE has not been the subject of any prior antidumping duty investigations in the United States. Furthermore, UHMWPE from Korea has not been subject to other import relief proceedings under Sections 201 and 301 of the Trade Act of 1974.

[6] Petition, exh. GEN-11.
[7] Petition, exh. GEN-9.

Nature and extent of sales at LTFV

Sales at LTFV

On October 6, 2020, Commerce published a notice in the *Federal Register* of its preliminary determination of sales at LTFV with respect to imports from Korea.[8] On February 25, 2021, Commerce published a notice of its final determination of sales at LTFV with respect to imports from Korea.[9] Table I-1 presents Commerce's dumping margins with respect to imports of UHMWPE from Korea.

Table I-1
UHMWPE: Commerce's weighted-average LTFV margins with respect to imports from Korea

Exporter	Producer	Preliminary dumping margin (percent)	Final dumping margin (percent)
KPIC	KPIC	7.80	7.84
All others		7.80	7.84

Source: 85 FR 63095, October 6, 2020; 86 FR 11497, February 25, 2021

The subject merchandise

Commerce's scope

In the current proceeding, Commerce has defined the scope as follows:[10]

> *The merchandise covered by the scope is ultra-high molecular weight polyethylene. Ultra-high molecular weight polyethylene is a linear polyethylene, in granular or powder form is defined by its molecular weight, as defined by Margolie's Equation, of greater than 1.0 × 106 g/mol. Ultra-high molecular weight polyethylene may also be defined by its melt mass-flow rate of <0.1 g/10 min, measured at 190 °C and 21.6 kg load, based on the methods and calculations set forth in the International Organization for Standardization (ISO) standards 21304-1 and 21304-2. Ultra-high molecular weight polyethylene has a Chemical Abstract Service (CAS) registry number of 9002-88-4.*

[8] 85 FR 63095, October 6, 2020.
[9] 86 FR 11497, February 25, 2021.
[10] 86 FR 11497, February 25, 2021.

The scope includes all ultra-high molecular weight polyethylene in granular or powder forms meeting the above specifications regardless of additives introduced in the manufacturing process. Ultra-high molecular weight polyethylene blended with other products is included in the scope of this investigation where ultra-high molecular weight polyethylene accounts for more than 50 percent, by actual weight, of the blend and the resulting blend maintains a molecular weight, as defined by Margolie's Equation, of greater than 1.0 × 106 g/mol and/or a melt mass-flow rate of <0.1 g/10 min.

Excluded from the scope of the investigation is medical-grade ultra-high molecular weight polyethylene. Medical grade ultra-high molecular weight polyethylene has a minimum viscosity of 2,000 ml/g at a concentration of 0.02% at 135 °C (275 °F) in decahydronaphthalene and an elongational stress of 0.2 MPa or greater. Medical-grade ultra-high molecular weight polyethylene is further defined by its ash and trace element content, which shall not exceed the following maximum quantities as set forth in ISO-5834-1: Ash (125 mg/kg), titanium (40 mg/kg), calcium (5 mg/kg), chlorine (30 mg/kg), and aluminum (20 mg/kg). ISO 5834-1 further defines medical grade ultra-high molecular weight polyethylene by its particulate matter content, which requires that there shall be no more than three particles of contaminant per 300 ± 20 g tested. Each of the above criteria is calculated based on the standards and methods used in ISO 5834-1.

The subject merchandise

Tariff treatment

Based upon the scope set forth by Commerce, information available to the Commission indicates that the merchandise subject to this investigation is currently imported under subheadings 3901.10.10 and 3901.20.10, which both cover polyethylene based on specific gravity and relative viscosity. The 2021 general rate of duty is 6.5 percent *ad valorem* for HTSUS both statistical reporting numbers 3901.10.1000 and 3901.20.1000. UHMWPE produced in China is subject to an additional 25 percent ad valorem duty under Section 301 of the Trade Act of 1974.[11] Decisions on the tariff classification and treatment of imported goods are within the authority of U.S. Customs and Border Protection.

[11] The Section 301 duties became effective on August 23, 2018 and remained the same rate for HTS 3901.10.10 and 3901.20.10; 83 FR 40823, pp. 40823-40838. The U.S. Trade Representative has not (continued...)

The product

Description and applications

The imported product subject to this investigation, UHMWPE, is an extremely high viscosity, substantially linear polyethylene, typically in the form of a granule or powder.[12] UHMWPE belongs to the polyethylene (PE) family of polymers, which includes high density polyethylene (HDPE), low density polyethylene (LDPE), linear low density polyethylene (LLDPE), high molecular weight polyethylene (HMWPE) and very-high molecular weight polyethylene (VHMWPE). One physical distinction UHMWPE has from its family members is its higher molecular weight.[13] The molecular weight of HDPE typically ranges from 50,000 to 250,000 grams per mole, [14] while UHMWPE produced by the petitioner ranges from 3.4 million to 10.2 million grams per mole.[15] UHMWPE has extremely long polymer chains, and these longer chains serve to transfer load more effectively to the polymer backbone by strengthening

granted any exclusions for HTS 3901.10.10 or 3901.20.10 from Section 301 duties under 9903.88.02. Harmonized Tariff Schedule of the United States, Chapter 99 Preliminary Revision 1, USITC Publication 5155, January 2021.

[12] Petitioner's product for UHMWPE meets the specifications set by ASTM specification D4020 and/or ISO specifications 21304- 1 and 21304-2.

[13] The respondent, in general, deems its products to be ultra-high, very-high, or high molecular weight polyethylene using the following divisions: "High" molecular weight products have a molecular weight less than approximately 300,000 g/mole; "Very-high" molecular weight products have a molecular weight between approximately 300,000 g/mole and 1 million g/mole; and "Ultra-high" molecular weight products have a molecular weight above approximately 1 million g/mole. Petitioner has defined the scope of this proceeding as UHMWPE with a melt mass flow rate of 0.1g/10 min measured at 190 °C and 21.6 kg load, based on the methods and calculations set forth in ISO standards 21304-1 and 21304-2. Respondent states UHMWPE with this viscosity has molecular weight of above approximately 1 million g/mole. Respondent states they export one product grade of very-high molecular weight to the U.S. that falls within the scope, which is used for Lithium-ion 2nd Battery Separators. Postconference answers to staff questions, pp. 5, 7. Petitioner produces very-high molecular weight polyethylene and states very high molecular weight polyethylene is out-of-scope. Petitioner's postconference brief, Exhibit 23, answers to staff questions, pp. 15-16.

[14] Urkac, Sadiye, "Characterization of Ultra high molecular weight polyethylene modified by metal gas hybrid ion implantation technique," 2006. https://www.semanticscholar.org/paper/Characterization-of-Ultra-High-Molecular-Weight-by-Sokullu-Emel/3d64144496685596e85483c2bf6607139dee908f.

[15] Petitioner states the respondent KPIC produces UHMWPE from 3.7 million to 9 million grams per mole, and that the grades and specifications are similar. Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 3.

intermolecular interactions. This causes the material to be very tough and gives it the highest impact strength of the polyethylenes.[16]

UHMWPE has unique characteristics which include low coefficient of friction, nonstick surface, chemical resistance, energy absorption, and abrasion resistance. It is 15 times more resistant to abrasion than carbon steel.[17] UHMWPE can be molded by downstream end users for processing into various finished products. It is used for unique applications and end-uses compared to other polyethylene products, including applications that require a higher level of durability and resistance. It can be used in certain high-strength applications in the following industries: construction, agriculture, material handling, transportation, textile, pulp and paper, food and beverage, mining, marine applications, porous plastics, oil and gas, high performance fibers, battery separators and wastewater treatment.[18]

Some examples of products made from the lower molecular weight polyethylenes such as HDPE, LDPE, and LLDPE include food packaging, non-food containers, plastic toys, and plastic bags.[19] Comparatively, UHMWPE is used to create fibers that are used in demanding, high strength applications such as ballistic and slash-proof armor.[20] As for ballistic-grade production devices, other polyethylene materials do not possess the requisite mechanical properties to adequately serve these purposes. LDPE, LLDPE, HDPE, and VHMWPE are significantly lower in fiber properties as measured by tenacity and would thus be inferior in energy absorption required for ballistic applications. For use in ballistic-grade production devices, UHMWPE possesses the necessary tensile strength that other PE fibers do not possess.[21]

Other products the fibers are used to manufacture include snowboards, skis, cut-resistant gloves, bow strings, climbing equipment, fishing line, spear lines for spear-guns, high performance sails, suspension lines on sport parachutes and paragliders, rigging in yachting, tow lines for boating, kites, and kite lines for kite sports. UHMWPE is also used in the production of specialty plectrums for guitar and other stringed instruments. UHMWPE is used in the manufacturing of products in other end applications such as food processing equipment,

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[16] Chen, Kevin, "Polyethylene UHMWPE, HDPE, LDPE, LLDPE—What are the differences?" https://www.klusster.com/portfolios/energetic-plastics/contents/8126, retrieved March 1, 2021.

[17] Petition, p. 9.

[18] Petition, pp. 15-16.

[19] Omnexus, "Polyethylene." https://omnexus.specialchem.com/selection-guide/polyethylene-plastic, retrieved January 8, 2020.

[20] Crouch, Ian, "Body Amour, New Materials, New Systems," Defence Technology, February 27, 2019. https://www.researchgate.net/publication/331378144_Body_armour_-_New_materials_new_systems.

[21] Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 10.

water treatment, conveyor lines, wear strips, bearings, gears, pistons, valves, marine equipment, and wet environments that require regular harsh cleaning.[22]

In certain applications, UHMWPE can replace steel. UHMWPE is best suited to replace steel in applications where wear resistance, toughness, weight and noise reduction are key considerations. These include chain/belt drivers, curved guides, chain and belt deflecting and tensioning devices, bearing bushes, track disks and impact-absorbing elements. Sheets of UHMWPE (e.g. 8-20 mm thickness) are often used for lining silos, bunkers, chutes, truck loading platforms, dump trucks, rail wagons, and ships' holds.

Furthermore, UHMWPE's sufficiently high tensile properties make it a replacement to certain steel products. UHMWPE is already widely used as a safer and stronger alternative to steel wire rope for heavy duty rigging and other maritime uses. UHMWPE rope is stronger, lighter, has higher abrasion resistance, and less recoil force than steel wire rope, while it also floats and is water resistant. While the tensile strength of ultra-high strength steel can be 780 MPa or higher, the tensile strength of UHMWPE fibers can exceed 3000 MPa, making it an ideal alternative for heavy duty rigging applications such as in mooring, maritime, and towing use.[23]

One industry source divides the UHMWPE applications into sheets, extruded irregular products, pipe, fibers, medical use, and other.[24] The industry can also be divided by molecular weight.[25] Respondent KPIC divides the vast majority of UHMPWE end users into two main categories: 1) companies that take the UHMWPE resin granules, heat it, and extrude it into stock shapes, and 2) producers of battery separators.[26] The Commission's questionnaire collected data into 3 categories of low, medium, and high UHMWPE.[27] All grades of UHMWPE generally have high wear resistance, high impact resistance, low friction, high chemical resistance, no moisture absorption, and good electrical insulation. In general, each of these characteristics are more pronounced the higher the molecular weight. However, higher molecular weights also are less processable. The higher molecular weight leads the product to be significantly more viscous. In evaluating the appropriate molecular weight for a downstream product, UHWMPE end users are typically evaluating the trade-off between the desirable

[22] Petition, p. 9.

[23] Petitioner's postconference brief, Exhibit 23, answers to staff questions, pp. 11-12.

[24] Petition, exhibit GEN-15, p. 93.

[25] Petition, exhibit GEN-15, p. 90. The categories are UHMWPE high, medium, and low range molecular weights.

[26] Respondent KPIC posthearing brief, response to the Commission's questions, p. 22

[27] The USITC questionnaires defined UHMWPE low molecular weight as less than 6.7×10^6 g/mol, UHMWPE medium molecular weight as 6.7×10^6 to 7×10^6 g/mol (inclusive), and UHMWPE high molecular weight as greater than 7×10^6 g/mol.

UHMWPE characteristics for their applications—wear resistance, impact resistance, friction, etc., and the potential difficulty processing the material as it becomes more viscous.[28]

Manufacturers can sell wide spec UHMWPE,[29] which is material specifications that are wider than the target range when material was produced (e.g., color, intrinsic viscosity) for a grade sold by a producer for a specific end use.[30] During the normal production process, wide spec is produced in predictable volumes when the production process moves from one product to another.[31] It is UHMWPE that producers assert does not meet the precise molecular weight and size required of a particular UHMWPE product.[32] [33]

[28] Respondent's posthearing brief, p. 77.

[29] KPIC prehearing brief, p. 13.

[30] World Polymers, "Industry Abbreviations and Definitions" http://www.worldpolymers.com/definitions.html, retrieved March 4, 2021; IHS Markit, Chemical Economics Handbook, Plastics Recycling, December 20, 2019, p. 31.

[31] Petitioner states that purchasers agree to specific volumes and values for wide spec just as they would for any other grade of UHMWPE, and that the product is sold and allotted its own separate contract price. Petitioner states that the price for wide spec is not built into the price of other grades and is not used to discount the per unit price of other UHMWPE products. Petitioner's posthearing brief, Exhibit 2, page 38.

[32] KPIC reported that it rarely sells wide spec product and did not sell any in the United States during the period of investigation and reported Celanese and Braskem regularly do so. Wide spec UHMWPE is typically ***. Respondent's posthearing brief, p. 52.

[33] One source indicates that wide spec high density polyethylene, an out-of-scope polyethylene similar to UHMWPE, has a lower price than prime grade. OPIS, PetrochemWire, "Polyethylene Weekly: A Review of Price Movements, Operations, and News," October 11, 2018, https://www.petrochemwire.com/wp-content/uploads/2019/03/Polyethylene-Weekly.pdf.

Different grades of UHMWPE are sold based upon their molecular weight, as well as physical, mechanical, thermal, and electrical characteristics.[34] Celanese produces 36 different grades of UHMWPE, while KPIC produces at least 8 different grades.[35] [36] Celanese states it has four grades that are similar to those that KPIC regularly exports,[37] [38] which are at the following molecular weights in table I-2:

Table I-2
UHMWPE: Comparison of product grades

Item	Celanese Molecular Weight (g/mole)/ Grade name	KPIC Molecular Weight (g/mole)/ Grade name
Grade 1	5.0 x 10^6 (GUR 4112)	5.0 x 10^6 (U050)
Grade 2	5.4 x 10^6 (GUR 4020-3)	5.5 x 10^6 (U050F)
Grade 3	3.7 x 10^6 (GUR 4113)	3.7 x 10^6 (U050H)
Grade 4	8.7 x 10^6 (GUR 4150)	9.0 x 10^6 (U090)

Source: Petitioner's posthearing brief, Exhibit 2, p. 30.

UHMWPE high molecular weight products have the most pronounced of all UHMWPE qualities. They have extremely high wear resistance, extremely high impact resistance, extremely low friction, but also extremely difficult processability (most viscous). Products in this molecular weight tier are primarily used in compression molding and ram extrusion

[34] Celanese website example, "GUR 4150" https://tools.celanese.com/products/datasheet/SI/GUR%C2%AE%204150; retrieved March 4, 2021; KPIC website example, "U090," http://www.kpic.co.kr/hp/en/product/polymer/pol_grade.asp?grade=U090&pm_cd=2C00; retrieved March 1, 2021.

[35] Celanese website, "Grade Filter," search term ultra high molecular weight polyethylene (PE-UHMW), https://tools.celanese.com/products, retrieved March 10, 2021; KPIC website, "Products: UHMWPE" http://www.kpic.co.kr/hp/en/product/polymer/pol_grp.asp?pm_cd=2C00, retrieved March 10, 2021.

[36] Celanese contends that different grades of UHMWPE can be utilized across the same applications and end uses based on customer needs and specifications. Petitioner's posthearing brief, Exhibit 2, p. 29.

[37] The grades of Celanese and KPIC have the same or similar specific gravities and densities. Petitioner's posthearing brief, Exhibit 2, p. 30.

[38] Celanese's information on grades on its website includes grades at 6.7 x 10^6 g/mol (GUR 4130, GUR 4523, GUR X 195, and GUR 5523). KPIC sells 2 grades at 7 x 10^6 g/mol (U070, U070H), which are listed on its website. Both companies' products are in the medium range of molecular weights from USITC questionnaire data. Celanese website, "Grade Filter," search term ultra high molecular weight polyethylene (PE-UHMW), https://tools.celanese.com/products, retrieved March 10, 2021; KPIC website, "Products: UHMWPE" http://www.kpic.co.kr/hp/en/product/polymer/pol_grp.asp?pm_cd=2C00, retrieved March 10, 2021.

applications. If the product has a low enough particle size it can also be used as a battery separator for regular (not EV) battery separators.[39]

UHMWPE medium molecular weight products have good wear resistance, good impact resistance, and relatively low friction—but not as good as high molecular weight products. However, these products are also more processable than high molecular weight products. This molecular weight is also primarily used in compression molding, ram extrusion, and (non-EV) battery separator applications.[40]

UHMWPE low molecular weight as products generally are more processable than higher-weight UHMWPE. The trade-off for better processability is that impact strength and wear resistance are not as high as higher-weight UHMWPE. Unlike medium-weight UHMWPE, low molecular weight UHMWPE is able to be spread thinly enough to be used as EV battery separators.[41]

Battery separator end users, whether for EV or non-EV batteries, generally require low- to medium-molecular weight UHMWPE. Battery separators are typically produced using thermally induced phase separation. The UHMWPE is dissolved into a dilutant, extruded, and then processed into a film. Battery separator manufacturers typically cannot use the higher molecular weights as they are too viscous and have decreased processability.[42]

[39] In addition, ***, KPIC's largest U.S. customer, produces stock shapes. Respondent's posthearing brief, pp. 23, 77. KPIC contends that ***. KPIC, prehearing brief, pp. 38, 40.

[40] Respondent's posthearing brief, p. 77.

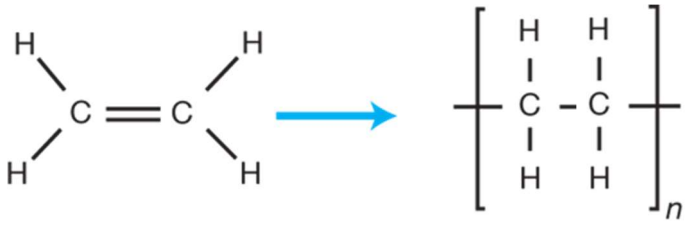
[41] All of KPIC's EV battery separator sales are in this category. Respondent's posthearing brief, pp. 77-78.

[42] EV batteries require a particularly thin film, and end users may purchase grades nearing or exceeding the lowest molecular weight threshold of the Commission's investigation at 1×10^6 g/mol.

Manufacturing processes

In general, the manufacturing process begins with the raw material of ethylene. Numerous ethylene molecules form a polymer via a catalyst and under pressure, as shown in Figure 1. Ethylene accounts for 99 percent of the raw material used in the chemical reaction.[43] A catalyst is used in the reaction, and for UHMWPE, several alternatives can be used, such as metallocene or Ziegler-Natta catalysts. The catalyst used in the manufacturing process is essential to producing the UHMWPE structure.[44]

Figure 1-1:
UHMWPE: Chemical structures and reaction to create polyethylene through the reaction of multiple ethylene molecules in the presence of catalyst



Ethylene Polyethylene

Note: Where n = an integer of repeating units of C_2H_4

Source: Sharpe, "Making Plastics: From Monomer to Polymer," AIChE, September 2015. https://www.aiche.org/resources/publications/cep/2015/september/making-plastics-monomer-polymer; Reusch, "Polymers" retrieved March 10, 2021, https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/polymers.htm.

[43] Respondent postconference answers to staff questions, p. 4; Hearing transcript, p. 8 (Cannistra).

[44] KPIC uses a Titanium-based Ziegler-Natta catalyst method developed in-house. Respondent's postconference answers to staff questions, p. 1. Petitioner states the manufacturing process used by both Celanese and Braskem is a *** Celanese and Braskem (to the best of {Celanese's} understanding) use *** While the type of catalyst is the same there are many variants of *** that for the most part impact finished goods properties. To the best of {Celanese's} understanding they are not the same variant. Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 1. Braskem responded that it uses the ***. Communication with USITC staff, February 26, 2021.

The respondent states that to their available industry knowledge, producers Celanese, Braskem and KPIC use a slurry continuous stirred tank reactor (CSTR) process to effectuate the chemical mixing. The slurry CSTR process used by all three producers is similar.[45] However, there are unique proprietary methods for undertaking the Slurry CSTR process. UHMWPE producers wishing to use a proprietary process not their own must receive a license to undertake the particular proprietary process from the process patent-holder.[46]

During the manufacturing process, UHMWPE powder can be produced with different molecular weights, bulk densities, average particle size, and particle size distribution. The different combinations of these variables will impart different performance characteristics to the material.[47]

After monomer ethylene molecules have reacted in presence of catalyst to yield the polymer of ethylene, the resultant properties are measured by various methods. There are minor impurities such as the catalyst residue in the final product.[48] This is a small amount that would not affect the physical characteristics of UHMWPE, except in the case of medical grade products.[49] The total ash standard is one method for determining the amount of impurities in a product.[50] Extraneous matter impurities are measured and measured by an alcohol test.[51]

Both petitioner and respondent agree the molecular weight of UHMWPE is difficult to measure, and they use various methods to determine final product characteristics. The respondent applies intrinsic viscosity technical standards. KPIC uses intrinsic viscosity standard ISO 1628-3 and believes based on market intelligence that Braskem uses intrinsic viscosity standard ASTM D4020.[52] The petitioner uses material flow to characterize its final product.[53]

[45] Respondent's postconference answers to staff questions, p. 1.

[46] Respondent's postconference answers to staff questions, p. 1.

[47] Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 7.

[48] Respondent's postconference answers to staff questions, p. 2; Petitioner's postconference brief, answers to staff questions, p. 3.

[49] Respondent's postconference answers to staff questions, p. 2.

[50] This standard is used by KPIC. Respondent's postconference answers to staff questions, p. 2.

[51] Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 3.

[52] Respondent's postconference answers to staff questions, p. 2.

[53] Petitioner defines UHMWPE by its melt mass-flow rate of <0.1 g/10 min, measured at 190 °C and 21.6 kg load, based on the International Organization for Standardization (ISO) standards 21304-1 and 21304-2. Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 3.

For the final product that is sent to the United States, KPIC offers the following three package sizes for UHMWPE: 25 kg, 550 kg, and 1,100 kg.[54] The company is able to ship within a week of receiving a customer's confirmation of shipment volume. Although the ports and transit can cause unforeseen delays, their customers in the United States can get the product within 45 days.[55] U.S. producers ship a their products in packaging sizes of less than 100 kg, 100 to 1000 kg, and greater than 1000 kg.[56]

Domestic like product issues

No issues with respect to domestic like product have been raised in this investigation. The petitioner and respondent agreed in the preliminary phase of this investigation that the appropriate domestic like product is UHMWPE, co-extensive with the scope of the investigation.[57] [58] Neither party has contested the definition of the domestic like product in the final phase of this investigation.[59]

[54] Affidavit of Un Kyung Kim, General Manager, Business Division 1, KPIC Corporation, p.5, March 23, 2020.

[55] Hearing transcript, p. 112 (Kim).

[56] See Appendix D.

[57] Petitioner's postconference brief, p. 32; Respondent's postconference brief, p. 5.

[58] No party requested information regarding the domestic like product when providing comments on the draft questionnaires.

[59] Petitioner's prehearing brief, p. 4; Respondent's prehearing brief, p. 13.

Part II: Conditions of competition in the U.S. market

U.S. market characteristics

UHMWPE is typically produced as a granular or powdered substance that can be formed into solid stock shapes or profiles by downstream end users for processing into various finished products or used to make fibers. The product is used in a variety of industries, including construction, agriculture, material handling, transportation, textile, pulp and paper, food and beverage, mining, marine, porous plastics, oil and gas, and waste-water treatment.[1]

Domestically produced UHMWPE comprised a majority of apparent U.S. consumption during 2017-19. Two U.S. producers of UHMWPE supplied *** percent of the U.S. market in 2017, *** percent in 2018, and *** percent in 2019, through their U.S. production operations.[2] [3] Imports of UHMWPE from Korea accounted for *** percent of apparent U.S. consumption in 2017, increasing to *** percent in 2018 and to *** percent in 2019.[4] Imports of UHMWPE from nonsubject sources, primarily from Belgium, Brazil, Germany, Japan, and the Netherlands, collectively accounted for *** percent of apparent U.S. consumption in 2017, *** percent in 2018, and *** percent in 2019.[5] Overall, apparent U.S. consumption of UHMWPE increased from *** pounds in 2017 to *** pounds in 2019, a net increase of *** percent.

The two U.S. producers and 6 of 9 responding importers reported that there had not been significant changes in the product range, product mix, or marketing of UHMWPE since January 1, 2017. Three importers did report significant changes, noting the constant development of better fiber, a new UHMWPE producer in the United States (Braskem), and a customer's request for a product change.

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[1] Petition – Product Description, p. 8.

[2] Braskem established U.S. production operations in January 2017.

[3] *** also imported UHMWPE during the period for which data were collected; ***. U.S. shipments of these imports accounted for an additional *** percent of apparent U.S. consumption in 2017; *** percent in 2018; and *** percent in 2019. *** was the consignee for all of U.S. importer *** reported imports from *** in 2017 and 2018. *** began importing directly from *** and ceased importing through *** in 2019.

[4] The Commission received questionnaires from ten importers.

[5] In 2017, Brazil was the largest nonsubject source of imports, which accounted for *** percent of apparent U.S. consumption. The share of apparent U.S. consumption of imports from Brazil declined to *** in 2019 after Braskem started U.S. production.

U.S. purchasers

The Commission issued questionnaires to fourteen firms and received six usable questionnaire responses from firms that had purchased UHMWPE during 2017-19.[6] [7] Three responding purchasers are end users and three identified as "other".[8] In general, one responding U.S. purchaser was located in the Northeast United States, two in the Southeast, two in the Midwest, and one in the Northwest. The responding purchasers represent firms in the plastics industry. Large purchasers of UHMWPE include ***.

Channels of distribution

U.S. producers and importers of product from Korea mainly sold UHMWPE to end users while sales of nonsubject product fluctuated between distributors end users during the period for which data were collected (table II-1).[9]

[6] The following firms provided usable purchaser questionnaire responses: ***. ***.

[7] Of the six responding purchasers, six purchased the domestic UHMWPE, four purchased imports of the subject merchandise from Korea, and three purchased imports of UHMWPE from the Netherlands.

[8] Regarding the firms that reported other, *** considers itself a processor that presses UHMWPE into sheets and sells to distributors who then sell to end users; *** converts raw material to stock shape semi-finished goods, then sells into the North American distribution market; *** uses UHMWPE for molding and processing.

[9] Importer KPIC uses a sales agent, JAZ Associates, to sell its product to the U.S. market. Hearing transcript, p. 103 (Trymbiski).

Table II-1
UHMWPE: U.S. producers' and importers' U.S. shipments, by sources and channels of distribution, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Share of U.S. shipments (percent)				
U.S. producers: to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: Korea to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: Brazil to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: Germany to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: Japan to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: Netherlands to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: All other sources to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: Nonsubject to Distributors	***	***	***	***	***
to End users	***	***	***	***	***
U.S. importers: All sources: to Distributors	***	***	***	***	***
to End users	***	***	***	***	***

Note: All other sources include Belgium (***) and China (***). *** operates solely as a trading company for purposes of maximizing duty drawback recovery on exports of other merchandise of the same kind and quality.

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

Geographic distribution

U.S. producers reported selling UHMWPE to *** (table II-2). Two responding importers reported selling to the Northeast, Midwest, Southeast, and Central Southwest of the United States. 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. One of the responding importers (***) delivered 100 percent of its sales of UHMWPE within 100 miles of its U.S. point of shipment while the other responding importer (***) sold 100 percent within 100 miles of its storage facility.

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

Region	U.S. producers	Subject U.S. importers
Northeast	***	***
Midwest	***	***
Southeast	***	***
Central Southwest	***	***
Mountains	***	***
Pacific Coast	***	***
Other	***	***
All regions (except Other)	***	***
Reporting firms	2	2

Note: 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

Table II-3 provides a summary of the supply factors regarding UHMWPE from U.S. producers and the Korean producer.[10] U.S. producers and KPIC reported increased capacity during 2017-19. U.S. producers had *** inventories while KPIC had *** inventories. *** reported the ability to produce alternative products.

Table II-3
UHMWPE: Supply factors that affect ability to increase shipments to the U.S. market

Country	Capacity (1,000 pounds)		Capacity utilization (percent)		Inventories as a ratio to total shipments (percent)		Shipments by market in 2019 (percent)		Able to shift to alternate products
	2017	2019	2017	2019	2017	2019	Home market shipments	Exports to non-U.S. markets	No. of firms reporting "yes"
United States	***	***	***	***	***	***	***	***	***
Korea	***	***	***	***	***	***	***	***	***

Note: Data provided by two U.S. producers and one Korean producer are believed to account for all U.S. and Korean production and shipments. For additional data on the number of responding firms and their share of U.S. production and of U.S. imports from each subject country, please refer to Part I, "Summary Data and Data Sources."

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

Domestic production

Based on available information, U.S. producers of UHMWPE have the ability to respond to changes in demand with large changes in the quantity of shipments of U.S.-produced UHMWPE to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the availability of unused capacity, relatively large amounts of inventories, some ability to shift production to or from alternate products, and some ability to shift shipments from alternate markets.

[10] Petitioner identified one known producer and exporter of UHMWPE from Korea. Petition, p.12. The sole known producer of UHMWPE in Korea is KPIC.

U.S. producers' capacity utilization decreased slightly during 2017-19, as capacity and production increased.[11] [12] U.S. producers' inventories as a share of total shipments decreased from *** percent in 2017 to *** percent in 2019. U.S. producers' export shipments decreased from *** percent in 2017 to *** percent in 2019.[13] U.S. producer *** reportedly can produce *** on the same equipment as UHMWPE. Factors affecting the ability to shift production include ***. U.S. producer *** supply constraints during 2017-19.

Subject imports from Korea

Based on available information, the foreign producer KPIC has the ability to respond to changes in demand with moderate changes in the quantity of shipments of UHMWPE to the U.S. market. The main contributing factors to this degree of responsiveness of supply are ***. Factors mitigating responsiveness of supply include ***.

KPIC's capacity utilization increased each year during 2017-19, as production and production capacity increased.[14] KPIC reported that one production constraint is the ***. The producer reported an expansion at its Onsan factory in 2017, which produces ethylene, but the expansion does not result in increased UHMWPE capacity. KPIC's capacity of UHMWPE is determined by its Ulsan facility, which has not been expanded.[15] KPIC's export shipments as a share of its total shipments were *** in 2019 compared to 2017.[16] KPIC reportedly can produce *** on the same equipment as UHMWPE. Factors affecting the KPIC's ability to shift production include ***.

[11] Capacity increased by *** percent and production increased by *** percent during 2017-19.

[12] As reported in the preliminary phase of this investigation, ***. ***, email to USITC staff, March 31, 2020.

[13] Principal export markets reported ***.

[14] Capacity increased by *** percent and production increased by *** percent during 2017-19.

[15] Hearing transcript, p. 192 (Kim).

[16] KPIC's principal export markets were ***.

Imports from nonsubject sources

Nonsubject imports accounted for *** percent of total U.S. imports in 2019, down from *** percent in 2017. In 2017, the largest source of nonsubject imports was Brazil, which accounted for *** percent of nonsubject imports; the Netherlands accounted for *** percent, Germany accounted for *** percent, and Japan accounted for *** percent. The share of nonsubject imports from Brazil declined to *** percent in 2019, while Japan increased to *** percent, the Netherlands to *** percent, and Germany to *** percent.

Supply constraints

Reporting of supply constraints was ***; *** reported that they *** experienced supply constraints since January 1, 2017. *** reported they had experienced supply constraints. *** reported *** as a supply constraint. Importer *** reported technical issues in its manufacturing plant that caused a production shortage, importer *** reported supply capacity constraints, and importer *** reported lead time issues. *** reported delivery, supply, and qualification issues.[17] Purchaser *** reported price and availability issues.[18] Purchaser *** reported reduced and delayed raw material deliveries due to capacity issues.

New suppliers

All five purchasers indicated that no new suppliers entered the U.S. market since January 1, 2017, though some importers mentioned the entrance of Braskem in narrative responses elsewhere in the questionnaires.[19]

[17] ***.

[18] *** reported in its preliminary phase questionnaire that it ***.

[19] Respondent asserts that the establishment of Braskem as a domestic producer is the most significant change in the conditions of competition. Hearing transcript, p. 9 (Okun).

U.S. demand

Based on available information, the overall demand for UHMWPE is likely to experience small-to-moderate changes in response to changes in price. The main contributing factors to this level of demand responsiveness are the lack of substitute products and the broad range of end uses and related cost shares.

End uses and cost share

U.S. demand for UHMWPE depends on the demand for U.S. produced downstream products. The product is used in a variety of industries, including construction, agriculture, material handling, transportation, textile, pulp and paper, food and beverage, mining, marine, porous plastics, oil and gas, and wastewater treatment. Downstream products reported by purchasers include battery separators where UHMWPE accounts for *** percent of the finished product (electric vehicle batteries); materials processing[20] (*** percent); materials handling equipment and systems[21] (*** percent); printed and laminated materials (*** percent); agricultural products, transportation, and water treatment (*** percent); and stock shapes (*** percent).

Business cycles

Most firms indicated that the UHMWPE market was not subject to distinct business cycles or conditions of competition. However, one U.S. producer, two importers, and one purchaser reported that the market is subject to distinct conditions of competition and one purchaser reported that the market was subject to business cycles. *** reported that it is subject to increasing competition and loss of market share as a result of subject imports from Korea. Importer *** reported that each application of downstream products is unique, and that product demand may depend on the growth cycle of the specific application of the product. Purchaser *** reported that most companies it works with have specific build cycles prior to their heavier sales times.

[20] Materials processing includes rollers, guides, plates, conveyor belts, liners, hoppers, dump trucks, ships' holds, or dock fenders.

[21] Materials handling equipment and systems include gears, pulleys, and bearings.

Demand trends

Most firms reported an increase in U.S. demand for UHMWPE since January 1, 2017 (table II-4). One purchaser reported fluctuating demand for battery separators. One purchaser each reported increasing and fluctuating demand for materials handling equipment and systems. One purchaser reported no change in demand for sports applications. One purchaser each reported increasing, no change, decreasing, and fluctuating demand for other products.[22]

Table II-4
UHMWPE: Firms' responses regarding U.S. demand and demand outside the United States

Item	Number of firms reporting			
	Increase	No change	Decrease	Fluctuate
Demand inside the United States:				
U.S. producers	***	***	***	***
Importers	5	---	---	1
Purchasers	3	---	---	1
Demand outside the United States:				
U.S. producers	***	***	***	***
Importers	4	---	1	---
Purchasers	1	1	---	---
Demand for end use product(s) reported by purchasers:				
Battery separators	---	---	---	1
Sports applications	---	1	---	---
Materials handling equipment and systems	1	---	---	1
Paper machines	---	1	---	---
Other	1	1	1	1

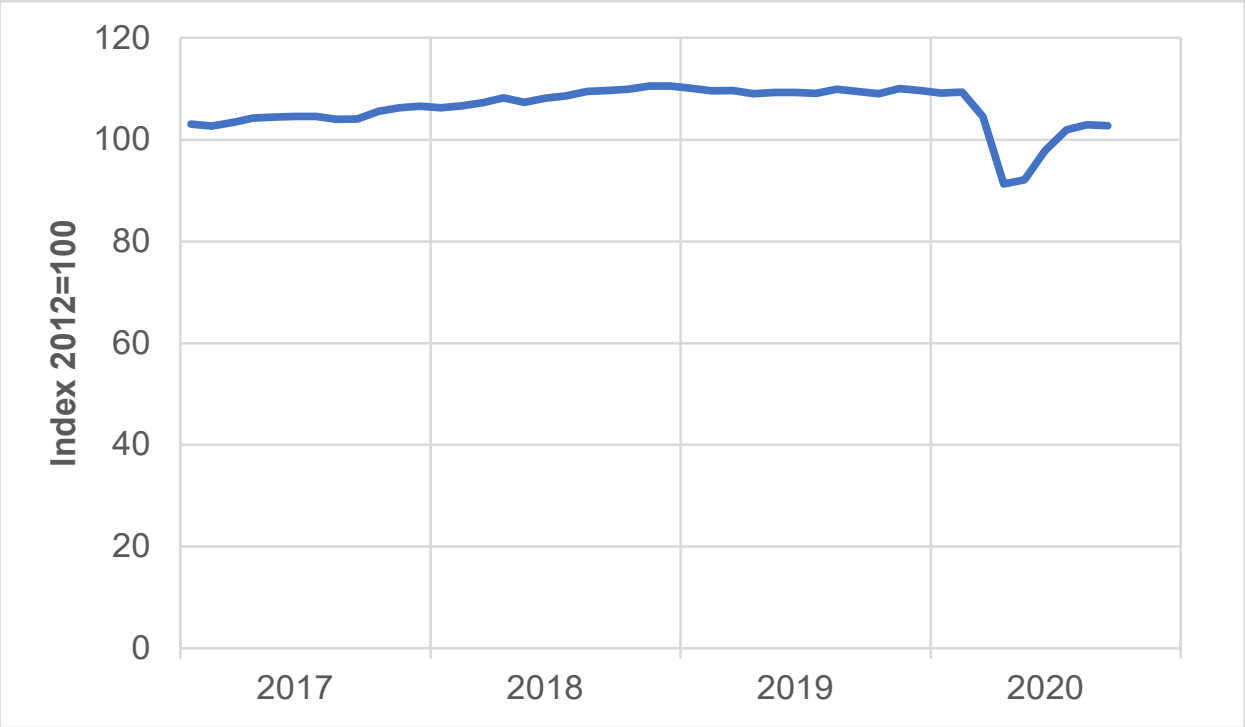
Note: There were no responses from responding firms regarding demand for the following end uses: high performance ballistic fibers or plates, food and beverage storage containers, pipes, materials processing, rope or other UHMWPE fibers and yarns, and paper machines.

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

[22] Other products include stock shapes (reported as increasing in demand by ***); automotive products (reported as no change in demand by ***); printed and laminated materials (reported as decreasing by ***); agricultural products, transportation products, and water treatment products (each reported as fluctuating by ***).

Industrial production in the United States increased by 7.3 percent from January 2017 to December 2018 before decreasing 1.1 percent to February 2020 (figure II-1).[23] Industrial production reached a period low in April 2020 after the COVID-19 outbreak in the United States and the recovered to match levels reached in early 2017.[24]

Figure II-1
UHMWPE: Industrial production in the United States, monthly, January 2017–September 2020



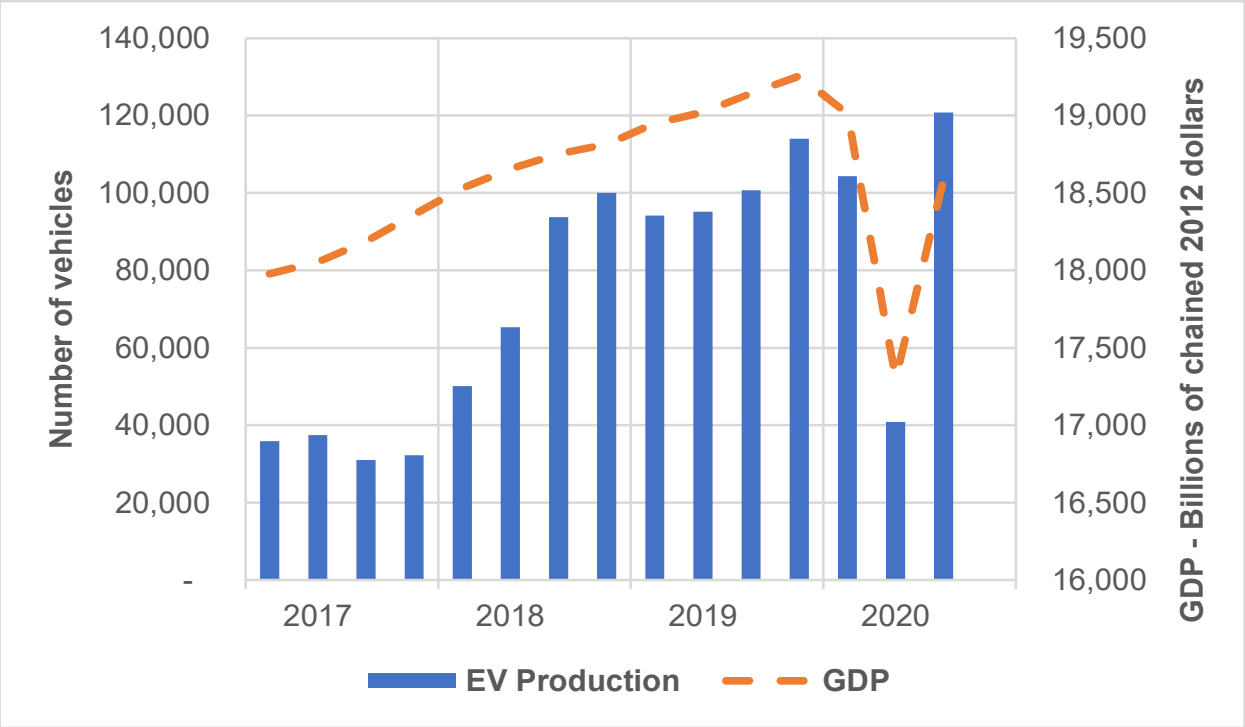
Source: Industrial Production Index, Index 2012=100, monthly, seasonally adjusted, St. Louis Federal Reserve Economic Data, https://fred.stlouisfed.org/series/INDPRO, accessed February 22, 2021.

[23] The industrial production index is an economic indicator that measures real output for all facilities located in the United States manufacturing, mining, and electric, and gas utilities. Growth in capacity utilization is an indicator of an increase in demand. The index is published by the Board of Governors of the Federal Reserve System.

[24] As industrial production increased from 2017 to 2018, apparent U.S. consumption of UHMWPE increased *** percent from *** pounds in 2017 to *** pounds in 2018; apparent consumption decreased to *** pounds in 2019 as industrial production decreased.

Petitioner Celanese and respondent KPIC project that much of the demand for UHMWPE is expected to be driven by electric vehicle (EV) production, as UHMWPE is commonly used as a battery separator in EV batteries.[25] Increased production of electric vehicles contribute to higher demand for lithium-ion batteries which rely on UHMWPE to function. Demand indicators from the automotive industry are closely related to GDP growth. As shown in figure II-2, EV production in the United States increased rapidly during 2017-18, then leveled off in 2019 and into 2020, with a steep second quarter decline and a third quarter 2020 recovery.[26]

Figure II-2
UHMWPE: EV production in the United States and U.S. GDP, quarterly, January 2017–September 2020



Sources: Wards Intelligence, www.wardsintelligence.com, accessed January 4, 2021; and Real Gross Domestic Product, Billions of Chained 2012 Dollars, Quarterly, seasonally adjusted, St. Louis Federal Reserve Economic Data, https://fred.stlouisfed.org/series/GDPC1, accessed January 14, 2021.

[25] Petitioner's prehearing brief, p. 12; respondent's prehearing brief, p. 6.

[26] Vehicle models include: Chevrolet Bolt, Ford Mustang Mach-E, Nissan Leaf, Tesla Model 3, Tesla Model S, Tesla Model X, and Tesla Model Y. Tesla Model 3 and Model Y comprised about 75 percent of EV production in 2020 (through the 3rd quarter). The batteries for the Model 3 and Model Y are currently produced by Panasonic at Tesla's Gigafactory in Nevada but Tesla is making plans to develop its own battery production in-house in the near future (The Verge, https://www.theverge.com/2020/9/22/21449238/tesla-electric-car-battery-tabless-cells-day-elon-musk, accessed March 2, 2021).

Substitute products

***, 6 of 9 importers, and all 6 purchasers reported that there are no substitutes for UHWMPE. *** reported high-density polyethylene (HDPE) as a substitute for UHMWPE where high performance isn't required and that changes in the price of HDPE affected the price for UHMWPE.[27] Importer *** reported high molecular weight polyethylene (HMWPE) and HDPE sheets are substitutes and that changes in price of these substitutes affected the price for UHMWPE. Importer *** reported polyoxymethylene and polytetrafluoroethylene rods as substitutes for UHMWPE.

U.S. producer Celanese can produce various grades and molecular weights of UHMWPE that range from 3.4 x 10^6 to 10.2 x 10^6 g/mol and that the varying grades and weights have very minor distinguishing differences, allowing the products to be substitutable with each other.[28] KPIC reported that end use differences and customers' preference for a precise formulation make the various grades and molecular weights of UHMWPE not substitutable with each other.[29]

Substitutability issues

The degree of substitution between domestic and imported UHMWPE depends upon such factors as relative prices, quality (e.g., grade standards, chemistry, etc.), and conditions of sale (e.g., price discounts/rebates, lead times between order and delivery dates, reliability of supply, product services, availability of certain product types from different sources, etc.). Based on available data, staff believes that there is a moderate-to-high degree of substitutability between domestically produced UHMWPE and UHMWPE imported from Korea. Most market participants described U.S. and Korean UHMWPE as at least frequently interchangeable and comparable across many factors. However, there were some certification and availability issues reported for both U.S. and Korean producers.

[27] *** also reported "other engineering polymers" as substitutes and reported that changes in the price of these substitutes do not impact the price of UHMWPE.

[28] It also asserts that KPIC can produce UHMWPE in a range from 3.7 x 10^6 to 9.0 x 10^6 g/mol. Petitioner's posthearing brief, Exhibit 2, p. 29.

[29] Respondent's posthearing brief, Response to Commission's Questions, p. 23.

Lead times

U.S. producers reported that *** percent of their commercial shipments were produced-to-order, with lead times averaging *** days. The remaining *** of their commercial shipments came from inventories, with lead times averaging *** days.[30] Two importers of UHMWPE from Korea reported an average *** percent of their commercial shipments were sold from the foreign manufacturers' inventory, with lead times averaging *** days.[31] The remaining *** percent of importers' commercial shipments were sold from U.S. inventory, with lead times averaging *** days.[32]

Knowledge of country sources

Five purchasers indicated they had marketing/pricing knowledge of domestic product and four of Korea product. For nonsubject countries, two purchasers indicated knowledge of Brazilian product, two of German product, two of Japanese product, and two of Dutch product.

As shown in table II-5, most purchasers sometimes make purchasing decisions based on the producer while most purchaser's customers never do. Of the three purchasers that reported that they sometimes make decisions based on the manufacturer, *** cited that it consistently used the same domestic producer based on the reliability of its product and *** reported making decisions based on availability and pricing. Of the two purchasers that reported that they always make decisions based on the manufacturer, one firm (***) cited price and availability. One of six purchasers reported that certain grades/types/sizes of UHMWPE are only available from certain country sources.[33]

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[30] *** reported that *** percent of its commercial shipments were produced-to-order, with lead times averaging *** days while *** reported that *** percent of its commercial shipments were sold from inventory, with lead times averaging *** days.

[31] Respondent reports that exports take a few months to clear customs and enter the United States before the purchaser takes title. Respondent's posthearing brief, Response to Commission's Questions, p. 27.

[32] Importer *** reported that *** of its commercial shipments were sold from the foreign manufacturers' inventory, with lead times averaging *** days. The remaining *** percent of its commercial shipments were sold from U.S. inventory, with lead times averaging *** days. Importer *** reported that *** percent of its commercial shipments were sold from the foreign manufacturers' inventory, with lead times averaging *** days.

[33] *** reported that KPIC U-70 and U-90 only comes from Korea. IRPC U510B and U710B is only manufactured in Thailand. Celanese manufactures GUR 4130 and GUR 4150 in their China, U.S., and EMEA operations. The firm cites that these products compete with each other but are not identical.

Table II-5
UHMWPE: Purchasing decisions based on producer and country of origin

Purchaser/customer decision	Always	Usually	Sometimes	Never
Purchases based on producer:				
Purchaser's decision	2	---	3	1
Purchaser's customer's decision	---	---	2	4
Purchases based on country of origin:				
Purchaser's decision	1	---	1	4
Purchaser's customer's decision	---	---	---	5

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

Factors affecting purchasing decisions

The most often cited top three factors firms considered in their purchasing decisions for UHMWPE were quality (6 firms), price (5 firms), and availability (2 firms) as shown in table II-6. Quality was the most frequently cited first-most important factor (cited as such by all 6 firms); price was the most frequently reported second-most and third-most important factor.

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

Factor	1st	2nd	3rd	Total
	Number of firms (number)			
Quality	6	---	---	6
Price / Cost	---	2	3	5
Availability / Supply	---	1	1	2
All other factors	---	3	2	5

Note: Other factors include technical expertise, reliability, consistency, product range, and delivery.

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

Two purchasers (***) reported that they usually purchase the lowest-priced product, two purchasers (***) reported they sometimes purchase the lowest-priced product, *** reported that it always purchases the lowest-priced product, and *** reported never.[34]

[34] *** reported price as the second-most important factor they consider when deciding from whom to purchase UHMWPE, *** reported price as the third-most important factor, and *** did not rank price as a factor in the top three but reported price as an additional factor that is very important in its purchase decisions.

Importance of specified purchase factors

Purchasers were asked to rate the importance of 16 factors in their purchasing decisions (table II-7). The factors rated as very important by more than half of responding purchasers were product consistency, and reliability of supply (6 each); availability, molecular weight, price,[35] and quality meets industry standards (5 each); delivery terms, delivery time, packaging, and quality exceeds industry standards (4 each).[36]

Table II-7
UHMWPE: Importance of purchase factors, as reported by U.S. purchasers, by factor

Factor	Number of firms reporting		
	Very important	Somewhat important	Not important
Availability	5	1	---
Delivery terms	4	1	1
Delivery time	4	2	---
Discounts offered	2	4	---
Minimum quantity requirements	---	3	3
Packaging	4	2	---
Molecular weight	5	1	---
Payment terms	1	4	1
Price	5	1	---
Product consistency	6	---	---
Product range	1	4	1
Quality meets industry standards	5	---	1
Quality exceeds industry standards	4	1	1
Reliability of supply	6	---	---
Technical support/service	3	2	1
U.S. transportation costs	2	4	---

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

[35] Price was not ranked as the most important purchasing factor by any responding firm in table II-6.

[36] Quality was ranked as the most important purchasing factor by all responding firms in table II-6, however, one firm (***) reported that 'quality meets industry standards' and 'quality exceeds industry standards' was not important in table II-7. When describing the characteristics it considers when determining the quality of UHMWPE, the purchaser cited the product meeting its global specification.

Supplier certification

Five of six purchasers require their suppliers to become certified or qualified to sell UHMWPE to their firm. Purchasers reported that the time to qualify a new supplier ranged from 7 days to 2 years.[37] ***, which reported 7 days, cited suppliers must fill out a questionnaire. Purchaser ***, which reported 730 days (2 years), cited lab testing and trials in addition to a review of the material specifications. ***, which reported that certification time varies, cited that it has specifications that the producer must meet and that the product must pass testing; it reported that ***. Purchaser *** reported ***. Purchaser *** has had *** and it qualified ***.[38]

Changes in purchasing patterns

Purchasers were asked about changes in their purchasing patterns from different sources since 2017 (table II-8). Four of 6 responding purchasers reported that they had changed suppliers since January 1, 2017. *** added *** as a second supplier due to customer requirements to be dual sourced.[39] *** diversified from a single source supplier model. *** added *** as fully qualified in 2020 and *** because of a transportation surcharge.

[37] Respondent noted that there is product as well as plant qualification for UHMWPE. Hearing transcript, p. 174 (Anderson).

[38] ***, email to USITC staff, February 24, 2021. A certification ***. In the preliminary phase of this investigation, *** reported having certified Braskem's operations in the United States in its Lost Sales and Lost Revenue Survey.

[39] Celanese asserts that "dual sourcing" typically means "dual-specified" and that customers requiring this only need to have another qualified supplier but not necessarily purchase from the other source. Hearing transcript, p. 56 (Lee).

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

Source of purchases	Did not purchase	Decreased	Increased	Constant	Fluctuated
United States	---	2	---	2	2
Korea	2	---	2	---	2
Brazil	3	---	---	---	---
Germany	3	---	---	---	---
Japan	3	---	---	---	---
Netherlands	1	1	---	---	1
All other sources	3	---	---	---	1
Sources unknown	3	---	---	---	---

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

Importance of purchasing domestic product

Four of 6 purchasers reported that most or all of their purchases did not require purchasing U.S.-produced product. However, purchaser *** reported some purchases that were required by law or regulation (for less than 1 percent of its purchases); the firm also reported purchases required by its customers to be domestic (for less than 1 percent of its purchases). *** reported other preferences for domestic product (for *** percent of its purchases); reasons it cited for preferring domestic product included resin properties as qualified for production.

Comparisons of domestic products, subject imports, and nonsubject imports

Purchasers were asked a number of questions comparing UHMWPE produced in the United States, Korea, and nonsubject countries. First, purchasers were asked for a country-by-country comparison on the same 16 factors (table II-9) for which they were asked to rate the importance of in purchasing decisions.

Most purchasers reported that U.S. and subject UHMWPE were comparable on all factors except for technical support/service, where the U.S. product was rated superior. Technical support/service was considered very important by half of purchasers, as noted in table II-7. When comparing domestic UHMWPE with that from nonsubject countries, most purchasers reported that the U.S. product was comparable on 15 of 16 factors. When comparing UHMWPE from Korea with that from nonsubject countries, most purchasers reported that the Korean product was comparable on all 16 factors.

Table II-9
UHMWPE: Purchasers' comparisons between U.S.-produced and imported products

Factor	Number of firms reporting								
	United States vs. Korea			United States vs. Nonsubject sources			Korea vs. Nonsubject sources		
	S	C	I	S	C	I	S	C	I
Availability	---	4	---	---	3	---	---	3	---
Delivery terms	---	4	---	---	3	---	---	3	---
Delivery time	1	3	---	---	3	---	---	3	---
Discounts offered	---	2	1	---	2	1	---	3	---
Minimum quantity requirements	---	2	1	---	3	---	---	3	---
Molecular weight	---	4	---	---	3	---	---	3	---
Packaging	---	4	---	---	3	---	---	3	---
Payment terms	---	3	1	---	3	---	1	2	---
Price	1	2	1	---	2	1	---	3	---
Product consistency	---	4	---	---	3	---	---	3	---
Product range	---	3	---	---	3	---	---	3	---
Quality meets industry standards	---	4	---	---	3	---	---	3	---
Quality exceeds industry standards	---	4	---	---	3	---	---	3	---
Reliability of supply	---	4	---	---	3	---	---	3	---
Technical support/service	2	1	1	2	1	---	---	2	1
U.S. transportation costs	1	3	---	---	3	---	---	3	---

Note: A rating of superior means that price/U.S. transportation cost 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 UHMWPE

In order to determine whether U.S.-produced UHMWPE can generally be used in the same applications as imports from Korea and nonsubject countries, U.S. producers, importers, and purchasers were asked whether the products can always, frequently, sometimes, or never be used interchangeably. As shown in table II-10, U.S. producers and purchasers indicated that U.S.-produced UHMWPE and that imported from Korea is *** interchangeable and responding importers most often indicated that it is frequently interchangeable. Comparing UHMWPE from nonsubject sources to those from the United States and Korea, U.S. producers reported the product to be *** interchangeable; importers and purchasers reported the product to be most often frequently interchangeable. *** stated that country of origin requirements could limit interchangeability.

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

Country pair	U.S. producers				U.S. importers				U.S. purchasers			
	A	F	S	N	A	F	S	N	A	F	S	N
United States vs. Korea	***	***	***	***	1	4	1	---	2	2	---	---
United States vs. Other	***	***	***	***	1	4	2	---	1	3	---	---
Korea vs. Other	***	***	***	***	1	4	1	---	1	3	---	---

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

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

As can be seen from table II-11, the majority of purchasers reported that domestically produced product usually met minimum quality specifications. Purchasers reported that Korean UHMWPE always or usually (two each) met minimum quality specifications.[40]

[40] Purchaser *** reported that UHMWPE from Korea "rarely or never" met minimum quality specifications. ***.

Table II-11
UHMWPE: Ability to meet minimum quality specifications, by source

Source of purchases	Always	Usually	Sometimes	Rarely or never
United States	2	3	1	---
Korea	2	2	---	1
Nonsubject	1	1	---	---

Note: Purchasers were asked how often domestically produced or imported UHMWPE 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 UHMWPE from the United States, Korea, or nonsubject countries. As seen in table II-12, U.S. producers reported that there are *** differences other than price between the U.S. product and that imported from Korea and nonsubject countries. A majority of responding importers indicated that there are "sometimes" differences other than price between the U.S. product and imports. A plurality of purchasers indicated that there are "frequently" or "sometimes" differences other than price between the U.S. product and imports. Importer *** stated that transportation costs of imports into the United States are too high. Purchaser *** stated that domestic availability and technical support are critical. Purchaser *** reported that one of its largest customers specifically requested *** product in 2020 due to its superior quality and material performance.[41]

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

	U.S. producers				U.S. importers				U.S. purchasers			
Country pair	A	F	S	N	A	F	S	N	A	F	S	N
United States vs. Korea	***	***	***	***	---	1	4	1	---	2	2	1
United States vs. Other	***	***	***	***	1	1	4	1	---	2	2	1
Korea vs. Other	***	***	***	***	---	1	4	1	---	1	2	1

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

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

[41] ***, email to USITC staff, February 24, 2021.

Elasticity estimates

This section discusses elasticity estimates. No parties provided comments on these estimates in their prehearing or posthearing briefs.

U.S. supply elasticity

The domestic supply elasticity for UHMWPE measures the sensitivity of the quantity supplied by U.S. producers to changes in the U.S. market price of UHMWPE. 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 UHMWPE. Analysis of these factors above indicates that the U.S. industry has the ability to considerably increase or decrease shipments to the U.S. market; an estimate in the range of 6 to 10 is suggested.

U.S. demand elasticity

The U.S. demand elasticity for UHMWPE measures the sensitivity of the overall quantity demanded to a change in the U.S. market price of UHMWPE. 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 the UHMWPE in the production of any downstream products. Based on the available information, the aggregate demand for UHMWPE is likely to be 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.[42] Product differentiation, in turn, depends upon such factors as quality (e.g., grade standards, chemistry, 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 UHMWPE and imported UHMWPE is likely to be in the range of 3 to 7. Most market participants described U.S. and Korean UHMWPE as at least frequently interchangeable, although there were some certification and availability issues reported for both U.S. and Korean producers.

[42] 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: U.S. producers' production, shipments, and employment

The Commission analyzes a number of factors in making injury determinations (see 19 U.S.C. §§ 1677(7)(B) and 1677(7)(C)). Information on the dumping margins was presented in *Part I* of this report and information on the volume and pricing of imports of the subject merchandise is presented in *Part IV* and *Part V*. Information on the other factors specified is presented in this section and/or *Part VI* and (except as noted) is based on the questionnaire responses of two firms that accounted for all known U.S. production of UHMWPE during 2019.

U.S. producers

The Commission issued a U.S. producer questionnaire to two firms based on information contained in the petition. Both firms provided usable data on their operations. Staff believes that these responses represent all known U.S. production of UHMWPE.

Table III-1 lists the U.S. producers of UHMWPE, their production locations, positions on the petition, and shares of total production.[1]

Table III-1
UHMWPE: U.S. producers, their positions on the petition, location of production, and share of reported production, 2019

Firm	Position on petition	Production location	Share of production (percent)
Braskem	***	La Porte, TX	***
Celanese	Petitioner	Bishop, TX	***
Total			100.0

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

[1] Braskem began U.S. production of UHMWPE in January 2017. *Braskem starts up new North American UTEC® plant,* https://www.braskem.com.br/news-detail/braskem-starts-up-new-north-american-utec-plant, retrieved January 21, 2021.

Table III-2 presents information on the U.S. producers' ownership, related and/or affiliated firms. As indicated in table III-2, both U.S. producers are related to foreign producers of UHMWPE located in countries other than Korea and both firms import UHMWPE from countries other than Korea.

Table III-2
UHMWPE: U.S. producers' ownership, related and/or affiliated firms

Item / Firm	Firm Name	Affiliated/Ownership
Ownership:		
***	***	***
Celanese	Publicly Traded	
Related importers/exporters:		
***	***	***
Related producers:		
***	***	***
***	***	***
***	***	***

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

Table III-3 presents U.S. producers' reported changes in operations since January 1, 2017.[2]

Table III-3
UHMWPE: U.S. producers' reported changes in operations, since January 1, 2017

Item / Firm	Reported changes in operations
Plant openings:	
***	***
Expansions:	
***	***
Prolonged shutdowns or curtailments:	
***	***

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

[2] On October 23, 2020, U.S. producer Celanese announced a planned capacity expansion at its Bishop, Texas facility. The expansion is expected to add approximately 15 metric kilotons (33,069,339 pounds) of UHMWPE capacity in early 2022. Celanese Announces GUR® Capacity Expansion, https://www.businesswire.com/news/home/20201023005104/en/, retrieved February 25, 2020; Celanese stated this expansion is intended to serve growing markets in China, Korea, and Europe, and none of the production is planned to be sold into the U.S. market. Hearing transcript, p. 49 (Kelly).

U.S. production, capacity, and capacity utilization

Table III-4 and figure III-1 present U.S. producers' production, capacity, and capacity utilization. U.S. producers' combined capacity increased by *** percent during 2017-18, driven by a *** percent and *** percent *** in Celanese and Braskem's capacity respectively. During 2018-19, U.S. producers' combined capacity *** and was *** in January-September 2020 compared to January-September 2019. During 2017-19, Braskem's production *** by *** percent and was *** percent *** during January-September 2020 compared to January-September 2019. Production for Celanese *** by *** percent during 2017-18, before *** by *** percent during 2018-19, and was *** percent *** during January-September 2020 compared to January-September 2019.

Braskem's capacity utilization *** by *** percentage points during 2017-18, *** by *** percentage points during 2018-19, and was *** percentage points *** during January-September 2020 compared to January-September 2019. Celanese's capacity utilization *** by *** percentage points during 2017-18, *** by *** percentage points during 2018-19, and was *** percentage points *** during January-September 2020 compared to January-September 2019.

Table III-4
UHMWPE: U.S. producers' production, capacity, and capacity utilization, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Capacity (1,000 pounds)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Production (1,000 pounds)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Capacity utilization (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Share of production (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	100.0	100.0	100.0	100.0	100.0

Note.-- Based on operating parameters of *** hours per week and *** weeks per year for Braskem, and *** hours per week and *** weeks per year for Celanese less production of other products. Braskem ***. Email from Braskem, March 8, 2021.
Source: Compiled from data submitted in response to Commission questionnaires.

Figure III-1
UHMWPE: U.S. producers' capacity, production, and capacity utilization, 2017-19, January to September 2019, and January to September 2020

* * * * * * *

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

Alternative products

As shown in table III-5, UHMWPE comprised more than *** percent of the total production by Celanese and Braskem using shared equipment in each full and partial year since 2017. In addition to UHMWPE, Celanese reported producing *** and Braskem reported producing *** on the same equipment as subject production.

Table III-5
UHMWPE: U.S. producers' overall capacity and production on the same equipment as subject production, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Overall capacity	***	***	***	***	***
Production:					
UHMWPE	***	***	***	***	***
Medical grade UHMWPE	***	***	***	***	***
High density polyethylene	***	***	***	***	***
Polypropylene	***	***	***	***	***
Other products	***	***	***	***	***
Out-of-scope production	***	***	***	***	***
Total production on same machinery	***	***	***	***	***

Table continued on next page.

Table III-5—Continued
UHMWPE: U.S. producers' overall capacity and production on the same equipment as subject production, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Ratios and shares (percent)				
Overall capacity utilization	***	***	***	***	***
Production: UHMWPE	***	***	***	***	***
Medical grade UHMWPE	***	***	***	***	***
High density polyethylene	***	***	***	***	***
Polypropylene	***	***	***	***	***
Other products	***	***	***	***	***
Out-of-scope production	***	***	***	***	***
Total production on same machinery	100.0	100.0	100.0	100.0	100.0

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.

U.S. producers' U.S. shipments and exports

Table III-6 presents U.S. producers' U.S. shipments, export shipments, and total shipments. Total shipments by quantity increased by *** percent during 2017-18, decreased by *** percent during 2018-19, and were *** percent higher during January-September 2020 compared to January-September 2019.[3] Export shipments by quantity increased by *** percent during 2017-18, decreased by *** percent during 2018-19, and were *** percent higher during January-September 2020 compared to January-September 2019. The increase in U.S. producers' export shipments during interim 2020 was largely driven by ***. During 2017-19, the share of U.S. producers' U.S. shipments by quantity ranged between *** percent and *** percent of total shipments, but was *** percent during January-September 2020 compared to *** percent during January-September 2019. During the period for which data were collected, ***.[4]

[3] The changes in U.S. producers' total shipments during 2017-18 and 2018-19 were both largely driven by ***, whose total shipments ***. *** producer questionnaire, section II-7.

[4] Celanese's producer questionnaire response, section II-7. Braskem's producer questionnaire response, section II-7.

Table III-6
UHMWPE: U.S. producers' U.S. shipments, exports shipments, and total shipments, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
U.S. shipments	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***
	Value (1,000 dollars)				
U.S. shipments	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***
	Unit value (dollars per pound)				
U.S. shipments	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***
	Share of quantity (percent)				
U.S. shipments	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	100.0	100.0	100.0	100.0	100.0
	Share of value (percent)				
U.S. shipments	***	***	***	***	***
Export shipments	***	***	***	***	***
Total shipments	100.0	100.0	100.0	100.0	100.0

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.

U.S. producers' U.S. shipments by packaging size and molecular weight

Figure III-2 and figure III-3 present data on the shares of U.S. producers' U.S. shipments by packaging size and by molecular weight.[5]

Figure III-2
UHMWPE: U.S. producers' shares of U.S. shipments by packaging size, 2019

* * * * * * *

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

Figure III-3
UHMWPE: U.S. producers' shares of U.S. shipments by molecular weight, 2019

* * * * * * *

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

[5] See Appendix D for complete data on U.S. shipments by packaging size and molecular weight for all known U.S. producers and all responding U.S. importers.

U.S. producers' inventories

Table III-7 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.

Table III-7
UHMWPE: U.S. producers' inventories, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
U.S. producers' end-of-period inventories	***	***	***	***	***
	Ratio (percent)				
Ratio of inventories to--					
U.S. production	***	***	***	***	***
U.S. shipments	***	***	***	***	***
Total shipments	***	***	***	***	***

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

U.S. producers' end-of-period inventories decreased by *** percent between 2017 and 2018, increased by *** percent between 2018 and 2019, and were *** percent higher in September 2020 compared to September 2019. Between 2017 and 2019, *** end-of-period inventories increased by *** percent but were *** percent lower in September 2020 compared to September 2019. Between 2017 and 2018, *** end-of-period inventories decreased by *** percent, then increased by *** percent between 2018 and 2019, and were *** percent higher in September 2020 compared to during September 2019.

The ratio of inventories to total shipments decreased by *** percentage points during 2017-18, increased by *** percentage points during 2018-19, and was *** percentage points higher during January-September 2020 compared to during January-September 2019. The ratio of inventories to U.S. shipments decreased by *** percentage points during 2017-18, increased by *** percentage points during 2018-19, and was *** percentage points higher during January-September 2020 compared to January-September 2019.

U.S. producers' imports

U.S. producers' U.S. production and imports of UHMWPE are presented in table III-8. Both U.S. producers imported UHMWPE from nonsubject sources. Braskem imported UHMWPE from *** while Celanese imported UHMWPE from ***.[6] Overall, the two U.S. producers imported *** pounds of UHMWPE in 2017; *** pounds in 2018; *** pounds in 2019; and *** pounds in January-September 2020.

Table III-8
UHMWPE: U.S. producers' U.S. production and imports, 2017-19, January to September 2019, and January to September 2020

* * * * * * *

Table continued on next page.

[6] Celanese stated the UHMWPE imported from its *** Celanese's producer questionnaire response, section II-14.

Table III-8—Continued
UHMWPE: U.S. producers' U.S. production and imports, 2017-19, January to September 2019, and January to September 2020

* * * * * * *

Note.--***. *** importer questionnaire, section II-6a. *** importer questionnaire, section II-6a. *** producer questionnaire, section II-12.

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

Braskem's imports from *** by *** percent during 2017-18, *** by *** percent during 2018-19, and were *** percent *** during January-September 2020 compared to January-September 2019. Braskem's ratio to U.S. production of imports from *** by *** percentage points during 2017-18, *** by *** percentage points during 2018-19, and was *** percentage points *** during January-September 2020 compared to January-September 2019.

Celanese's imports from *** ranged between *** and *** pounds while its imports from *** ranged between *** and *** pounds. Celanese's total imports *** by *** percent during 2017-18, *** by *** percent during 2018-19, and was *** percent *** during January-September 2020 compared to January-September 2019. Celanese's ratio to U.S. production of imports from all sources *** by *** percentage points during 2017-18, *** by *** percentage points during 2018-19, and was *** percentage points *** during January-September 2020 compared to January-September 2019.

U.S. employment, wages, and productivity

Table III-9 shows U.S. producers' employment-related data. The number of production and related workers (PRWs) increased during 2017-18, decreased *** during 2018-19, and was *** lower in January-September 2020 than in January-September 2019. During 2017-19, the total number of hours worked and wages paid increased however both were higher in January-September 2020 than in January-September 2019. Productivity decreased during 2017-19 and was lower in January-September 2020 than in January-September 2019.

Table III-9
UHMWPE: U.S. producers' employment related data, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
Production and related workers (PRWs) (number)	***	***	***	***	***
Total hours worked (1,000 hours)	***	***	***	***	***
Hours worked per PRW (hours)	***	***	***	***	***
Wages paid ($1,000 dollars)	***	***	***	***	***
Hourly wages (dollars per hour)	***	***	***	***	***
Productivity (pounds per hour)	***	***	***	***	***
Unit labor costs (dollars per pound)	***	***	***	***	***

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

Part IV: U.S. imports, apparent U.S. consumption, and market shares

U.S. importers

The Commission issued importer questionnaires to fourteen firms (including both U.S. producers) believed to import UHMWPE.[1] Usable questionnaire responses were received from ten firms, representing the large majority of U.S. imports of UHMWPE in 2019 under statistical reporting numbers 3901.10.1000 and 3901.20.1000, a broad product category that also includes other ethylene polymers with a relative viscosity of 1.44 or more.[2] [3] Table IV-1 lists all responding U.S. importers of UHMWPE from Korea and other sources in 2019.

Table IV-1
UHMWPE: U.S. importers, their headquarters, and share of total imports by source, 2019

		Share of imports by source (percent)							
Firm	Headquarters	Korea	Brazil	Germany	Japan	Nether lands	All other sources	Nonsubject sources	All import sources
Braskem	Philadelphia, PA	***	***	***	***	***	***	***	***
Celanese	Irving, TX	***	***	***	***	***	***	***	***
DL Trading	Katy, TX	***	***	***	***	***	***	***	***
DSM	Greenville, NC	***	***	***	***	***	***	***	***
ENTEK	Lebanon, OR	***	***	***	***	***	***	***	***
Itochu	White Plains, NY	***	***	***	***	***	***	***	***
KPIC	Seoul, KR	***	***	***	***	***	***	***	***
Mitsui	Rye Brook, NY	***	***	***	***	***	***	***	***
Pacific High	Williamsville, NY	***	***	***	***	***	***	***	***
TSE	Clearwater, FL	***	***	***	***	***	***	***	***
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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

[1] The Commission issued questionnaires to those firms identified in the petition, 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 statistical reporting numbers 3901.10.10.00 and 3901.20.10.00 in 2019.

[2] ***. KPIC's importer questionnaire response, section I-7.

[3] ***. *** importer questionnaire, section II-6a. *** importer questionnaire, section II-6a. *** producer questionnaire, section II-12. DL Trading's importer questionnaire response, sections I-7 and II-12.

U.S. imports

Table IV-2 presents data for U.S. imports of UHMWPE from Korea and all other sources. During 2017-19, imports from Korea increased by *** pounds (*** percent) but were *** lower during January-September 2020 compared to January-September 2019. Imports from Brazil decreased by *** pounds (*** percent) during 2017-19 and were *** pounds (*** percent) lower during January-September 2020 compared to January-September 2019.[4] [5] Imports from Germany increased by *** pounds (*** percent) during 2017-18, decreased by *** pounds (*** percent) during 2018-19 and were *** pounds (*** percent) lower during January-September 2020 compared to January-September 2019. Imports from Japan increased by *** pounds (*** percent) during 2017-19 but were *** pounds (*** percent) lower during January-September 2020 compared to January-September 2019. Imports from the Netherlands decreased by *** pounds (*** percent) during 2017-18, increased by *** pounds (*** percent) during 2018-19, but were *** pounds (*** percent) lower during January-September 2020 compared to January-September 2019. Imports from all other sources increased by *** pounds (*** percent) during 2017-18, decreased by *** pounds (*** percent) during 2018-19, and were *** pounds (*** percent) lower during January-September 2020 compared to January-September 2019.[6] [7]

During the period for which data were collected, average unit values for imports from Korea fluctuated between *** and *** per pound. Average unit values for imports from *** decreased from $*** per pound in 2017 to $*** per pound in 2018, then increased to $*** per pound in 2019 and were $*** per pound during January-September 2020. Average unit values for imports from *** and *** were the highest among all reported imports, with imports from *** ranging between $*** and $*** per pound, and imports from *** ranging between $*** and $*** per pound. During the

[4] *** reported ***. *** importer questionnaire response, sections II-2a and II-6a.

[5] Braskem began U.S. production of UHMWPE in January 2017. *Braskem starts up new North American UTEC® plant,* https://www.braskem.com.br/news-detail/braskem-starts-up-new-north-american-utec-plant, retrieved January 21, 2021.

[6] *** reported imports from Belgium which were produced by ***. *** importer questionnaire response, section II-10a.

[7] *** reported imports from China which were produced by ***. *** importer questionnaire response, section II-10a.

same time period, average unit values for imports from all sources ranged between $1.38 and $1.53 per pound.

The share of imports from Korea by quantity ranged from *** percent in 2017 to *** percent in 2019, and was *** percent during interim 2019 compared to *** percent during interim 2020. The share of imports from Brazil ranged from *** percent in 2017 to *** percent in 2019 as *** began replacing its imports with domestic production. The share of imports from Germany increased from *** percent in 2017 to *** percent in 2018, and then decreased to *** percent in 2019. The share of imports from Japan increased from *** percent in 2017 to *** percent in 2019. The share of imports from the Netherlands increased from *** percent in 2017 to *** percent in 2019. The share of imports from all other sources increased from *** percent in 2017 to *** percent in 2018, and then decreased to *** percent in 2019.

Table IV-2
UHMWPE: U.S. imports by source, 2017-19, January-September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	41,094	32,321	32,354	24,231	18,731
	Value (1,000 dollars)				
U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	56,908	48,828	48,265	36,106	28,643

Table continued on next page.

Table IV-2—Continued
UHMWPE: U.S. imports by source, 2017-19, January-September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	1.38	1.51	1.49	1.49	1.53
	Share of quantity (percent)				
U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	100.0	100.0	100.0	100.0	100.0
	Share of value (percent)				
U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	100.0	100.0	100.0	100.0	100.0
	Ratio to U.S. production				
U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	***	***	***	***	***

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

Figure IV-1
UHMWPE: U.S. import quantities and average unit values, 2017-19, January to September 2019, and January to September 2020

* * * * * * *

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

U.S. importers' U.S. shipments by packaging size and molecular weight

Figure IV-2 and figure IV-3 present data for U.S. importers' share of U.S. shipments from all sources in 2019 by packaging size and by molecular weight.

Figure IV-2
UHMWPE: U.S. importers' share of U.S. shipments from all sources by packaging size, 2019

* * * * * * *

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

Figure IV-3
UHMWPE: U.S. importers' share of U.S. shipments from all sources by molecular weight, 2019

* * * * * * *

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

Negligibility

The statute requires that an investigation be terminated without an injury determination if imports of the subject merchandise are found to be negligible.[8] Negligible imports are generally defined in the Act, as amended, as imports from a country of merchandise corresponding to a domestic like product where such imports account for less than 3 percent of the volume of all such merchandise imported into the United States in the most recent 12-month period for which data are available that precedes the filing of the petition or the initiation of the investigation. However, if there are imports of such merchandise from a number of countries subject to investigations initiated on the same day that individually account for less than 3 percent of the total volume of the subject merchandise, and if the imports from those countries collectively account for more than 7 percent of the volume of all such merchandise imported into the United States during the applicable 12-month period, then imports from such countries are deemed not to be negligible.[9] Imports from Korea accounted for *** percent of total imports of UHMWPE by quantity during March 2019 through February 2020.

Table IV-3
UHMWPE: U.S. imports in the twelve-month period preceding the filing of the petition, March 2019 through February 2020

Item	March 2019 through February 2020	
	Quantity (1,000 pounds)	Share quantity (percent)
U.S. imports from.--		
Korea	***	***
Brazil	***	***
Germany	***	***
Japan	***	***
Netherlands	***	***
All other sources	***	***
Nonsubject sources	***	***
All import sources	31,746	100.0

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.

[8] Sections 703(a)(1), 705(b)(1), 733(a)(1), and 735(b)(1) of the Act (19 U.S.C. §§ 1671b(a)(1), 1671d(b)(1), 1673b(a)(1), and 1673d(b)(1)).

[9] Section 771 (24) of the Act (19 U.S.C § 1677(24)).

Apparent U.S. consumption

Table IV-4 and figure IV-4 present data on apparent U.S. consumption for UHMWPE. During 2017-19, total apparent U.S. consumption increased by *** pounds (*** percent). During 2017-18, apparent consumption increased by *** percent while U.S. producers' U.S. shipments increased by *** percent and U.S. importers' U.S. shipments decreased by *** percent. During 2018-19, apparent consumption decreased by *** percent, while U.S. producers' U.S. shipments decreased by *** percent and U.S. importers' U.S. shipments decreased by *** percent. Apparent consumption was *** percent lower during January-September 2020 compared to during January-September 2019, while U.S. producers' U.S. shipments and U.S. importers' U.S. shipments from all sources were *** percent and *** percent lower respectively during the same time period.

Table IV-4
UHMWPE: Apparent U.S. consumption, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
U.S. producers' U.S. shipments.--Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All U.S. producers	***	***	***	***	***
U.S. importers' U.S. shipments from.--Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	40,957	32,365	30,253	23,140	19,069
Apparent U.S. consumption	***	***	***	***	***

Table continued on next page.

Table IV-4—Continued
UHMWPE: Apparent U.S. consumption, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Value (1,000 dollars)				
U.S. producers' U.S. shipments.--Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All U.S. producers	***	***	***	***	***
U.S. importers' U.S. shipments from.--Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	55,580	49,088	45,841	35,607	28,778
Apparent U.S. consumption	***	***	***	***	***

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.

Figure IV-4
UHMWPE: Apparent U.S. consumption, 2017-19, January to September 2019, and January to September 2020

* * * * * * *

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

U.S. market shares

U.S. market share data are presented in table IV-5. By quantity, U.S. producers accounted for more than half of apparent U.S. consumption in each full and partial year; U.S. shipments of imports from Korea accounted for less than ten percent.

Table IV-5
UHMWPE: Market shares, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Apparent U.S. consumption	***	***	***	***	***
	Share of quantity (percent)				
U.S. producers' U.S. shipments.--Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All U.S. producers	***	***	***	***	***
U.S. importers' U.S. shipments from.--Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All import sources	***	***	***	***	***
	Value (1,000 dollars)				
Apparent U.S. consumption	***	***	***	***	***
	Share of value (percent)				
U.S. producers' U.S. shipments.--Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All U.S. producers	***	***	***	***	***
U.S. importers' U.S. shipments from.--Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
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.

The share of U.S. producers' U.S. shipments by quantity increased by *** percentage points during 2017-19, but was *** lower during January-September 2020 compared to January-September 2019. The share of U.S. importers' U.S. shipments from Korea by quantity increased by *** percentage points during 2017-19 and was *** percentage points higher during January-September 2020 compared to January-September 2019. During 2017-19, U.S. imports from Brazil, Germany, and all other sources lost share in the overall market (by *** percentage points for Brazil, by *** percentage points for Germany, and by *** percentage points for all other sources), however the market share of imports from Brazil and Germany were both *** higher during January-September 2020 compared to January-September 2019, while the market share of imports from all other sources was lower during January-September 2020 compared to January-September 2019. The market share of U.S. imports from Japan and the Netherlands increased during 2017-19 (by *** percentage points for Japan and by *** percentage points for the Netherlands), but the market share for U.S. imports from Japan was *** lower during January-September 2020 compared to January-September 2019 while the market share for U.S. imports from the Netherlands was higher during January-September 2020 compared to January-September 2019.

Part V: Pricing data

Factors affecting prices

Raw material costs

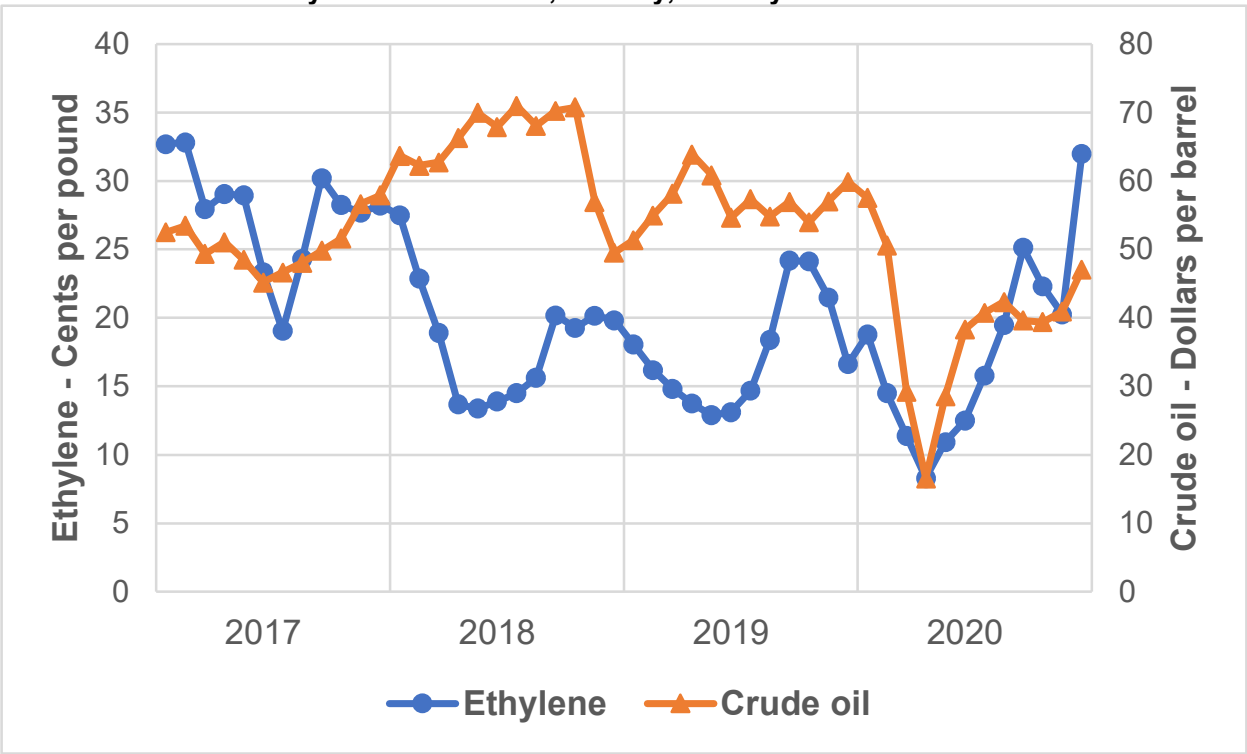
UHMWPE is synthesized from its monomer ethylene, which is bonded together to form the base polyethylene product.[1] The manufacturing process of ethylene is primarily dependent upon steam cracking of hydrocarbons. A variety of hydrocarbons can be used in this process ranging from natural gas liquids (ethane, propane, butane) to petroleum liquids (naphtha, gas oil, crude oil). The price for ethylene decreased irregularly by 75 percent from $0.33 per pound in January 2017 to a period-low of $0.08 per pound in April 2020 before bouncing back and increasing to $0.32 per pound in December 2020 (figure V-1).[2] Ethylene costs as a share of the total cost of goods sold ("COGS") reported by U.S. producers declined from *** percent in 2017 to *** percent in 2018 and to *** percent in 2019.[3]

[1] Petition, p. 10.

[2] IHS Markit reported that ethylene prices increased in August and September of 2020 due to outages of some crackers and Hurricane Laura in late August. Ethylene Market Outlook Considering the Impact of COVID-19, IHS Markit, September 10, 2020.

[3] Ethylene costs as a share of the total COGS reported by U.S. producers was *** percent in the interim period of January-September 2020.

Figure V-1
UHMWPE: Prices for ethylene and crude oil, monthly, January 2017-December 2020



Sources: Ethylene--Energy Indicators, Gulf Coast Ethylene Prices Monthly, Federal Reserve Bank of Dallas, email correspondence with staff March 1, 2021; Crude oil--U.S. Energy Information Administration, West Texas Intermediate Crude Oil Price Monthly, https://www.eia.gov/opendata/qb.php?category=1039852&sdid=STEO.WTIPUUS.M, accessed March 1, 2021.

Celanese reported the lowest ethylene prices during the ***; KPIC also reported the lowest naphtha prices during the *** (figure V-2).

Figure V-2
UHMWPE: Average prices for ethylene and naphtha as reported by Celanese and KPIC, quarterly, January 2017-December 2020

* * * * * * *

Sources: Celanese--prehearing brief, Exhibit 10; KPIC--posthearing brief, Exhibit 19.

One U.S. producer and 6 of 9 responding importers reported that raw material prices have fluctuated since January 1, 2017.[4] U.S. producer *** reported that prices of UHMWPE are correlated with prices of crude oil – as oil prices fluctuate, selling prices of UHMWPE change accordingly. Importers *** report that selling prices for UHMWPE are subject to ethylene prices while importers *** report that ethylene prices have little to no impact on selling prices for UHMWPE.

Five of six purchasers reported that they are familiar with the prices of raw materials used in the production of UHMWPE, and two of the six further reported that information on raw material prices affected their negotiations or contracts to purchase UHMWPE since 2017.[5] Purchaser *** reported that it utilizes index pricing based on ethylene cost and purchaser *** reported that raw material price changes have led to market price erosion and affected sales mix. In contrast, four purchasers reported that raw material price changes did not affect negotiations or contracts. Purchaser *** reported that the fixed production costs

[4] The Commission received questionnaires from two U.S. producers and ten importers.
[5] Purchaser questionnaires from six firms were used. See Part II for more information on purchasers.

carry a heavier weight than raw material costs and purchaser *** reported that producers refuse to negotiate based on raw material prices.

Transportation costs to the U.S. market

Transportation costs for UHMWPE shipped from Korea to the United States averaged 8.8 percent during 2019. These estimates were derived from official import data and represent the transportation and other charges on imports.[6]

U.S. inland transportation costs

*** U.S. producers and importers reported that they typically arrange transportation to their customers. U.S. producers reported that their U.S. inland transportation costs ranged from *** percent while importers reported costs of *** percent.

Pricing practices

Pricing methods

U.S. producers and importers reported mostly using *** and *** in order to set prices for UHMWPE (table V-1).[7] Other transactions reported by importer *** use ***. Importer *** reported that price movements of UHMWPE are influenced by changes in the price of ethylene and are generally discussed during contract negotiations. Importer *** reported raw material and transportation costs as key factors affecting price movements in the market.

[6] The estimated transportation costs were obtained by subtracting the customs value from the c.i.f. value of the imports for 2019 and then dividing by the customs value based on HTS statistical reporting numbers 3901.10.1000 and 3901.20.1000.

[7] Celanese reported that contract negotiations typically take place over a period of 3-6 months. Petitioner's preliminary phase postconference brief, response to staff questions, Exhibit 23, p. 19.

Table V-1
UHMWPE: U.S. producers' and importers' reported price setting methods, by number of responding firms

Method	U.S. producers	U.S. importers
Transaction-by-transaction	***	6
Contract	***	6
Set price list	***	---
Other	***	1
Responding firms	2	8

Note: 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 *** UHMWPE under *** and importers reported *** selling under ***; spot sales are *** (table V-2).

Table V-2
UHMWPE: U.S. producers' and importers' shares of U.S. commercial shipments by type of sale, 2019

Item	U.S. producers	Subject U.S. importers
	Share (percent)	
Share of commercial U.S. shipments.-- Long-term contracts	***	***
Annual contract	***	***
Short-term contracts	***	***
Spot sales	***	***
Total	100.0	100.0

Note: Because of rounding, figures may not add to totals shown.

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

The average contract duration for *** reported by U.S. producers was *** years. U.S. producers reported that ***.

Most importers reported that ***. Importer *** reported that ***.

Importer *** reported that ***.

Five purchasers reported that they purchase UHMWPE monthly and one firm purchases daily. Purchasers reported purchasing domestic and subject UHMWPE in 25 kg packages (or similar size), supersacks (500 kg ±10%), and bulk (truck or railcar). Five of six purchasers reported that their purchasing frequency had not changed since 2017 but *** reported more frequent purchases due to growth. Two of five responding purchasers contacted 1 to 4 suppliers before making a purchase and a range of 1 to 5 suppliers were reportedly contacted by the remaining three purchasers. Five of six purchasers reported that purchases of UHMWPE usually involve negotiations between a supplier and a purchaser. Common factors that purchasers negotiate are price, contract length, and delivery terms. *** reported that competitive pricing is reviewed during negotiations but is limited by the qualifications of the competing firms. Purchaser *** reported that its supply agreement with *** and prices are reviewed annually, typically during the last quarter of the calendar year for the subsequent year.[8]

Sales terms and discounts

*** U.S. producers and importers reported that prices of UHMWPE are quoted on ***. However, importer *** reported prices of imported UHMWPE from Korea on ***. *** reported that it typically has a discount policy based on ***. *** reported that it has a ***.[9] One importer, ***, reported having an annual total volume discount, and 4 importers reported no discount policy.

[8] ***, email to USITC staff, February 24, 2021.

[9] Celanese reported that it has some contracts that include ***. Petitioner's preliminary phase postconference brief, response to staff questions, Exhibit 23, p. 18.

Price leadership

Purchasers *** reported that Celanese (Ticona) was a price leader and that it usually leads with price increases and others follow. Purchaser *** reported that price leaders are Celanese and Braskem America and that price changes are typically negotiated during contract renewal, prices are seldomly announced through supplier letters, and any announced price increases are absorbed by end users.

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 UHMWPE products shipped to unrelated U.S. customers during January 2017-September 2020.[10]

Product 1.--UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in individual packaging with a net weight of 25 kg.

Product 2.--UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

Product 3.--UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT).

Product 4.--UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

Product 5.--UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT).

[10] Products 2, 4, and 5 were added in the final phase of this investigation at the request of KPIC, while the definitions for products 1 and 3 were not changed, in an effort to obtain greater coverage of the UHMWPE market.

Products 1, 2, and 3 have identical average molecular weight/volume ranges and are considered a medium molecular weight UHMWPE. Products 4 and 5 have identical average molecular weight/volume ranges and are considered a high molecular weight.[11]

Two U.S. producers (***)[12] and two importers *** [13] provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.[14] *** provided pricing data for ***; *** provided pricing data for ***; *** reported pricing for ***; and *** reported pricing for ***. Pricing data reported by these firms accounted for approximately *** percent of U.S. producers' shipments of UHMWPE and *** percent of U.S. shipments of subject imports from Korea in 2019.[15] [16]

Pricing data for products 1-5 are presented in tables V-3 to V-7 and figures V-3 to V-7.

[11] Typical end uses for products 1, 2, and 3 are regular (non-EV) battery separators and products 4 and 5 are used in compression molding applications to form stock shapes. Respondent's posthearing brief, Response to Commission's Questions, pp. 76-78. UHMWPE high molecular weight products can also be used as regular (non-EV) battery separators if the product has a low enough particle size. For more information on molecular weight, please refer to Part I, product "Description and applications."

[12] *** did not provide pricing product data in the preliminary phase.

[13] In the preliminary phase of the investigation, *** submitted an importer questionnaire that reported importing product 1 from Korea (product 1 definition did not change from the preliminary to the final phase). However, the firm recognized that it should have reported imports for preliminary phase product 4 instead of product 1. ***, email to USITC staff, October 6, 2020. Yet, it was determined that *** was the importer of record for the product and that *** purchased the product from ***. ***, email to USITC staff, November 24, 2020. As a result, *** submitted an importer questionnaire and *** submitted a purchaser questionnaire in the final phase of this investigation.

[14] 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.

[15] Pricing coverage is based on U.S. shipments reported in questionnaires.

[16] No price data was reported for products 2, 3, and 5 for imports from Korea.

Table V-3
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, and margins of underselling/(overselling), by quarter, January 2017 through September 2020

Period	United States		Korea		
	Price (dollars per pound)	Quantity (pounds)	Price (dollars per pound)	Quantity (pounds)	Margin (percent)
2017:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2018:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2019:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2020:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***

Note: Product 1: UHMWPE, with an average molecular weight/volume ranging from 6.7×10^6 to 7×10^6 g/mol based on the producer's advertised testing methodology; in individual packaging with a net weight of 25 kg.

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

Table V-4
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, and margins of underselling/(overselling), by quarter, January 2017 through September 2020

Period	United States		Korea		
	Price (dollars per pound)	Quantity (pounds)	Price (dollars per pound)	Quantity (pounds)	Margin (percent)
2017:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2018:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2019:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2020:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***

Note: Product 2: UHMWPE, with an average molecular weight/volume ranging from 6.7×10^6 to 7×10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

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

Table V-5
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, and margins of underselling/(overselling), by quarter, January 2017 through September 2020

Period	United States		Korea		
	Price (dollars per pound)	Quantity (pounds)	Price (dollars per pound)	Quantity (pounds)	Margin (percent)
2017:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2018:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2019:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2020:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***

Note: Product 3: UHMWPE, with an average molecular weight/volume ranging from 6.7×10^6 to 7×10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT).

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

Table V-6
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, and margins of underselling/(overselling), by quarter, January 2017 through September 2020

Period	United States		Korea		
	Price (dollars per pound)	Quantity (pounds)	Price (dollars per pound)	Quantity (pounds)	Margin (percent)
2017:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2018:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2019:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2020:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***

Note: Product 4: UHMWPE, with an average molecular weight/volume ranging from 8.7×10^6 to 9×10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

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

Table V-7
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 5, and margins of underselling/(overselling), by quarter, January 2017 through September 2020

Period	United States		Korea		
	Price (dollars per pound)	Quantity (pounds)	Price (dollars per pound)	Quantity (pounds)	Margin (percent)
2017:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2018:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2019:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2020:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***

Note: Product 5: UHMWPE, with an average molecular weight/volume ranging from 8.7×10^6 to 9×10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT).

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

Figure V-3
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 1, by quarter, January 2017 through September 2020

* * * * * * *

* * * * * * *

Product 1: UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in individual packaging with a net weight of 25 kg.

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

Figure V-4
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 2, by quarter, January 2017 through September 2020

* * * * * * *

* * * * * * *

Product 2: UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

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

Figure V-5
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 3, by quarter, January 2017 through September 2020

* * * * * * *

* * * * * * *

Product 3: UHMWPE, with an average molecular weight/volume ranging from 6.7 x 10^6 to 7 x 10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT).

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

Figure V-6
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 4, by quarter, January 2017 through September 2020

* * * * * * *

* * * * * * *

Product 4: UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

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

Figure V-7
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic and imported product 5, by quarter, January 2017 through September 2020

* * * * * * *

* * * * * * *

Product 5: UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in bulk packaging with a net pallet weight of 130,000 lbs (59 MT) to 140,000 lbs (63.5 MT).

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

Import purchase costs

In addition to price data, the Commission also requested that importers provide landed duty-paid values and quantities for imports used for internal consumption. One importer (*** provided such data on imports from Korea, and its purchase cost data for imports of product 4 are presented in table V-8 and figure V-8, along with U.S. sales prices (previously presented).[17] [18] Import purchase cost data reported by this firm accounted for *** percent of imports from Korea in 2019.

[17] LDP import value does not include any potential additional costs that a purchaser may incur by importing rather than purchasing from another importer or U.S. producer. Price-cost differentials are based on LDP import values whereas margins of underselling/overselling are based on importer sales prices.

[18] *** originally reported cost data for product 1; however, the firm recognized that it should have reported imports for product 4 instead of product 1. ***, email to USITC staff, March 9, 2021.

Table V-8
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic product 4 and unit LDP import purchase values, and quantities of product 4, by quarter, January 2017 through September 2020

Period	United States		Korea (cost)		
	Price (dollars per pound)	Quantity (pounds)	Unit LDP value (dollars per pound)	Quantity (pounds)	Price-cost differential (percent)
2017:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2018:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2019:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***
Oct.-Dec.	***	***	***	***	***
2020:					
Jan.-Mar.	***	***	***	***	***
Apr.-Jun.	***	***	***	***	***
Jul.-Sep.	***	***	***	***	***

Note: U.S. f.o.b. price data is the same as the data for prices to end users presented in table V-6 and figure V-6.
Note: Product 4: UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

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

Figure V-8
UHMWPE: Weighted-average f.o.b. prices and quantities of domestic product 4 and unit LDP import purchase values, and quantities of product 4, by quarter, January 2017 through September 2020

* * * * * * *

* * * * * * *

Note: U.S. f.o.b. price data is the same as the data for prices to end users presented in table V-6 and figure V-6.
Note: Product 4: UHMWPE, with an average molecular weight/volume ranging from 8.7 x 10^6 to 9 x 10^6 g/mol based on the producer's advertised testing methodology; in supersacks with net weight ranging from 453 kg to 550 kg, shipped in quantities less than 59 MT.

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

In addition to the import purchase cost data, firms were asked to estimate a variety of costs associated with their imports for internal use of UHMWPE. The single responding firm (***) reported that it incurred additional costs by importing UHMWPE rather than purchasing from a U.S. producer or importer. The following estimates were reported (as a share of landed duty-paid value) for the following factors: inland transportation costs of *** percent; cost per kg increase of *** percent;[19] freight costs of *** percent;[20] and labor costs of *** percent.[21]

When describing how the its additional costs by importing UHMWPE directly compare with the additional costs it incurs when purchasing from a U.S. producer or importer, *** stated that ***. The firm also stated that ***.

Importers reporting import purchase costs were asked to identify the benefits of importing UHMWPE for internal use as opposed to purchasing it from a U.S. producer or importer. *** reported that it consults with U.S. producers and importers to compare costs in determining whether or not to import UHMWPE and cited that ***. The firm reported that the UHMWPE it imported from Korea was not priced lower than it would be if it had purchased from a U.S. producer or importer.

[19] The firm reported that the ***.
[20] The firm reported ***.
[21] The firm requires ***.

Price trends

In general, prices decreased overall during January 2017-September 2020. Table V-9 summarizes the price trends, by country and product from the first quarter of 2017 to the third quarter of 2020. [22] As shown in the table, domestic price decreases for *** ranged from *** to *** percent;[23] the domestic price increased by *** percent for ***.[24] [25] The import price for *** decreased by *** percent. [26] [27]

[22] An example calculation of price change would be, for product 1, the domestic price in the first quarter of 2017 was *** dollars per pound and the price in the third quarter of 2020 was *** dollars per pound, resulting in *** percent.

[23] Celanese asserts that during contract negotiations, a price decrease in one product will lead to price decreases for all the products customers purchase across the portfolio. Petitioner's posthearing brief, Exhibit 2, p. 7. Staff estimates that the correlation coefficients between prices reported by Celanese for all five pricing products were ***. A value less than 0.5 indicates a weak or no linear correlation, between 0.5 and 0.7 a moderate correlation, and greater than 0.7 a strong correlation.

[24] U.S. producer *** did not report pricing products 1 and 3 for the first quarter of 2017, therefore the domestic changes in prices over the period for these products shown in the table are calculated from what *** reported in the first quarter of 2017 and what both U.S. producers reported in the third quarter of 2020. The price for product 1 reported by *** from the first quarter of 2017 to the third quarter of 2020 decreased *** percent and the price for product 3 increased *** percent over the period. The price for product 1 reported by *** from the third quarter of 2017 (the first quarter reported) to the third quarter of 2020 was *** and the price for product 3 decreased *** percent over the period.

[25] In the preliminary phase of this investigation, purchaser *** reported that ***.

[26] Korean imports ***.

[27] Import purchase cost data for Korean imports ***.

Table V-9
UHMWPE: Summary of weighted-average f.o.b. prices for products 1-5 from the United States and Korea

Item	Number of quarters	Low price (dollars per pound)	High price (dollars per pound)	Change in price over period (percent)
Product 1: United States	***	***	***	***
Korea price	***	***	***	***
Korea cost	***	***	***	***
Product 2: United States	***	***	***	***
Korea price	***	***	***	***
Korea cost	***	***	***	***
Product 3: United States	***	***	***	***
Korea price	***	***	***	***
Korea cost	***	***	***	***
Product 4: United States	***	***	***	***
Korea price	***	***	***	***
Korea cost	***	***	***	***
Product 5: United States	***	***	***	***
Korea price	***	***	***	***
Korea cost	***	***	***	***

Note: Percentage change in price is from the first quarter of 2017 to the third quarter of 2020.

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

Price and purchase cost comparisons

As shown in table V-10, prices for product imported from Korea were below those for U.S.-produced product in 21 of 22 instances (*** pounds); margins of underselling ranged from 4.4 to 55.8 percent.[28] In the remaining instance (*** pounds), prices for product from Korea were 0.6 percent above prices for the domestic product.[29]

Table V-10
UHMWPE: Instances of underselling/overselling and the range and average of margins, by country, January 2017-September 2020

Source	Underselling				
	Number of quarters	Quantity (pounds)	Average margin (percent)	Margin range (percent)	
				Min	Max
Product 1	***	***	***	***	***
Product 2	***	***	***	***	***
Product 3	***	***	***	***	***
Product 4	***	***	***	***	***
Product 5	***	***	***	***	***
Total, underselling	21	***	22.2	4.4	55.8
Source	(Overselling)				
	Number of quarters	Quantity (pounds)	Average margin (percent)	Margin range (percent)	
				Min	Max
Product 1	***	***	***	***	***
Product 2	***	***	***	***	***
Product 3	***	***	***	***	***
Product 4	***	***	***	***	***
Product 5	***	***	***	***	***
Total, overselling	1	***	(0.6)	(0.6)	(0.6)

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

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

[28] No importers reported price data for products 2, 3, and 5 imported from Korea during January 2017-September 2020.

[29] The instance of overselling was driven by ***.

As shown in table V-11, purchase costs for product imported from Korea were below those for U.S.-produced product in all eight instances (*** pounds); differentials ranged from *** to *** percent. There were no instances of unit purchase cost data higher than U.S. prices.

Table V-11
UHMWPE: Instances of the purchase cost data of imports from Korea being higher and lower than the U.S. prices, by product, January 2017-September 2020

	Unit purchase cost data lower than U.S. prices				
				Price / cost differential range (percent)	
Source	Number of quarters	Quantity (pounds)	Average price / cost differential (percent)	Min	Max
Product 1	***	***	***	***	***
Product 2	***	***	***	***	***
Product 3	***	***	***	***	***
Product 4	***	***	***	***	***
Product 5	***	***	***	***	***
Total, lower	8	***	***	***	***

Note: These data include only quarters in which there is a comparison between the U.S. and subject product.

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

Lost sales and lost revenue

In the preliminary phase of this investigation, the Commission requested that U.S. producers of UHMWPE report purchasers with which they experienced instances of lost sales or revenue due to competition from subject imports of UHMWPE from Korea during January 2017-December 2019. One of two responding U.S. producers reported usable lost sales and lost revenue information. Petitioner Celanese submitted lost sales and lost revenue allegations, identifying *** firms.

In the final phase of this investigation, of the two responding U.S. producers, *** reported reduced prices, *** rolled back announced price increases, and *** reported lost sales.

Staff issued questionnaires to fourteen purchasers and received 6 usable responses.[30] Responding purchasers reported purchasing and importing *** pounds of UHMWPE during January 2017-September 2020 (table V-12).

Of the six responding purchasers, four reported that they had purchased imported UHMWPE from Korea instead of U.S.-produced product since 2017. Three of these purchasers reported that subject import prices were lower than U.S.-produced product, and one of these purchasers reported that price was a primary reason for the decision to purchase imported product rather than U.S.-produced product. One purchaser *** estimated that the quantity of UHMWPE from Korea purchased instead of domestic product was *** pounds (table V-13).[31] Purchasers identified *** as non-price reasons for purchasing imported rather than U.S.-produced product.

Of the six responding purchasers, *** reported that U.S. producers had reduced prices in order to compete with lower-priced imports from Korea; *** reported that they did not and *** did not know. The reported estimated price reduction was *** percent.

[30] ***.

[31] As previously mentioned, contracts with KPIC are negotiated annually. The purchaser reported this amount as a sum of annual and interim 2020 purchases over the period between January 2017 and September 2020. The *** pound amount is ***, indicating that ***. Furthermore, ***.

Table V-12
UHMWPE: Purchasers' reported purchases and imports, January 2017-September 2020

Purchaser	Purchases and imports in January 2017-September 2020 (1,000 pounds)			Change in domestic share (pp, 2017-19)	Change in subject country share (pp, 2017-19)
	Domestic	Subject	All other		
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	***	***	***	***	***

Note: All other includes all other sources and unknown sources.
Note: Percentage points (pp) change: Change in the share of the firm's total purchases of domestic and/or subject country imports between first and last years.

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

Table V-13
UHMWPE: Purchasers' responses to purchasing subject imports instead of domestic product

Purchaser	Subject imports purchased instead of domestic (Y/N)	Imports priced lower (Y/N)	If purchased subject imports instead of domestic, was price a primary reason		
			Y/N	If Yes, quantity (1,000 pounds)	If No, non-price reason
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
***	***	***	***	***	***
Total	Yes--3; No--2	Yes--2; No--1	Yes--1; No--2	***	

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

Part VI: Financial experience of U.S. producers

Background

Two U.S. producers, Celanese and Braskem, provided usable financial results on their U.S. UHMWPE operations.[1] For calendar year 2019, Celanese accounted for *** percent and Braskem accounted for *** percent of UHMWPE sales quantity, as shown in figure VI-1. Revenue reflects ***.[2]

[1] Both Celanese and Braskem reported financial results for the fiscal year end of December 31, which is the same as the calendar year. Celanese provided its financial data on the basis of generally accepted accounting principles (GAAP) and Braskem provided its financial data on the basis of International Financial Reporting Standards (IFRS).

[2] Braskem was created in August 2002 by the merger of six companies from the Odebrecht Group and the Mariani Group (Copene, OPP, Trikem, Proppet, Nitrocarbono, and Polialden). Braskem states that it is "the largest petrochemical company in the Americas and the world's leading biopolymer producer" with production in Brazil (29 industrial units), Mexico (4 industrial units), Germany (2 industrial units) and the United States (5 industrial units in Pennsylvania, West Virginia, and Texas). Braskem's business model is to produce upstream basic petrochemicals and use them as raw material for producing thermoplastic resins which are then sold to downstream plastics converters. In the United States and Europe, Braskem only produces thermoplastic resins. The company produces thermoplastic resins polyethylene (PE), polypropylene (PP) and polyvinyl chloride (PVC) and basic petrochemicals such as ethylene, propylene, butadiene, chlorine, benzene, and toluene. Braskem's webpages, https://www.braskem.com.br/usa/profile, and https://www.braskem.com.br/usa/history, retrieved January 12, 2021.

Celanese's UHMWPE operations are part of the company's Engineering Materials business segment and includes operations of more than ten other chemicals including: polyoxymethylene, polybutylene terephthalate, long-fiber reinforced thermoplastics, liquid crystal polymers, thermoplastic elastomers, nylon compounds or formulations, polypropylene compounds or formulations, polyphenylene sulfide, acesulfame potassium, potassium sorbate, and sorbic acid. In 2019, the reported net sales of UHMWPE were *** percent of the $2.4 billion net sales in Celanese's Engineering Materials business segment. Celanese's 2019 Form 10-K, pp. 5 and 37 (as filed).

Figure VI-1
UHMWPE: Share of net sales quantity, by firm, 2019

* * * * * * *

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

Operations on UHMWPE

Table VI-1 presents aggregated data on U.S. producers' operations in relation to UHMWPE, while table VI-2 presents corresponding changes in average unit values (AUVs). Table VI-3 presents selected company-specific financial data.

Table VI-1
UHMWPE: Results of operations of U.S. producers, 2017-19, January-September 2019, and January-September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Total net sales	***	***	***	***	***
	Value (1,000 dollars)				
Total net sales	***	***	***	***	***
Cost of goods sold.-- Ethylene	***	***	***	***	***
Other raw materials	***	***	***	***	***
Total raw material costs	***	***	***	***	***
Direct labor	***	***	***	***	***
Other factory costs	***	***	***	***	***
Total COGS	***	***	***	***	***
Gross profit	***	***	***	***	***
SG&A expense	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***
Other expense/ (income)	***	***	***	***	***
Net income or (loss)	***	***	***	***	***
Depreciation/amortization	***	***	***	***	***
Cash flow	***	***	***	***	***
	Ratio to net sales (percent)				
Cost of goods sold.-- Ethylene	***	***	***	***	***
Other raw materials	***	***	***	***	***
Total raw material costs	***	***	***	***	***
Direct labor	***	***	***	***	***
Other factory costs	***	***	***	***	***
Total COGS	***	***	***	***	***
Gross profit	***	***	***	***	***
SG&A expense	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***
Net income or (loss)	***	***	***	***	***

Table continued on next page.

Table VI-1—Continued
UHMWPE: Results of operations of U.S. producers, 2017-19, January-September 2019, and January-September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Ratio to total COGS (percent)				
Cost of goods sold.--					
Ethylene	***	***	***	***	***
Other raw materials	***	***	***	***	***
Total raw material costs	***	***	***	***	***
Direct labor	***	***	***	***	***
Other factory costs	***	***	***	***	***
Average COGS	***	***	***	***	***
	Unit value (dollars per pound)				
Total net sales	***	***	***	***	***
Cost of goods sold.--					
Ethylene	***	***	***	***	***
Other raw materials	***	***	***	***	***
Total raw material costs	***	***	***	***	***
Direct labor	***	***	***	***	***
Other factory costs	***	***	***	***	***
Average COGS	***	***	***	***	***
Gross profit	***	***	***	***	***
SG&A expense	***	***	***	***	***
Operating income or (loss)	***	***	***	***	***
Net income or (loss)	***	***	***	***	***
	Number of firms reporting				
Operating losses	***	***	***	***	***
Net losses	***	***	***	***	***
Data	***	***	***	***	***

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

Table VI-2
UHMWPE: Changes in AUVs between calendar years 2017-19 and partial year periods, January-September 2019 and January-September 2020

Item	Between calendar years			Between partial year period
	2017-19	2017-18	2018-19	2019-20
	Change in AUVs (percent)			
Total net sales	▲***	▲***	▲***	▼***
Cost of goods sold.--				
Ethylene	▼***	▼***	▼***	▼***
Other raw materials	▼***	▼***	▲***	▲***
Total raw material costs	▼***	▼***	▼***	▼***
Direct labor	▲***	▲***	▲***	▲***
Other factory costs	▲***	▼***	▲***	▲***
Average COGS	▲***	▲***	▲***	▲***
	Change in AUVs (dollars per pound)			
Total net sales	▲***	▲***	▲***	▼***
Cost of goods sold.--				
Ethylene	▼***	▼***	▼***	▼***
Other raw materials	▼***	▼***	▲***	▲***
Total raw material costs	▼***	▼***	▼***	▼***
Direct labor	▲***	▲***	▲***	▲***
Other factory costs	▲***	▼***	▲***	▲***
Average COGS	▲***	▲***	▲***	▲***
Gross profit	▼***	▲***	▼***	▼***
SG&A expense	▼***	▼***	▲***	▼***
Operating income or (loss)	▲***	▲***	▼***	▼***
Net income or (loss)	▲***	▲***	▼***	▼***

Note.--Shares and ratios shown as “0.00” percent represent non-zero values less than “0.005” percent (if positive) and greater than “0.005” percent (if negative). Period changes preceded by a “▲” represent an increase, while period changes preceded by a “▼” represent a decrease.

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

Table VI-3
UHMWPE: Results of operations of U.S. producers, by firm, 2017-19, January-September 2019, and January-September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Total net sales (1,000 pounds)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Total net sales (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Cost of goods sold (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Gross profit or (loss) (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	SG&A expenses (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Operating income or (loss) (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Net income or (loss) (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***

Table continued on next page.

Table VI-3—Continued
UHMWPE: Results of operations of U.S. producers, by firm, 2017-19, January-September 2019, and January-September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	COGS to net sales ratio (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Gross profit or (loss) to net sales ratio (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	SG&A expense to net sales ratio (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Operating income or (loss) to net sales ratio (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Net income or (loss) to net sales ratio (percent)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit net sales value (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit ethylene (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit other raw materials (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit total raw materials (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***

Table continued on next page.

Table VI-3—Continued
UHMWPE: Results of operations of U.S. producers, by firm, 2017-19, January-September 2019, and January-September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit direct labor (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit other factory costs (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit COGS (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit gross profit or (loss) (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit SG&A expenses (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit operating income or (loss) (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Unit net income or (loss) (dollars per pound)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***

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

Net sales

As presented in table IV-1, U.S. UHMWPE producers' total net sales quantity and value fluctuated but increased overall from 2017 to 2019, increasing by *** percent by quantity and *** percent by value from 2017 to 2018 before declining by *** percent by quantity and *** percent by value percent from 2018 to 2019. Total net sales were *** higher by quantity and *** higher by value in the interim period of January-September 2020 than in January-September 2019. Average unit net sales values increased from $*** per pound in 2017 to $*** per pound in in 2019 and decreased to $*** per pound in January-September 2020 and January-September 2019.

Cost of goods sold and gross profit or loss

As presented in table VI-1, U.S. UHMWPE producers' total cost of goods sold ("COGS") fluctuated but increased overall from 2017 to 2019, increasing from 2017 to 2018 before declining in 2019, and COGS were higher in interim 2020 than in interim 2019. Average per unit values of COGS increased slightly from 2017 *** to 2019 *** and were higher in interim 2020 *** than in interim 2019 ***. As a ratio to net sales, COGS increased from *** percent in 2017 to *** percent in 2019 and was higher in interim 2020 (*** percent) than in interim 2019 (*** percent). This was attributable to the increase in *** costs.

Total raw materials represent the largest share of total COGS, ranging from *** percent in interim 2020 to *** percent in 2017. Total raw material costs increased irregularly by *** percent in absolute values from 2017 to 2019 and were higher by *** percent in interim 2020 than in interim 2019. Average per unit total raw material costs *** each year, from $*** per pound in 2017 to $*** per pound in 2019 and were lower in interim 2020 ($*** per pound) than in interim 2019 ($*** per pound). As a ratio to net sales, total raw material costs declined from *** percent in 2017 to *** percent in 2019 and were lower in interim 2020 *** than in interim 2019 ***.

Ethylene accounted for virtually all of the total raw material costs and as a ratio to net sales declined from 2017 to 2019 and was lower in interim 2020 than interim 2019. Per unit ethylene costs (dollars per pound) decreased from 2017 to 2019 and were lower in interim 2020 than in interim 2019. Braskem reported *** per unit ethylene costs (*** from 2017 to interim 2020) than Celanese (*** for the same period), and also had *** in per unit ethylene

costs during the period for which data were collected.[3] Both U.S. producers reported procuring ethylene from *** contracts, with fixed quantity and prices partially fluctuating based on ethylene's published prices.[4] Other raw materials accounted for a very small share of total raw materials at $*** per pound and include *** and *** as a chain terminator. Celanese uses ***.[5] Braskem uses ***.[6]

Other factory costs represent the second largest share of total COGS (***). Average per unit other factory costs ranged from $*** per pound to $*** per pound from 2017 to 2019 and were similar in interim 2020 ($*** per pound) and interim 2019 ($*** per pound) (table VI-1). As a ratio to net sales, other factory costs increased irregularly from *** percent in 2017 to *** in 2019 and were higher in interim 2020 (*** percent) than in interim 2019 (*** percent).[7]

[3] For its ethylene raw material, Braskem ***. Communication with ITC staff, February 23, 2021. Celanese does not produce its ethylene, and instead purchases it via long term contracts. Hearing transcript, pp. 90-91 (Kelly), 87-88 (Lee). This is in contrast to KPIC, as the firm produces its own ethylene. Hearing transcript, p. 88 (Toubia), p. 192 (Kim). Costs of ethylene vary geographically and typically are more expensive in Asia compared to the United States. Hearing transcript, p. 176 (Anderson).

[4] ***. U.S. producer questionnaires, III-9e and III-9f.

[5] ***. ***, communication with USITC staff, March 27, 2020.

[6] ***, communication with USITC staff, February 23, 2021.

[7] Celanese had ***. ***, communication with USITC staff, February 26, 2021.
Braskem ***. ***, communication with USITC staff, February 23, 2021.

Direct labor costs represent the third largest share of total COGS (***). Average per unit direct labor costs increased from $*** per pound in 2017 to $*** per pound in 2018 and remained the same in 2019, while interim 2020 was higher ($*** per pound) than interim 2019 ($*** per pound) (table VI-1). As a ratio to net sales, direct labor costs increased from *** percent in 2017 to *** percent in 2019 and were higher in interim 2020 (*** percent) than in interim 2019 (*** percent).[8]

U.S. UHMWPE producers' gross profit increased irregularly by *** percent from 2017 to 2019 (***). The industry's gross profits were lower in interim 2020 ($***) than in interim 2019 ($***). The gross profit margin (gross profit as a ratio to net sales) was *** percent in 2017, *** percent in 2018 and *** percent in 2019 and was lower in interim 2020 (*** percent) than in interim 2019 (*** percent). The lower gross profits between the two interim periods ***.

SG&A expenses and operating income or loss

As presented in table IV-1, U.S. UHMWPE producers' selling, general, and administrative ("SG&A") expense ratios (i.e., total SG&A expenses divided by net sales) decreased irregularly from 2017 to 2019, from *** percent in 2017 to *** percent in 2019 and were lower in

[8] Braskem and Celanese have ***. ***, communication with USITC staff, February 26, 2021. Braskem ***. ***, communication with USITC staff, February 23, 2021.

interim 2020 (*** percent) than in interim 2019 (*** percent). As presented in table VI-3, Celanese accounted for the *** of SG&A expenses, and it explained that selling expense were ***.[9]

As presented in table VI-1, U.S. producers' combined operating income increased from 2017 to 2018 before declining in 2019 *** and was lower in interim 2020 ($***) and interim 2019 ($***). Operating margins (i.e. operating income divided by net sales) were *** percent in 2017, *** percent in 2018, *** percent in 2019, *** percent in interim 2020, and *** percent in interim 2019.[10]

All other expenses and net income or loss

Classified below the operating income level are interest expenses, other expenses, and other income. In table VI-1, these items are aggregated with the net amount shown. The net "all other expenses" fluctuated from 2017 to 2019, with *** "all other expenses" reported in interim 2020. Celanese reported *** other expenses or income related to UHMWPE operations during the period for which data were requested, and *** its net income is ***. Braskem reported *** other expenses and a *** amount of income. Braskem's interest expense *** from $*** in 2017 to $*** in 2019, with $*** in interim 2019 and *** interest expense in interim 2020.[11] Overall, the

[9] Celanese ***. ***, communication with USITC staff, March 27, 2020 and February 26, 2021. Although a smaller part of aggregate SG&A expenses, Braskem's *** from 2017 to 2019 and *** levels in interim 2020 than interim 2019 affect the overall trend in SG&A expenses. Braskem ***. ***, communication with USITC staff, February 23, 2021.

[10] U.S. producers reported *** as a result of COVID-19's impact but the declines in COGS items (particularly for ethylene) resulted in an increase in operating and net income from 2017 to 2019.

[11] Braskem ***. ***, communication with USITC staff, February 23, 2021.

U.S. UHMWPE industry's net income increased irregularly from $*** in 2017 to $*** in 2019; net income was higher in interim 2020 $*** than in interim 2019 $***. As a ratio to net sales, net income also increased irregularly from *** percent of net sales in 2017 to *** percent in 2018, then to *** percent in 2019. Net income as a ratio to net sales was lower in interim 2020 (*** percent) than interim 2019 (*** percent).[12]

Capital expenditures, research and development expenses, assets, and return on assets

Table VI-4 presents capital expenditures, research and development ("R&D") expenses, assets, and return on assets ("ROA") of U.S. UHMWPE producers. Table VI-5 provides U.S. producers' narrative responses regarding the nature and focus of their capital expenditures and R&D expenses as well as substantial changes in assets. Braskem's capital expenditures *** from 2017 to 2019 but then were *** in interim 2020 than in interim 2019 and are ***.[13] Celanese's total capital expenditures *** from 2017 to 2019, and then were *** in interim 2020 than in interim 2019. The firm explained that ***.[14] Total assets utilized in U.S. producers'

[12] A variance analysis is not shown due to differences in the level of vertical integration, cost structures, and corporate allocation between the two U.S. producers of UHMWPE.

[13] U.S. producers' questionnaire response of Braskem, question III-13b. In addition, Braskem ***. ***, communication with USITC staff, February 23, 2021.

[14] Celanese stated that R&D expenses are ***. ***, communication with USITC staff, March 27, 2020. Celanese ***. ***, communication with USITC staff, February 26, 2021.

UHMWPE operations increased by *** percent from 2017 to 2019 and the ROA increased irregularly by *** percentage points during this time.

Table VI-4
UHMWPE: Capital expenditures, R&D expenses, total assets, and operating return on assets of U.S. producers, 2017-19, January-September 2019, and January-September 2020

	Calendar year			January to September	
	2017	2018	2019	2019	2020
Item	Capital expenditures (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Research and development expenses (1,000 dollars)				
Braskem	***	***	***	***	***
Celanese	***	***	***	***	***
All firms	***	***	***	***	***
	Total net assets (1,000 dollars)				
Braskem	***	***	***		
Celanese	***	***	***		
All firms	***	***	***		
	Operating return on assets (percent)				
Braskem	***	***	***		
Celanese	***	***	***		
All firms	***	***	***		

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

Table VI-5
UHMWPE: U.S. producers' narrative responses, relating to capital expenditures, R&D expenses, total assets, and operating return on assets since January 1, 2017

Item / Firm	Narrative
Nature and focus of capital expenditures	
Braskem	***
Celanese	***
Nature and focus of R&D expenses	
Braskem	***
Celanese	***
Description of net assets	
Braskem	***
Celanese	***

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

Capital and investment

The Commission requested U.S. producers of UHMWPE to describe any actual or potential negative effects of imports of UHMWPE from Korea on their firms' growth, investment, ability to raise capital, development and production efforts, or the scale of capital investments. Table VI-6 presents U.S. producers' responses on the impact of subject imports in each category and table VI-7 provides their narrative responses. *** reported actual and anticipated negative effects on investment, while *** reported none. *** reported actual and anticipated negative effects on growth and development while *** reported none. *** reported actual and anticipated negative effects of imports.

Table VI-6
UHMWPE: Actual and anticipated negative effects of imports on investment, growth, and development reported by U.S. producers since January 1, 2017

Item	No	Yes
Negative effects on investment	***	***
Cancellation, postponement, or rejection of expansion projects		***
Denial or rejection of investment proposal		***
Reduction in the size of capital investments		***
Return on specific investments negatively impacted		***
Other		***
Negative effects on growth and development	***	***
Rejection of bank loans		***
Lowering of credit rating		***
Problem related to the issue of stocks or bonds		***
Ability to service debt		***
Other		***
Anticipated negative effects of imports	***	***

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

Table VI-7
UHMWPE: Narratives relating to actual and anticipated negative effects of imports on investment, growth, and development reported by U.S. producers, since January 1, 2017

Item / Firm	Narrative
Reduction in the size of capital investments:	
***	***.
Other effects on growth and development:	
***	***.
Anticipated effects of imports:	
***	***
***	***.

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

Part VII: Threat considerations and information on nonsubject countries

Section 771(7)(F)(i) of the Act (19 U.S.C. § 1677(7)(F)(i)) provides that—

> *In determining whether an industry in the United States is threatened with material injury by reason of imports (or sales for importation) of the subject merchandise, the Commission shall consider, among other relevant economic factors*[1]*--*
>
> *(I) if a countervailable subsidy is involved, such information as may be presented to it by the administering authority as to the nature of the subsidy (particularly as to whether the countervailable subsidy is a subsidy described in Article 3 or 6.1 of the Subsidies Agreement), and whether imports of the subject merchandise are likely to increase,*
>
> *(II) any existing unused production capacity or imminent, substantial increase in production capacity in the exporting country indicating the likelihood of substantially increased imports of the subject merchandise into the United States, taking into account the availability of other export markets to absorb any additional exports,*
>
> *(III) a significant rate of increase of the volume or market penetration of imports of the subject merchandise indicating the likelihood of substantially increased imports,*
>
> *(IV) whether imports of the subject merchandise are entering at prices that are likely to have a significant depressing or suppressing effect on domestic prices, and are likely to increase demand for further imports,*
>
> *(V) inventories of the subject merchandise,*

[1] Section 771(7)(F)(ii) of the Act (19 U.S.C. § 1677(7)(F)(ii)) provides that "The Commission shall consider {these factors} . . . as a whole in making a determination of whether further dumped or subsidized imports are imminent and whether material injury by reason of imports would occur unless an order is issued or a suspension agreement is accepted under this title. The presence or absence of any factor which the Commission is required to consider . . . shall not necessarily give decisive guidance with respect to the determination. Such a determination may not be made on the basis of mere conjecture or supposition."

(VI) 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,

(VII) in any investigation under this title which involves imports of both a raw agricultural product (within the meaning of paragraph (4)(E)(iv)) and any product processed from such raw agricultural product, the likelihood that there will be increased imports, by reason of product shifting, if there is an affirmative determination by the Commission under section 705(b)(1) or 735(b)(1) with respect to either the raw agricultural product or the processed agricultural product (but not both),

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

(IX) any other demonstrable adverse trends that indicate the probability that there is likely to be material injury by reason of imports (or sale for importation) of the subject merchandise (whether or not it is actually being imported at the time).[2]

Information on the volume and pricing of imports of the subject merchandise is presented in *Parts IV* and *V*; and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts is presented in *Part VI*. Information on inventories of the subject merchandise; foreign producers' operations, including the potential for "product-shifting;" any other threat indicators, if applicable; and any dumping in third-country markets, follows. Also presented in this section of the report is information obtained for consideration by the Commission on nonsubject countries.

[2] Section 771(7)(F)(iii) of the Act (19 U.S.C. § 1677(7)(F)(iii)) further provides that, in antidumping investigations, ". . . the Commission shall consider whether dumping in the markets of foreign countries (as evidenced by dumping findings or antidumping remedies in other WTO member markets against the same class or kind of merchandise manufactured or exported by the same party as under investigation) suggests a threat of material injury to the domestic industry."

The industry in Korea

The Commission issued a foreign producer / exporter questionnaire to the sole firm believed to produce and export UHMWPE from Korea.[3] KPIC provided a timely and usable response to the Commission's questionnaire and confirmed that it accounted for all production of UHMWPE in Korea, and all exports for the United States of UHMWPE from Korea, in 2019.[4] Table VII-1 presents information on the UHMWPE operations of the responding producer/exported in Korea, KPIC.

Table VII-1
UHMWPE: Summary data for Korean producer KPIC, 2019

Firm	Production (1,000 pounds)	Share of reported production (percent)	Exports to the United States (1,000 pounds)	Share of reported exports to the United States (percent)	Total shipments (1,000 pounds)	Share of firm's total shipments exported to the United States (percent)
KPIC	***	100.0	***	100.0	***	***
All firms	***	100.0	***	100.0	***	***

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

Changes in operations

As presented in table VII-2 Korean producer KPIC reported several operational and organizational changes since January 1, 2017.

Table VII-2
UHMWPE: Korea producer KPIC's reported changes in operations, since January 1, 2017

Item / Firm	Reported changed in operations
Expansions:	
***	***

Table continued on next page.

[3] This firm was identified through a review of information submitted in the petition and contained in *** records.

[4] Respondent's preliminary conference opening statement, p. 1.

Table VII-2 – Continued
UHMWPE: Korea producer KPIC's reported changes in operations, since January 1, 2017

Item / Firm	Reported changed in operations
Prolonged shutdowns or curtailments:	
***	***

Note.—KPIC processes naphtha into ethylene at its Onsan facility. That ethylene is subsequently transferred to its Ulsan plant where it is used to produce polyethylene products including UHMWPE. *** Email from Respondents, March 5, 2020. See also hearing transcript, p. 192.

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

Operations on UHMWPE

Table VII-3 presents information on the UHMWPE operations of KPIC. KPIC's capacity increased by *** percent during 2017-18 and by *** percent during 2018-19 but was *** percent lower during January-September 2020 compared to January-September 2019.[5] KPIC projects its capacity to decrease by *** percent during 2019-20 and then increase by *** percent during 2020-21. KPIC's production increased by *** percent during 2017-18 and by *** percent during 2018-19 but was *** percent lower during January-September 2020 compared to January-September 2019. KPIC projects its production to decrease by *** percent during 2019-20, and then increase by *** percent during 2020-21.[6]

During 2017-18 KPIC's end-of-period inventories decreased by *** percent before increasing by *** percent during 2018-19. Inventories were *** percent lower in January-September 2020 compared to January-September 2019.

KPIC's capacity utilization increased by *** percentage points during 2017-19, was *** percentage point lower during January-September 2020 compared to January-September 2019, and is projected to *** during 2020-21.

[5] As noted in table VII-4, overall capacity was *** percent higher in January-September 2020 than in January-September 2019. During this same time period KPIC's out-of-scope production increased.

[6] KPIC projects a *** percent market demand increase for 2021. KPIC's foreign producer questionnaire response, section II-8.

During the period for which data were collected, the share of KPIC's export shipments to the United States by quantity remained between *** and *** percent of total shipments, and is projected to increase to *** percent in 2021 from *** percent in 2020. During the same time period, the share of KPIC's total home market shipments by quantity fluctuated between *** and *** percent of total shipments and is projected to decreased to *** percent in 2021 from *** percent in 2020.

Table VII-3
UHMWPE: Data on industry in Korea 2017-19, January to September 2019, January to September 2020, and projection calendar years 2020 and 2021

Item	Actual experience					Projections	
	Calendar year			January to September		Calendar year	
	2017	2018	2019	2019	2020	2020	2021
	Quantity (1,000 pounds)						
Capacity	***	***	***	***	***	***	***
Production	***	***	***	***	***	***	***
End-of-period inventories	***	***	***	***	***	***	***
Shipments:							
Home market shipments:							
Internal consumption/ transfers	***	***	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***	***	***
Total home market shipments	***	***	***	***	***	***	***
Export shipments to:							
United States	***	***	***	***	***	***	***
All other markets	***	***	***	***	***	***	***
Total exports	***	***	***	***	***	***	***
Total shipments	***	***	***	***	***	***	***

Table continued on next page.

Table VII-3—Continued
UHMWPE: Data on industry in Korea 2017-19, January to September 2019, January to September 2020, and projection calendar years 2020 and 2021

Item	Actual experience					Projections	
	Calendar year			January to September		Calendar year	
	2017	2018	2019	2019	2020	2020	2021
	Ratios and shares (percent)						
Capacity utilization	***	***	***	***	***	***	***
Inventories/production	***	***	***	***	***	***	***
Inventories/total shipments	***	***	***	***	***	***	***
Share of shipments:							
Home market shipments:							
Internal consumption/ transfers	***	***	***	***	***	***	***
Commercial home market shipments	***	***	***	***	***	***	***
Total home market shipments	***	***	***	***	***	***	***
Export shipments to:							
United States	***	***	***	***	***	***	***
All other markets	***	***	***	***	***	***	***
Total exports	***	***	***	***	***	***	***
Total shipments	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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

Alternative products

As shown in table VII-4, KPIC produced other products on the same equipment and machinery used to produce UHMWPE. KPIC's overall capacity increased by *** pounds (*** percent) during 2017-18, before decreasing by *** pounds (*** percent) during 2018-19, and was *** pounds (*** percent) higher during January-September 2020 compared to January-September 2019. The share of in-scope production increased from *** percent of total production in 2017 to *** percent of total production in 2019 but was *** percentage points lower during January-September 2020 compared to January-September 2019.[7]

Table VII-4
UHMWPE: Overall capacity and production on the same equipment as subject production by Korean producer KPIC, 2017-19, January to September 2019 and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Overall capacity	***	***	***	***	***
Production: UHMWPE	***	***	***	***	***
Medical grade UHMWPE	***	***	***	***	***
High density polyethylene	***	***	***	***	***
Polypropylene	***	***	***	***	***
Other products	***	***	***	***	***
Out-of-scope production	***	***	***	***	***
Total production on same machinery	***	***	***	***	***
	Ratios and shares (percent)				
Overall capacity utilization	***	***	***	***	***
Production: UHMWPE	***	***	***	***	***
Medical grade UHMWPE	***	***	***	***	***
High density polyethylene	***	***	***	***	***
Polypropylene	***	***	***	***	***
Other products	***	***	***	***	***
Out-of-scope production	***	***	***	***	***
Total production on same machinery	100.0	100.0	100.0	100.0	100.0

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

[7] KPIC stated ***. KPIC's foreign producer questionnaire response, section II-2c.

Exports

According to GTA, the leading export markets for polyethylene from Korea are China, Vietnam, and Russia (table VII-5). During 2019, China was the top export market for polyethylene from Korea, accounting for 58.1 percent of exports from Korea by quantity, followed by Vietnam, accounting for 5.8 percent of exports by quantity.

Table VII-5
Polyethylene, in primary forms: Exports from Korea by destination market, 2017-19

Destination market	Calendar year		
	2017	2018	2019
	Quantity (1,000 pounds)		
United States	46,585	41,804	34,389
China	2,130,943	2,314,671	2,677,329
Vietnam	393,306	362,646	266,479
Russia	110,101	108,166	169,969
Turkey	228,380	187,363	158,181
India	91,949	88,715	115,441
Belgium	84,532	51,033	69,398
Spain	82,856	52,253	65,365
Indonesia	57,090	69,555	62,982
Netherlands	65,725	65,891	57,026
All other destination markets	1,194,019	1,250,630	930,312
All destination markets	4,485,485	4,592,727	4,606,871
	Value (1,000 dollars)		
United States	34,888	34,819	28,025
China	1,203,232	1,361,094	1,326,886
Vietnam	216,373	215,081	129,558
Russia	64,702	66,771	87,405
Turkey	128,955	114,961	80,917
India	58,334	59,533	65,561
Belgium	47,347	30,250	35,436
Spain	44,348	30,676	32,507
Indonesia	36,560	43,957	34,177
Netherlands	41,604	44,162	33,707
All other destination markets	710,051	806,745	500,672
All destination markets	2,586,395	2,808,049	2,354,851

Table continued on next page.

Table VII-5—Continued
Polyethylene, in primary forms: Exports from Korea by destination market, 2017-19

Destination market	Calendar year		
	2017	2018	2019
	Unit value (dollars per pound)		
United States	0.75	0.83	0.81
China	0.56	0.59	0.50
Vietnam	0.55	0.59	0.49
Russia	0.59	0.62	0.51
Turkey	0.56	0.61	0.51
India	0.63	0.67	0.57
Belgium	0.56	0.59	0.51
Spain	0.54	0.59	0.50
Indonesia	0.64	0.63	0.54
Netherlands	0.63	0.67	0.59
All other destination markets	0.59	0.65	0.54
All destination markets	0.58	0.61	0.51
	Share of quantity (percent)		
United States	1.0	0.9	0.7
China	47.5	50.4	58.1
Vietnam	8.8	7.9	5.8
Russia	2.5	2.4	3.7
Turkey	5.1	4.1	3.4
India	2.0	1.9	2.5
Belgium	1.9	1.1	1.5
Spain	1.8	1.1	1.4
Indonesia	1.3	1.5	1.4
Netherlands	1.5	1.4	1.2
All other destination markets	26.6	27.2	20.2
All destination markets	100.0	100.0	100.0

Source: Official exports statistics under HS subheadings 3901.10 and 3901.20 as reported by Korea Trade Statistics Promotion Institute (KTSPI) in the Global Trade Atlas database, accessed November 25, 2020.

U.S. inventories of imported merchandise

Table VII-6 presents data on U.S. importers' reported inventories of UHMWPE imports by source. Inventories of imports from Korea fluctuated between *** and *** pounds between 2017 and September 2020. The ratio of inventories of imports from Korea to U.S. imports decreased from *** percent in 2017 to *** percent in 2019 but was *** percent during January-September 2020 compared to *** percent in January-September 2019.

*** inventories of imports from Brazil were reported during 2017-18, while *** pounds were reported in 2019, *** pounds during January-September 2020, and *** during January-September 2019.[8] The ratio of inventories of imports from Brazil to U.S. imports was *** percent in 2019, *** percent during January-September 2020, and *** percent during January-September 2019.

Inventories of imports from Japan increased from *** pounds to *** pounds during 2017-19 and were *** pounds higher during January-September 2020 compared to January-September 2019. The ratio of inventories of imports from Japan to U.S. imports increased from *** percent in 2017 to *** percent in 2019 and was *** percent during January-September 2020 compared to *** percent during January-September 2019.

Inventories of imports from the Netherlands decreased from *** pounds in 2017 to *** pounds in 2019, and were *** pounds during January-September 2020 compared to January-September 2019. The ratio of inventories of imports from the Netherlands to U.S. imports increased from *** percent in 2017 to *** percent in 2018, then decreased to *** percent in 2019 and was *** percentage points lower during January-September 2020 compared to January-September 2019.

[8] ***. Email from ***.

Table VII-6
UHMWPE: U.S. importers' end-of-period inventories of imports by source, 2017-19, January to September 2019 and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Inventories (1,000 pounds); Ratios (percent)				
Imports from Korea Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from Brazil: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from Germany: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from Japan: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from Netherlands: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from All other sources: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from Nonsubject sources: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***
Imports from All sources: Inventories	***	***	***	***	***
Ratio to U.S. imports	***	***	***	***	***
Ratio to U.S. shipments of imports	***	***	***	***	***
Ratio to total shipments of imports	***	***	***	***	***

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

U.S. importers' outstanding orders

The Commission requested importers to indicate whether they imported or arranged for the importation of UHMWPE after September 2020. Table VII-7 presents arranged imports for October 2020 through September 2021.

Table VII-7
UHMWPE: Arranged imports, October 2020 through September 2021

Arranged U.S. imports from.--					
Korea	***	***	***	***	***
Brazil	***	***	***	***	***
Germany	***	***	***	***	***
Japan	***	***	***	***	***
Netherlands	***	***	***	***	***
All other sources	***	***	***	***	***
Nonsubject sources	***	***	***	***	***
All sources	***	***	***	***	***

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

Antidumping or countervailing duty orders in third-country markets

There are no known antidumping or countervailing duty orders on UHMWPE in third-country markets.[9]

Information on nonsubject countries

Petitioner states, based on its industry knowledge, that Germany, France, China and the United Kingdom are nonsubject countries.[10] The respondent states that Japan exports to the United States, and that nonsubject imports play a significant role in the U.S. UHMWPE market.[11]

The respondent expects the largest nonsubject imports are from ***.[12]

The respondent states that Celanese *** and Braskem ***. ***.

[9] Petitioner's postconference brief, Exhibit 23, answers to staff questions, p. 23; Respondent's postconference answers to staff questions, p. 13.

[10] Petitioner's postconference brief, Exhibit 23, p. 23. Petitioner reports that China and the United Kingdom are immaterial.

[11] Respondent's postconference answers to staff questions, p. 13.

[12] Respondent's postconference answers to staff questions, p. 14.

***. Although *** did not report the countries from which it primarily imported because it sources from ***, it is likely that *** also imports primarily from ***.[13]

The global UHMWPE market size was estimated at $1.76 billion in 2019. It is expected to register a compound annual growth rate of 11.4 percent during the forecast period of 2020-27.[14] The UHMWPE global market size and projection includes in and out-of-scope products. Medical grade and prosthetics, which is out of scope, led the application segment of the UHMWPE market and accounted for more than 32.8 percent of global revenue in 2019. Medical grade UHMWPE (outside the scope of this investigation) is estimated to witness highest growth over the forecast period. The next largest application segments are fibers, filtration, and batteries.[15]

Another source projects that consumption of a downstream product of UHMWPE, fiber material, will increase *** percent per year from 2018 to 2023.[16] Global annual capacity of these high strength fibers was about *** in 2018, with capacity in China of ***, the U.S. ***, Japan ***, Western Europe ***, and Korea ***.[17]

One industry source shows UHMWPE divided into low, middle, and high range molecular weight categories. Globally, in 2019, the UHMWPE low range market share was *** percent, medium was *** percent, and high was *** percent.[18]

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[13] Respondent's postconference answers to staff questions, pp. 13-14.

[14] Grandview Research, UltraHigh Molecular Weight Polyethylene Market Size, Share & Trends Analysis Report by Product (Medical Grade & Prosthetics, Fibers), by Application, and Segment Forecasts, 2020 – 2027," December 2020. https://www.grandviewresearch.com/industry-analysis/ultra-high-molecular-weight-polyethylene-market.

[15] Non-medical grade products are in scope products. Ibid.

[16] IHS Markit, *Chemical Economics Handbook, Fibers, Specialty Organic*, May 15, 2019, p. 43.

[17] IHS Markit, *Chemical Economics Handbook, Fibers, Specialty Organic*, May 15, 2019, pp. 37-38. The capacity numbers do not appear to contain any medical grade out-of-scope product.

[18] Petition, Exhibit GEN-15, p. 91, figure 66 and table 77. The USITC questionnaire had ***.

At the global export level, UHMWPE falls under the category of polyethylene in primary forms. In 2019, the three largest global exporters in this larger category of products were the United States (13.4 billion pounds, 14.7 percent of total share of quantity), Saudi Arabia (11.0 billion pounds, 12.0 percent of total share of quantity), and Singapore (6.2 billion pounds, 6.8 percent of total share of quantity), as shown in table VII-8.

Table VII-8
Polyethylene, in primary forms: Global exports by exporter, 2017-19

Exporter	Calendar year		
	2017	2018	2019
	Quantity (1,000 pounds)		
United States	7,846,503	9,646,995	13,368,482
Korea	4,485,485	4,592,727	4,606,871
Saudi Arabia	18,953,217	20,533,782	10,979,862
Singapore	5,084,510	5,243,800	6,241,837
Belgium	6,776,258	6,403,184	6,161,039
Thailand	3,923,044	4,356,242	4,696,779
Kuwait	1,034,064	1,590,508	4,484,118
Germany	4,527,540	4,309,204	4,133,290
Canada	3,022,543	3,477,813	3,808,849
United Arab Emirates	4,881,191	3,921,553	3,739,704
Netherlands	3,108,812	3,253,153	3,183,819
Malaysia	1,623,348	2,911,521	3,176,368
India	885,484	2,252,507	2,410,094
France	2,241,301	2,021,395	1,939,941
Brazil	2,083,336	1,851,767	1,777,661
All other exporters	25,303,216	23,626,050	16,481,763
All reporting exporters	95,779,853	99,992,201	91,190,475
	Value (1,000 dollars)		
United States	4,699,532	5,964,184	6,397,784
Korea	2,586,395	2,808,049	2,354,851
Saudi Arabia	8,714,089	10,474,156	8,934,359
Singapore	2,829,699	3,063,703	2,926,710
Belgium	4,311,177	4,212,654	3,603,679
Thailand	2,200,060	2,635,167	2,264,445
Kuwait	393,130	605,674	1,653,260
Germany	3,054,492	3,072,155	2,634,643
Canada	1,746,891	2,100,833	1,915,513
United Arab Emirates	2,361,110	2,041,835	1,771,019
Netherlands	2,011,363	2,123,902	1,827,162
Malaysia	818,686	1,516,835	1,413,740
India	458,264	1,162,290	1,030,939
France	1,366,337	1,258,424	1,048,359
Brazil	1,119,493	1,009,956	793,036
All other exporters	14,534,536	13,825,550	8,882,970
All reporting exporters	53,205,253	57,875,365	49,452,469

Table continued on next page.

Table VII-8—Continued
Polyethylene, in primary forms: Global exports by exporter, 2017-19

Exporter	Calendar year		
	2017	2018	2019
	Unit value (dollars per pound)		
United States	0.60	0.62	0.48
Korea	0.58	0.61	0.51
Saudi Arabia	0.46	0.51	0.81
Singapore	0.56	0.58	0.47
Belgium	0.64	0.66	0.58
Thailand	0.56	0.60	0.48
Kuwait	0.38	0.38	0.37
Germany	0.67	0.71	0.64
Canada	0.58	0.60	0.50
United Arab Emirates	0.48	0.52	0.47
Netherlands	0.65	0.65	0.57
Malaysia	0.50	0.52	0.45
India	0.52	0.52	0.43
France	0.61	0.62	0.54
Brazil	0.54	0.55	0.45
All other exporters	0.57	0.59	0.54
All reporting exporters	0.56	0.58	0.54
	Share of quantity (percent)		
United States	8.2	9.6	14.7
Korea	4.7	4.6	5.1
Saudi Arabia	19.8	20.5	12.0
Singapore	5.3	5.2	6.8
Belgium	7.1	6.4	6.8
Thailand	4.1	4.4	5.2
Kuwait	1.1	1.6	4.9
Germany	4.7	4.3	4.5
Canada	3.2	3.5	4.2
United Arab Emirates	5.1	3.9	4.1
Netherlands	3.2	3.3	3.5
Malaysia	1.7	2.9	3.5
India	0.9	2.3	2.6
France	2.3	2.0	2.1
Brazil	2.2	1.9	1.9
All other exporters	26.4	23.6	18.1
All reporting exporters	100.0	100.0	100.0

Source: Official exports statistics under HS subheadings 3901.10 and 3901.20 reported by various national statistical authorities in the Global Trade Atlas database, accessed November 25, 2020. HS subheadings 3901.10 and 3901.20 include products that are outside the scope of these investigations and therefore overstate export data.

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
85 FR 13922, March 10, 2020	*Ultra-High Molecular Weight Polyethylene From Korea; Institution of Anti-Dumping Duty Investigation and Scheduling of Preliminary Phase Investigations*	https://www.govinfo.gov/content/pkg/FR-2020-03-10/pdf/2020-04830.pdf
85 FR 17861, March 31, 2020	*Ultra-High Molecular Weight Polyethylene From the Republic of Korea: Initiation of Less-Than-Fair-Value Investigation*	https://www.govinfo.gov/content/pkg/FR-2020-03-31/pdf/2020-06589.pdf
85 FR 23063, April 24, 2020	*Ultra-High Molecular Weight Polyethylene From Korea*	https://www.govinfo.gov/content/pkg/FR-2020-04-24/pdf/2020-08691.pdf
85 FR 43813, July 20, 2020	*Ultra-High Molecular Weight Polyethylene From the Republic of Korea: Postponement of Preliminary Determination in the Less-Than-Fair-Value Investigation*	https://www.govinfo.gov/content/pkg/FR-2020-07-20/pdf/2020-15601.pdf
85 FR 63095, October 6, 2020	*Ultra-High Molecular Weight Polyethylene From the Republic of Korea: Preliminary Affirmative Determination of Sales at Less Than Fair Value*	https://www.govinfo.gov/content/pkg/FR-2020-10-06/pdf/2020-22060.pdf
85 FR 66576, October 20, 2020	*Ultra-High Molecular Weight Polyethylene From Korea; Scheduling of the Final Phase of an Anti-Dumping Duty Investigation*	https://www.govinfo.gov/content/pkg/FR-2020-10-20/pdf/2020-23145.pdf
86 FR 11497, February 25, 2021	*Ultra-High Molecular Weight Polyethylene From the Republic of Korea: Final Determination of Sales at Less Than Fair Value*	https://www.govinfo.gov/content/pkg/FR-2021-02-25/pdf/2021-03903.pdf

APPENDIX B

LIST OF HEARING WITNESSES

CALENDAR OF PUBLIC HEARING

Those listed below appeared in the United States International Trade Commission's hearing via video conference:

Subject: Ultra-High Molecular Weight Polyethylene from Korea

Inv. No.: 731-TA-1474 (Final)

Date and Time: February 18, 2021 - 9:30 a.m.

OPENING REMARKS:

In Support of Imposition (**Daniel Cannistra**, Crowell & Moring LLP)
In Opposition to Imposition (**Deanna Tanner Okun**, Adduci, Mastriani & Schaumberg LLP)

In Support of the Imposition of Antidumping Duty Order:

Crowell & Moring LLP
Washington, DC
on behalf of

Celanese Corporation

Michelle Lee, Commercial Vice President, Celanese Corporation

Tom Kelly, Senior Vice President of Engineered Materials, Celanese Corporation

Adam Santosuosso, Chief Legal Counsel, Celanese Corporation

Daniel Cannistra)
Spencer Toubia) – OF COUNSEL
Brian McGrath)

In Opposition to the Imposition of
Antidumping Duty Order:

Adduci, Mastriani & Schaumberg LLP
Washington, DC
on behalf of

Korea Petrochemical Ind. Co. Ltd. ("KPIC")

Eunsuk Cho, Assistant Sales Manager, Sales & Marketing, Team 1, KPIC

Il Joo Kim, Chief of Department, Marketing Support Team, KPIC

Sunhee Sohn, Translator

Brian Trymbiski, President, JAZ Associates, Inc.

Ted Trymbiski, Sales Manager, JAZ Associates, Inc.

Charles Anderson, Principal, Capital Trade Incorporated

Andrew Szamosszegi, Principal, Capital Trade Incorporated

Deanna Tanner Okun)
Elizabeth Duall Regard) – OF COUNSEL
Lydia C. Pardini)

REBUTTAL/CLOSING REMARKS:

In Support of Imposition (**Daniel Cannistra**, Crowell & Moring LLP)
In Opposition to Imposition (**Deanna Tanner Okun**, Adduci, Mastriani & Schaumberg LLP)

-END-

APPENDIX C

SUMMARY DATA

Table C-1
UHMWPE: Summary data concerning the U.S. market, 2017-19, January to September 2019, and January to September 2020
(Quantity=1,000 pounds; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per pound; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to September		Comparison years			Jan-Sep
	2017	2018	2019	2019	2020	2017-19	2017-18	2018-19	2019-20
U.S. consumption quantity:									
Amount	***	***	***	***	***	▲***	▲***	▼***	▼***
Producers' share (fn1)	***	***	***	***	***	▲***	▲***	▼***	▼***
Importers' share (fn1):									
Korea	***	***	***	***	***	▲***	▲***	▲***	▲***
Brazil	***	***	***	***	***	▼***	▼***	▼***	▲***
Germany	***	***	***	***	***	▼***	▲***	▼***	▲***
Japan	***	***	***	***	***	▲***	▲***	▲***	▼***
Netherlands	***	***	***	***	***	▲***	▼***	▲***	▲***
All other sources	***	***	***	***	***	▼***	▼***	▼***	▼***
Nonsubject sources	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources	***	***	***	***	***	▼***	▼***	▲***	▲***
U.S. consumption value:									
Amount	***	***	***	***	***	▲***	▲***	▼***	▼***
Producers' share (fn1)	***	***	***	***	***	▲***	▲***	▲***	▲***
Importers' share (fn1):									
Korea	***	***	***	***	***	▲***	▲***	▲***	▲***
Brazil	***	***	***	***	***	▼***	▼***	▼***	▲***
Germany	***	***	***	***	***	▼***	▲***	▼***	▲***
Japan	***	***	***	***	***	▲***	▲***	▲***	▼***
Netherlands	***	***	***	***	***	▲***	▼***	▲***	▲***
All other sources	***	***	***	***	***	▼***	▲***	▼***	▼***
Nonsubject sources	***	***	***	***	***	▼***	▼***	▼***	▼***
All import sources	***	***	***	***	***	▼***	▼***	▼***	▼***
U.S. importers' U.S. shipments of imports from:									
Korea:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▼***
Value	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value	***	***	***	***	***	▼***	▼***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	▲***	▼***	▼***
Brazil:									
Quantity	***	***	***	***	***	▼***	▼***	▼***	▲***
Value	***	***	***	***	***	▼***	▼***	▼***	▲***
Unit value	***	***	***	***	***	▼***	▼***	▲***	▲***
Ending inventory quantity	***	***	***	***	***	▲***	***	▲***	▲***
Germany:									
Quantity	***	***	***	***	***	▼***	▲***	▼***	▼***
Value	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit value	***	***	***	***	***	▲***	▲***	▼***	▲***
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Japan:									
Quantity	***	***	***	***	***	▲***	▲***	▲***	▼***
Value	***	***	***	***	***	▲***	▲***	▲***	▼***
Unit value	***	***	***	***	***	▲***	▲***	▲***	▼***
Ending inventory quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
Netherlands:									
Quantity	***	***	***	***	***	▲***	▼***	▲***	▲***
Value	***	***	***	***	***	▲***	▼***	▲***	▲***
Unit value	***	***	***	***	***	▲***	▲***	▼***	▲***
Ending inventory quantity	***	***	***	***	***	▼***	▼***	▼***	▼***
All other sources:									
Quantity	***	***	***	***	***	▼***	▲***	▼***	▼***
Value	***	***	***	***	***	▼***	▲***	▼***	▼***
Unit value	***	***	***	***	***	▲***	▲***	▼***	▼***
Ending inventory quantity	***	***	***	***	***	***	***	***	***
Nonsubject sources:									
Quantity	***	***	***	***	***	▼***	▼***	▼***	▼***
Value	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit value	***	***	***	***	***	▲***	▲***	▲***	▲***
Ending inventory quantity	***	***	***	***	***	▲***	▲***	▲***	▲***
All import sources:									
Quantity	40,957	32,365	30,253	23,140	19,069	▼(26.1)	▼(21.0)	▼(6.5)	▼(17.6)
Value	55,580	49,088	45,841	35,607	28,778	▼(17.5)	▼(11.7)	▼(6.6)	▼(19.2)
Unit value	1.36	1.52	1.52	1.54	1.51	▲11.7	▲11.8	▼(0.1)	▼(1.9)
Ending inventory quantity	***	***	***	***	***	▲***	▲***	▲***	▲***

Table continued on next page.

Table C-1--Continued
UHMWPE: Summary data concerning the U.S. market, 2017-19, January to September 2019, and January to September 2020
(Quantity=1,000 pounds; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per pound; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to September		Comparison years			Jan-Sep
	2017	2018	2019	2019	2020	2017-19	2017-18	2018-19	2019-20
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 per hour)	***	***	***	***	***	▲***	▲***	▲***	▼***
Productivity (pounds per hour)	***	***	***	***	***	▼***	▼***	▼***	▼***
Unit labor costs	***	***	***	***	***	▲***	▲***	▲***	▲***
Net sales:									
Quantity	***	***	***	***	***	▲***	▲***	▼***	▲***
Value	***	***	***	***	***	▲***	▲***	▼***	▲***
Unit value	***	***	***	***	***	▲***	▲***	▲***	▼***
Cost of goods sold (COGS)	***	***	***	***	***	▲***	▲***	▼***	▲***
Gross profit or (loss) (fn2)	***	***	***	***	***	▲***	▲***	▼***	▼***
SG&A expenses	***	***	***	***	***	▲***	▼***	▲***	▼***
Operating income or (loss) (fn2)	***	***	***	***	***	▲***	▲***	▼***	▼***
Net income or (loss) (fn2)	***	***	***	***	***	▲***	▲***	▼***	▲***
Capital expenditures	***	***	***	***	***	▲***	▲***	▲***	▲***
Research and development expenses	***	***	***	***	***	***	***	***	***
Net assets	***	***	***	***	***	▲***	▲***	▲***	***
Unit COGS	***	***	***	***	***	▲***	▲***	▲***	▲***
Unit SG&A expenses	***	***	***	***	***	▼***	▼***	▲***	▼***
Unit operating income or (loss) (fn2)	***	***	***	***	***	▲***	▲***	▼***	▼***
Unit net income or (loss) (fn2)	***	***	***	***	***	▲***	▲***	▼***	▼***
COGS/sales (fn1)	***	***	***	***	***	▲***	▲***	▲***	▲***
Operating income or (loss)/sales (fn1)	***	***	***	***	***	▼***	▲***	▼***	▼***
Net income or (loss)/sales (fn1)	***	***	***	***	***	▲***	▲***	▼***	▼***

Note.--Shares and ratios shown as "0.0" percent represent non-zero values less than "0.05" percent (if positive) and greater than "(0.05)" percent (if negative). Zeroes, null values, and undefined calculations are suppressed and shown as "---". Period changes preceded by a "▲" represent an increase, while period changes preceded by a "▼" represent a decrease.

fn1.--Reported data are in percent and period changes are in percentage points.
fn2.--Percent changes only calculated when both comparison values represent profits; The directional change in profitability provided when one or both comparison values represent a loss.

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

APPENDIX D

U.S. SHIPMENTS BY MOLECULAR WEIGHT AND PACKAGING

Data for U.S. producers' U.S. shipments by molecular weight and packaging are presented in table D-1 while data for U.S. importers' U.S. shipments by source, molecular weight and packaging are reported in tables D-2 through D-9. U.S. shipment data by molecular weight and packaging for all U.S. producers and U.S. importers combined are reported in table D-10.

Table D-1

UHMWPE: U.S. producer U.S. shipments by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

Table continued on next page.

Table D-1—Continued

UHMWPE: U.S. producer U.S. shipments by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-2

UHMWPE: U.S. importer U.S. shipments from Korea by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Korea.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

Table continued on next page.

Table D-2—Continued

UHMWPE: U.S. importer U.S. shipments from Korea by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging					
High molecular weight: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Korea.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-3

UHMWPE: U.S. importer U.S. shipments from Brazil by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

Table continued on next page.

Table D-3—Continued

UHMWPE: U.S. importer U.S. shipments from Brazil by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Brazil.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-4

UHMWPE: U.S. importer U.S. shipments from Germany by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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Table D-4—Continued

UHMWPE: U.S. importer U.S. shipments from Germany by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Germany.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-5

UHMWPE: U.S. importer U.S. shipments from Japan by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

Table continued on next page.

Table D-5—Continued

UHMWPE: U.S. importer U.S. shipments from Japan by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Japan.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-6

UHMWPE: U.S. importer U.S. shipments from the Netherlands by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Netherlands.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

Table continued on next page.

Table D-6—Continued

UHMWPE: U.S. importer U.S. shipments from the Netherlands by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Netherlands.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-7

UHMWPE: U.S. importer U.S. shipments from all other sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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Table D-7—Continued

UHMWPE: U.S. importer U.S. shipments from all other sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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Table D-7—Continued

UHMWPE: U.S. importer U.S. shipments from all other sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Share of Quantity (percent)				
Low molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All other sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	100.0	100.0	100.0	100.0	100.0

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

Table D-8

UHMWPE: U.S. importer U.S. shipments from nonsubject sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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Table D-8—Continued

UHMWPE: U.S. importer U.S. shipments from nonsubject sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Nonsubject sources.--					
In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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

Table D-9

UHMWPE: U.S. importer U.S. shipments from all sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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Table D-9—Continued

UHMWPE: U.S. importer U.S. shipments from all sources by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: All import sources.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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

Table D-10

UHMWPE: U.S. producer and U.S. importer U.S. shipments by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Quantity (1,000 pounds)				
Low molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Value (1,000 dollars)				
Low molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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Table D-10—Continued

UHMWPE: U.S. producer and U.S. importer U.S. shipments by molecular weight and packaging, 2017-19, January to September 2019, and January to September 2020

Item	Calendar year			January to September	
	2017	2018	2019	2019	2020
	Unit value (dollars per pound)				
Low molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
	Share of Quantity (percent)				
Low molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
Medium molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
High molecular weight: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***
All molecular weights: Combined.-- In packaging less than 100 kg	***	***	***	***	***
In packaging from 100 kg to 1,000 kg	***	***	***	***	***
In packaging over 1,000 kg	***	***	***	***	***
All packaging	***	***	***	***	***

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