1,1,1,2--Tetrafluoroethane (R-134a) from China

Investigation No. 731-TA-1313 (Final)

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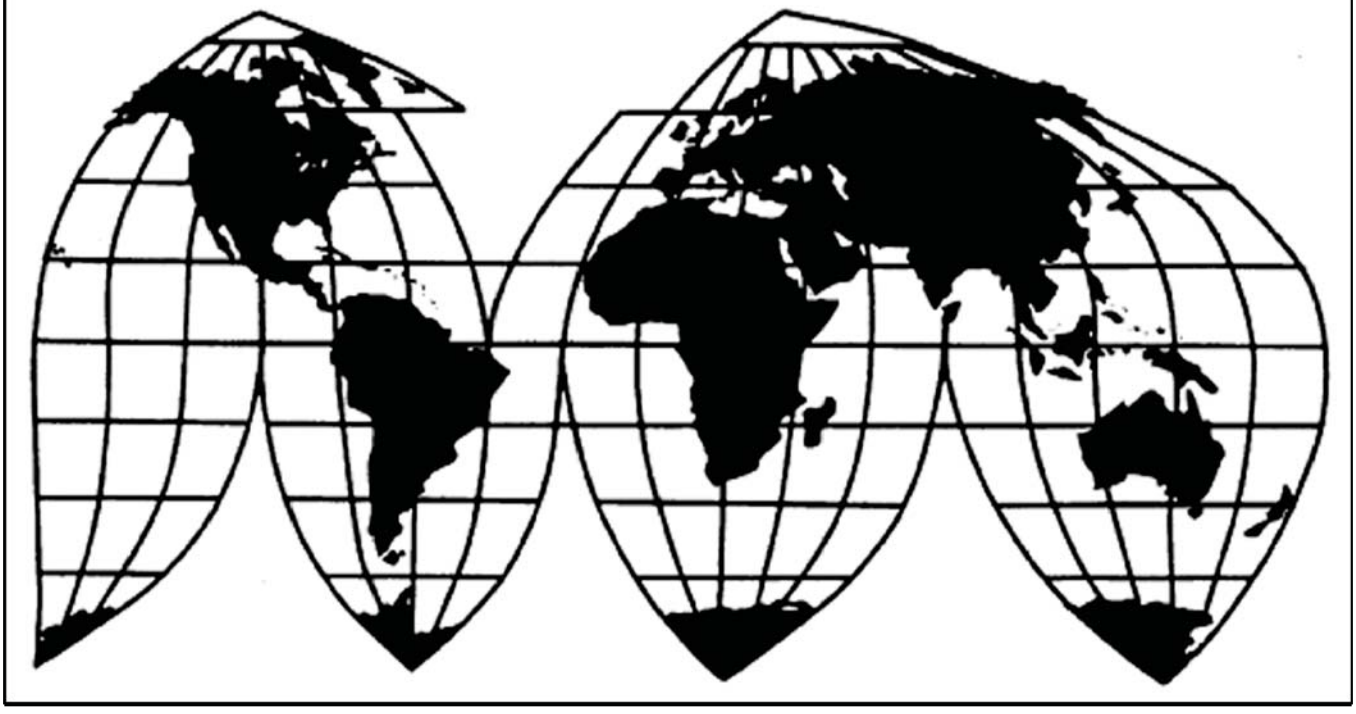
U.S. International Trade Commission



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U.S. International Trade Commission

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UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation No. 731-TA-1313 (Final)
1,1,1,2-Tetrafluoroethane (R-134a) from China

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 materially injured by reason of imports of 1,1,1,2-tetrafluoroethane ("R-134a") from China, provided for in subheading 2903.39.20 of the Harmonized Tariff Schedule of the United States, that have been found by the Department of Commerce ("Commerce") to be sold in the United States at less than fair value ("LTFV").[2]

BACKGROUND

The Commission, pursuant to section 735(b) of the Act (19 U.S.C. 1673d(b)), instituted this investigation effective March 3, 2016, following receipt of a petition filed with the Commission and Commerce by the American HFC Coalition and its individual members (Amtrol, Inc., West Warwick, Rhode Island; Arkema, Inc., King of Prussia, Pennsylvania; The Chemours Company FC LLC, Wilmington, Delaware; Honeywell International Inc., Morristown, New Jersey; Hudson Technologies, Pearl River, New York; Mexichem Fluor Inc., St. Gabriel, Louisiana; and Worthington Industries, Inc., Columbus, Ohio) and District Lodge 154 of the International Association of Machinists and Aerospace Workers. The Commission scheduled the final phase of the investigation following notification of a preliminary determination by Commerce that imports of R-134a from China 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 November 7, 2016 (81 FR 78186). The hearing was held in Washington, DC, on February 23, 2017, and all persons who requested the opportunity were permitted to appear in person or by counsel.

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

[2] The Commission also finds that imports subject to Commerce's affirmative critical circumstances determination are not likely to undermine seriously the remedial effect of the antidumping duty order on China.

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 materially injured by reason of imports of 1,1,1,2–Tetrafluoroethane ("R-134a") from China found by the U.S. Department of Commerce ("Commerce") to be sold in the United States at less than fair value. We also find that critical circumstances do not exist with respect to the imports from China for which Commerce made an affirmative critical circumstances determination.[1]

I. Background

The petition in this investigation was filed on March 3, 2016 by the American HFC Coalition ("The Coalition"), a group including the three domestic producers, as well as wholesalers and suppliers, of R-134a, and District Lodge 154 of the International Association of Machinists and Aerospace Workers, a labor union. Representatives from each of the domestic producers appeared at the hearing accompanied by counsel. The Coalition and domestic producer Mexichem Fluor Inc. ("Mexichem") filed prehearing and posthearing briefs.

Four producers of R-134a in China -- Zhejiang Quhua Fluor-Chemistry Co., Ltd., Sinochem Environmental Protection Chemicals Co., Ltd., Zhejiang Sanmei Chemical Industry Co., Ltd., and Jiangsu Bluestar Green Technology Co. Ltd. (collectively "Chinese Respondents") -- filed prehearing and posthearing briefs. BBC Biochemical ("BBC"), an importer of subject merchandise, also filed a brief statement as nonparty opposing a finding of critical circumstances. Representatives from AutoZone Parts Inc. ("AutoZone") and Weitron, Inc. ("Weitron"), importers of subject merchandise, appeared at the hearing accompanied by counsel.

U.S. industry data are based on the questionnaire responses from three domestic producers that accounted for all domestic production of R-134a in 2015. U.S. import data are based on official Commerce import statistics and from questionnaire responses of 33 U.S. importers of R-134a from China, which accounted for 94.7 percent of U.S. imports of R-134a from China in 2015. The Commission received responses to its questionnaires from six Chinese producers and two exporters that accounted for 73.8 percent of overall production of subject merchandise in China in 2015.[2]

[1] Chairman Schmidtlein and Commissioner Williamson dissenting with respect to critical circumstances. *See* Separate Views of Chairman Rhonda K. Schmidtlein and Commissioner Irving A. Williamson Regarding Critical Circumstances. They join sections I through V.A of this opinion.

[2] Confidential Report, Memorandum INV-PP-033 (March 13, 2017) ("CR") at I-6, Public Report ("PR") at I-4.

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."[3] 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."[4] 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."[5]

The decision regarding the appropriate domestic like product in an investigation is a factual determination, and the Commission has applied the statutory standard of "like" or "most similar in characteristics and uses" on a case-by-case basis.[6] No single factor is dispositive, and the Commission may consider other factors it deems relevant based on the facts of a particular investigation.[7] The Commission looks for clear dividing lines among possible like products and disregards minor variations.[8] Although the Commission must accept Commerce's determination as to the scope of the imported merchandise that is subsidized or sold at less than fair value,[9] the Commission determines what domestic product is like the imported articles Commerce has identified.[10]

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[3] 19 U.S.C. § 1677(4)(A).

[4] 19 U.S.C. § 1677(4)(A).

[5] 19 U.S.C. § 1677(10).

[6] 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).

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

[8] *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.").

[9] *See*, *e.g., USEC, Inc. v. United States*, 34 Fed. Appx. 725, 730 (Fed. Cir. 2002) ("The ITC may not modify the class or kind of imported merchandise examined by Commerce."); *Algoma Steel Corp. v.*

(Continued...)

B. Product Description

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

> 1,1,1,2-Tetrafluoroethane, R-134a, or its chemical equivalent, regardless of form, type, or purity level. The chemical formula for 1,1,1,2-Tetrafluoroethane is CF_3-CH_2F, and the Chemical Abstracts Service registry number is CAS 811-97-2.
>
> Merchandise covered by the scope of this investigation is currently classified in the Harmonized Tariff Schedule of the United States ("HTSUS") at subheading 2903.39.2020. Although the HTSUS subheading and CAS registry number are provided for convenience and customs purposes, the written description of the scope is dispositive.[11]

R-134a is a single component refrigerant that is a clear, colorless liquid or gas that is relatively nontoxic and nonflammable.[12] It is used in automotive air conditioning systems, stationary commercial air conditioning and refrigeration, as well as various other applications such as foam expansion and propellants.[13]

C. Domestic Like Product Analysis

In its preliminary determination, the Commission defined a single domestic like product coextensive with Commerce's scope definition.[14] The Commission found that all domestically

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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).

[10] *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); *Cleo*, 501 F.3d at 1298 n.1 ("Commerce's {scope} finding does not control the Commission's {like product} determination."); *Torrington*, 747 F. Supp. at 748-52 (affirming the Commission's determination defining six like products in investigations in which Commerce found five classes or kinds).

[11] 1,1,1,2 Tetrafluoroethane (R–134a) From the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Affirmative Determination of Critical Circumstances, in Part, 82 Fed. Reg. 12192 (March 1, 2017).

[12] CR at I-12, PR at I-9.

[13] CR at I-4, PR at I-3. The stationary market includes stationary air conditioning units for commercial or residential buildings (large capacity chillers) and medium temperature commercial refrigeration. Petition at 14.

[14] *1,1,1,2-Tetrafluoroethane (R-134a) from China, Inv. No. 731-TA-1313 (Preliminary)* USITC Pub. 4606 at 7 (April 2016) ("Preliminary Determination"); Confidential Preliminary Determination, EDIS Doc. 579686 at 10.

produced R-134a shares the same physical characteristics and general uses and that all R-134a is made from the same raw materials, is produced using similar chemical reactions, and is predominantly used for refrigeration purposes. It also found that all R-134a is sold through similar channels of distribution. The Commission consequently defined a single domestic like product coextensive with Commerce's scope for purposes of its preliminary determination.[15]

In the final phase of this investigation, no party contests the definition of the domestic like product. The Coalition and the Chinese Respondents agree that the Commission should find a single domestic like product that is coextensive with Commerce's scope.[16] The record of the final phase of this investigation does not contain any information concerning the domestic like product factors that is different from that in the preliminary phase.[17] Thus, we define a single domestic like product consisting of R-134a that is coextensive with Commerce's scope.

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."[18] 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 Coalition argues that the Commission should find a domestic industry that consists of the three domestic producers of R-134a: the Chemours Company FC LLC ("Chemours"), Mexichem, and Arkema Inc. ("Arkema").[19] Chinese Respondents agree that this is the appropriate definition.[20] None of these producers is a related party.[21] We consequently define the domestic industry as all U.S. producers of R-134a.

IV. Material Injury by Reason of Subject Imports

Based on the record in the final phase of this investigation, we find that an industry in the United States is materially injured by reason of imports of R-134a from China that Commerce has found to be sold in the United States at less than fair value.[22]

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[15] Preliminary Determination, USITC Pub. 4606 at 6-7.

[16] Coalition's Prehearing Brief at 8-9; Chinese Respondents' Prehearing Brief at 6.

[17] *See generally* CR at I-11 to I-18, PR at I-8 to I-15.

[18] 19 U.S.C. § 1677(4)(A).

[19] Coalition's Prehearing Brief at 8-9.

[20] Chinese Respondents' Prehearing Brief at 6.

[21] *See generally* CR at III-9-10, PR at III-5.

[22] Pursuant to Section 771(24) of the Tariff Act, imports from a subject country of merchandise corresponding to a domestic like product that account for less than 3 percent of all such merchandise imported into the United States during the most recent 12 months for which data are available preceding the filing of the petition shall be deemed negligible. 19 U.S.C. §§ 1671b(a), 1673b(a), 1677(24)(A)(i), 1677(24)(B). The record indicates subject imports of R-134a from China exceed the (Continued...)

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.[23] 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.[24] The statute defines "material injury" as "harm which is not inconsequential, immaterial, or unimportant."[25] 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 States.[26] 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."[27]

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,[28] 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.[29] 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.[30]

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requisite statutory negligibility threshold. Subject imports from China accounted for 94.7 percent of total imports of R-134a by quantity from March 2015 to February 2016, the 12 months prior to filing of the petition. Consequently, we find that subject imports from China are not negligible.

[23] 19 U.S.C. §§ 1671d(b), 1673d(b). The Trade Preferences Extension Act of 2015, Pub. L. 114-27, amended the provisions of the Tariff Act pertaining to Commission determinations of material injury and threat of material injury by reason of subject imports in certain respects. We have applied these amendments here.

[24] 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).

[25] 19 U.S.C. § 1677(7)(A).

[26] 19 U.S.C. § 1677(7)(C)(iii).

[27] 19 U.S.C. § 1677(7)(C)(iii).

[28] 19 U.S.C. §§ 1671d(a), 1673d(a).

[29] *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).

[30] 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 (Continued...)

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.[31] In performing its examination, however, the Commission need not isolate the injury caused by other factors from injury caused by unfairly traded imports.[32] 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

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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).

[31] The Uruguay Round Agreements Act Statement of Administrative Action, H.R. Doc. 103-316, vol. I at 851-2 (1994). ("{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 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.

[32] 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.").

as nonsubject imports, which may be contributing to overall injury to an industry.[33] It is clear that the existence of injury caused by other factors does not compel a negative determination.[34]

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" and the Commission "ensure{s} that it is not attributing injury from other sources to the subject imports."[35] [36] Indeed, the Federal Circuit has examined and affirmed various Commission methodologies and has disavowed "rigid adherence to a specific formula."[37]

The Federal Circuit's decisions in *Gerald Metals, Bratsk*, and *Mittal Steel* all involved cases where the relevant "other factor" was the presence in the market of significant volumes of price-competitive nonsubject imports. The Commission interpreted the Federal Circuit's guidance in *Bratsk* as requiring it to apply a particular additional methodology following its finding of material injury in cases involving commodity products and a significant market

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

[34] *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.").

[35] *Mittal Steel*, 542 F.3d at 877-78; *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 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*, 792 F.3d 1355 (Fed. Cir. 2015), the Federal Circuit affirmed the Commission's causation analysis as comporting with the Court's guidance in *Mittal*.

[36] Commissioner Kieff does not join this paragraph or the following three paragraphs. He points out that the Federal Circuit, in *Bratsk*, 444 F.3d 1369, and *Mittal Steel*, held that the Commission is *required*, in certain circumstances when analyzing present material injury, to consider a particular issue with respect to the role of nonsubject imports, without reliance upon presumptions or rigid formulas. The Court has not prescribed a specific method of exposition for this consideration. *Mittal Steel* explains as follows:

> What *Bratsk* held is that "where commodity products are at issue and fairly traded, price competitive, non-subject imports are in the market," the Commission would not fulfill its obligation to consider an important aspect of the problem if it failed to consider whether non-subject or non-LTFV imports would have replaced LTFV subject imports during the period of investigation without a continuing benefit to the domestic industry. 444 F.3d at 1369. Under those circumstances, *Bratsk* requires the Commission to consider whether replacement of the LTFV subject imports might have occurred during the period of investigation, and it requires the Commission to provide an explanation of its conclusion with respect to that factor.

542 F.3d at 878.

[37] *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.").

presence of price-competitive nonsubject imports.[38] The additional "replacement/benefit" test looked at whether nonsubject imports might have replaced subject imports without any benefit to the U.S. industry. The Commission applied that specific additional test in subsequent cases, including the *Carbon and Certain Alloy Steel Wire Rod from Trinidad and Tobago* determination that underlies the *Mittal Steel* litigation.

Mittal Steel clarifies that the Commission's interpretation of *Bratsk* was too rigid and makes clear that the Federal Circuit does not require the Commission to apply an additional test nor any one specific methodology; instead, the court requires the Commission to have "evidence in the record" to "show that the harm occurred 'by reason of' the LTFV imports," and requires that the Commission not attribute injury from nonsubject imports or other factors to subject imports.[39] Accordingly, we do not consider ourselves required to apply the replacement/benefit test that was included in Commission opinions subsequent to *Bratsk*.

The progression of *Gerald Metals, Bratsk*, and *Mittal Steel* clarifies that, in cases involving commodity products where price-competitive nonsubject imports are a significant factor in the U.S. market, the Court will require the Commission to give full consideration, with adequate explanation, to non-attribution issues when it performs its causation analysis.[40]

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.[41] Congress has delegated this factual finding to the Commission because of the agency's institutional expertise in resolving injury issues.[42]

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.

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[38] *Mittal Steel*, 542 F.3d at 875-79.

[39] *Mittal Steel*, 542 F.3d at 873 (quoting from *Gerald Metals*, 132 F.3d at 722), 875-79 & n.2 (recognizing the Commission's alternative interpretation of *Bratsk* as a reminder to conduct a non-attribution analysis).

[40] To that end, after the Federal Circuit issued its decision in *Bratsk*, the Commission began to present published information or send out information requests in the final phase of investigations to producers in nonsubject countries that accounted for substantial shares of U.S. imports of subject merchandise (if, in fact, there were large nonsubject import suppliers). In order to provide a more complete record for the Commission's causation analysis, these requests typically seek information on capacity, production, and shipments of the product under investigation in the major source countries that export to the United States. The Commission plans to continue utilizing published or requested information in the final phase of investigations in which there are substantial levels of nonsubject imports.

[41] We provide in our respective discussions of volume, price effects, and impact a full analysis of other factors alleged to have caused any material injury experienced by the domestic industry.

[42] *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.").

1. Demand Conditions

Demand for R-134a is derived from demand for products in which it is incorporated. These include air conditioning systems, particularly automotive air conditioning systems, as well as propellant in aerosol cans, as a foam expansion agent, and in pharmaceutical applications such as asthma inhalers.[43] Of these end-use applications, automotive air conditioning accounts for approximately one-half of the U.S. market for R-134a, including both automotive OEMs and the automotive aftermarket. Sales to automotive OEMs account for about 12 percent of the total domestic market for R-134a, while the automotive aftermarket accounts for approximately 35 percent of the total domestic market.[44]

U.S. Environmental Protection Agency regulations require that all automotive OEMs shift from R-134a to the next generation of refrigerants by 2021.[45] While this will eliminate much of the automotive OEM market for R-134a, the parties agree that the automotive aftermarket for R-134a will continue to be a significant source of demand for the product in the foreseeable future.[46]

Like the automotive portion of the market, the stationary air conditioning market consists of sales to OEMs and an aftermarket. Sales to stationary OEMs account for about 3 percent of the total market while sales to the stationary aftermarket account for approximately 6 percent of the domestic market.[47] The foam expansion and propellant portions are roughly 20 percent of the market, and 24 percent of sales were for "unknown or other" end uses.[48]

Demand for R-134a is seasonal and is highest during the spring and summer. R-134a producers increase shipments during the first half of the year and purchasers build inventory levels in preparation for the warmer summer months.[49]

The Coalition and the Chinese Respondents did not agree concerning the trends in U.S. demand over the POI.[50] We find that U.S. demand for R-134a was less volatile during the POI than the apparent U.S. consumption data may suggest.[51] The apparent U.S. consumption data for R-134a increased from 82,215 short tons in 2013 to 84,348 short tons in 2014 and then fell

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[43] CR/PR at II-1.

[44] CR/PR at Table IV-11.

[45] CR at I-4 n.6, PR at I-3 n.6.

[46] Coalition's Prehearing Brief at 11-12; Chinese Respondents' Prehearing Brief at 9-10.

[47] CR/PR at Table IV-11.

[48] CR/PR at Table IV-11.

[49] Coalition's Prehearing Brief at 10; Chinese Respondents' Prehearing Brief at 10.

[50] The Coalition and Mexichem indicated that stockpiling (and destocking) of inventories may account for the swings in apparent U.S. consumption. Tr. at 100-101 (Geosits, Huan); Coalition's Prehearing Brief at 15. On the other hand, Chinese Respondents' view is that there were changes in demand over the period of investigation ("POI"), but they were not as large as those indicated by the apparent U.S. consumption data. *See* Chinese Respondents' Posthearing Brief, Answers to Questions at 13-17.

[51] Producers, importers and purchasers responding to the Commission questionnaires provided mixed assessments of demand in the United States over the POI, although the largest number of each type of market participant reported no change. *See* CR/PR at Table II-3.

to 70,454 short tons in 2015.[52] Apparent U.S. consumption was 56,718 short tons in January-September ("interim") 2015 and 82,303 short tons in interim 2016.[53]

2. Supply Conditions

The domestic industry supplied the majority of R-134a to the U.S. market but lost market share over the POI in all applications for which data were collected.[54] U.S. producers' U.S. shipments accounted for 79.6 percent of apparent U.S. consumption in 2013, 81.3 percent in 2014, 76.5 percent in 2015, 76.6 percent in interim 2015, and 68.5 percent in interim 2016.[55] The domestic industry's shipments were concentrated in the automotive aftermarket, the foam expansion and propellant, and "other" portions of the market.[56]

One domestic producer, ***, indicated that it had a scheduled shutdown in November 2014 for maintenance, which was followed by a six-month unplanned shutdown to make needed repairs.[57] The domestic producers indicated that they build up inventory prior to any scheduled shutdown or "turnaround" to enable uninterrupted supply.[58] ***.[59]

Subject imports supplied most of the remainder of the U.S. market and gained market share over the POI.[60] Subject imports had some presence in markets for all applications, and were concentrated in the automotive aftermarket, the stationary aftermarket, and the "other" segment.[61] R-134a from China was subject to antidumping and countervailing duty investigations from 2013 to 2014.[62] As a result of those investigations, imports of R-134a from China were subject to provisional countervailing duties from April 18, 2014 through December 9, 2014,[63] and to provisional antidumping duties from May 29, 2014 through December 9,

[52] CR/PR at Table IV-6.

[53] CR/PR at Table IV-6. The record also indicates that average temperatures in the United States increased over the POI. CR/PR at Fig. II-1. AutoZone asserts that this may have led to higher apparent U.S. consumption in interim 2016, but there was disagreement on this point. *See* CR at II-19, II-19 n.48, PR at II-12, II-12 n.48.

[54] *See* CR/PR at Tables E-1 to E-9.

[55] CR/PR at Table IV-6.

[56] CR at IV-17, PR at IV-11.

[57] CR at II-8, II-8 n.19, PR at II-5, II-5 n.19.

[58] CR at II-8, VI-3, n.7, PR at II-7, VI-2, n.7.

[59] CR at II-11, PR at II-8.

[60] *See* CR/PR at Table IV-6, E-1 to E-9.

[61] CR/PR at Tables E-1 to E-9.

[62] *1, 1, 1, 2-Tetrafluoroethane from China*, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final), USITC Pub. 4503 (Dec. 2014).

[63] *Countervailing Duty Investigation of 1, 1, 1, 2-Tetrafluoroethane From the People's Republic of China: Preliminary Affirmative Determination and Alignment of Final Determination with Final Antidumping Determination*, 79 Fed. Reg. 21895 (April 18, 2014); *1, 1, 1, 2-Tetrafluoroethane from China*, 79 Fed. Reg. 73102 (Dec. 9, 2014).

2014.[64] The provisional duties were no longer collected after December 9, 2014, when the Commission issued negative determinations in its investigations.[65]

Nonsubject imports had a minimal presence in the U.S. market throughout most of the POI.[66] Their share of apparent U.S. consumption increased from 1.0 percent in 2013 to 4.5 percent in 2014 and then declined to 1.6 percent in 2015. Nonsubject imports were 1.6 percent of apparent U.S. consumption in interim 2015 and 1.2 percent in interim 2016.[67] The primary sources of nonsubject imports were the United Kingdom and India.[68]

3. Substitutability and Other Conditions

We find that there is a high degree of substitutability between subject imports and the domestic like product.[69] The great majority of domestic producers, importers, and purchasers reported that U.S.-produced R-134a was "always" or "frequently" interchangeable with R-134a from China.[70] All U.S. producers and a majority of importers and purchasers reported that differences other than price between U.S.-produced R-134a and R-134a from China were sometimes or never significant in purchasing decisions.[71]

The record indicates that price is an important factor in purchasing decisions. Purchasers most frequently cited price, quality, and availability/supply as the factors affecting their purchasing decisions.[72] Thirty-three of 38 purchasers also listed price as very important in their purchasing decisions.[73]

Subject imports are predominantly sold in 30-lb containers while most domestically produced R-134a is sold in bulk.[74] Sales into the automotive aftermarket are generally made on a spot basis.[75]

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[64] *1, 1, 1, 2-Tetrafluoroethane From the People's Republic of China: Antidumping Duty Investigation, Preliminary Determination of Sales at Less Than Fair Value, Affirmative Preliminary Determination of Critical Circumstances, in Part, and Postponement of Final Determination*, 79 Fed. Reg. 30817 (May 29, 2014); *1, 1, 1, 2-Tetrafluoroethane from China*, 79 Fed. Reg. 73102 (Dec. 9, 2014).

[65] *See 1, 1, 1, 2-Tetrafluoroethane from China*, 79 Fed. Reg. 73102 (Dec. 9, 2014); *see also 2014 R-134a Determinations*, USITC Pub. 4503 at 5-6.

[66] CR/PR at Table IV-3.

[67] CR/PR at Table IV-6.

[68] CR at II-11, PR at II-7.

[69] *See* CR at II-21, PR at II-13.

[70] CR/PR at Table II-9.

[71] CR/PR at Table II-11.

[72] CR/PR at Table II-5; CR at II-22, PR at II-14.

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

[74] CR/PR at Table IV-12

[75] Tr. at 42 (Geosits).

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."[76]

Subject import volume declined from 15,900 short tons in 2013 to 11,916 short tons in 2014.[77] The decline in subject import volume in 2014 occurred while imports of R-134a from China were subject to investigation and subject to provisional duties for almost eight months. Following the Commission's negative determinations in those prior investigations, provisional duties were removed in late 2014.[78] In 2015, when subject imports from China were no longer subject to investigation, they increased to 15,429 short tons, a level comparable to that of 2013.[79] The volume of subject imports was more than twice as high in interim 2016, when it was 24,953 short tons, as in interim 2015, when it was 12,361 short tons.[80]

Despite the small decrease in the volume of subject imports between 2013 and 2015, the market share held by subject imports increased over the three-year period. Their share fell from 19.3 percent in 2013 to 14.1 percent in 2014, and then increased to 21.9 percent in 2015.[81] Their market penetration continued to increase in the interim period, from 21.8 percent in interim 2015 to 30.3 percent in interim 2016.[82]

Subject imports gained market share over the entire POI at the expense of domestic industry. The industry lost 3.1 percentage points of market share from 2013 to 2015, and its market share was 8.1 percentage points lower in interim 2016 than in interim 2015.[83] Although over 80 percent of the subject imports were sold in the automotive aftermarket, they increased their share in all end-use applications.[84]

Based on the foregoing, we find the volume of subject imports and the increase in that volume to be significant in absolute terms and relative to consumption in the United States.

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

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[76] 19 U.S.C. § 1677(7)(C)(i).
[77] CR/PR at Table IV-2.
[78] *See* discussion in section IV.B.2 above.
[79] CR/PR at Table IV-6.
[80] CR/PR at Table IV-6.
[81] CR/PR at Table IV-6.
[82] CR/PR at Table IV-6.
[83] CR/PR at Table IV-6.
[84] CR/PR at Tables IV-8, E-1 to E-9.

(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.[85]

As explained above, the record indicates that there is a high degree of substitutability between domestically produced R-134a and the subject imports and that price is an important factor in purchasing decisions.

The Commission collected quarterly pricing data on five pricing products.[86] Three U.S. producers, Honeywell,[87] and 18 importers provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.[88]

The quarterly pricing data show that the subject imports undersold the domestic like product in 64 percent of the price comparisons (47 of 73 quarters).[89] On a volume basis, 46.0 million short tons (76 percent) of subject imports in pricing comparisons undersold domestically produced R-134a, while 14.2 million tons (24 percent) of these subject imports oversold domestically produced R-134a.[90]

Underselling was prevalent in product 2 (*** comparisons), the 30-lb container category in which *** percent of the subject imports for which pricing data were reported were sold.[91] Product 3, on the other hand, the pricing product with the smallest subject import shipment quantities sold, had the lowest rate of underselling (*** comparisons).[92] The margins of underselling for the five pricing products ranged from 0.8 percent to 39.6 percent, and the average margin of underselling was 12.9 percent.[93]

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[85] 19 U.S.C. § 1677(7)(C)(ii).

[86] The pricing products were:

Product 1.-- R-134a in bulk sold to repackers and distributors;

Product 2.-- R-134a in 30-pound containers with an automotive valve sold to distributors;

Product 3.-- R-134a in 30-pound containers with an HVAC valve sold to distributors or wholesalers;

Product 4.-- R-134a in 30-pound containers with an automotive valve sold to retailers;

Product 5.-- R-134a in 12-ounce containers sold to distributors.

CR at V-7 to V-8, PR at V-5.

[87] Honeywell did not produce R-134a but sold R-134a that ***. CR at I-6 n. 7, IV-26 n.23, PR at I-4, IV-14 n.23.

[88] CR at V-8, PR at V-7. Reported pricing data accounted for approximately 38.2 percent of reported U.S. producers' shipments of R-134a and 82.5 percent of subject imports from China in 2015. *Id*.

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

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

[91] CR/PR at Table V-9; CR at V-8, PR at V-5.

[92] CR at V-8, PR at V-5.

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

We have also examined data concerning direct imports, which accounted for almost *** percent of subject imports in 2015.[94] Six importers reported import purchase cost data for their direct imports of bulk R-134a from China for internal use or repackaging during the POI.[95] The directly imported R-134a was priced lower than the domestically produced bulk R-134a in all 12 quarters for which import purchase cost data were reported.[96] Even taking into account the additional costs the importers assumed with direct importing, the record indicates that the reported prices for direct imports were generally lower than prices charged by U.S. producers.[97]

Purchasers also confirmed purchasing subject imports instead of the domestic product due to lower prices. Of 38 responding purchasers, 17 indicated that they the subject imports rather than domestically produced R-134a primarily due to lower

Given the high frequency of underselling and the fact that price is an important consideration in purchasing decisions, we find the underselling to be significant.

We also find that subject imports depressed U.S. producers' prices to a significant degree. The pricing data indicate generally that prices for the domestic like product decreased over the POI. Prices for domestically produced R-134a declined for four of the five pricing products.[99] Prices for subject imports in all five products declined to a greater extent than prices for domestically produced R-134a, suggesting subject imports were driving domestic prices lower.[100]

Prices for domestically produced R-134a fell or were flat during 2013 and then recovered during 2014.[101] Prices for domestically produced R-134a then declined in 2015 and

[94] CR at V-21 n.20, PR at V-9 n.20. Direct imports represented smaller shares of total subject imports in 2013 and 2014. *Id.*

[95] CR at V-21, PR at V-9.

[96] We reject respondents' contention that consideration of the direct import data is improper because it involves "double counting "of product included in the U.S. producer/importer pricing comparisons. The direct import data represent distinct transactions involving imported articles at a different level of trade from the transactions reported in the producer/importer pricing comparisons. We also note that the direct import data in CR/PR Table V-10 are not included in the pricing comparisons in CR/PR Table V-9.

[97] Differences in weighted average prices ranged from 22 cents to 80 cents per pound. CR/PR at Table V-10. The record indicates that direct importers compared the costs associated with directly importing R-134a to U.S. producers' and importers' prices. CR at V-24, PR at V-9. The differences in weighted average prices were larger than the reported costs of importing R-134a from China. CR/PR at Table V-11.

[98] CR at V-26, PR at V-10. The 19,209 short tons reported to have been shifted to the subject imports understates the total amount shifted as only 13 of the 19 purchasers that purchased subject imports furnished the amounts that they had purchased. CR at V-26, PR at V-11.

[99] CR/PR at Table V-8.

[100] *See* CR/PR at Table V-8.

[101] *See* CR/PR at Figures V-1 to V-5.

the first quarter of 2016, before leveling off.[102] The price declines were most pronounced for four of the five products between the last quarter of 2014 and the first quarter of 2015,[103] a period that coincided with the removal of the provisional duties on R-134 from China in December 2014. As documented by the Coalition, purchasers demanded price concessions or "rebates" once R-134a from China was no longer subject to such duties.[104]

The industry's raw material costs declined during the POI, but the modest declines were not experienced by all three producers, were not widely publicized, and were not cited by purchasers as justification for lower prices.[105] The fact that purchasers cited the availability of subject imports as justifying discounts once the provisional duties were removed also indicates that lower raw material costs were not responsible for the decline in R-134a prices.[106] Accordingly, the record indicates raw materials costs do not explain the magnitude or timing of the pricing declines.

We also examined trends in apparent U.S. consumption as a possible reason for declining prices in 2015. As discussed above, market participants did not agree as to underlying demand trends during this period or the extent to which the fluctuations in the apparent U.S. consumption data, which are based on imports rather than shipments of imports, reflect changes in underlying demand for R-134a. While there were fluctuations in reported apparent U.S. consumption during 2015 and interim 2016, we do not find that these fluctuations can explain price movements during the period. The timing of the price declines in 2013, 2015, and the first part of 2016 generally coincided with increases in subject imports while the price increases during 2014 corresponded with the provisional duties from the earlier investigations.[107] Finally, the record contains additional evidence indicating that subject imports rather than trends in raw materials costs or demand placed downward pressure on domestic prices for R-134a during the POI.[108]

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[102] *See* CR/PR at Figures V-1 to V-5. The petition in this investigation was filed in March 2016, and domestic prices stabilized in the second and third quarter of 2016. *See* CR at IV-10, PR at IV-8; Tr. at 136-37 (Dayton).

[103] *See* CR/PR at Figs. V-1 to V-5.

[104] CR at II-27, II-27 n.57, V-5 n. 14, PR at II-17, II-17 n.57, V-3-4 n.14.

[105] CR/PR at Tables VI-1 and VI-4. Arkema indicated that ***. CR at VI-15, VI-15 n.17, PR at VI-7, VI-7 n.17. Witnesses for the domestic industry also testified that raw material costs were not impacting R-134a prices. Tr. at 105-07 (Butterbaugh, Cariilo, Pacillo). *See also* CR/PR at Table V-14 (purchasers note lower priced Chinese product affects prices and indicate R-134a prices not set relative to raw material costs).

[106] *See also* CR/PR at Table V-14 (referencing lower priced Chinese product and noting prices not set relative to raw material costs).

[107] Chinese Respondents argue that increasing subject imports did not coincide with price declines. Chinese Respondents' Prehearing Brief at 33. While price declines did not perfectly correlate with increasing subject import volumes, the record as a whole indicates that subject imports were placing downward pressure on prices leading to price declines over much of the POI.

[108] Thirteen purchasers indicated that domestic producers reduced their prices to compete with lower-priced subject imports. CR at V-28, PR at V-11. Further, major purchasers ***, have begun using (Continued...)

Accordingly, we find that subject imports significantly undersold the domestic like product. As a result of this underselling, the subject imports gained market share at the expense of the domestic like product; they also depressed prices to a significant degree. The low-priced subject imports consequently had significant effects on the domestic industry, which are described further below.

E. Impact of the Subject Imports[109]

Section 771(7)(C)(iii) of the Tariff Act provides that in examining the impact of subject imports, the Commission "shall evaluate all relevant economic factors which have a bearing on the state of the industry."[110] 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 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."[111]

(…Continued)
reverse auctions to secure the lowest price for their purchases. CR at V-3, PR at V-2. Price is the only basis on which bidders compete. CR at V-3 n.8, PR at V-2 n.8.

A witness for one of the largest importers, Weitron, indicated that the Chinese sought to gain market share in the United States and that product from China was attractively priced. "There were a lot of Chinese brokers that popped up in this time frame. … There were a lot of new player{s} in the 134a market in 2015 and '16 that are hell bent on trying to get market share in this country." Tr. at 173 (Dayton). She further explained that "pricing was such that made it favorable for some of these brokers to bring it in from China." *Id.* at 174-175 (Dayton).

[109] 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 Commerce found dumping margins of 148.79 percent to 167.02 percent for subject imports from China. *See 1,1,1,2 Tetrafluoroethane (R–134a) From the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Affirmative Determination of Critical Circumstances, in Part*, 82 Fed. Reg. 12192 (March 1, 2017). We take into account in our analysis the fact that Commerce has found that all subject producers in China are 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 significant underselling of subject imports and the price depressing effects of that underselling, described in both the price effects discussion and below, is particularly probative to an assessment of the impact of the subject imports.

[110] 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.").

[111] 19 U.S.C. § 1677(7)(C)(iii). This provision was amended by the Trade Preferences Extension Act of 2015, Pub. L. 114-27.

We find that the subject imports had a significant impact on the domestic industry during the period of investigation. Most indicators of the domestic industry's performance declined over the POI. Declines were most apparent during 2015 and interim 2016, when subject import volume and market penetration increased sharply.

The domestic industry's capacity declined from 114,363 short tons in 2013 to 107,925 short tons in 2014, and to 88,078 short tons in 2015.[112] It was 62,955 short tons in interim 2015 and 85,301 short tons in interim 2016.[113] Annual capacity fluctuations to a large extent reflect ***.[114] Production followed the same trends as capacity, declining from 100,031 short tons in 2013 to 96,586 short tons in 2014, and 72,223 short tons in 2015.[115] Production was 58,848 short tons in interim 2015 and 74,101 short tons in interim 2016.[116] Capacity utilization increased from 87.5 percent in 2013 to 89.5 percent in 2014; it then declined to 82.0 percent in 2015, and was 93.5 percent in interim 2015 and 86.9 percent in interim 2016.[117]

U.S. shipments were 65,477 short tons in 2013, 68,612 short tons in 2014, and 53,890 short tons in 2015.[118] U.S. shipments were 43,424 short tons in interim 2015 and 56,340 short tons in interim 2016.[119] The domestic industry's market share was 79.6 percent in 2013, 81.3 percent in 2014, and fell thereafter, declining to 76.5 percent in 2015; it was lower in interim 2016, when it was 68.5 percent, than in interim 2015, when it was 76.6 percent.[120] The number of production workers showed small declines over the POI, falling from 209 workers in 2013 to 205 workers in 2015; the number of workers was 206 in interim 2015 and 205 during interim 2016.[121] Hours worked showed minor fluctuations from 2013 to 2015 and in the interim periods.[122] Wages paid increased from 2013 to 2015 and were higher in interim 2016 than in interim 2015.[123] Productivity declined from 2013 to 2015 but was higher in interim 2016 than in interim 2015.[124]

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[112] CR/PR at Table III-4.

[113] CR/PR at Table III-4.

[114] CR at III-3-5, PR at III-2-3.

[115] CR/PR at Table III-4.

[116] CR/PR at Table III-4.

[117] CR/PR at Table III- 4. The domestic industry's end-of-period inventories fell from 8.8 percent of total shipments in 2013 to 8.0 percent in 2014 and then increased to 14.1 percent in 2015, and were 14.2 percent in interim 2015 and 8.0 percent in interim 2016. CR/PR at Table III-6.

[118] CR/PR at Table III-5.

[119] CR/PR at Table III-5

[120] CR/PR at Table IV-6.

[121] CR/PR at Table III-8.

[122] CR/PR at Table III-8.

[123] Wages paid were $19.1 million in 2013, $19.8 million in $2014, $20.6 million in 2015 and $15.0 million in interim 2015 and $15.4 million in interim 2016. CR/PR at Table III-8.

[124] CR/PR at Table III-8. Productivity declined from 205.8 short tons per 1,000 hours in 2013 to 148.6 short tons per 1,000 hours in 2015. It was 163.0 short tons per 1,000 hours during interim 2015 and 207 short tons per 1,000 hours during interim 2016. *Id.*

The domestic industry's sales quantities and net unit sales values both decreased from 2013 to 2015.[125] Net sales quantities were higher during interim 2016 than interim 2015, although the domestic industry's net unit sales values were lower.[126] Sales revenues fell from 2013 to 2015 before increasing in interim 2016 relative to interim 2015.[127] The value of cost of goods sold ("COGS") displayed similar trends to sales revenues.[128]

Gross profit, operating income, and net income all declined from 2013 to 2015, and then improved in interim 2016 relative to interim 2015. The industry experienced net losses in 2014 and 2015 and an operating loss in 2015; notwithstanding the improvement during the interim period, the operating and net losses continued in interim 2016.[129] The industry's ratio of operating income to net sales followed a similar trend, declining from 2013 to 2015 before improving in interim 2016 relative to interim 2015.[130] The industry's capital expenditures increased irregularly from 2013 to 2015 and were lower in interim 2016 than in interim 2015.[131]

After declining in 2014 while being subject to provisional duties most of the year, subject imports increased during 2015 and interim 2016. Through pervasive underselling, the subject imports' market share rose during these periods.[132] These gains occurred at the expense of the domestic industry, which lost 4.8 percentage points of market share in 2015 relative to 2014.[133] In 2015, the domestic industry's production, commercial U.S. shipments,[134] and sales revenues all declined, as did its profitability.

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[125] CR/PR at Table VI-4. Net sales totaled 97,709 short tons in 2013, 97,664 short tons in 2014, and 69,897 short tons in 2015. *Id.* The industry's average unit net sales values were $4,625 per short ton in 2013, $4,201 per short ton in 2014 and $4,281 per short ton in 2015. *Id.*

[126] Net sales were 55,817 short tons in interim 2015 and 75,661 short tons in interim 2016. The industry's average unit net sales values were $3,979 per short ton in interim 2015 and $3,943 per short ton in interim 2016. CR/PR at Table VI-4.

[127] Sales revenues were $451.9 million in 2013, $410.3 million in 2014, $299.2 million in 2015, $222.1 million in interim 2015, and $298.3 million in interim 2016. CR/PR at Table VI-1.

[128] Total COGS was $361.9 million in 2013, $357.2 million in 2014, $283.1 million in 2015, $224.3 million in interim 2015, and $278.5 million in interim 2016. CR/PR at Table VI-1.

[129] Gross profit was $90.0 million in 2013, $53.1 million in 2014 and $16.1 million in 2015. The industry reported a $2.2 million gross loss in interim 2015 and a $19.8 million gross profit in interim 2016. Operating income was $44.8 million in 2013 and $17.3 million in 2014 followed by operating losses of $22.5 million in 2015, $18.4 million in interim 2015, and $11.7 million in interim 2016. The industry recorded net income of $28.3 million in 2013, followed by net losses of $989,000 in 2014, $16.4 million in 2015, $27.0 million in interim 2015, and $16.7 million in interim 2016. CR/PR at Table VI-1.

[130] The domestic industry's ratio of operating income to net sales was 9.9 percent in 2013, 4.2 percent in 2014, negative 2.4 percent 2015, negative 8.3 percent in interim 2015, and negative 3.9 percent in interim 2016. CR/PR at Table VI-1.

[131] The domestic industry's capital expenditures were $*** in 2013, $*** in 2014, $*** in 2015, $*** in interim 2015, and $*** in interim 2016. CR/PR at Table VI-5. The industry's research and development expenditures declined from 2013 to 2015, but were higher in interim 2016 than in interim 2015. They were $*** in 2013, $*** in 2014, $*** in 2015, $*** in interim 2015, and $*** in interim 2016. *Id.*

[132] S*ee* CR/PR at Table IV-6.

[133] S*ee* CR/PR at Table IV-6.

In interim 2016, the industry's market share was 8.1 points lower than in interim 2015 as the volume and market share of the subject imports exceeded interim 2015 levels.[135] Although industry output and financial performance improved somewhat during interim 2016 because Chemours was no longer experiencing an ***,[136] it still incurred operating losses. Respondents contend that it was Chemours's extended shutdown rather than the subject imports that explains the industry's poor performance during the POI.[137] Although the record indicates that Chemours's shutdown contributed to the domestic industry's difficulties, it cannot explain the information in the record indicating that lower-priced subject imports caused the domestic industry to lose sales, nor can it explain why domestic industry prices fell in 2015 notwithstanding that the Chemours shutdown during that year reduced the domestic industry's available capacity.[138] Chinese Respondents also contend that the increase in subject imports stemmed from purchasers' desire to ensure that they had a reliable source of supply, but this is not supported by the record. Rather than entering in response to a perceived shortage or supply problems, the record indicates that subject imports consistently entered the U.S. market at low prices in order to increase market share.[139] Finally, we are not persuaded by

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(…Continued)

[134] Although export shipments declined by *** short tons in 2015 relative to 2014, the decline in U.S. shipments was even greater. The decline in export shipments also does not explain the domestic industry's declining market share or declining net sales values as export sales values were generally increasing. *See* CR/PR at Tables III-5 and C-1.

[135] S*ee* CR/PR at Table IV-6.

[136] CR at VI-11, VI-18, PR at VI-6, VI-8. As a result of Chemours's resumption of normal production operations, the domestic industry's unit COGS were lower during interim 2016 than during interim 2015, leading to reduced losses. *See* CR/PR at Table VI-1.

[137] Chinese Respondents contend that Chemours's results were aberrational, distort the results of the industry and the Commission should assess the impact of the subject imports on the industry without Chemours. Chinese Respondents' Prehearing Brief at 40-43. The Commission, however, must evaluate the impact on the industry as a "whole." 19 U.S.C. § 1677(4)(A). Chemours generally reported higher costs due to using ***. CR at VI-17 n.22, PR at VI-8 n.22; Tr. at 108 (Cannon) (noting different strategy of Chemours).

[138] Respondents suggest that the industry's difficulties were limited to Chemours, but the other two domestic producers both saw their commercial sales quantities decline in 2015 relative to 2014 despite Chemours purchasing from them during 2015 to meet its obligations. CR at II-11, PR at II-8; CR/PR at Table VI-4. Moreover, the other producers' net sales values generally declined over the POI, reflecting the decline in prices. *See* CR/PR at Table VI-4. Chinese Respondents acknowledge that *** profitability declined from 2013 to 2014, then remained steady in 2015, and then fell further in interim 2016 relative to interim 2015. Chinese Respondents' Prehearing Brief at 41. These producers' trend in profitability is consistent with the poor performance of the industry as a whole resulting from the impact of the subject imports during the POI.

[139] As noted, the record indicates that subject imports were priced aggressively to capture market share during the POI as confirmed by hearing testimony. *See, e.g.,* Tr. at 173 (Dayton). Even during Chemours's six-month shutdown, there were no reports of shortages or supply problems. The domestic industry's elevated end of period inventories for interim 2015 and full year 2015 are also inconsistent with the alleged supply difficulties. *See* CR/PR at Table III-6. Despite respondents' claims (Continued...)

respondents' argument that there was a lack of correlation between trends in subject import volume and the domestic industry's condition during the POI.[140] By taking market share from the domestic industry, the subject imports caused the industry's output to be lower than it would have been otherwise.[141] This and the significant price depression caused by the subject imports caused the industry to forego revenues it would otherwise have obtained, resulting in generally poor financial performance in 2015 and interim 2016. We accordingly find that the significant volume of subject imports, which depressed domestic prices and gained market share at the expense of the domestic industry through significant underselling, had a significant impact on the domestic industry.

We have considered whether there are other factors that may have had an impact on the domestic industry during the period of investigation to ensure that we are not attributing injury from such other factors to subject imports. We have already considered the shutdown of Chemours and its effect on the performance of the domestic industry. Nonsubject imports as a share of apparent U.S. consumption increased from *** percent in 2013 to *** percent in 2014, decreased to *** percent in 2015, and were *** percent in interim 2015 and *** percent in interim 2016.[142] The extremely small presence of nonsubject imports cannot explain the magnitude of the domestic industry's loss of market share and revenues due to underselling of significant and increasing volumes of subject imports.

We also considered whether changes in apparent U.S. consumption over the POI affected the domestic industry's performance. As previously discussed, the record indicates that the fluctuations in apparent U.S. consumption do not appear fully to reflect changes in underlying demand and in any event cannot explain the timing of price declines the domestic industry experienced. Further, because of the elevated level of subject imports, the domestic

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(…Continued)
that purchasers were concerned about reliability of supply, they overwhelmingly reported that domestically produced R-134a was superior or comparable to the subject imports with respect to "reliability of supply" and "availability." CR/PR at Table II-8. The domestic like product, however, was rated as inferior with respect to "price" (*i.e.*, higher-priced) by a majority of responding purchasers. CR/PR at Table II-8. While ***. CR at V-3 n.9, PR at V-2 n.9; Coalition's Posthearing Brief, Exhibit 1 at 17-19.

[140] Respondents argue that the domestic industry's condition improved when subject imports were increasing during interim 2016 relative to interim 2015 and that the industry performed worse during 2014 when subject imports were lower than during 2013. Chinese Respondents' Posthearing Brief at 2-3. We note that the industry's overall improvement in interim 2016 is related to Chemours's resumption of normal operations after an extended shutdown during interim 2015. CR at VI-18, PR at VI-8. As noted, the other producers performed worse in interim 2016 relative to interim 2015. The industry's poorer performance in 2014 relative to 2013 reflects its lower sales values during 2014. *See* CR/PR at Table VI-1. Although domestic prices recovered in the second half of 2014, most sales of R-134a occur during the first half of the year due to its seasonal nature. *See* CR/PR at Figs V-1 to V-5.

[141] Even after accounting for Chemours's shutdown, the industry had appreciable unused capacity throughout the period of investigation, indicating it had the ability to increase production, and its capacity utilization declined after 2014. *See* CR/PR at Table III-5.

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

industry was unable to obtain the market share it achieved in 2014 at any subsequent time during the POI. Consequently, changes in demand do not explain the magnitude of the domestic industry's decline in output and shipments over the POI or the domestic industry's depressed prices. Thus, these other factors cannot explain the loss in market share, output, and revenues that we have attributed to the subject imports. We therefore conclude that the subject imports had a significant impact on the domestic R-134a industry.

For the reasons stated above, we determine that an industry in the United States is materially injured by reason of subject imports of R-134a from China that are sold in the United States at less than fair value.

V. Critical Circumstances

A. Legal Standards and Party Arguments

In its final antidumping determination concerning R-134a from China, Commerce found that critical circumstances exist with respect to all exporters in China except Sanmei Industry Chemical Company Ltd.[143] Because we have determined that the domestic industry is materially injured by reason of subject imports from China, we must further determine "whether the imports subject to the affirmative {Commerce critical circumstances} determination ... are likely to undermine seriously the remedial effect of the antidumping {and/or countervailing duty} order{s} to be issued."[144] The SAA indicates that the Commission is to determine "whether, by massively increasing imports prior to the effective date of relief, the importers have seriously undermined the remedial effect of the order" and specifically "whether the surge in imports prior to the suspension of liquidation, rather than the failure to provide retroactive relief, is likely to seriously undermine the remedial effect of the order."[145] The legislative history for the critical circumstances provision indicates that the provision was designed "to deter exporters whose merchandise is subject to an investigation from circumventing the intent of the law by increasing their exports to the United States during the period between initiation of an investigation and a preliminary determination by {Commerce}."[146] An affirmative critical circumstances determination by the Commission, in conjunction with an affirmative determination of material injury by reason of subject imports, would normally result in the retroactive imposition of duties for those imports subject to the affirmative Commerce critical circumstances determination for a period 90 days prior to the suspension of liquidation.

The statute provides that, in making this determination, the Commission shall consider, among other factors it considers relevant,

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[143] 82 Fed. Reg. at 12193.

[144] 19 U.S.C. §§ 1671d(b)(4)(A)(ii), 1673d(b)(4)(A)(ii).

[145] SAA at 877.

[146] *ICC Industries, Inc. v United States,* 812 F.2d 694, 700 (Fed. Cir. 1987), *quoting* H.R. Rep. No. 96-317 at 63 (1979), *aff'g* 632 F. Supp. 36 (Ct. Int'l Trade 1986). *See* 19 U.S.C. §§ 1671b(e)(2), 1673b(e)(2).

(I) the timing and the volume of the imports,
(II) a rapid increase in inventories of the imports, and
(III) any other circumstances indicating that the remedial effect of the {order} will be seriously undermined.[147]

In considering the timing and volume of subject imports, the Commission's practice is to consider import quantities prior to the filing of the petition with those subsequent to the filing of the petition using monthly statistics on the record regarding those firms for which Commerce has made an affirmative critical circumstances determination.[148]

Petitioners' Arguments. The Coalition argues that the Commission should make a critical circumstances finding in this investigation. The Coalition urges the Commission to look at the first nine months of the year in evaluating the volume of subject imports because the demand is seasonal for R-134a.[149] Mexichem asserts that the increase in subject imports after the filing of the petition goes beyond the typical seasonal buildup in inventories. [150] The Coalition observes that inventories after the first nine months of 2016 were 50 percent higher than inventories for all of 2015, the year with the highest end-of-period inventories for the POI.[151] It contends that whether or not the subject imports were ordered before the petition was filed has no bearing on whether the subject imports will undermine the effectiveness of the order.[152]

Respondents' Arguments. Chinese Respondents acknowledge that subject imports almost doubled in the six months after the filing of the petition compared to the six months prior, but contend this merely reflects seasonal changes in demand for R-134a.[153] They contend any increased subject imports were ordered before the petition was filed, entered the U.S. market immediately after the filing of the petition (March-May 2016), and reflect the forecasts for warm weather in 2016.[154] BBC also contends that the increase in subject imports was consistent with the typical building of inventory for summer.[155] [156]

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[147] 19 U.S.C. §§ 1671d(b)(4)(A)(ii), 1673d(b)(4)(A)(ii).

[148] *See Lined Paper School Supplies from China, India, and Indonesia,* Inv. Nos. 701-TA-442-43, 731-TA-1095-97, USITC Pub. 3884 at 46-48 (Sept. 2006); *Carbazole Violet Pigment from China and India,* Inv. Nos. 701-TA-437 and 731-TA-1060-61 (Final), USITC Pub. 3744 at 26 (Dec. 2004); *Certain Frozen Fish Fillets from Vietnam,* Inv. No. 731-TA-1012 (Final), USITC Pub. 3617 at 20-22 (Aug. 2003).

[149] Coalition's Prehearing Brief at 52.

[150] Mexichem's Prehearing Brief at 10.

[151] Coalition's Prehearing Brief at 53.

[152] Coalition's Posthearing Brief, Exhibit I at 44.

[153] Chinese Respondents' Prehearing Brief at 61-62; Chinese Respondents' Posthearing Brief, Answers to Commissioners' Questions at 40-42.

[154] Chinese Respondents' Posthearing Brief, Answers to Commissioners' Questions at 40-42.

[155] BBC's Statement at 1-3.

[156] Chairman Schmidtlein and Commissioner Williamson have made affirmative critical circumstances findings and do not join the remainder of this opinion. *See* their Separate Views.

B. Analysis

We first consider the appropriate period for comparison of pre-petition and post-petition levels of subject imports from China. The petition was filed on March 3, 2016, and the current practice in antidumping investigations is to compare the six-month periods before and after the filing of the petition, although these periods may be altered when warranted. In particular, the Commission has utilized a different time period when the investigation concerns a seasonal product.[157]

As previously discussed, demand patterns for R-134a are seasonal. The product is typically stockpiled early in the season for shipment during the warmer months.[158] Consequently, we will compare the volume of subject imports subject to the Commerce critical circumstances finding during the six months after the filing of the petition to the same period the previous year in order to account for seasonal demand for R-134a. We thus compare the periods March-August 2016 and March-August 2015.

Subject import volume subject to the affirmative critical circumstances finding in Commerce's antidumping duty investigation for the March-August periods in 2015 and 2016 show an increase of *** percent, from *** short tons to *** short tons.[159] Much of the increase in subject imports that occurred during March-August 2016 occurred during the first three months of the period, or between March 2016 and May 2016.[160] As lead times are 60 to 90 days for R-134a ordered from China, much of the increase that occurred during March-May 2016 resulted from orders placed before the filing of the petition.[161] Subject imports that entered during the period June-August 2016 (after the petition was filed) were actually lower than those entering June-August 2015.[162] End-of-period inventories of subject imports from China subject to affirmative critical circumstances findings in Commerce's antidumping duty investigation increased *** percent from *** short tons in interim 2015 to *** short tons in interim 2016, but decreased relative to the volume of subject imports.[163] Additionally, prices

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[157] *Certain Polyester Staple Fiber from China*, Inv. No. 731-TA-1104 (Final), USITC Pub. 3922 at 35 (Jun. 2007).

[158] CR at II-16, PR at II-10.

[159] *See* EDIS Doc. Nos. 605745 and 604046.

[160] *See* EDIS Doc. Nos. 605745 and 604046.

[161] CR at II-21, PR at II-13-14. The impact of lead times is also evidenced in the delay in the arrival of subject imports after the elimination of provisional duties in December 2014. Subject import volume in December 2014 was ***, only *** short tons in January 2015 and a below normal *** short tons in February 2015. *See* EDIS Doc. No. 604046 (monthly import quantities).

[162] *See* EDIS Doc. Nos. 605745 and 604046 (monthly import quantities).

[163] CR/PR at Table IV-5. End of period inventories were equivalent to *** percent of subject imports during interim 2016 and *** percent of subject imports during interim 2015. *Id.* Petitioners argued that U.S. distributor BMP had acquired large inventories of R-134a that would be sold at low prices, limiting the effect of any antidumping order. Coalition's Prehearing Brief at 53-54. Yet, the text of the BMP letter cited by Petitioners makes clear that BMP's inventory of R-134a had been entered "prior to February 2016," and so prior to the filing of the petition. Coalition's Prehearing Brief at Exhibit 24.

for four of the five domestically produced pricing products increased between the second quarter of 2016 and the third quarter of 2016, in several instances by *** amounts.[164]

Although there was an increase in subject imports in the six month post-petition period, we do not find that the imports subject to Commerce's affirmative critical circumstances determination are likely "to undermine seriously" the remedial effect of Commerce's antidumping duty order. In light of the fact that the increase in subject imports occurred earlier in interim 2016, the stable level of importers' inventories relative to subject import volumes, and increased prices for domestically produced products in the third quarter of 2016, we make a negative critical circumstances determination with regard to subject imports from China.

VI. Conclusion

For the reasons stated above, we determine that an industry in the United States is materially injured by reason of subject imports of R-134a from China that are sold in the United States at less than fair value.

[164] CR/PR at Tables V-3-5, V-7.

Separate Views of Chairman Rhonda K. Schmidtlein and Commissioner Irving A. Williamson Regarding Critical Circumstances

We have made an affirmative critical circumstances finding with respect to dumped imports of R-134a from China for which Commerce found critical circumstances, for the reasons below.[1] In our analysis we compared subject imports in the six months prior to the filing of the petition with those in the six months after the filing. As explained below, we also made additional comparisons in order to control for seasonal aspects of the market for R-134a.

In its final antidumping duty critical circumstances determination for R-134a from China, Commerce determined that critical circumstances existed for all producers/exporters of subject merchandise except for Sanmei Industry Chemical Company Ltd. when it is both the producer and exporter.[2] The volume of imports covered by the critical circumstances finding was *** percent higher in the six-month period after the filing of the petition as compared to the six-month period prior to the filing of the petition. Specifically, the volume increased from *** short tons in the pre-petition period to *** short tons in the post-petition period.[3] We also examined changes in inventory levels. Importer inventories were *** percent higher in September 2016 than in September 2015.[4] Thus, the surge of subject imports resulted in a combination of increased inventories of Chinese R-134a and lost market share by the domestic industry to subject imports in interim 2016.[5]

We recognize that demand for R-134a is seasonal for certain end-uses, with many automotive and stationary aftermarket firms stocking up in the first half of the year for use in the summer months.[6] Although some increase from the pre- to post-petition period may be expected due to this seasonal effect, a comparison of the same annual period between 2015 and 2016 also show very large increases. Specifically, subject imports more than doubled between interim 2015 and interim 2016.[7] As noted above, the inventory volume of subject

[1] For the relevant legal standards for the Commission's critical circumstances determination, please see section V of the Commission's Views. *See also, e.g., Certain Hot-Rolled Steel Flat Products from Australia, Brazil, Japan, Korea, the Netherlands, Turkey, and the United Kingdom,* Inv. Nos. 701-TA-545-547 and 731-TA-1291-1297 (Final), USITC Pub. 4638 at 47-48 (Sept. 2016) (same).

[2] *See* 82 Fed. Reg. 12193 (March 1, 2017).

[3] CR/PR at Table IV-4, as revised in INV-PP-038 (March 22, 2017).

[4] CR/PR at Table IV-5. U.S. importers' inventories of subject imports were *** short tons in September 2015 and were *** short tons in September 2016. The latter amount was equivalent to *** percent of apparent U.S. consumption in interim 2016. *See* CR/PR at Table IV-6 (82,303 short tons).

[5] CR/PR at Table IV-6.

[6] CR at II-16; PR at II-10.

[7] *See* EDIS Doc. Nos. 605745 and 604046 (monthly import quantities). We note that the Commission majority used a different period to account for seasonality. Their analysis of subject import volumes in March-August 2015 and March-August 2016 also shows that the subject imports increased following the filing of the petition, albeit to a lesser extent than when comparing the full interim data. Regardless of the period examined, the record shows that the increased volume of imports following the filing of the petition resulted in a significant increase in subject import inventories in September 2016 as compared to the prior year.

imports in September 2016 was also significantly larger than it was at the same time in the prior year. The month of September falls after the normal build-up period, which generally occurs prior to the summer months in anticipation of warmer weather. This increase in imports, along with the very large build-up of inventories between interim periods cited above, demonstrate that the growth in subject imports cannot be explained by any seasonal effect.

Rather, the increase in imports and inventories appears to reflect an effort by Chinese exporters to flood the U.S. market with low-priced R-134a. An importer testified that many new entrants were "hell bent" on gaining market share in the United States.[8] A significant importer, BMP, circulated weekly faxes to purchasers in 2016 touting a large supply of Chinese product at low prices, which likely had an impact on both the automotive and HVAC aftermarket.[9] Additionally, respondents explained the increase in subject import inventories by stating that the normal build-up was "was accelerated in 2016 because of the possibility that prohibitive ADD/CVD cash deposits would be required."[10] This has resulted in a large volume of low-priced R-134a from China already in the United States that will continue to supply the market without being subject to duties.

We conclude that the surge of imports subject to the antidumping duty critical circumstances determination that occurred between the filing of the petition and the imposition of provisional duties, as well as the corresponding increase in inventories, indicate that the imports subject to the determination are likely to undermine seriously the remedial effect of the antidumping duty order. Accordingly, we make an affirmative finding of critical circumstances with respect to such imports.

[8] Tr. at 173 (Ms. Dayton).

[9] Coalition's Prehearing Brief at Exhibit 5; Tr. at 167 (Ms. Dayton).

[10] Chinese Respondents' Prehearing Brief at 63.

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 the American HFC Coalition and its individual members (Amtrol, Inc., West Warwick, Rhode Island; Arkema, Inc. ("Arkema"), King of Prussia, Pennsylvania; The Chemours Company FC LLC ("Chemours"), Wilmington, Delaware; Honeywell International Inc. ("Honeywell"), Morristown, New Jersey; Hudson Technologies, Pearl River, New York; Mexichem Fluor Inc. ("Mexichem"), St. Gabriel, Louisiana; and Worthington Industries, Inc., Columbus, Ohio), as well as District Lodge 154 of the International Association of Machinists and Aerospace Workers, on March 3, 2016, 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 1,1,1,2 - tetrafluoroethane ("R-134a")[1] from China. The following tabulation provides information relating to the background of this investigation.[2] [3]

Effective date	Action
March 3, 2016	Petition filed with Commerce and the Commission; institution of Commission investigation (81 FR 12523, March 9, 2016)
April 1, 2016	Commerce's notice of initiation (81 FR 18830)
April 22, 2016	Commission's preliminary determination (81 FR 23750)
October 7, 2016	Commerce's preliminary determination (81 FR 69786); scheduling of final phase of Commission investigation (81 FR 78186, November 7, 2016)
December 1, 2016	Commerce's preliminary determination, amended (81 FR 86699)
March 1, 2017	Commerce's final determination (82 FR 12192)
February 23, 2017	Commission's hearing
March 23, 2017	Commission's vote
April 5, 2017	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 to this investigation.

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

[3] A list of witness appearing at the hearing is presented in appendix B of this report.

STATUTORY CRITERIA AND ORGANIZATION OF THE REPORT

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*

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

advanced version of the domestic like product, and (V) in {an antidumping investigation}, the magnitude of the margin of dumping.

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

R-134a is a single component refrigerant gas used in automotive air conditioning systems, stationary commercial air conditioning and refrigeration, as well as various other applications such as foam expansion and propellants. R-134a is part of a group of refrigerant gases (commonly referred to as "HFCs") that is subject to U.S. environmental regulations and international commitments that may affect demand, sales, distribution, and disposal of R-134a.[6] Currently, three firms produce R-134a in the United States: Arkema, Chemours, and

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

[6] U.S. producers reported that from January 1, 2013 to September 2016, no restrictions were in effect on the production or distribution of R-134a in the United States. The most recent environmental regulation aimed at reducing global HFC consumption is the Kigali Amendment to the Montreal Protocol, signed by the United States in October 2016. The Kigali Amendment includes a cap and phase down of HFCs (including R-134a) in the United States starting in 2019. In the United States, the Environmental Protection Agency ("EPA") has regulated R-134a through two Significant New Alternatives Policy ("SNAP") regulations issued in 2015 and 2016, making R-134a unacceptable for use in certain applications such as OEM automotive air conditioning as of model year 2021 vehicles and aerosol applications in 2016; but no restriction for the use of R-134a in automotive or stationary air conditioning aftermarkets. Several responding U.S. importers have reported that the sale and

(*continued*...)

Mexichem. Leading producers of R-134a in China include Zhejiang Quhua Fluor-Chemistry Co. Ltd. ("Juhua"), Zhejiang Sanmei Chemical Industry Co. Ltd. ("Sanmei"), and Sinochem Environment Protection Chemicals (Taicang) Co. Ltd. ("Sinochem Tiacang"), and the leading U.S. importers of R-134a from China are ***. According to questionnaire responses, the leading importers of R-134a from nonsubject countries (primarily India, Taiwan, and the United Kingdom) are *** and ***. U.S. purchasers of R-134a include distributors and repackagers in the automotive and stationary aftermarkets; retailers in the automotive aftermarket; and automotive and other OEMs. Leading purchasers, in order of quantity of purchases from U.S. producers and importers, include ***.

Apparent U.S. consumption of R-134a totaled approximately 70,454 short tons ($279.7 million) in 2015. U.S. producers' U.S. shipments of R-134a totaled 53,890 short tons ($220.9 million) in 2015, and accounted for 76.5 percent of apparent U.S. consumption by quantity and 79.0 percent by value. U.S. imports from China totaled 15,429 short tons ($50.8 million) in 2015 and accounted for 21.9 percent of apparent U.S. consumption by quantity and 18.1 percent by value. U.S. imports from nonsubject sources totaled 1,135 short tons ($8.1 million) in 2015 and accounted for 1.6 percent of apparent U.S. consumption by quantity and 2.9 percent by value.

SUMMARY DATA AND DATA SOURCES

A summary of data collected in this investigation is presented in appendix C, table C-1. Appendix D presents responses by U.S. producers, importers, and purchasers on the effects of regulatory changes on production and demand of R-134a and development of replacement and substitutes for R-134a. Appendix E presents detailed data on U.S. producers and importers' U.S. shipments of R-134a by each application type. U.S. industry data are based on questionnaire responses of three firms that accounted for all U.S. production of R-134a during 2015, supplemented with data from Honeywell for U.S. shipments and pricing.[7] Data for U.S. imports are compiled from both official Commerce statistics for HTS statistical reporting number 2903.39.2020 and imports of R-134a reported in questionnaire responses under all other HTS categories (adjusted with proprietary Customs data for 2013).[8] Thirty-three usable U.S. importer responses were received, representing 94.7 percent of U.S. imports from China in

(…*continued*)
distribution of R-134a are being restricted starting in 2017. See appendix D for the responses by U.S. producers, importers, and purchasers on the environmental regulations impacting R-134a.

[7] Honeywell is not a U.S. producer of R-134a ***.

[8] In 2013, six out of 33 responding U.S. importers *** reported importing R-134a from China using two other statistical reporting numbers (2903.39.2030 and 2903.39.2050). In 2014, three U.S. importers *** reported importing R-134a from China using two other statistical reporting numbers (2903.39.2030 and 2903.39.2050). In 2015, one responding U.S. importer *** reported importing *** of R-134a from China using one other statistical reporting number (2903.39.2050). In January-September 2016, no responding U.S. importer reported imports of R-134a from China using other statistical reporting numbers. From 2013 to September 2016, no responding U.S. importer reported imports of R-134a using other statistical reporting numbers non-Chinese sources.

2015.[9] Foreign industry data are based on questionnaire responses of six Chinese producers and two Chinese exporters of R-134a. These firms' exports to the United States exceeded U.S. imports of R-134a from China in 2015.[10] According to estimates requested of the responding Chinese producers, the production of R-134a in China reported in *Part VII* of the report accounts for approximately 73.8 percent of overall production of R-134a in China.

PREVIOUS AND RELATED INVESTIGATIONS

R-134a has been subject to several proceedings before the Commission. On December 31, 2007, the Commission instituted a section 337 investigation concerning the manufacturing of R-134a, based on a complaint filed by INEOS Fluor Holdings Ltd.[11] against Sinochem.[12] The complaint alleged violations of section 337 by reason of infringement of various process patents used in the manufacture of R-134a. On December 1, 2008, the Administrative Law Judge determined that Sinochem had violated section 337, but the Commission remanded on the issue of obviousness. On June 1, 2009, the Commission determined to review the remand determination and reversed the Judge's conclusion of nonobviousness, finding that the remaining asserted claim would have been obvious to one of ordinary skill in the art and was therefore invalid. With its finding of no violation, the Commission terminated the investigation on August 10, 2009.[13]

In October 2013, Mexichem filed antidumping and countervailing duty petitions with the Commission and Commerce concerning R-134a from China. In October 2014, Commerce found that such imports were subsidized by the government of China, at rates ranging from 1.87 percent to 22.75 percent,[14] and were being sold at less than fair value, at a margin of 280.67 percent.[15] However, the Commission found that such imports did not cause or threaten to

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[9] Coverage was calculated from responding U.S. importers' reported quantity of imports imported under statistical reporting number 2903.39.2020 (*** short tons) compared with official import statistics (15,429 short tons).

[10] Coverage was calculated from responding producers/exporters in China's reported quantity of exports to the United States (12,658 short tons from six Chinese producers as well as *** short tons from two Chinese exporters) compared with official import statistics (15,426 short tons).

[11] In April 2010, INEOS Fluor Holdings, Ltd. sold its refrigerant business to Mexichem.

[12] *In the Matter of Certain R-134a Coolant (Otherwise Known as 1,1,1,2—Tetrafluoroethane)*, USITC Publication No. 4150 (December 2010).

[13] *In the Matter of Certain R–134a Coolant (Otherwise Known as 1,1,1,2-Tetrafluoroethane); Notice of Commission Determination To Reverse the Remand Determination of the Presiding Administrative Law Judge and To Terminate the Investigation in Its Entirety With a Finding of No Violation*, 74 FR 39968, August 10, 2009.

[14] *Countervailing Duty Investigation of 1,1,1,2 Tetrafluoroethane from the People's Republic of China: Final Affirmative Countervailing Duty Determination*, 79 FR 62594, October 20, 2014.

[15] Commerce also found that critical circumstances exist with respect to imports of R-134a from China by Bluestar, non-individually examined companies, and the PRC-wide entity. *1,1,1,2-*

(*continued*...)

cause material injury to the domestic industry at its meeting on November 12, 2014[16] and published its determinations in the *Federal Register* on December 9, 2014.[17] The Commission's negative determinations were appealed to the Court of International Trade. On June 6, 2016, the Court of International Trade affirmed the Commission's 2014 final negative material injury determinations and negative threat of injury determinations concerning imports of R-134a from China.[18]

Additionally, in 2015, the American HFC Coalition filed an antidumping duty petition covering Hydrofluorocarbon Blends and Components Thereof from China ("HFC"). The scope of the HFC investigation did not include R-134a when imported as a stand-alone component (*i.e.*, unblended), but it did include R-134a that is incorporated within three of the five HFC blends prior to importation.[19] Thus, imports of R-404A, R-407A, or R-407C that include R-134a in a blend with other single-component HFCs were subject to the scope of the HFC investigation. In June 2016, Commerce found that HFC blends and components were being sold at less than fair value, with margins ranging from 101.82 percent to 216.37 percent.[20] In August 2016, the Commission determined that an industry in the United States was materially injured by reason of imports of HFC blends from China. The Commission further determined that a U.S. industry was not materially injured or threatened with material injury by reason of imports of HFC components from China.[21] Effective August 19, 2016, Commerce issued an antidumping duty order on HFC blends, but not on HFC components from China.[22] Petitioners Arkema, Chemours, and Honeywell appealed the Commission's negative determination on HFC components (R-32, R-125, and R-143a) to the U.S. Court of International Trade. Their appeal, *Arkema, Inc., v. United States*, Court No. 16-179, on HFC components is currently pending before the court.

(…*continued*)
Tetrafluroethane from the People's Republic of China: Final Determination of Sales at Less Than Fair Value, 79 FR 62597, October 20, 2014.

[16] *USITC news release*, https://www.usitc.gov/press_room/news_release/2014/er1112ll233.htm, retrieved March 13, 2017.

[17] *1,1,1,2-Tetrafluoroethane from China: Determinations*, 70 FR 73102, December 9, 2014.

[18] Mexichem Fluor Inc. v. United States, 179 F.Supp.3d 1238 (2016).

[19] Ibid.

[20] *Hydrofluorocarbon Blends and Components Thereof from the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Final Affirmative Determination of Critical Circumstances*, 81 FR 42314, June 29, 2016.

[21] *Hydrofluorocarbon Blends and Components from China: Determination*, 81 FR 53157, August 11, 2016.

[22] *Hydrofluorocarbon Blends from the People's Republic of China: Antidumping Duty Order*, 81 FR 55436, August 19, 2016.

NATURE AND EXTENT OF SALES AT LTFV

On March 1, 2017, Commerce published a notice in the *Federal Register* of its final determination of sales at LTFV with respect to imports from China.[23] Table I-1 presents Commerce's dumping margins with respect to imports of R-134a from China.

Table I-1
R-134a: Commerce's final weighted-average LTFV margins, amended, with respect to imports from China

Exporter	Producer	Final dumping margin (*percent*)
Zhejiang Sanmei Chemical Industry Co., Ltd.	Zhejiang Sanmei Chemical Industry Co., Ltd. and Jiangsu Sanmei Chemicals Co., Ltd.	148.79
Jiangsu Bluestar Green Technology Co., Ltd.	Jiangsu Bluestar Green Technology Co., Ltd.	148.79
T.T. International Co., Ltd.	Electrochemical Factory of Zhejiang Juhua Co., Ltd.	148.79
T.T. International Co., Ltd.	Sinochem Environmental Protection Chemicals (Taicang) Co., Ltd.	148.79
T.T. International Co., Ltd.	Zhejiang Quzhou Lianzhou Refrigerants Co., Ltd.	148.79
T.T. International Co., Ltd.	Zhejiang Sanmei Chemical Ind. Co., Ltd	148.79
T.T. International Co., Ltd.	Zhejiang Zhonglan Refrigeration Technology Co., Ltd.	148.79
Weitron International Refrigeration Equipment Co., Ltd.	Sinochem Environmental Protection Chemicals (Taicang) Co., Ltd.	148.79
Weitron International Refrigeration Equipment Co., Ltd.	Weitron International Refrigeration Equipment Co., Ltd.	148.79
Weitron International Refrigeration Equipment Co., Ltd.	Zhejiang Organic Fluor-Chemistry Plant, Zhejiang Juhua Co., Ltd.	148.79
Weitron International Refrigeration Equipment Co., Ltd.	Zhejiang Quhua Fluor-Chemistry Co., Ltd.	148.79
Weitron International Refrigeration Equipment Co., Ltd.	Zhejiang Quhua Juxin Fluorochemical Industry Co., Ltd.	148.79
Weitron International Refrigeration Equipment Co., Ltd.	Zhejiang Sanmei Chemical Industry Co., Ltd.	148.79
All others		167.02

Source: 82 FR 12192, March 1, 2017.

[23] *1,1,1,2 Tetrafluoroethane (R-134a) from the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Affirmative Determination of Critical Circumstances, in Part*, 82 FR 12192, March 1, 2017.

THE SUBJECT MERCHANDISE

Commerce's scope

Commerce has defined the scope of this investigation as follows:[24]

The product subject to this investigation is 1,1,1,2-Tetrafluoroethane, R-134a, or its chemical equivalent, regardless of form, type, or purity level. The chemical formula for 1,1,1,2-Tetrafluoroethane is CF_3-CH_2F, and the Chemical Abstracts Service registry number is CAS 811-97-2.[25]

Merchandise covered by the scope of this investigation is currently classified in the Harmonized Tariff Schedule of the United States ("HTSUS") at subheading 2903.39.2020. Although the HTSUS subheading and CAS registry number are provided for convenience and customs purposes, the written description of the scope is dispositive.

Tariff treatment

Information available to the Commission indicates that the merchandise subject to this investigation is imported under statistical reporting number 2903.39.2020 of the Harmonized Tariff Schedule of the United States ("HTS"). The 2016 general rate of duty for subheading 2903.39.20 (a residual or "basket" tariff category for fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons) is 3.7 percent ad valorem. Decisions on the tariff classification and treatment of imported goods are within the authority of U.S. Customs and Border Protection.

While this subheading is an *eo nomine* product category created in 2009 that includes only the subject merchandise, petitioners contend that some U.S. imports of R-134a may have entered the United States in 2013 and 2014 misreported under incorrect statistical reporting

[24] *1,1,1,2 Tetrafluoroethane (R-134a) from the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Affirmative Determination of Critical Circumstances, in Part*, 82 FR 12192, March 1, 2017.

[25] 1,1,1,2-Tetrafluoroethane is sold under a number of trade names including Klea 134a and Zephex 134a (Mexichem Fluor); Genetron 134a (Honeywell); Freon™ 134a, Suva 134a, Dymel 134a, and Dymel P134a (Chemours); Solkane 134a (Solvay); and Forane 134a (Arkema). Generically, 1,1,1,2-Tetrafluoroethane has been sold as Fluorocarbon 134a, R-134a, HFC-134a, HF A-134a, Refrigerant 134a, and UN3159.

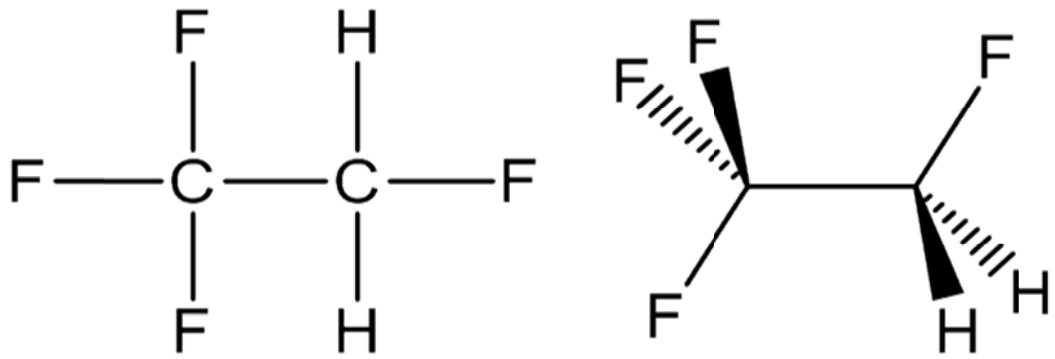
numbers.[26] Respondents noted that over time, misreporting gets corrected and occurs less frequently than in the past.[27]

THE PRODUCT[28]

Manufacturing processes

The subject product is 1,1,1,2-tetrafluoroethane (a.k.a. HFC-134a or R-134a). It is a clear, colorless liquid or gas, which is gaseous at normal atmospheric conditions. It has a boiling point of -15° F and a freezing point of -153° F. It is relatively nontoxic and nonflammable. As can be seen in figure I-1 below, it is composed of two carbon atoms, two hydrogen atoms and four fluorine atoms.

Figure I-1
R-134a: Structure



Source: http://www.chm.bris.ac.uk/motm/hfc134/hfch.htm.

There are multiple methods used to produce R-134a. Generally, they involve reacting hydrogen fluoride (HF) with a compound containing carbon and chlorine. The fluorine replaces the chlorine. The reaction with hydrogen fluoride may have to be repeated multiple times to

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[26] *1,1,1,2-Tetrafluoroethane (R-134a) from China, Inv. No. 731-TA-1313 (Preliminary*), Publication 4606, April 2016, p. I-6.

[27] Ibid. The current HTS statistical reporting number was created in 2009. Prior to 2009, R-134a was classified under HTS 2903.39.2050, which was a broader "other" category that included other fluorinated hydrocarbons. In the current proceeding, four out of 33 responding U.S. importers used statistical reporting numbers 2903.39.2030 and 2903.39.2050 for imports of R-134a in 2013 and 2014. No responding U.S. importer reported imports of R-134a using other statistical reporting in 2015 or in interim January-September 2016.

[28] Unless otherwise noted, information in this section is from *1,1,1,2-Tetrafluoroethane (R-134a) from China, Inv. No. 731-TA-1313 (Preliminary*), Publication 4606, April 2016, pp. I-6 to I-19, and *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, pp. I-8 to I-15.

reach the desired end product. Generally, a fluorocarbon plant is designed to make one compound and cannot be used to make a different compound in response to changing market conditions.[29]

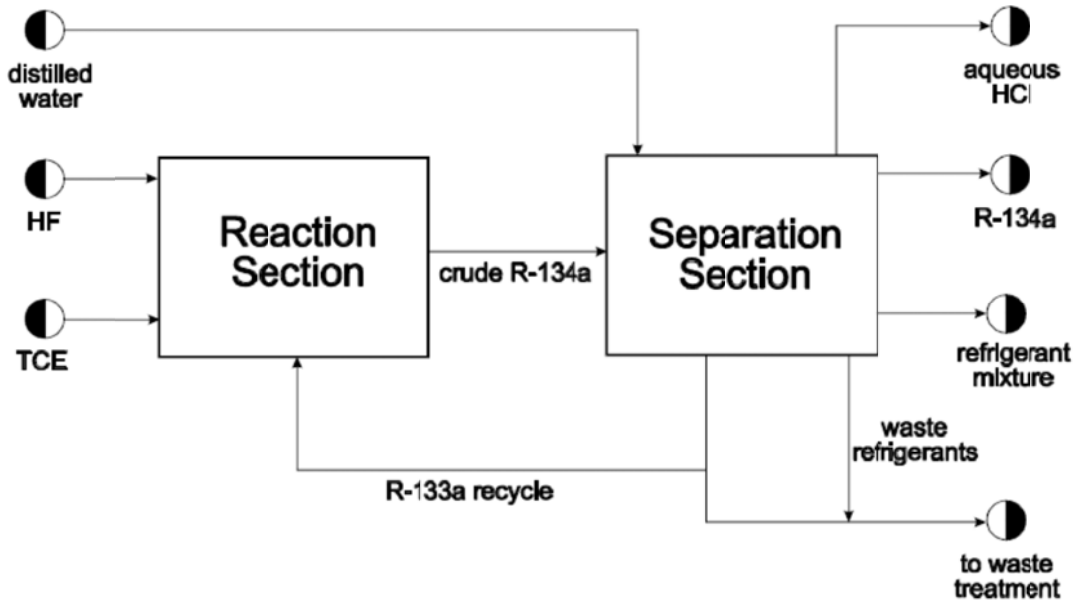
Mexichem uses a two-stage process. Its first stage involves an exothermic, vapor phase reaction of trichloroethylene (TCE) with hydrogen fluoride (HF) over a chromium-based catalyst to produce 1-chloro-2,2,2-trifluoroethane (R-133a). The second stage is an endothermic, vapor phase reaction of R-133a with HF over a chromium-based catalyst again to produce HFC-134a.[30] HFC-134a is separated out of the recycle stream by distillation. Hydrochloric acid (HCl), the byproduct of the reactions, has to be either disposed of or sold on the market. [31]

Mexichem's production process is expressed by the following series of reaction equations and illustrated in figure I-2 that follows:

$$3\ HF + TCE\ (HC_2Cl_3) \rightarrow R-133a\ (H_2C_2ClF_3) + 2\ HCl$$

$$R-133a\ (H_2C_2ClF_3) + HF \rightarrow R-134a\ (H_2C_2F_4) + HCl$$

Figure I-2
R-134a: Production process



Source: *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. I-9.

[29] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-8.

[30] In an exothermic reaction, heat is given off when the inputs combine to make the resultant molecule. By contrast, an endothermic reaction requires heat (energy) as an input for the reaction to occur, i.e., the inputs absorb heat (energy) when producing the resultant molecule.

[31] Conference transcript, p. 24 (Pacillo). Chemours uses a *** to manufacture HFC-134a. *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-8.

Fluorspar, one of the primary inputs to HF (hydrofluoric acid), which is a necessary input to most processes for producing R-134a, is distributed throughout the world. The bulk of the identified reserves are in South Africa (17 percent), Mexico (13 percent), China (10 percent), and Mongolia (9 percent). However, two countries, China and Mexico, combined, accounted for over 75 percent of global production in 2014 and 2015. China accounted for 59 percent and 61 percent of global production in 2014 and 2015, respectively. Mexico produced 17-18 percent of global production in each of those years.[32]

Description and applications

Physical characteristics of refrigerants

Refrigerants need to have a number of specific properties to be used in their various applications. Boiling point and vapor pressure are two such properties essential for their functionality.[33] Any compound used on a mass commercial scale also needs to be noncorrosive to minimize equipment maintenance costs. Safety concerns require other properties such as being nonflammable and nontoxic.

Early refrigeration systems used compounds such as ammonia, methyl chloride or sulfur dioxide. Given that these compounds were either highly flammable or toxic, alternatives were sought for them early in the twentieth century.[34] In 1931, a joint venture between DuPont and General Motors discovered an economical method to produce chlorofluorocarbons (CFCs). These CFCs had good refrigerant properties and were neither flammable nor toxic, in most uses. One of the most commonly used CFCs was R-12 (dichlorodifluoromethane).[35] For half a century these CFCs were used extensively as they were relatively safe, inexpensive, and effective. As environmental concerns became more important, CFCs such as R-12 have been replaced by hydrofluorocarbons (HFCs), including R-134a.[36]

Fluorinated, organic (i.e., carbon-containing) compounds that are related to R-134a are classified into three groups: chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and

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[32] U.S. Geological Survey, Mineral Commodity Summaries, Fluorspar, January 2016.

[33] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-9.

[34] Ammonia is still used in many food industry applications because it is a very efficient refrigerant. It is also being developed further because it is a naturally occurring compound that has no negative effect on the environment.

[35] The common term "freon" is the trade name for DuPont's line of CFC refrigerants. *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-10.

[36] "In roughly 1994, R12 refrigerant was phased out due to the environmental regulations, and then all vehicles began using 134a." *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-10.

hydrofluorocarbons (HFCs). Almost all of these compounds are man-made as fewer than a dozen fluorinated, organic compounds occur in nature.[37]

CFCs, which contain only chlorine, fluorine, and carbon atoms, have an excellent combination of physical properties such as a low boiling point and a low vapor pressure to make them ideal for many refrigerant applications. These compounds are nonreactive, nontoxic, and nonflammable. The lack of reactivity means that the compound is stable and noncorrosive. While these characteristics are desirable when the compound is being used as a refrigerant or a propellant, the stability contributes to the compound's effect on the ozone layer as it rises into the stratosphere.

HCFCs contain hydrogen atoms in addition to the chlorine, fluorine, and carbon atoms. Hydrogen atoms may be introduced into the CFC structure to lower the chlorine content (to reduce the impact on the ozone layer). The HCFCs (and HFCs) have shorter lifecycles in the lower atmosphere so they are less likely to reach the stratosphere and damage the ozone. However, introducing a hydrogen atom into a one-carbon CFC lowers the boiling point, which is too low for some applications. Therefore, two- and three-carbon HCFCs are more attractive substitutes. Another drawback of replacing chlorine with hydrogen is that flammability increases as the hydrogen content increases.[38]

HFCs have completely replaced the chlorine atoms with either fluorine or hydrogen. These compounds still retain enough of the desirable properties (nontoxic, nonflammable, nonreactive, low boiling point, and low vapor pressure) while eliminating the effect on the ozone layer.

Flammability

Flammability is a significant safety concern for a refrigerant. Potential fires, whether inside a closed system (which might then explode) or outside the system when the refrigerant leaks, would require the system and the area around it to be modified substantially. Systems made strong enough to contain any pressure build up from an internal fire would be more expensive. Systems that ensure zero refrigerant leakage are also more expensive and would still require significant fire suppression gear in case of failure.[39]

Toxicity

The problems caused by toxicity are similar to those for flammability. The cost of designing and installing a system that has zero leakage would be prohibitive. Additional monitors would be required to check for any incidental leakage. Also, the cost of health monitoring or potential liability would have to be added to the cost of the system.

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[37] *Fluorine Compounds, Organic*. Kirk-Othmer Encyclopedia of Chemical Technology (2004), vol. 11, p. 858.

[38] *Fluorine Compounds, Organic*. Kirk-Othmer Encyclopedia of Chemical Technology (2004), vol. 11, p. 859.

[39] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-11.

Vapor pressure

An ideal refrigerant would have a low vapor pressure. The higher the vapor pressure, the stronger the equipment required to contain it. The stronger, heavier equipment would cost more initially and, for portable air conditioning systems like those on automobiles, would increase the operating costs, too. Installing a heavier air conditioning system would be counter to numerous recent moves to improve vehicle fuel efficiency.[40]

Form (liquid vs. gas)

The physical form of the refrigerant determines the design and operation of the system. Many systems combine liquid and gas components to take advantage of the phase transformation to transfer a significant amount of energy without requiring a large temperature swing in the refrigerant.

Nomenclature and classification conventions

The designation R-134a follows the naming convention for refrigerants: the "R" implies that it is a refrigerant and the numbers and their positions identify the chemical composition. In this case, the "4" indicates that there are four fluorine atoms; the "3" shows that the compound contains two hydrogen atoms; and the "1" means that there are two carbon atoms. The hydrogen digit is one more than the number of hydrogen atoms in the compound; the carbon digit is one less than the number of carbon atoms.[41] The "a" specifies a certain isomer of this compound. All 400 and 500 series refrigerants (R-4xx and R-5xx) are blends.

The safety classification of compounds follows a convention prescribed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers ("ASHRAE") and the International Institute of Refrigeration ("IIFIIR"). Under this convention the toxicity of the compound is designated by the letter "A" or "B." "A" compounds are less toxic; "B" compounds are more toxic.[42]

Flammability of refrigerants follows a similar designation, this time using the numbers 1 through 3. The refrigerants increase in flammability as the number increases.[43] R-134a has a safety classification of "A1," which means that it is relatively nontoxic and nonflammable.[44]

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[40] Ibid.

[41] International Institute for Refrigeration, "Classification of Refrigerants," pp. 1-2.

[42] Class "A" refrigerants have no or unidentified toxicity at concentrations at or below 400ppm. Class "B" refrigerants have been identified as toxic at concentrations below 400ppm. International Institute for Refrigeration, "Classification of Refrigerants," p. 2.

[43] Class 1 refrigerants do not "propagate flame" at standard room temperature and pressure. Class 2 refrigerants have a flammability limit of at least 0.10 kg/cubic meter at standard room temperature and pressure and have a heat of combustion of less than 19 kJ/kg. Class 3 refrigerants are even more flammable. International Institute for Refrigeration, "Classification of Refrigerants," p. 3.

[44] International Institute for Refrigeration, "Classification of Refrigerants," Annex.

Environmental concerns have caused a transition away from the CFCs and their collection of excellent properties to alternatives with less ideal properties. As more of the halogens (chlorine and fluorine) have been replaced in these refrigerants, it has become more difficult for producers to find the right collection of properties in a single compound. Thus, the industry has combined different compounds into blends to get the essential or desired properties for the given application. For example, one refrigerant might have the ideal vapor pressure while another has the ideal boiling point. When combined, their performance might suffer some, but the blend is able to meet the overall performance requirements for the specific application.[45] In some cases the blend may have superior properties to either of the component refrigerants.

Refrigerant applications

There are numerous applications for refrigerants including automotive air conditioning, appliances, small stationary equipment, medium temperature supermarket cases, and industrial and commercial chillers.[46] Multiple refrigerants could potentially be used for each of these applications; however, cost effectiveness appears to be the primary factor in determining the refrigerant used in each application.[47]

Generally, the refrigerant and system are chosen together. Using a different refrigerant would reduce the unit's efficiency if not render it non-functional, or require altering multiple system components to accommodate the new refrigerant in order to make the system as effective as with the intended refrigerant.[48]

Automotive air conditioning

Automotive air conditioning is the primary use for R-134a.[49] Within the automotive air conditioning sector there are two sub-categories of end users: (1) the original equipment manufacturers ("OEMs") (automobile manufacturers) and (2) the automotive aftermarket which includes automobile repair shops, dealerships, and auto retail stores.

Approximately 95 percent of all vehicles on the road in the United States use R-134a[50] and their systems cannot use another refrigerant. The cost of replacing the entire air

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[45] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, pp. I-12-13.

[46] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-13. DuPont, Technical Information Brochure, "DuPont HFC-134a: Properties, Uses, Storage, and Handling."

[47] Ibid.

[48] Conference transcript, pp. 73-74 (Geosits and Sassano).

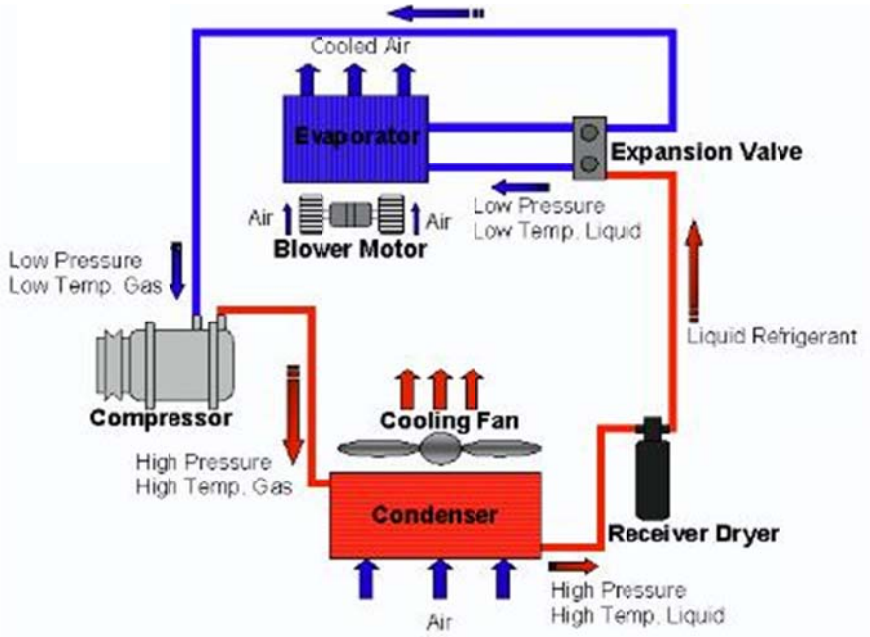
[49] Since 2004, new vehicles produced in the United States use R-134a, with OEMs such as GM, Ford, and Toyota purchasing the R-134a in bulk railcars. Hearing transcript, p. 32 (Buterbaugh). Starting in model year 2013, some new vehicles produced in the United States started using R-1234yf ("HFO-1234yf" or "1234yf") as the refrigerant.

[50] Hearing transcript, p. 32 (Geosits).

conditioning system on existing vehicles would be prohibitively expensive.[51] Therefore, some demand for R-134a in the aftermarket will continue after another refrigerant becomes the standard in new automotive air conditioning units. The United States is scheduled to transition to the next generation of refrigerants by 2021.[52] The EU has banned, effective January 2017, the sale and registration of new vehicles that use air conditioning refrigerants with a global warming potential (GWP) of greater than 150, including R-134a. [53]

Figure I-2 illustrates how a car air conditioning unit works. The diagram lists the relative temperature and phase of the refrigerant as it travels through the system. A refrigeration system will generally have four main components: a compressor, a condenser, an expansion valve, and an evaporator.

Figure I-2
R-134a: Car air conditioning system



Source: *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. I-14.

The compressor is a pump that draws the refrigerant gas from the evaporator to maintain the desired low temperature and pressure in the evaporator. The compressor increases not only the pressure but also the temperature of the refrigerant gas. The increased

[51] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-13.

[52] Petition, pp. 13-14. Conference transcript, pp. 36, 53-54 (Sassano).

[53] "The mobile air-conditioning systems MACs," European Commission, http://ec.europa.eu/growth/sectors/automotive/environment-protection/mobile-air-conditioning-systems_en, accessed January 25, 2017.

pressure drives the refrigerant flow through the system. The increased temperature ensures that the refrigerant is at a higher temperature than the air passing over the condenser to allow energy to be removed from the system.

The condenser is generally a set of many small, thin-walled pipes where the air conditioning unit transfers energy (heat) from the system to the heat sink (the outside air). The cooler outside air takes away enough energy for the refrigerant gas to condense into a liquid. The phase transformation allows a large amount of energy to be transferred even though the temperature change of the refrigerant may not be that great.

The expansion valve reduces the refrigerant pressure and regulates the liquid–refrigerant flow to the evaporator. The lower pressure allows the refrigerant to boil at a lower temperature. The valve is designed to adjust the amount of refrigerant flowing into the evaporator to correspond to the amount of heat being removed from the refrigerated space.

The evaporator captures or absorbs heat from the car interior. A fan blows air from inside the car over a set of thin-walled coils, which have cool refrigerant liquid entering them. The hotter air boils the low-pressure refrigerant inside the coils, transferring heat from inside the car to the refrigerant. Again, the phase transformation allows a considerable amount of energy to be transferred even though the refrigerant temperature may change only slightly.[54]

R-134a for use in the automobile aftermarket, typically sold in 12-ounce cans by retailers like AutoZone,[55] may include additives to perform functions such as: stop leaks in hoses, o-rings and gaskets; prevent wear and extend the life of older or high-usage air conditioning systems; condition seals; detect leaks (UV); eliminate moisture and acid; and improve cooling performance.[56] The additives are typically a lubricant (polyalkylene glycol) and a sealant (bentonite clay) which are available globally.[57] These R-134a with additives are sold by

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[54] *Refrigeration*. Kirk-Othmer Encyclopedia of Chemical Technology (2006), vol. 21, pp. 11-15.

[55] AutoZone's witness testified at the hearing that "65 percent of {its} R-134a business consists of R-134a with additives, which has been and continues to be sourced domestically, simply because there's no other source for these products outside the U.S." Hearing transcript, pp. 125-126 (Lammers). ***. HFC Coalition's posthearing brief argues that the statement that R-134a with additives are "sourced domestically" is misleading. It notes that "repackers either purchase domestic R-134a or import R-134a from China, mix in a particular additive, and repackage the product in retail containers. The finished products purchased by AutoZone are not truly domestic," showing an example of a 12-ounce can of A/C Pro sold at AutoZone marked "Assembled in U.S.A. from components of U.S.A. and China." HFC Coalition's posthearing brief, exh. 1-46 and exh. 14.

[56] HFC Coalition's posthearing brief, exh. 1-46 and ***.

[57] ***. Polyalkylene glycols, a family of polymers that were invented over 60 years ago, are produced globally with most production in Asia, particularly China. "Polyalkylene Glycols," *Chemical Economics Handbook,* 13 January 2017, pp. 4-5 and "Polyalkylene glycols: Present and future applications," *Tribology & Lubrication Technology*, June 2013, pp. 34-9. Bentonite includes any natural material composed mainly of clay minerals. Bentonite is produced globally, but production in 2016 was concentrated in the United States and China. *Wyoming Bentonite, Summary Report*, September 2014, Wyoming State Geological Survey and "Clays," U.S. Geological Survey, *Mineral Commodity Summaries*, January 2017.

repackers ***.[58] The brand names of these R-134a with additives include A/C Pro with Qwik Boost®, Arctic Freeze, and EZ Chill.

Domestic refrigeration

R-134a may also be used in household appliances such as refrigerators, freezers, and dehumidifiers. Residential central air conditioning systems, however, generally do not use R-134a. Older residential air conditioning systems, both central and wall units, generally use R-22 and newer systems use R-410A.[59]

Commercial refrigeration

R-134a may also be used in large, self-contained commercial refrigeration systems such as supermarket display cases and freezers as well as large air conditioning systems in office buildings, stores, and airports.[60] R-134a may also be used in refrigeration systems for commercial food storage as well as in transport refrigeration systems in trucks, trains, or ships.

Propellant and pharmaceutical applications

In addition to its primary use as a refrigerant, R-134a is used as a propellant in various applications such as aerosol cans, foam-blowing of building insulation, and pharmaceutical uses like asthma inhalers.[61] The nontoxicity, nonflammability, or other physical properties of the subject product make it preferable to alternatives in these applications.[62] The product needs to be nontoxic when it is being used as a blowing agent in an open environment and nonflammable if it is being used near, or to clean, energized electronic circuits. R-134a is used to deliver pharmaceuticals into the lungs via metered dose inhalers in order to treat chronic obstructive pulmonary disease (COPD) and asthma.[63] R-134a for use in pharmaceutical products has to be further purified than standard R-134a and requires chain of custody documentation.

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[58] ***.

[59] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-15.

[60] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-15. Blends such as R-404A are also frequently used in supermarket refrigeration. *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-15.

[61] Petition, p. 14.

[62] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-15.

[63] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-15.

U.S. shipment data of R-134a by application

Table I-2 presents the major end use applications of fluorocarbons including R-134a and similar refrigerants.[64]

Table I-2
R-134a: Major applications of fluorocarbons or refrigerants, by application

Major applications	Major fluorocarbons or refrigerants
Refrigeration:	**HFC-134a**
	Recycled HCFC-22
Automobile air conditioning	HFC-32
Home/commercial air conditioning	HFC-125
Industrial plant cooling and processing	HFC-143a
Retail store chilled and frozen foods	Recycled CFCs
Home refrigerators and freezers	Refrigerant Blends (e.g., R-410A, R-404A)
Refrigerated transport	HFO-1234yf
	Ammonia
	Carbon dioxide (R-744)
Foam blowing:	**HFC-134a**
	HFC-245fa
Insulation for appliances and buildings	HFC-365mfc
Packaging foams, thermal containers	HFO-1234ze
Electronics:	HFC-116
	HFC-14
Gases, etching, solvent cleaning	HFC-23
	Carbon dioxide (R-744)
Chemical inputs:	HCFC-22
	HCFC-142b
For fluoropolymers/fluoroelastomers	HFC-152a
Propellants:	HFC-227ea
	HFC-152a
Personal care and commercial products	**HFC-134a**
Metered-dose inhalers	Carbon dioxide (R-744)
Fire extinguishing:	HFC-227ea
	HFC-23
	HFC-236fa

Source: Aida Jebens, et al., "CEH Marketing Research Report: Fluorocarbons," 543.7000, February 2014.

[64] Data provided by U.S. producers and U.S. importers which show reported U.S. shipments categorized by end use application is presented in *Part IV*.

The regulatory history of automotive refrigerants

R-12 "FREON"

Prior to the 1930's, refrigeration systems commonly used ammonia and sulfur dioxide as refrigerants, both of which are toxic and flammable. Chloroflurocarbons (CFC's) were developed as a safer alternative and widely used in all refrigeration systems. The most common CFC was R-12 and was marketed under the DuPont trademark, "Freon™." R-12 was used for decades as the refrigerant in home and automobile air conditioning systems and in aerosol can production.

Montreal Protocol

In 1985, the discovery of a hole in the Earth's ozone layer led to an international environmental agreement to reduce substances with high ozone depleting potential ("ODP").[65] This international agreement, the Montreal Protocol on Substances that Deplete the Ozone Layer ("Montreal Protocol"), entered into force in 1989 and has been ratified by 197 nations, including the United States, Japan, China, and the European Union.[66] Among those substances deemed with a high ODP was all CFC's, including R-12 refrigerants. The Montreal Protocol began to schedule the worldwide phase-out of the production and use of ozone-depleting CFCs. A later amendment to the Montreal Protocol accelerated the phase-out of Class I substances, which included CFCs (including R-12), to the end of 1995.[67] The Montreal Protocol is incorporated into U.S. law through Title VI of the Clean Air Act, which is implemented by U.S. Environmental Protection Agency ("EPA") regulations.[68]

The EPA, pursuant to Section 612(c) of the Clean Air Act, is authorized to identify and publish lists of acceptable and unacceptable substitutes for class I or class II ozone-depleting

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[65] The ODP of a chemical compound is the relative amount of degradation to the ozone layer it can cause, with trichlorofluoromethane (R-11 or CFC-11) being fixed at an ODP of 1.0, which is the maximum ODP of Class I and II substances with the exception of halons. R-12 has an ODP of 1.0 whereas R-134a has an ODP of 0.

[66] The list of signatories may be found at: http://ozone.unep.org/new_site/en/treaty_ratification_status.php, retrieved February 8, 2017.

[67] The Montreal Protocol included two phase-out deadlines, one for Class I substances and the other for Class II substances. Class I substances are defined as chemicals with an ozone-depletion potential of 0.2 or higher and include: CFCs, halons, carbon tetrachloride, and methyl chloroform, HBFCs, and methyl bromide. Class II substances are chemicals with an ozone-depletion potential of less than 0.2 and include all HCFCs, which includes R-22 a popular refrigerant for home air conditioning units. By January 1, 2020, the U.S. is required to reduce its consumption of Class II substances by 99.5 percent below the U.S. baseline and chemical manufacturers will no longer be able to produce R-22 to service existing air conditioners and heat pumps.

[68] https://www.epa.gov/clean-air-act-overview/clean-air-act-text, https://www.epa.gov/clean-air-act-overview/clean-air-act-title-vi-stratospheric-ozone-protection, and https://www.epa.gov/sites/production/files/2015-11/documents/the_clean_air_act_-_highlights_of_the_1990_amendments.pdf, retrieved February 8, 2017.

substances.[69] This program, known as the Significant New Alternatives Policy ("SNAP") Program, regulates substitutes for the ozone-depleting chemicals that are being phased out pursuant to the Montreal Protocol.[70]

Recently, parties to the Montreal Protocol have turned their attention to curbing the use of HFCs, which initially replaced ozone-depleting CFCs, because of their high global warming potential. In November 2015, all 197 parties of the Montreal Protocol agreed to the "Dubai Pathway" to prepare an amendment in 2016 that will call for the reduction of HFC production and consumption.[71] In October 2016, the United States agreed to the Kigali Amendment to the Montreal Protocol, requiring a global phase-down of HFCs, including R-134a. Under this amendment, the United States and all developed countries are committed to a graduated reduction of their production and consumption of HFCs starting in 2019.[72]

Transition from R-12 to R-134a

Under the EPA's SNAP program in 1995, R-134a was deemed an acceptable substitute for CFC–12 in retrofitted and new motor vehicle air conditioners in the United States.[73] Since its approval by the EPA, R-134a has become the most used refrigerant for automotive air conditioning in the United States and globally. By 2004, all automobiles produced or sold in North America, Japan, and the Europe used R-134a as a refrigerant.[74]

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[69] EPA evaluates the refrigerants using the following factors: (1) atmospheric effects (the ODP and GWP); (2) exposure assessments (estimate concentration levels to which people may be exposed); (3) Toxicity; (4) Flammability; and (5) Other environmental impact. http://www.epa.gov/ozone/snap/about.html, https://www.epa.gov/snap/overview-snap, and https://www.epa.gov/snap/refrigeration-and-air-conditioning, retrieved February 8, 2017.

[70] In order for a refrigerant to be used in the U.S. marketplace it must be on the EPA's list of approved refrigerant for the end use specified. Section 612(d) of the Clean Air Act grants the right to any person to petition EPA to add a substance to or delete a substance from the lists. The Agency has 90 days to grant or deny a petition. *See* 59 FR 13044, March 18, 1994 (EPA promulgation of SNAP regulations).

[71] "Statement from EPA Administrator Gina McCarthy on Decision Reached at the 27th Meeting of the Parties to the Montreal Protocol / Decision Puts World on Path to 2016 Amendment to Phase Down HFCs," EPA news release, https://www.epa.gov/newsroom retrieved April 4, 2016.

[72] "The Kigali Amendment to the Montreal Protocol: Another Global Commitment to stop climate change," United Nations Environment Programme ("UNEP"), http://web.unep.org/kigali-amendment-montreal-protocol-another-global-commitment-stop-climate-change, retrieved January 22, 2017 and http://ozone.unep.org/sites/ozone/files/pdfs/FAQs_Kigali_Amendment_v3.pdf, retrieved February 8, 2017.

[73] 60 FR 31092, June 13, 1995 (SNAP list of acceptable substitutes for R-12 in 1995).

[74] *"Refrigerants for Light-Duty Passenger Vehicle Air Conditioning Systems,"* Working paper 2011-3, International Council on Clean Transportation, July 2011, p. 1.

Kyoto Protocol

Signed by 183 nations in 1997, the Kyoto Protocol to the United Nations Framework Convention on Climate Change ("Kyoto Protocol") is an international treaty that sets binding obligations on industrialized countries to reduce emissions of greenhouse gases.[75] The protocol set national reduction targets for a number of gases with high Global Warming Potential ("GWP"),[76] among those were hydrofluorocarbons (HFCs). Developed nations that ratified the Kyoto Protocol agreed to phase-out the manufacture and use of HFCs with a GWP of greater than 150. R-134a has a GWP of 1,430.

Corporate Average Fuel Economy ("CAFE") standards[77] in the United States

Although the United States has not ratified the Kyoto Protocol, the NHTSA and EPA announced proposed CAFE standards in 2009 that would regulate greenhouse gas emissions of automobiles, among which were HFC refrigerants.[78] The regulation did not provide a ban or a phase-out schedule, but rather gave CAFE credits[79] to any automobile manufacturer that produced automobiles that used a refrigerant with a GWP less than 150. The EPA, pursuant to its SNAP program, approved a number of refrigerants with a GWP less than 150, including R-152a (GWP=124), R-744 (GWP=1), and HFO-1234yf (GWP=4).[80] In 2012, HFO-1234yf was available as an alternative to R-134a. Honeywell is a U.S. manufacturer of HFO-1234yf.[81] Several environmentally friendly alternatives to R-134a are also being developed, including ***.[82]

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[75] Although 103 nations have signed the Kyoto Protocol only 83 nations have ratified it and are therefore bound to its requirements. The United States has signed, but not ratified, the Kyoto Protocol. https://treaties.un.org/doc/Publication/MTDSG/Volume%20II/Chapter%20XXVII/XXVII-7-a.en.pdf, retrieved February 8, 2017.

[76] GWP is defined as the ratio of the warming caused by a substance to the warming caused by a similar mass of carbon dioxide. Thus, the GWP of CO_2 is defined to be 1.0. CFC-12 has a GWP of 10,900.

[77] CAFE are regulations in the United States, first enacted in 1975 and now promulgated by the National Highway Traffic Safety Administration ("NHTSA"), intended to reduce energy consumption by improving the average fuel economy of cars and light trucks sold in the United States. In 2010, the NHTSA, jointly with the EPA, issued greenhouse gas ("GHG") emissions standards. For the first time, these GHG standards were part of the CAFE regulation.

[78] *Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule*, 75 FR 25324, May 7, 2010. (CAFE standards for model years 2012 to 2016); *2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards*, 77 FR 62624, October 15, 2012 (CAFE standards for model years 2017 to 2025).

[79] CAFE provides for a credit trading and transferring system that allows manufacturers to transfer credits between automobile categories, as well as, sell them to other manufacturers.

[80] 73 FR 33304, June 12, 2008 (R-152a); 76 FR 17488, March 29, 2011 (HFO-1234yf); 77 FR 33315, June 6, 2012 (R-744 or CO_2).

[81] ***.

[82] ***.

General Motors announced that it would produce automobiles for model year 2013 that would use the 1234yf refrigerant. General Motors was the first U.S. automobile manufacturer to install 1234yf, but by model year 2017 *** were using R-1234yf on at least some models.[83] [84] In 2014, over 99 percent of the new vehicle production in the United States installed and used R-134a as its refrigerant.[85]

EU regulations on R-134a

Subsequent to the EU's ratification of the Kyoto Protocol, the EU promulgated regulations relating to emissions from air conditioning systems in motor vehicles in May 2006.[86] The EU regulation provided for a total ban on air conditioning systems and refrigerants designed to use HFCs with a GWP higher than 150, which includes R-134a (GWP=1,430). The ban covers all new automobile types from January 1, 2011 and applies to all vehicles as of January 1, 2017. In order to comply with the EU F-gas regulation, manufacturers attempted to develop a refrigerant that would have a GWP of less than 150, but have low toxicity and flammability like R-134a. In 2007, the product HFO-1234yf was developed through a joint venture of DuPont and Honeywell.[87] HFO-1234yf has a GWP of 4 and appeared to have favorable toxicity and flammability characteristics.

EU transition from R-134a to HFO-1234yf

In spite of safety concerns raised by Daimler AG in 2012,[88] the EU moved forward with its MAC directive such that as of January 2017 all new vehicles must be installed with MACs that use a refrigerant with a GWP of 150 or less. The EU has banned the sale, registration, or use of any new vehicle using a refrigerant that does not meet this criterion. Therefore, R-134a is no longer an option for European automotive OEMs. While other refrigerants meet the GWP

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[83] *"GM First to Market Greenhouse Gas-Friendly Air Conditioning Refrigerant,"* RP News Wires, http://www.reliableplant.com/Articles/Print/25709, retrieved on October 22, 2013.

[84] ***.

[85] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-19.

[86] EU Directive 2006/40/EC; Also referred to as the "MAC Directive" or "F-gas Regulation." http://europa.eu/legislation_summaries/internal_market/single_market_for_goods/motor_vehicles/interactions_industry_policies/l24280_en.htm, retrieved on November 20, 2013.

[87] China is expected to be the largest producer of HFO-1234yf as DuPont, Honeywell, Arkema, and Daikin have announced that they are building manufacturing facilities in China. *"Arkema to build production capacity for the novel refrigerant gas HFO-1234yf,"* Chemical Week, September 4, 2013; *"China expected to be largest production base of HFO-1234yf worldwide,"* PRLOG, December 28, 2012.

Mexichem stated that it is also developing a HFO-1234yf product. *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-20.

[88] In September 2012, Mercedes-Benz announced that testing of HFO-1234yf showed safety issues such as flammability and recalled 3,500 automobiles in which it had installed air conditioning systems that used the new refrigerant. *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. I-20.

requirement and could potentially be used in MACs, HFO-1234yf has become the standard refrigerant for the European automotive OEMs. R-134a will continue to be used in the aftermarket.

DOMESTIC LIKE PRODUCT ISSUES

No issues with respect to the definition of the domestic like product have been raised in this investigation. The petitioners proposed that the domestic like product should be defined as co-extensive with the scope definition.[89] In the preliminary phase of this investigation, the Commission defined the domestic like product as a single domestic like product consisting of R-134a that is coextensive with Commerce's scope.[90] The petitioners and Chinese respondents agree with the Commission's definition of the domestic like produce and domestic industry.[91] No party provided comments on the Commission's draft questionnaires for the final phase of this investigation, which collected data and other information based on a co-extensive domestic like product.

[89] Petition, p. 19 and HFC Coalition's prehearing brief, pp. 8-9.

[90] *1,1,1,2-Tetrafluoroethane (R-134a) from China, Inv. No. 731-TA-1313 (Preliminary*), Publication 4606, April 2016, p. 5.

[91] HFC Coalition's prehearing brief, p. 8 and Chinese respondents' prehearing brief, p. 6.

PART II: CONDITIONS OF COMPETITION IN THE U.S. MARKET[1]

U.S. MARKET CHARACTERISTICS

The primary use for R-134a is as a refrigerant gas in vehicle A/C systems. There are two primary distribution channels for vehicle A/C systems: original equipment manufacturers (OEMs) and the automotive aftermarket. The automotive aftermarket, which is much larger than the automotive OEM market, is primarily served by distributors. R-134a is also used as a refrigerant in large commercial A/C units and in appliances (refrigerators, freezers, and dehumidifiers). There are also a number of non-refrigerant uses for R-134a: the installation of insulating foams, as an aerosol propellant in sprays, in aerosol dusters for electronics, and in pharmaceuticals (for inhalers).[2] Petitioners report that some distributors sell R-134a to both the automotive aftermarket and the HVAC aftermarket, and that some of the largest national distributors for the aftermarket are now purchasing directly from China.[3]

R-134a is sold in various bulk sizes as well as packaged in smaller size containers. For bulk sales, U.S. producers can supply R-134a in large truckloads while importers sell bulk product in ISO containers.[4] Typical smaller containers are 30-pound containers and 12-ounce cans. The 12-ounce cans are sold at retail for do-it-yourself customers while 30-pound containers typically go to repair shops.[5]

Some distributors are also repackagers that repackage bulk product into 30-pound cylinders and 12-ounce containers for resale to auto dealerships, service centers, service stations, and auto parts retailers. U.S. producer Arkema, for example, sells R-134a to large distributors that buy in bulk and repackage the product into smaller containers, and it also sells directly to OEMs, including air-conditioning or refrigeration equipment manufacturers and chemical companies that produce aerosol products. Some distributors also import 30-pound cylinders and 12-ounce containers from China.[6] Petitioners argue that lower prices of R-134a in 30-pound cylinders have caused many firms to switch from repackaging bulk R-134a to purchasing prepackaged Chinese R-134a.[7]

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[1] Honeywell does not produce R-134a, but supplies the U.S. market with R-134a ***. Honeywell's shipment information including pricing data and answers to market related questions are included with the U.S. producers in Parts II and V.

[2] *Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. II-1; Conference transcript, pp. 29-30 (Geosits); respondents' postconference brief, pp. 5-6.

[3] Hearing transcript, p. 43 (Geosits).

[4] OEM auto manufacturers typically purchase R-134a in bulk railcars or tank trucks. Hearing transcript, p. 32 (Buterbaugh).

[5] *Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. II-1; Conference transcript, p. 35 (Sassano).

[6] *Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. II-1; Conference transcript, pp. 28-29 (Geosits).

[7] Conference transcript, pp. 18-19 (Haun).

According to petitioners, the three U.S. producers have different marketing strategies for R-134a. They stated that the majority of Chemours' R-134a sales are of packaged product sold under its brand name, Freon, and that it does not sell bulk product to repackagers.[8] They stated that Mexichem, on the other hand, sells mostly bulk product and Arkema sells both bulk and packaged product.[9]

In 2015, 35.2 percent of combined U.S. shipments of R-134a (domestic and imported) were to the automotive aftermarket, 19.5 percent to the foam expansion and propellant market, 12.3 percent to automotive OEMs, 6.1 percent to the stationary aftermarket, 2.8 percent to the stationary OEM market, and 24.1 percent to other and unknown uses.[10] Although subject import shipments were reported for all of the above specified uses, most subject import shipments were to the automotive aftermarket.[11] Importers of Chinese R-134a reported that in 2015, *** percent of U.S. shipments were to the automotive aftermarket, down from *** percent in 2013 and 2014. For U.S. producers, foam expansion comprised the largest share of 2015 shipments (*** percent), followed by the automotive aftermarket (*** percent), and automotive OEMs (*** percent).

Apparent U.S. consumption of R-134a decreased during 2013-15. Overall, apparent U.S. consumption in 2015 was 14.3 percent lower than in 2013. Apparent U.S. consumption was 45.1 percent higher in interim 2016 than in interim 2015.

U.S. PURCHASERS

The Commission received 38 usable questionnaire responses from firms that have purchased R-134a since January 2013.[12] These 38 firms reported purchasing 39 thousand short tons in 2015, slightly more than half of apparent U.S. consumption. Twenty-four responding purchasers are distributors, 9 are OEMs, 4 are auto parts retailers, 12 are repackagers, and 7 indicated other roles including general retailers and aerosol and inhaler manufacturers.[13]

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[8] Hearing transcript, pp. 32-33 (Buterbaugh). ***.

[9] Hearing transcript, pp. 108-109 (Cannon). ***.

[10] "Other" includes stationary refrigerators/air conditioners, non-automotive OEMs, propellants, refrigerant blends, and miscellaneous applications. More detailed data regarding shipments by end use is presented in Part IV and Appendix E.

[11] Petitioners stated that it was easier for imports from China to penetrate the automotive aftermarket than other parts of the R-134a market since aftermarket distributors tend to purchase on a spot basis and because there is a logistical cost advantage to purchasing imported packaged product instead of bulk product. Hearing transcript, p. 34 (Buterbaugh). Weitron's representative stated that it is difficult for the Chinese product to supply the OEM market because these customers typically purchase product in bulk tanker trucks on a just in time basis. Hearing transcript, pp. 167-169 (Dayton).

[12] Of the 38 responding purchasers, 32 purchased domestic R-134a, 16 purchased imports of R-134a from China, 5 purchased imports from other sources, and 8 purchased R-134a from unknown sources.

[13] Some purchasers indicated more than one category.

Fifteen of the 38 purchasers also imported R-134a. The largest responding purchasers of R-134a were ***.[14]

One large buyer in the automotive aftermarket is AutoZone, which sells R-134a to vehicle repair shops and do-it-yourself customers. It purchases R-134a in 30-pound cylinders and 12-ounce cans from repackagers and also imports R-134a from China.[15] Another large buyer in the automotive aftermarket is Weitron, which repackages and distributes a variety of refrigerants including R-134a. Weitron purchases R-134a in bulk and repackages it into 30-pound cylinders and 12-ounce cans.[16]

CHANNELS OF DISTRIBUTION

U.S. producers and importers reported selling to all three specified channels: distributors, end users, and retailers (table II-1). U.S. producers sold a slight majority to end users in 2013 and 2015, and a slight majority to distributors in 2014 and interim 2016. Distributors were the largest volume channel for importers of Chinese R-134a.

GEOGRAPHIC DISTRIBUTION

U.S. producers and importers reported selling R-134a to all regions in the United States (table II-2). For U.S. producers, 1 percent of sales were within 100 miles of their production facility, 72 percent were between 101 and 1,000 miles, and 27 percent were over 1,000 miles. Importers sold about 21 percent within 100 miles of their U.S. point of shipment, 55 percent between 101 and 1,000 miles, and 25 percent over 1,000 miles.

SUPPLY AND DEMAND CONSIDERATIONS

U.S. supply

Domestic production

Based on available information, U.S. producers of R-134a have the ability to respond to changes in demand with moderate changes in the quantity of shipments of U.S.-produced R-134a to the U.S. market. The main contributing factors to this degree of responsiveness of supply are the existence of alternate markets and some unused capacity, tempered by a lack of production alternatives.

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[14] ***.

[15] Hearing transcript, pp. 125-126 (Lammers).

[16] Weitron packages R-134a both in the United States and in China. Hearing transcript, pp. 133-135 (Dayton).

Table II-1
R-134a: U.S. producers' and importers' U.S. commercial shipments, by sources and channels of distribution, 2013-15, January-September 2015, and January-September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Commercial U.S. shipments (short tons)				
U.S. producers: Distributors	***	***	***	***	***
End users	***	***	***	***	***
Retailers	***	***	***	***	***
U.S. importers: China: Distributors	5,400	4,837	9,672	7,827	8,362
End users	3,564	1,684	1,645	1,676	4,548
Retailers	2,174	931	1,452	939	2,874
U.S. importers: Nonsubject sources: Distributors	***	***	***	***	***
End users	***	***	***	***	***
Retailers	***	***	***	***	***
	Share of commercial U.S. shipments (percent)				
U.S. producers: Distributors	***	***	***	***	***
End users	***	***	***	***	***
Retailers	***	***	***	***	***
U.S. importers: China: Distributors	48.5	64.9	75.7	75.0	53.0
End users	32.0	22.6	12.9	16.1	28.8
Retailers	19.5	12.5	11.4	9.0	18.2
U.S. importers: Nonsubject sources: Distributors	***	***	***	***	***
End users	***	***	***	***	***
Retailers	***	***	***	***	***

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

Industry capacity

Domestic production capacity and production decreased during 2013-15 but both were higher in interim 2016 than in interim 2015. U.S. R-134a capacity decreased from 114,363 short tons in 2013 to 88,078 short tons in 2015. The reduction in domestic capacity was the result of ***. Domestic capacity utilization decreased irregularly from 87.5 percent in 2013 to 82.0 percent in 2015; it was 93.5 percent in interim 2015 and 86.9 percent in interim 2016. This level of capacity utilization suggests that U.S. producers may have some capacity to increase production in response to an increase in prices.

Table II-2
R-134a: Geographic market areas in the United States served by U.S. producers and importers

Region	U.S. producers	Subject U.S. importers
Northeast	4	21
Midwest	4	21
Southeast	4	26
Central Southwest	4	21
Mountains	4	19
Pacific Coast	4	21
Other[1]	3	13
All regions (except Other)	4	17
Reporting firms	4	26

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

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

Alternative markets

All three U.S. producers export R-134a; principal markets include the ***.[17] Export shipments and U.S. shipments both declined from 2013 to 2015, and both were higher in interim 2016 than in interim 2015. U.S. producers' exports, as a percentage of total shipments, decreased from *** percent in 2013 to *** percent in 2015, and were *** percent in interim 2016. This fairly high level of exports indicates that U.S. producers may have the ability to shift shipments between the U.S. market and other markets in response to price changes.

Inventory levels

U.S. producers' inventories, as a ratio to total shipments, increased irregularly from *** percent in 2013 to *** percent in 2015, and were *** percent in interim 2016. These inventory levels suggest that U.S. producers may have some ability to use inventories to respond to changes in demand. U.S. producers schedule outages ("turnarounds") every two to three years for preventative maintenance, inspection, and ***. These outages usually last *** days, and producers build inventory to prepare for the outage.[18] Chemours had a scheduled turnaround in November 2014, in which it discovered an equipment issue, and extended the turnaround time to make needed repairs.[19]

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[17] ***.

[18] Conference transcript, p. 45 (Sassano), pp. 77-78 (Pacillo, Haun). Hearing transcript, p. 35 (Buterbaugh).

[19] Hearing transcript, p. 35 (Buterbaugh). Chemours reported that its typical turnaround time is 30 to 35 days or longer. Hearing transcript, p. 72 (Buterbaugh). ***. HFC Coalition's posthearing brief, exh. 1, p. 7.

Production alternatives

All three U.S. producers stated that they could not switch production from R-134a to other products. Additionally, ***.

Subject imports from China

Based on available information, producers of R-134a from China have the ability to respond to changes in demand with moderate changes in the quantity of shipments of R-134a to the U.S. market. The main contributing factors to the moderate degree of responsiveness of supply are the existence of alternate markets, tempered by limited unused capacity and small inventories.

Industry capacity

Reported R-134a production capacity in China increased from 141 thousand short tons in 2013 to 169 thousand short tons in 2015, and was projected to decline slightly in 2016. Production also increased from 2013 to 2015. Capacity utilization was approximately 94 percent in both 2013 and 2015, and slightly lower in 2014. This level of utilization indicates that Chinese producers may have limited unused capacity with which to increase shipments to the United States.

Petitioners stated that total Chinese R-134a capacity is 220 thousand short tons, which is higher than that reported in questionnaires, and that China continues to add capacity to produce R-134a, even though China's current capacity exceeds total global demand.[20]

Alternative markets

About half of Chinese producers' shipments were to the Chinese home market and most of the remainder were to third country markets. Chinese producers' shipments to the home market increased from 47.1 percent of total shipments in 2013 to 53.1 percent in 2015 and the share to third country markets decreased irregularly from 42.2 percent to 39.0 percent. Chinese producers reported shipping to markets throughout the world: Europe, Asia, Latin America, the Middle East, and South Africa. The size and diversity of these other markets suggest that R-134a producers in China may be able to shift sales from other markets to the U.S. market in response to relative price changes.

Petitioners state that demand in China has been low and shows no signs of improving because of "overcapacity and weak demand from downstream industries."[21] Additionally, petitioners argue that due to regulatory changes in the EU, Chinese exports will continue to

[20] HFC Coalition's prehearing brief, pp. 41-43.
[21] HFC Coalition's prehearing brief, p. 45.

target the U.S. market.[22] Petitioners also noted that Chinese R-134a face antidumping duties in India.[23] Respondents state that demand for R-134a in China and third-country export markets will continue to increase due to increased demand in the automotive industry.[24] They also state that consumers in China are updgrading equipment from R-22 to R-134a, that there are currently no restrictions on R-134a usage in China, and that they are unaware of any future planned restrictions on R-134a.[25]

Inventory levels

Chinese producers' R-134a inventories, as a share of total shipments, decreased from 5.0 percent in 2013 to 4.1 percent in 2015. These data indicate that producers in China may have a limited ability to use inventories to increase sales to the United States.

Production alternatives

Five of the eight responding Chinese producers reported that they could shift production between R-134a and other products, although none of the responding producers reported actual production of other products on the same equipment during the period for which data were collected. These other products include R-32, R-125, R-143a, R-404a, and other refrigerant chemicals.

Nonsubject imports

Imports from nonsubject sources fluctuated during 2013-15, increasing from 1.0 percent of apparent U.S. consumption of R-134a in 2013 to 4.5 percent in 2014, and declining to 1.6 percent in 2015. The largest nonsubject sources of R-134a imports in 2015 were the United Kingdom (3.9 percent of total imports) and India (1.7 percent).[26]

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[22] HFC Coalition's prehearing brief, pp. 46-47. As of January 2017, there is a ban on the use of fluorinated greenhouse house gases (including R-134a) in all new vehicles on the EU market.

[23] HFC Coalition's prehearing brief, p. 48. Respondents state that the antidumping order will not have a significant impact on Chinese exports since India is one of many export markets for China and because demand in India is expected to increase. Respondents' prehearing brief, p. 50.

[24] Respondents' prehearing brief, pp. 47-50.

[25] Respondents' prehearing brief, pp. 47-48.

[26] In 2014, imports from nonsubject sources accounted for 24.3 percent of total imports. Germany was the largest nonsubject source of R-134a imports, accounting for 12.6 percent of total imports, followed by the United Kingdom (3.8 percent), France (3.2 percent), and Japan (2.5 percent). Imports from nonsubject source accounted for 5.0 percent of total imports in 2013.

New suppliers

Four of 38 purchasers indicated that new suppliers have entered the U.S. market since January 1, 2013. *** stated that many small R-134a producers in China have entered the market. The other purchasers listed Amcor, Daikin Europe GmbH which purchased Solvay, and Vision Wheel (formerly Global Automotive).

Supply constraints

The three U.S. producers *** reported that they had no supply constraints.[27] Chemours stated that during its shutdown for repairs it used inventories it built in advance of the turnaround and also purchased from other domestic producers, and that it was able to meet all of its contractual obligations as well as make sales to the spot market.[28] ***.

Most importers (26 of 31) also reported no supply constraints. Among the five importers that stated they did have supply constraints, two firms (***) reported constraints related to the prior antidumping and countervailing duty investigations, with *** stating that it suspended sales in June and July of 2014, and two firms (***) reported turning down business because of low market prices. The other importer reporting supply constraints was ***.

Most purchasers (29 of 38) also reported experiencing no supply constraints for R-134a since 2013. Nine firms indicated experiencing supply constraints, with five noting issues with domestically-produced R-134a and two noting supply issues with Chinese R-134a related to the antidumping investigations.[29] Of the five firms describing domestic supply issues, *** stated that Mexichem and Chemours ***, *** noted a short-term plant disruption at Chemours, *** stated that Honeywell refused to quote, and *** stated that domestic producers sometimes limit the quantities available. ***, stated that some domestic producers have raised their R-134a prices above market ***.

Respondents argue that purchasers in the automotive aftermarket are reluctant to rely soley or heavily on domestic producers for R-134a supply because of the supply shortages that occurred in 2010-11.[30] Respondents also state that the five purchasers that noted domestic supply issues since 2013 account for a *** of U.S. purchases.[31] AutoZone stated that domestic producers do not solicit its business, and that it has not a received a response from domestic

[27] Conference transcript, p. 11 (Cannon).

[28] Hearing transcript, pp. 35-36 (Buterbaugh).

[29] One purchaser did not provide an explanation and one stated that "supply is sometimes limited at purchase cost."

[30] Respondents' prehearing brief, p. 26.

[31] Respondents' prehearing brief, pp. 27-28.

producers when requesting quotes or attempting to source from them.[32] Petitioners deny that the domestic industry has refused to supply AutoZone.[33]

All three U.S. producers (***) reported that they are able to supply R-134a in 12-ounce cans with the customer's label indirectly through repackagers but only one firm (***) reported actually doing so. Producer ***. Among importers, seven firms indicated that they import R-134a in 12-ounce cans, and four can arrange for supply of 12-ounce cans. Importers *** reported that they directly supply private label 12-ounce cans, ***, and ***.[34] ***.[35]

U.S. demand

Based on available information, the overall demand for R-134a would likely experience small changes in response to changes in price. The main contributing factors are the lack of substitute products for R-134a and the small cost share of R-134a in most of its final end uses.

End uses

U.S. demand for R-134a depends on the demand for U.S.-produced downstream products and services. End uses include automotive A/C (new and repairs), refrigerant blends, refrigerators, stationary A/C units, industrial aerosol products, foam blowing, and pharmaceuticals.[36]

Automotive OEM demand is based on U.S. new vehicle production. OEM demand is affected more immediately than aftermarket demand by any changes in regulations, car design, or the state of the economy. The A/C aftermarket is substantially larger than the OEM market, constituting about three quarters of R-134a used in the overall automotive market. Although R-134a is not consumed by the A/C unit operation, some of the product leaks out of the system over time, degrading cooling performance. Automotive A/C units typically need to be recharged with refrigerant every 5 years.[37] System damage in a vehicle accident also creates demand for R-134a in the aftermarket.[38]

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[32] It stated that Mexichem did submit a bid in 2015, but that Chinese suppliers, some of which had higher bids, were selected "due to other favorable terms and allowances." Hearing transcript, pp. 128-129 (Lammers).

[33] HFC Coalition's posthearing brief, p. 8 and exh. 1, p. 17.

[34] Three importers stated they could supply 12-ounce private label cans through a repackager but none of these firms actually did so.

[35] Email from ***, March 22, 2016.

[36] Respondents state that new uses of R-134a have been developed and include use in the heat pump market, alternative aerosols, and magnesium alloy to protect gas. Respondents' postconference brief, Answers to Questions from Commission Staff, no. 1 and 11.

[37] "R-134a is typically replaced whenever a sufficient amount of the gas has leaked from the refrigeration system such that the system could be damaged or is no longer effective. Different sectors have different "leak rates," which are the rates at which refrigerant is lost between refrigerant charges (expressed in terms of the percentage of the full charge that would be lost over a 12-month period) if

(*continued*...)

Current U.S. regulations require that automotive OEMs move away from R-134a in 2021, however there will continue to be a substantial aftermarket.[39] Regulations require phase-out of R-134s by 2024 for the stationary HVAC market, 2017 through 2022 for the foam blowing market, and 2021 for household refrigerants.[40] Information regarding regulations affecting R-134a is presented in Part I. Petitioners state that many applications will not be affected by regulations, including the "automotive aftermarket, certain foam applications, stationary aftermarket, internal consumption in HFC blends, swaps, pharmaceutical R-134a, and home refrigeration."[41]

Cost share

R-134a generally accounts for a small share of the cost of most end-use products, including automobiles, HVAC systems, refrigerators, and medical devices. It can account for a somewhat higher share of some products such as foam insulation and aerosols. Reported cost shares for some uses were as follows:

- Automobiles (new) (less than 1 percent)
- Non-automotive refrigerant uses (refrigerators and HVAC) (less than 2 percent)
- Inhalers (less than 1 percent)
- Foam/insulation (7 to 13 percent)
- Aerosol products (13 to 55 percent)
- Refrigerant blends (40 to 54 percent)
- Repackaging into cans and cylinders (60 to 92 percent).

Business cycles

Most responding firms (all U.S. producers, 23 of 33 importers, and 24 of 38 purchasers) indicated that the R-134a market was subject to business cycles. Many firms reported seasonal demand for R-134a, particularly higher demand in the summer in the automotive and stationary A/C aftermarkets, and that many firms stock up in the first half of the year to meet this seasonal demand. U.S. producer *** stated that the most of its shipments to the automotive aftermarket are during January to July. Importer and distributor *** similarly stated that automotive demand is higher in the first and second quarters. Purchaser *** identified March to August, *** identified spring and summer, and *** identified April to September as times of higher demand. AutoZone places orders with its R-134a suppliers in the early fall for

(…*continued*)
the current rate of loss were to continue over that period." The leak rate for R-134a in automotive uses is lower (5 percent) than the leak rate for R-134a in other refrigerant uses. HFC Coalition's posthearing brief, exh. 1, pp. 12-13.

[38] *Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. II-12.

[39] Conference transcript, pp. 54-56 (Sassano). HFC Coalition's prehearing brief, pp. 11-12.

[40] HFC Coalition's prehearing brief, p. 11.

[41] HFC Coalition's posthearing brief, exh. 1, p. 8.

deliveries at the end of the year through the spring of the next year.[42] Importer and purchaser Weitron stated that in 2016, 61 percent of its sales of R-134a in 30-ounce cylinders were during February to May, and that it purchases large amounts of product in the several months preceding the busy season to have product ready to serve its customers.[43]

Firms also noted that weather patterns affect demand, with higher demand in hotter years. In addition to seasonal demand patterns, automotive OEM *** noted that R-134a is gradually being replaced by more environmentally friendly refrigerants driven by government and consumer mandates. A few firms also noted supply factors such as raw material shortages and plant outages as affecting business cycles.

One U.S. producer, four importers, and four purchasers reported other distinctive conditions of competition.[44] *** reported industry consolidation resulting in high prices in 2010-11, that retail prices are directly correlated with consumer demand since R-134a is a discretionary purchase, and the effects of the antidumping investigations. *** noted a decrease in demand for R-134a in the United States, as well as in Canada and the EU because of the use of 1234yf as a result of environmental regulations. *** described regulations and potential regulations, the antidumping duty investigations, the small number of U.S. production plants, and domestic supply shortages. *** stated that R-134a is a commodity product sensitive to competition, product availability, and market conditions.

Three U.S. producers, 11 importers, and 12 purchasers reported changes in the conditions of competition since 2013.[45] U.S. producers noted increased imports from China at low prices. Purchasers and importers noted price and market volatility related to the antidumping duty investigations,[46] Chemours' extended plant closure at the end of 2014 through the first half of 2015, more imported product and Chinese product sold directly to customers, and lower prices. *** stated that quotes from China are now provided in the third quarter rather than in the first quarter of the year.

Demand trends

All U.S. producers and a plurality of importers and purchasers reported that U.S. demand for R-134a had not changed since 2013, although some firms reported that demand had decreased, increased, or had fluctuated (table II-3).

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[42] Hearing transcript, p. 125 (Lammers).

[43] Hearing transcript, p. 134 (Dayton).

[44] Other conditions of competition included global oversupply (reported by ***), industry consolidation causing a domestic shortage, and difficulties arising from the previous investigations of R-134a.

[45] Petitioners argued that the bonding requirements on R-134a during 2014 are another condition of competition and respondents argued that the deposit requirements had a significant impact on the market. Conference transcript, p. 56 (Cannon) and p. 15 (Schutzman).

[46] ***.

Table II-3
R-134a: 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	0	4	0	0
Importers	4	11	9	5
Purchasers	6	11	9	9
Demand outside the United States: U.S. producers	1	3	0	0
Importers	1	9	6	2
Purchasers	3	5	5	2
Demand for purchasers' final products: Purchasers	2	4	3	4

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

Petitioners stated that demand is the U.S. market is stable but will decline over time.[47] U.S. producer *** stated that there has been no overall change in U.S. demand, although there has been a decrease in demand by automotive OEMs and an increase in demand for automotive aftermarket and foam applications. It further noted that automotive OEMs are moving to replace R-134a with 1234yf to meet U.S. and EU regulations, but that it does not expect these changes to affect the U.S. automotive aftermarket market for ten or more years. *** described the U.S. market as mature with flat to two percent growth per year; it stated that growth has been tempered by more efficient A/C systems, which require less charge and less frequency of service. *** stated that SNAP regulations that ban or will ban the use of R-134a in automotive A/C, foam and aerosol applications have reduced demand. AutoZone stated that demand for R-134a was higher in 2016 than in 2015 because of hotter weather, particularly in certain parts of the country.[48] Figure II-1 presents data for average U.S. temperatures from 2013-16. As shown in the figure, average temperatures increased during each year, and peak temperatures were higher in 2015 than in 2014, and in 2016 than in 2015.

Figure II-1
Average monthly temperatures in the United States *, 2013-16**

* * * * * * *

The EPA requires that all new cars shift from R-134a to 1234yf by 2021, leading to a shrinking OEM market for R-134a. However, petitioners argue that there will be steady demand

[47] Petitioners also stated that there should be a *** in 2017 because of ***. HFC Coalition's prehearing brief, p. 11.

[48] Hearing transcript, p. 178 (Lammers). On the other hand, Weitron's representative stated that she did not see any significant changes in the level of demand between 2015 and 2016. Hearing transcript, p. 177 (Dayton). Arkema's representative stated that it may have been a little warmer in some parts of the United States in 2015, but not in all areas of the country. Hearing transcript, p. 91 (Haun).

for R-134a in the aftermarket for at least a decade after the phase out, and R-134a will continue to be used in other applications such as the stationary OEM and aftermarkets as well as in foam applications.[49]

Most U.S. producers and a plurality of purchasers and importers reported that demand outside the United States had also not changed. Demand decreases were attributed to a shift from R-134a to 1234yf by automotive OEMs in the EU. Demand increases were attributed to economic growth in Asia and Latin America.

Substitute products

Substitutes for R-134a are limited. Most U.S. producers (3 of 4), but a minority of responding importers (5 of 33), and purchasers (10 of 36) reported that there were substitutes for R-134a. These included: 152A, CO2, hydrocarbons, and 123ze/HFO-1234 for propellants; 152A and hydrocarbons for foam; and 1234yf, R-404A, R437A, and hydrocarbons for refrigerant/air conditioners. These substitutes are limited in the short term because replacing R-134a with another refrigerant typically requires retrofitting or changing equipment.[50] Only one importer and one purchaser reported that the price of substitutes affected demand for R-134a. Importer *** reported that the EPA phaseout of R-134a had reduced its price. Purchaser *** reported an increase in the price of R-134a since the EPA SNAP ban in July 2016.

SUBSTITUTABILITY ISSUES

The degree of substitution between domestic and imported R-134a depends upon such factors as relative prices, quality (e.g., reliability of supply, purity, etc.), and conditions of sale (e.g., price discounts/rebates, lead times between order and delivery dates, payment terms, product services, etc.). Based on available data, staff believes that there is a high degree of substitutability between domestically produced R-134a and R-134a imported from China.

Lead times

U.S. producers reported that *** percent of their commercial shipments were from inventory, with lead times averaging 11 days. Importers reported that 48 percent of their commercial shipments were from U.S. inventories, with lead times averaging 13 days and that most of the remainder (44 percent) was produced-to-order, with lead times averaging 61

[49] HFC Coalition's prehearing brief, pp. 11-12.

[50] Refrigeration systems using R-134a are designed specifically for R-134a. Respondents' postconference brief, p. 8.

days.[51] Weitron stated that lead times from China to the United States are generally two to three months.[52] ***.[53]

Petitioners state that R-134a from China typically is shipped to arrive in the fourth and first quarter of the year.[54]

Knowledge of country sources

Most purchasers (34 of 38) indicated they had marketing/pricing knowledge of domestic product, 24 of Chinese product, and 9 of product from nonsubject countries (Belgium, France, Germany, India, and the United Kingdom).

As shown in table II-4, most purchasers and their customers sometimes or never make purchasing decisions based on the producer or country of origin. Of the seven purchasers that reported that they always make decisions based the manufacturer, most noted that the suppliers must be approved and meet specifications and quality standards.

Table II-4
R-134a: Purchasing decisions based on producer and country of origin

Decision	Always	Usually	Sometimes	Never
Purchaser makes decision based on producer	7	6	13	12
Purchaser's customers make decision based on producer	1	3	8	20
Purchaser makes decision based on country	4	3	9	22
Purchaser's customers make decision based on country	0	1	12	16

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

Factors affecting purchasing decisions

The most often cited top-three factors firms consider in their purchasing decisions for R-134a were price (35 firms), availability/supply (29 firms), and quality (22 firms), as shown in table II-5. Price and quality were the most frequently cited first-most important factors (cited by 13 firms each), followed by availability (9 firms); price was the most frequently reported second-most important factor (13 firms); and price was the most frequently reported third-most important factor (9 firms).

[51] Four of the six importers reporting produced-to-order shipment reported lead times of 45 to 75 days, one reported 7 days and one reported 120 days. About 8 percent of shipments were from foreign inventories.

[52] Hearing transcript, p. 172 (Dayton).

[53] ***.

[54] In addition, they state that Chinese producers and exporters finance U.S. importers' inventories. HFC Coalition's prehearing brief, p. 10.

Table II-5
R-134a: Ranking of factors used in purchasing decisions as reported by U.S. purchasers, by factor

Factor	First	Second	Third	Total
Price / cost	13	13	9	35
Availability / supply / reliability	9	12	8	29
Quality	13	4	5	22
Delivery / lead time	1	4	2	7
Payment / credit terms	0	2	4	6
Other[1]	3	5	7	15

[1] Other factors include customer approval, brand, and qualified source for first factor; location (2 firms), customer needs, service, and traditional supplier for second factor; and cylinder return policy, ease in doing business, minimum order quantity, supply chain (2 firms), and traditional supplier (2 firms) for third factor.

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

Petitioners stated that quality, reliability, timeliness, and delivery method are important to purchasers, but that U.S. producers are no longer able to charge a premium for service because of low import prices.[55]

Four of 38 purchasers reported that they always purchase the lowest-priced R-134a, 20 reported usually, 11 reported sometimes, and 4 reported never. The four purchasers that reported that they never purchase the lowest-priced R-134a were two firms that purchase R-134a for pharmaceutical uses, an automotive OEM, and a firm that uses R-134a in foam insulation.

Purchasers reported a number of reasons for purchasing R-134a from one source although a comparable product was available at a lower price from another source; reasons cited include quality, lead time, availability, supplier relationship, supply chain risk, continuity of supply, and product range.

Most purchasers (33 of 37) stated that there were not certain types of R-134a that were only available from a single source. One firm stated that pharmaceutical grade R-134a was only available from the UK and another firm stated that pharmaceutical grade R-134a was not available from China. *** stated that R-134a in returnable cylinders is generally only sourced domestically. ***.

Importance of specified purchase factors

Purchasers were asked to rate the importance of 15 factors in their purchasing decisions (table II-6). The factors rated as very important by more than half of responding purchasers were availability (36 of 38 purchasers), quality meets industry standards (35), product consistency (34), price (33), reliability of supply (32), delivery time (26), and delivery terms (21).

[55] Conference transcript, p. 63 (Haun) and p. 67 (Buterbaugh).

Factors rated as somewhat important or not important by a majority of purchasers were extension of credit, minimum quantity requirements, packaging, product range, technical support/service, and U.S. transportation costs.

Table II-6
R-134a: Importance of purchase factors, as reported by U.S. purchasers, by factor

Factor	Number of firms reporting		
	Very important	Somewhat important	Not important
Availability	36	2	0
Delivery terms	21	15	2
Delivery time	26	10	2
Discounts offered	16	14	8
Extension of credit	10	19	9
Minimum quantity requirements	6	19	13
Packaging	9	20	9
Price	33	5	0
Product consistency	34	4	0
Product range	6	16	16
Quality meets industry standards	35	2	1
Quality exceeds industry standards	18	15	4
Reliability of supply	32	5	1
Technical support/service	10	16	12
U.S. transportation costs	12	19	8

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

Supplier certification

Fourteen of 36 responding purchasers require their suppliers to become certified or qualified to sell R-134a to their firm. Purchasers reported that the time to qualify a new supplier ranged from 5 to 180 days, with four firms reporting 5 to 15 days, four reporting 60 to 120 days, and one reporting 180 days. Only two purchasers reported that a supplier had failed in its attempt to qualify product, or had lost its approved status since 2013.[56]

Changes in purchasing patterns

Purchasers were asked about changes in their purchasing patterns from different sources since 2013 (table II-7); reasons reported for changes in purchasing patterns included: cost, consumer demand, availability, antidumping investigations, expanded product line, ease of purchasing, and seasonal demand changes. Automotive OEMs reported that reasons for

[56] ***.

changes in their domestic purchases were vehicle production mix, vehicle demand, and transition to 1234yf in new automobiles.

Table II-7
R-134a: Changes in purchase patterns from U.S., subject, and nonsubject countries

Source	Did not purchase	Decreased	Increased	Constant	Fluctuated
United States	2	6	7	10	12
China	12	3	7	2	10
All other sources	18	1	2	2	3
Sources unknown	18	1	1	2	3

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

Seventeen of 38 responding purchasers reported that they had changed suppliers since January 1, 2013. The most often cited reasons for changing suppliers were availability and price, as well as the antidumping duty investigations. Some firms reported switching among domestic suppliers. For example, *** reported switching between *** depending on negotiations; *** switched from *** based on relationship and price; *** dropped *** based on price and payment terms; and ***.

Other firms switched between import suppliers or between import and domestic suppliers. For example, ***. *** stated that it added many suppliers, including ***, based on price, availability, and payment terms. *** reported dropping *** because of a price increase, dropping ***, and also adding another firm, ***, for lower cost bulk purchases. *** stated that it purchased from *** during Chemours' production outage. *** reported that based on availability and price, ***. *** added *** because it could provide competitively-priced 1,000-pound containers that were easier to manage than 125-pound cylinders. ***, which typically bought from ***, stated that it purchased from *** in 2016. *** stated that it has stopped purchasing from *** since early 2016. *** stated that it ***. *** reported dropping and adding various import suppliers and distributors because of quality, availability, and price.

Petitioners stated that immediately following the Commission's vote in the previous investigation in November 2014, distributors canceled orders with domestic producers and demanded rebates or credits on sales that had already been made.[57]

Importance of purchasing domestic product

Most responding purchasers (27 of 36) reported that all of their R-134a purchases in 2015 had no domestic requirements, and the remaining nine purchasers reported that 50 to 98 percent had no domestic requirements. One purchaser (***) reported that domestic product was required by law for 10 percent of its purchases. Eight purchasers reported that domestic product was required by their customers, for 2 to 40 percent of their purchases. Two

[57] Hearing transcript, pp. 11-12 (Cannon), p. 43 (Geosits). Mexichem stated that it returned *** to customers as a result of the 2014 negative determination. Mexichem's posthearing brief, exh. 1, p. 3.

purchasers reported that some of their 2015 purchases required domestic product for other reasons (***).

Comparisons of domestic products, subject imports, and nonsubject imports

Purchasers were asked a number of questions comparing R-134a produced in the United States, China, and nonsubject countries. First, purchasers were asked for a country-by-country comparison on the same 15 factors (table II-8) for which they were asked to rate the importance.

Most purchasers reported that U.S. and Chinese R-134a were comparable on 12 of the 15 factors. The exceptions were delivery time and technical support/service, for which the majority of purchasers rated the domestic product as superior, and price, for which 20 of 28 purchasers indicated that the Chinese product was lower priced. Most purchasers reported that U.S. and nonsubject R-134a were comparable on all factors except delivery terms, delivery time, price, and U.S. transportation costs. A majority or plurality of purchasers reported that China and nonsubject R-134a were comparable on all factors.

Comparison of U.S.-produced and imported R-134a

In order to determine whether U.S.-produced R-134a can generally be used in the same applications as imports from China, 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-9, the majority of responding producers, importers, and purchasers reported that R-134a from all country pairs was always interchangeable. Four purchasers provided additional information regarding factors that limit interchangeability; two firms noted limited interchangeability for pharmaceutical grade product, one stated that not all Chinese sources are interchangeable due to quality, and one stated that the product is only interchangeable if it meets the U.S. OEM specification.

As can be seen from table II-10, nearly all responding purchasers reported that domestically produced product and imported product always met minimum quality specifications.

In addition, producers, importers, and purchasers were asked to assess how often differences other than price were significant in sales of R-134a from the United States, China, or nonsubject countries. As seen in table II-11, all U.S. producers and a majority of importers and purchasers reported that differences other than price between R-134a from different sources were sometimes or never significant in sales of the product. Some purchasers and importers, however, reported that such differences were always or frequently significant. Some purchasers noted that factors such as quality, lead time, local inventory, availability, risk in longer supply chains, and transportation network can differ between sources.

Table II-8
R-134a: Purchasers' comparisons between U.S.-produced and imported product

Factor	Number of firms reporting								
	United States vs. China			United States vs. nonsubject			China vs nonsubject		
	S	C	I	S	C	I	S	C	I
Availability	11	16	2	1	6	0	0	8	1
Delivery terms	13	15	0	3	3	0	0	7	1
Delivery time	24	3	1	5	2	0	1	5	3
Discounts offered	1	19	6	1	4	0	2	5	0
Extension of credit	5	21	1	2	4	0	1	5	2
Minimum quantity requirements	6	21	0	1	5	0	0	8	0
Packaging	4	24	0	1	6	0	0	9	0
Price[1]	1	7	20	1	2	4	3	4	2
Product consistency	5	23	0	1	6	0	0	8	1
Product range	6	19	2	1	5	0	0	8	0
Quality meets industry standards	2	27	0	1	6	0	0	9	0
Quality exceeds industry standards	4	25	0	1	6	0	0	9	0
Reliability of supply	8	19	1	1	6	0	0	9	0
Technical support/service	16	10	1	1	5	0	0	7	1
U.S. transportation costs[1]	11	16	0	3	3	0	0	7	1

[1] 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.

Table II-9
R-134a: Interchangeability between R-134a produced in the United States and in other countries, by country pairs

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. China	3	1	0	0	24	4	1	1	22	3	2	1
United States vs. Other	3	1	0	0	12	4	0	1	9	2	0	0
China vs. Other	3	1	0	0	11	4	0	1	9	1	0	1

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

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

Table II-10
R-134a: Ability to meet minimum quality specifications, by source[1]

Source	Always	Usually	Sometimes	Rarely or never
United States	31	2	1	0
China	21	3	0	2
Other	5	1	0	0

[1] Purchasers were asked how often domestically produced or imported R-134a meets minimum quality specifications for their own or their customers' uses.

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

Table II-11
R-134a: Significance of differences other than price between R-134a produced in the United States and in other countries, by country pairs

	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. China	0	0	3	1	6	3	9	12	10	2	9	8
United States vs. Other	0	0	3	1	3	2	4	7	3	2	4	4
China vs. Other	0	0	2	1	2	2	3	7	2	3	2	4

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

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

*** stated that the advantages of domestic suppliers include quality assurances, full product offerings including HFO refrigerants, and availability of product. *** stated that Chinese transportation network and associated costs are significant factors. On the other hand, *** stated the domestic and Chinese products are comparable in quality, so price is usually the deciding factor, and *** stated that R-134a has become a commodity and that its customers do not care about the source of the product.

ELASTICITY ESTIMATES

This section discusses elasticity estimates. Parties did not comment on these estimates.

U.S. supply elasticity

The domestic supply elasticity[58] for R-134a measures the sensitivity of the quantity supplied by U.S. producers to changes in the U.S. market price of R-134a. 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 R-134a. Analysis of these factors earlier indicates that the U.S. industry has the ability to moderately increase or decrease shipments to the U.S. market; an estimate in the range of 3 to 6 is suggested.

U.S. demand elasticity

The U.S. demand elasticity for R-134a measures the sensitivity of the overall quantity demanded to a change in the U.S. market price of R-134a. This estimate depends on factors discussed earlier such as the existence, availability, and commercial viability of substitute products, as well as the component share of R-134a in the production of any downstream products. Based on the available information, the aggregate demand for R-134a is likely to be inelastic; a range of -0.25 to -0.75 is suggested.

Substitution elasticity

The elasticity of substitution depends upon the extent of product differentiation between the domestic and imported products.[59] Product differentiation, in turn, depends upon such factors as quality (e.g., chemistry, appearance, 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 R-134a and imported R-134a is likely to be in the range of 3 to 5.

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[58] A supply function is not defined in the case of a non-competitive market.

[59] 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 three firms that accounted for all U.S. production of R-134a in 2015.

U.S. PRODUCERS

The Commission issued a U.S. producer questionnaire to three firms based on information contained in the petition. All three firms provided useable data on their productive operations.[1] Staff believes that these responses represent 100 percent of U.S. production of R-134a. Table III-1 lists U.S. producers of R-134a, their production locations, positions on the petition, and shares of total production.

Table III-1
R-134a: U.S. producers of R-134a, their positions on the petition, production locations, and share of reported production, 2015

Firm	Position on petition	Production location	Share of production (percent)
Arkema	Support	Calvert City, KY	***
Chemours	Support	Corpus Christi, TX	***
Mexichem	Support	St. Gabriel, LA	***
Total			100.0

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

Table III-2 presents information on U.S. producers' ownership, and related and/or affiliated firms.

Table III-2
R-134a: U.S. producers of R-134a, ownership, related and/or affiliated firms, since January 2013

* * * * * * *

As discussed in greater detail below, *** U.S. producers directly import R-134a from China and *** U.S. producers directly import R-134a from nonsubject sources.

[1] In addition, the Commission received a U.S. producer response from Honeywell, ***.

Producers were asked to report any changes in operations since January 2013. All three firms reported prolonged shutdowns or production curtailments. Table III-3 presents producer responses.

Table III-3
R-134a: U.S. producers' reported changes in operations, since January 1, 2013

* * * * * * *

U.S. PRODUCTION, CAPACITY, AND CAPACITY UTILIZATION

Table III-4 and figure III-1 present U.S. producers' production, capacity, and capacity utilization. Total U.S. producers' capacity and production decreased by 23.0 percent and 27.8 percent, respectively, from 2013 to 2015, but were both higher in January-September 2016 than in January-September 2015. Most of the change in capacity and production from 2013 to 2014 and 2014 to 2015 was the result of ***.[2] This also resulted in higher capacity and production in January to September 2016 than in January to September 2015. Capacity utilization ranged from 82.0 percent to 89.5 percent from 2013 to 2015 and was lower in January to September 2016 than in January to September 2015.

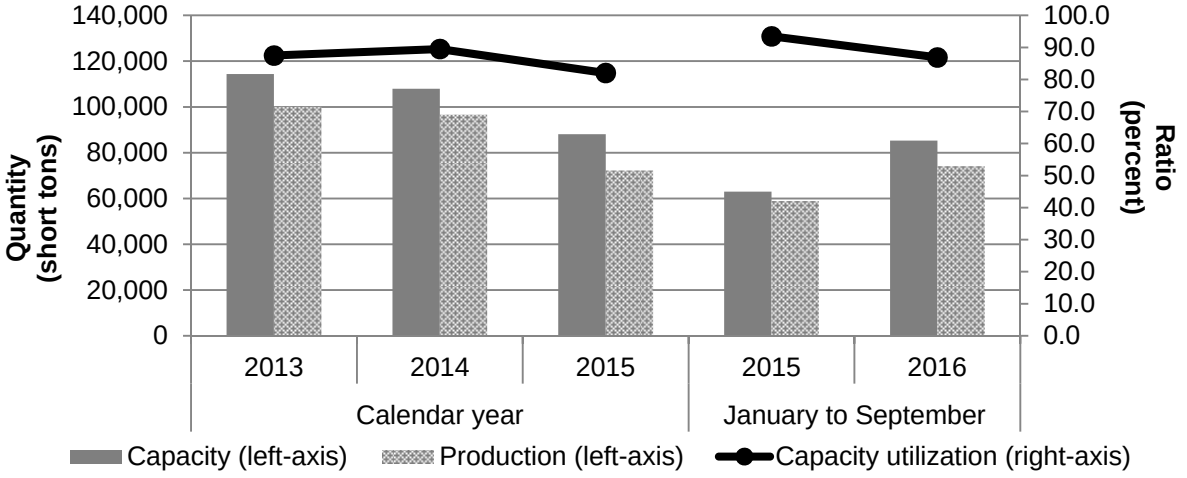
Table III-4
R-134a: U.S. producers' production, capacity, and capacity utilization, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Capacity (short tons)				
Arkema	***	***	***	***	***
Chemours	***	***	***	***	***
Mexichem	***	***	***	***	***
Total capacity	114,363	107,925	88,078	62,955	85,301
	Production (short tons)				
Arkema	***	***	***	***	***
Chemours	***	***	***	***	***
Mexichem	***	***	***	***	***
Total production	100,031	96,586	72,223	58,848	74,101
	Ratio (percent)				
Arkema	***	***	***	***	***
Chemours	***	***	***	***	***
Mexichem	***	***	***	***	***
Average capacity utilization	87.5	89.5	82.0	93.5	86.9

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

[2] See *Part VI* for more details.

Figure III-1
R-134a: U.S. producers' production, capacity, and capacity utilization, 2013-15, January to September 2015, and January to September 2016



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

Arkema's production capacity was calculated ***. Arkema's ***.[3]

Chemours' capacity was calculated ***. Chemours explained that its capacity ***.[4]

Mexichem calculated ***. Mexichem reported ***.[5]

The Commission asked the domestic producers to report constraints on their capacity to produce R-134a. Arkema stated that ***. Chemours stated that ***. Mexichem added that its capacity ***.

*** U.S. producers reported that they cannot switch production between R-134a and other production using the same equipment and labor. Chemours reported ***.[6]

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

Table III-5 presents U.S. producers' U.S. shipments, export shipments, and total shipments. The quantity of U.S. producers' U.S. shipments decreased from 2013 to 2015 by 17.7 percent, while the value decreased by 28.1 percent. ***, reported an increase in U.S. shipments of R-134a from 2013 to 2015 by *** percent and had higher U.S. shipments in January to September 2016 than in January to September 2015. *** reported declines in their

[3] *Investigation No. 731-TA-1313 (Preliminary): 1,1,1,2-Tetrafluoroethane (R-134a) from China*--Staff Report, INV-OO-029, April 11, 2016, p. III-5.

[4] Chemours ***. Ibid.

[5] Mexichem replaces its catalyst every three years, resulting in a 45-day shutdown. Its last catalyst change shutdown occurred in the fall of 2015. *1,1,1,2-Tetrafluoroethane (R-134a) from China, Inv. No. 731-TA-1313 (Preliminary)*, Publication 4606, April 2016, p. III-2.

[6] ***.

U.S. shipments of R-134a from 2013 to 2015, by ***. For January to September 2016, ***'s U.S. shipments were lower than in January to September 2015 while ***'s U.S. shipments were much higher. The unit values of U.S. shipments also decreased by 12.6 percent from 2013 to 2015. U.S. producers reported exporting to ***. The quantity of export shipments decreased by *** percent from 2013 to 2015.

Table III-5
R-134a: U.S. producers' U.S. shipments, export shipments, and total shipments, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Quantity (short tons)				
U.S. shipments	65,477	68,612	53,890	43,424	56,340
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***
	Value (1,000 dollars)				
U.S. shipments	307,061	302,126	220,908	173,640	219,968
Export shipments	***	***	***	***	***
Total shipments	***	***	***	***	***
	Unit value (dollars per short ton)				
U.S. shipments	4,690	4,403	4,099	3,999	3,904
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

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

In addition, Honeywell ***. The tabulation below presents ***.

* * * * * * *

U.S. PRODUCERS' INVENTORIES

Table III-6 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. U.S. producers' inventories of R-134a increased by 13.9 percent from 2013 to 2015 but were lower in January-September 2016 than in January-September 2015. *** experienced a decline in its inventories from 2013 to 2015, by *** percent, while *** reported increasing inventories, by ***. By quantity, *** held the largest inventory of R-134a (*** short tons) in 2015. Inventories relative to U.S. shipments increased by 5.1 percentage points from 2013 to 2015, while inventories relative to total shipments increased by *** percentage points.

Table III-6
R-134a: U.S. producers' inventories, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Quantity (short tons)				
U.S. producers' end-of-period inventories	8,632	7,811	9,831	10,589	8,066
	Ratio (percent)				
Ratio of inventories to.--					
U.S. production	8.6	8.1	13.6	13.5	8.2
U.S. shipments	13.2	11.4	18.2	18.3	10.7
Total shipments	***	***	***	***	***

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

U.S. PRODUCERS' IMPORTS

U.S. producers' direct imports of R-134a are presented in table III-7. No U.S. producer reported direct imports of R-134a from China. ***. ***.

Table III-7
R-134a: U.S. producers' direct imports, 2013-15, January to September 2015, and January to September 2016

* * * * * * *

U.S. EMPLOYMENT, WAGES, AND PRODUCTIVITY

Table III-8 shows U.S. producers' employment-related data. The level of production-related workers (PRWs) remained almost constant from 2013 to 2015 and was one less in January-September 2016 than in January-September 2015. Although production declined from 2013 to 2015, industry witnesses testified at the hearing that the same number of employees is needed to operate the R-134a plants, regardless of whether the plant is running at 100 percent or 50 percent capacity.[7] In addition, U.S. producers stated that they utilize a long term strategy in this market and do not lay off PRWs due to declines in production without much consideration.[8] They added that R-134a plants employ workers who are highly skilled, with training and development of PRWs taking over two years.[9] Hours worked per PRW increased slightly from 2013 to 2015 by 2.0 percent, but was slightly lower in January-September 2016 than in January-September 2015. Total wages paid increased by 7.5 percent, while productivity declined by 27.8 percent from 2013 to 2015. ***.

Table III-8
R-134a: U.S. producers' employment related data, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
Production and related workers (PRWs) (number)	209	209	205	206	205
Total hours worked (1,000 hours)	486	487	486	361	358
Hours worked per PRW (hours)	2,325	2,330	2,371	1,752	1,746
Wages paid ($1,000)	19,111	19,809	20,553	14,999	15,358
Hourly wages (dollars per hour)	$39.32	$40.68	$42.29	$41.55	$42.90
Productivity (short tons per 1,000 hours)	205.8	198.3	148.6	163.0	207.0
Unit labor costs (dollars per short tons)	$191	$205	$285	$255	$207

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

[7] Hearing transcript, p. 78 (Pacillo).
[8] Hearing transcript, p. 78 (Pacillo), p. 79 (Rowe), and p. 79 (Buterbaugh).
[9] Ibid.

PART IV: U.S. IMPORTS, APPARENT U.S. CONSUMPTION, AND MARKET SHARES

U.S. IMPORTERS

The Commission issued importer questionnaires to 66 firms believed to be importers of R-134a, as well as to all U.S. producers of R-134a.[1] Usable questionnaire responses were received from 33 firms, of which 29 reported imports of R-134a from China and nine reported imports from other sources.[2] [3] Table IV-1 lists all responding U.S. importers of R-134a from China and other sources, their headquarters, and their shares of U.S. imports, in 2015.[4] Eight responding importers of R-134a had no imports in 2015 but reported imports in 2013 or 2014.

[1] The Commission issued questionnaires to those firms identified in the petition, along with firms that, based on reviews of data provided by U.S. Customs and Border Protection ("Customs") and the record in the preliminary phase of this investigation that may have accounted for more than one percent of total imports under HTS statistical reporting number 2903.39.2020 in 2015.

[2] The Commission received one unusable response from ***.

[3] For data on the share of responding U.S. importers' U.S. imports from China, please refer to *Part I*, "Summary Data and Data Sources."

[4] Data from the preliminary phase of this investigation included responses of 30 importers, including ***'s incorrect submission. In the final phase of this investigation, the same 30 responding importers from the preliminary also submitted U.S. importers questionnaires and the Commission received four new U.S. importer questionnaires from ***. Because of the unusable data from ***, four new responding importers, and data revisions by several importers that reported different data in the preliminary phase, data in the final phase will differ from the data in the preliminary phase of this investigation.

Table IV-1
R-134a: U.S. importers, their headquarters, and share of total imports by source, 2015

Firm	Headquarters	Share of imports by source (percent)		
		China	All other sources	Total imports
Advance Stores	Roanoke, VA	***	***	***
A-Gas	Magnolia, TX	***	***	***
Arkema	King of Prussia, PA	***	***	***
Autopart	Norton, MA	***	***	***
AutoZone	Memphis, TN	***	***	***
BBC Biochemical	Mount Vernon, WA	***	***	***
BMP[1]	Tampa, FL	***	***	***
CRC	Warminster, PA	***	***	***
Diversified	Rhome, TX	***	***	***
DYK	Memphis, TN	***	***	***
FCI	Glen Rock, NJ	***	***	***
Foosung	Cleveland, TN	***	***	***
FSD	Doral, FL	***	***	***
Galpa	Doral, FL	***	***	***
GM	Detroit, MI	***	***	***
GSK	Philadelphia, PA	***	***	***
Hudson	Pearl River, NY	***	***	***
ICOR	Indianapolis, IN	***	***	***
Kivlan	Mechanicsburg, PA	***	***	***
Mexichem	St. Gabriel, LA	***	***	***
Mondy	San Antonio, TX	***	***	***
National	Philadelphia, PA	***	***	***
Old World	Northbrook, IL	***	***	***
O'Reilly	Springfield, MO	***	***	***
Rig Tough	San Antonio, TX	***	***	***
Solvay	Houston, TX	***	***	***
Technical Chemical	Cleburne, TX	***	***	***
Tulstar	Tulsa, OK	***	***	***
USA Refrigerants	Sarasota, FL	***	***	***
VGT	Decatur, AL	***	***	***
Walmart[2]	Bentonville, AR	***	***	***
Wego	Great Neck, NY	***	***	***
Weitron	Newark, DE	***	***	***
Total		***	***	***

[1] BMP's questionnaire ***.
[2] Walmart's questionnaire ***.

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

U.S. IMPORTS FROM CHINA

Table IV-2 and figure IV-1 present data for U.S. imports of R-134a from China and all other sources from 2013 to September 2016.[5] U.S. import data are based on official Customs import data, HTS statistical reporting number 2903.39.2020, adjusted with imports reported in questionnaire responses that entered the United States under HTS numbers *other than* 2903.39.2020.[6] Six U.S. importers, ***,[7] imported R-134a using other statistical reporting numbers in 2013. Three U.S. importers, ***, imported R-134a using other statistical reporting numbers in 2014. One responding U.S. importer *** reported importing *** of R-134a from China in 2015 using other statistical reporting number 2903.39.2050.[8] No responding U.S. importer reported imports of R-134a using other statistical reporting numbers in interim January-September 2016.

*** were the three largest importers of R-134a from China in 2015. The quantity of imports from China decreased by 3.0 percent from 2013 to 2015 but was much higher in January to September 2016 than in January to September 2015.[9] The value of imports from China decreased by 10.7 percent from 2013 to 2015 but was much higher in January to September 2016 than in January to September 2015.

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[5] Starting in April 2014, U.S. imports of R-134a from China were temporarily subject to antidumping duty margins and countervailable subsidy rates from previous investigations. These margins and rates on R-134a from China were no longer in effect after the Commission determined that imports of R-134a from China did not materially injure or threaten to materially injure the domestic industry. *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final*), USITC Publication 4503, December 2014.

[6] For 2013, data for *** were adjusted by taking the total reported U.S. imports from China in questionnaire responses and subtracting the entries of R-134a from China imported by *** under the correct statistical reporting number 2903.39.2020 for R-134a in proprietary Customs data to avoid double-counting.

[7] In the preliminary phase of this investigation, ***.

[8] The other statistical reporting numbers used to import R-134a were 2903.39.2030 and 2903.39.2050. Three firms further explained that these misreporting were the result of errors made by customs brokers, ***. Effective January 1, 2016, statistical reporting number 2903.39.2030 was removed from the HTS.

[9] Imports of R-134a from China were temporarily subject to antidumping and countervailing bonding requirements in 2014. *1,1,1,2-Tetrafluoroethane from China: Determinations*, 79 FR 73102, December 9, 2014 and *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final*), USITC Publication 4503, December 2014.

Table IV-2

R-134a: U.S. imports, by source, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016[1]
	Quantity (short tons)				
U.S. imports from.--China	15,900	11,916	15,429	12,361	24,953
All other sources	838	3,820	1,135	933	1,011
All import sources	16,738	15,736	16,564	13,294	25,963
	Value (1,000 dollars)				
U.S. imports from.--China	56,860	39,421	50,760	41,337	96,943
All other sources	5,764	17,415	8,071	6,666	6,200
All import sources	62,624	56,836	58,830	48,003	103,143
	Unit value (dollars per short ton)				
U.S. imports from.--China	3,576	3,308	3,290	3,344	3,885
All other sources	6,878	4,559	7,111	7,146	6,135
All import sources	3,741	3,612	3,552	3,611	3,973
	Share of quantity (percent)				
U.S. imports from.--China	95.0	75.7	93.1	93.0	96.1
All other sources	5.0	24.3	6.9	7.0	3.9
All import sources	100.0	100.0	100.0	100.0	100.0
	Share of value (percent)				
U.S. imports from.--China	90.8	69.4	86.3	86.1	94.0
All other sources	9.2	30.6	13.7	13.9	6.0
All import sources	100.0	100.0	100.0	100.0	100.0
	Ratio to U.S. production				
U.S. imports from.--China	15.9	12.3	21.4	21.0	33.7
All other sources	0.8	4.0	1.6	1.6	1.4
All import sources	16.7	16.3	22.9	22.6	35.0

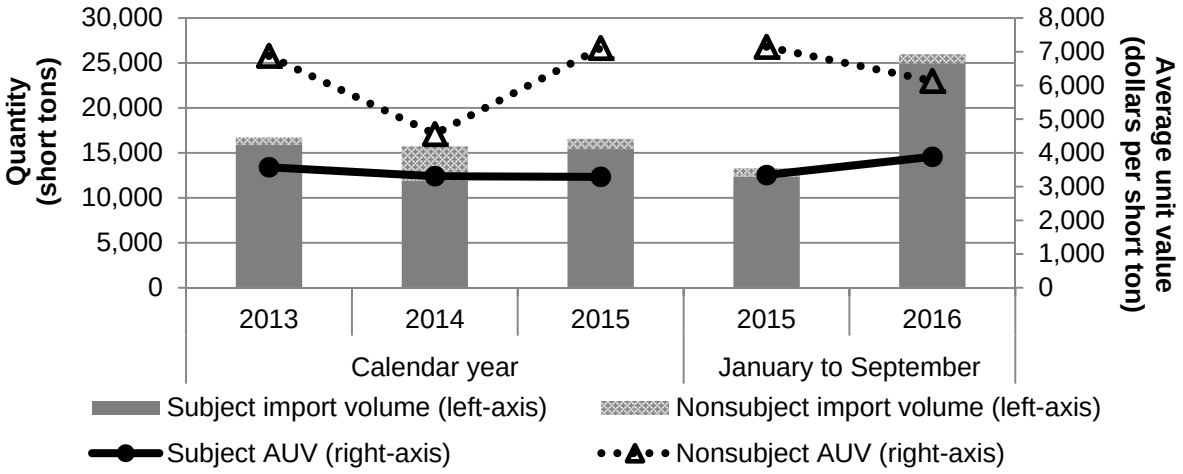
[1] Based on official Commerce statistics, imports of R-134a in calendar year 2016 were 25,516 short tons from China and 2,018 short tons from non-Chinese sources, with total U.S. imports of 27,534 short tons from all import sources.

Note.--Staff notes that ***. Staff further notes that ***.

Source: Official Commerce statistics under HTS statistical reporting number 2903.39.2020, accessed December 20, 2016, data submitted in response to Commission questionnaires reported in the “other HTS” category, and adjusted proprietary Customs data for *** in 2013.

Figure IV-1

R-134a: U.S. import volumes and prices, 2013-15, January to September 2015, and January to September 2016



Source: Official Commerce statistics under HTS statistical reporting number 2903.39.2020, accessed December 20, 2016, and data submitted in response to Commission questionnaires (adjusted with proprietary Customs data for *** in 2013).

U.S. IMPORTS FROM NONSUBJECT COUNTRIES

Table IV-3 presents U.S. imports of R-134a from all sources other than China based on official Commerce statistics. The top nonsubject sources of U.S. imports in 2015 were the United Kingdom, India, France, and Germany.

Table IV-3

R-134a: U.S. imports from nonsubject sources, by country, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Quantity (short tons)				
Nonsubject U.S. imports.--United Kingdom	643	604	648	469	426
India	20	88	284	284	526
France	0	497	85	85	13
Germany	80	1,985	71	71	0
Singapore	14	6	27	15	13
Hong Kong	0	0	11	0	15
Italy	19	17	7	7	0
Canada	10	5	3	2	5
Japan	0	398	0	0	0
Belgium	0	195	0	0	0
Dominican Republic	0	1	0	0	0
Korea	0	0	0	0	4
Mexico	0	0	0	0	8
Netherlands	7	9	0	0	0
Portugal	0	3	0	0	0
Russia	44	12	0	0	0
All nonsubject sources	838	3,820	1,135	933	1,011
	Share of total U.S. imports (percent)				
Nonsubject U.S. imports.--United Kingdom	3.8	3.8	3.9	3.5	1.6
India	0.1	0.6	1.7	2.1	2.0
France	---	3.2	0.5	0.6	0.1
Germany	0.5	12.6	0.4	0.5	0.0
Singapore	0.1	0.0	0.2	0.1	0.1
Hong Kong	---	---	0.1	---	0.1
Italy	0.1	0.1	0.0	0.0	---
Canada	0.1	0.0	0.0	0.0	0.0
Japan	0.0	2.5	0.0	0.0	0.0
Belgium	---	1.2	---	---	---
Dominican Republic	---	0.0	---	---	---
Korea	---	---	---	---	0.0
Mexico	---	---	---	---	0.0
Netherlands	0.0	0.1	---	---	---
Portugal	---	0.0	---	---	---
Russia	0.3	0.1	---	---	---
All nonsubject sources	5.0	24.3	6.9	7.0	3.9

Source: Official Commerce statistics under HTS statistical reporting number 2903.39.2020, accessed December 20, 2016.

CRITICAL CIRCUMSTANCES

On March 1, 2017, Commerce issued its final determination that "critical circumstances" exist with regard to imports from China of R-134a for the non-individually examined respondents and the PRC-wide entity, but do not exist with regard to imports from mandatory respondent, Sanmei.[10] [11] In this investigation, if both Commerce and the Commission make affirmative final critical circumstances determinations, certain subject imports may be subject to antidumping duties retroactive by 90 days from October 7, 2016, the effective date of Commerce's preliminary affirmative LTFV determination. Table IV-4 presents monthly U.S. imports subject to Commerce's preliminary affirmative critical circumstance determination. Table IV-5 presents U.S. importers' reported end-of-period inventories from China in September 2015 and September 2016. Inventories held by U.S. importers that imported all of their 2015-16 volume from exporters other than Sanmei were *** short tons in September 2015 and *** short tons in September 2016.

Table IV-4
R-134a: U.S. imports from China subject to Commerce's critical circumstances findings, September 2015 through August 2016

* * * * * * *

Figure IV-2
R-134a: Monthly U.S. imports for Commerce's affirmative critical circumstance findings for China, September 2015 through August 2016

* * * * * * *

Table IV-5
R-134a: U.S. importers' end-of-period inventories, September 2016 and September 2017

* * * * * * *

[10] *1,1,1,2 Tetrafluoroethane (R-134a) from the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Affirmative Determination of Critical Circumstances, in Part*, 82 FR 12192, March 1, 2017. When petitioners file timely allegations of critical circumstances, Commerce examines whether there is a reasonable basis to believe or suspect that (1) either there is a history of dumping and material injury by reason of dumped imports in the United States or elsewhere of the subject merchandise, or the person by whom, or for whose account, the merchandise was imported knew or should have known that the exporter was selling the subject merchandise at LTFV and that there was likely to be material injury by reason of such sales; and (2) there have been massive imports of the subject merchandise over a relatively short period.

[11] Sanmei is a producer and exporter of R-134a in China. For 2015, Sanmei was ***. See *Part VII* for more information on Sanmei.

Weitron testified at the hearing that critical circumstances do not exist for imports of R-134a from China, arguing that its imports during the critical circumstance period were due to the seasonal nature of R-134a. It stated that its imports during this period were "typical" of its purchasing,[12] inventory, and selling[13] activities from year to year. It testified that the large volume of imports in the first quarter of 2016 were orders placed before the petition was filed in March 2016 and that the increase in the second quarter of 2016 were the result of prices increasing "substantially" after the filing of the petition.[14]

NEGLIGIBILITY

The statute requires that an investigation be terminated without an injury determination if imports of the subject merchandise are found to be negligible.[15] Negligible imports are generally defined in the Tariff Act of 1930, 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.[16] Imports from China accounted for 94.7 percent of total imports of R-134a by quantity from March 2015 to February 2016.[17]

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[12] Weitron testified that it purchased R-134a at a price that is 70 percent higher in January 2017 than in February 2016 from the same vendor. Hearing transcript, pp. 135-136 (Dayton).

[13] Weitron stated that "in 2016 over 61 percent of our sales in 134a in 30 pound cylinders were sold in the four months February through May, while only four percent of the same product in the four months September through December. Given the instantaneous demand that occurs in our business, I regularly purchase large amounts of product in the several 21 months preceding the season, in order to be able to satisfy our customer demand." Weitron stated that it actually imported less Chinese material during the full year 2016 compared to full year 2015 and full year 2014, by 29 percent less in 2016 compared to 2015. Hearing transcript, pp. 134-135 (Dayton).

[14] Hearing transcript, pp. 136-137 (Dayton).

[15] 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)).

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

[17] Monthly import data for 2015 and 2016 are believed to be mostly reliable. *** was reported by one U.S. importer, ***, in 2015. No U.S. importer reported misreporting imports of R-134a from China in January-September 2016.

APPARENT U.S. CONSUMPTION AND MARKET SHARES

Table IV-6 and figure IV-3 present data on apparent U.S. consumption and U.S. market shares for R-134a. From 2013 to 2015, apparent consumption decreased by both quantity and value, 14.3 percent and 24.3 percent, respectively.[18] For the interim period, apparent consumption measured by both value and quantity was higher in January to September 2016 than in January to September 2015. U.S. producers' share of U.S. consumption, based on quantity, decreased from 2013 to 2015 by 3.2 percentage points and was lower in January to September 2016 than in January to September 2015. The market share of imports of R-134a from China increased by 2.6 percentage points and imports of R-134a from nonsubject sources increased by 0.6 percentage points from 2013 to 2015. Market share of imports from China was higher in January to September 2016 than in January to September 2015 while the market share of imports from nonsubject sources was lower.[19]

[18] Petitioners' witnesses at the hearing testified that demand did not actually decline from 2013 to 2015. They stated that imports and shipments may have declined due to inventory buildup by purchasers and end users in 2014 as a result of the temporary duties on R-134a from China in 2014, and that R-134a held in inventory were later consumed in 2015. Hearing transcript, p. 100 (Geosits) and p. 101 (Haun).

[19] See table E-9 for total shipments, and shares of total shipments, by source. Total shipment data diverge from apparent U.S. consumption (based on imports) in January-September 2016, consistent with rising importer inventory levels during that period.

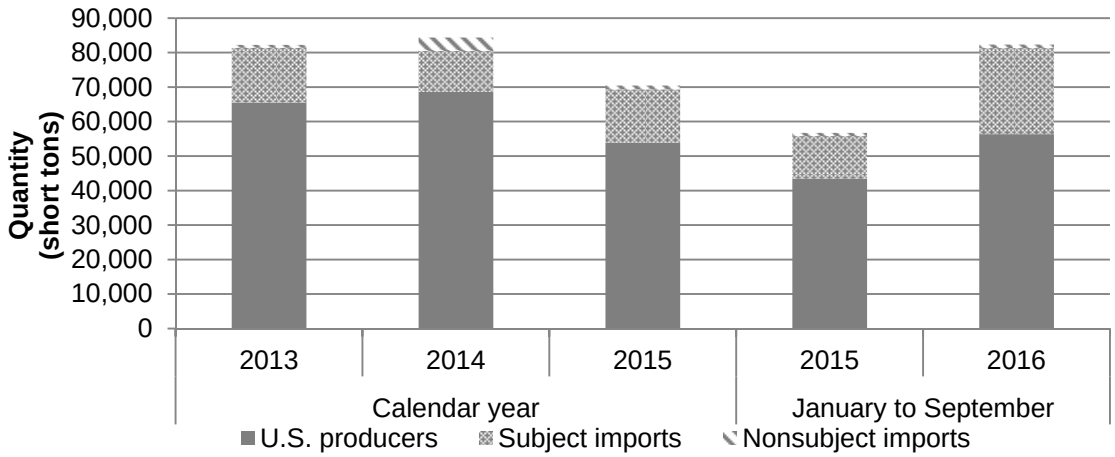
Table IV-6
R-134a: Apparent U.S. consumption and market shares, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Quantity (short tons)				
U.S. producers' U.S. shipments	65,477	68,612	53,890	43,424	56,340
U.S. imports from.--					
China	15,900	11,916	15,429	12,361	24,953
All other sources	838	3,820	1,135	933	1,011
Total U.S. importers' U.S. shipments	16,738	15,736	16,564	13,294	25,963
Apparent U.S. consumption	82,215	84,348	70,454	56,718	82,303
	Value (1,000 dollars)				
U.S. producers' U.S. shipments	307,061	302,126	220,908	173,640	219,968
U.S. imports from.--					
China	56,860	39,421	50,760	41,337	96,943
All other sources	5,764	17,415	8,071	6,666	6,200
Total U.S. importers' U.S. shipments	62,624	56,836	58,830	48,003	103,143
Apparent U.S. consumption	369,685	358,962	279,738	221,643	323,111
	Share of quantity (percent)				
U.S. producers' U.S. shipments	79.6	81.3	76.5	76.6	68.5
U.S. imports from.--					
China	19.3	14.1	21.9	21.8	30.3
All other sources	1.0	4.5	1.6	1.6	1.2
Total U.S. importers' U.S. shipments	20.4	18.7	23.5	23.4	31.5
	Share of value (percent)				
U.S. producers' U.S. shipments	83.1	84.2	79.0	78.3	68.1
U.S. imports from.--					
China	15.4	11.0	18.1	18.7	30.0
All other sources	1.6	4.9	2.9	3.0	1.9
Total U.S. importers' U.S. shipments	16.9	15.8	21.0	21.7	31.9

Source: Official Commerce statistics under HTS statistical reporting number 2903.39.2020, accessed December 20, 2016, and data submitted in response to Commission questionnaires (adjusted with proprietary Customs data for *** in 2013).

Figure IV-3

R-134a: Apparent U.S. consumption, 2013-15, January to September 2015, and January to September 2016



Source: Official Commerce statistics under HTS statistical reporting number 2903.39.2020, accessed December 20, 2016, and data submitted in response to Commission questionnaires (adjusted with proprietary Customs data for *** in 2013).

U.S. PRODUCERS AND IMPORTERS' U.S. SHIPMENTS BY APPLICATION

Table IV-7 presents U.S. producers' and Honeywell's U.S. shipments by application. Producers identified "other" applications as ***, sales to co-producers, ***, ***, and ***. The automotive aftermarket constituted the largest share of U.S. shipments of R-134a by both quantity and value.[20] [21] Unit values were mixed, with stationary OEMs having the highest unit values in 2013 and 2014 while stationary aftermarket had the highest unit values in 2015 and other and unknown markets had the highest unit values in interim January-September 2016. Overall, the unit values of R-134a declined steadily from 2013 to 2015 and were lower in January-September 2016 than in January-September 2015.

Table IV-7

R-134a: U.S. producers' and Honeywell's U.S. shipments by application, 2013-15, January to September 2015, and January to September 2016

* * * * * * *

[20] Arkema experienced ***. Arkema explained that ***. William Williams, Regional Finance Director, Arkema, email message to USITC staff, February 28, 2017.

[21] Mexichem experienced ***. Mexichem explained that ***. Mexichem further explained that ***. Peter Geosits, Commercial Director, Mexichem, email message to USITC staff, February 28, 2017.

U.S. shipments of imports from China by application are presented in table IV-8, and U.S. shipments of imports from all other sources by application are presented in table IV-9. The vast majority, ranging from 81 to 93 percent, of imports of R-134a from China were used in the automotive aftermarket[22] while much larger share of nonsubject imports were used in the other and unknown category, primarily for pharmaceutical and medicinal purposes. A small amount, less than three percent, of imports of R-134a from China were used in the other and unknown category. Table IV-10 presents U.S. shipments of imports by application from all sources. When all U.S. shipments of imports are combined, the automotive aftermarket is the top market for imports of R-134a, driven by imports of R-134a from China.

Table IV-8

R-134a: U.S. importers' U.S. shipments of imports from China by application, 2013-15, January to September 2015, and January to September 2016

* * * * * * *

Table IV-9

R-134a: U.S. importers' U.S. shipments of imports from all other sources by application, 2013-15, January to September 2015, and January to September 2016

* * * * * * *

Table IV-10

R-134a: U.S. importers' U.S. shipments of imports from all sources by application, 2013-15, January to September 2015, and January to September 2016

* * * * * * *

Table IV-11 presents U.S. shipments of R-134a by application from domestic production and all imports. When all U.S. shipments by application are combined, the automotive aftermarket is the largest application for R-134a.

[22] One importer, Weitron, testified that for imports of R-134a in 30-lb cylinders from China, it is clear which application the imports are intended for based on the type of valve on the cylinder—HVAC or auto valve. Hearing transcript, p. 167 (Dayton).

Table IV-11

R-134a: U.S. producers' and importers' U.S. shipments of imports from all sources by application, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Quantity (short tons)				
U.S. producers' U.S. shipments to:					
Automotive OEM	***	***	***	***	***
Automotive aftermarket	***	***	***	***	***
Total automotive	***	***	***	***	***
Stationary OEM	***	***	***	***	***
Stationary aftermarket	***	***	***	***	***
Total stationary	***	***	***	***	***
Foam expansion and propellant	***	***	***	***	***
Other and unknown	***	***	***	***	***
Overall U.S. producers' shipments	***	***	***	***	***
	Quantity (short tons)				
U.S. importers' U.S. shipments to:					
Automotive OEM	***	***	***	***	***
Automotive aftermarket	***	***	***	***	***
Total automotive	***	***	***	***	***
Stationary OEM	***	***	***	***	***
Stationary aftermarket	***	***	***	***	***
Total stationary	***	***	***	***	***
Foam expansion and propellant	***	***	***	***	***
Other and unknown	***	***	***	***	***
Overall U.S. importers' shipments	***	***	***	***	***
	Total quantity (short tons)				
U.S. producers and importers' U.S. shipments to:					
Automotive OEM	8,668	8,712	8,455	6,438	5,966
Automotive aftermarket	31,360	35,997	24,234	20,815	39,142
Total automotive	40,028	44,709	32,689	27,253	45,108
Stationary OEM	2,298	2,017	1,939	1,503	1,155
Stationary aftermarket	4,708	3,880	4,191	3,245	3,534
Total stationary	7,006	5,897	6,130	4,748	4,689
Foam expansion and propellant	13,871	14,396	13,441	10,627	9,649
Other and unknown	17,224	15,282	16,586	13,042	14,288
Overall U.S. shipments	78,129	80,284	68,846	55,670	73,734

Table continued.

Table IV-11--Continued

R-134a: U.S. producers' and importers' U.S. shipments of imports from all sources by application, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Share of total quantity (percent)				
U.S. producers and importers' U.S. shipments to:					
Automotive OEM	11.1	10.9	12.3	11.6	8.1
Automotive aftermarket	35.9	44.8	35.2	37.4	53.1
Total automotive	51.2	55.7	47.5	49.0	61.2
Stationary OEM	2.9	2.5	2.8	2.7	1.6
Stationary aftermarket	6.0	4.8	6.1	5.8	4.8
Total stationary	9.0	7.3	8.9	8.5	6.4
Foam expansion and propellant	17.8	17.9	19.5	19.1	13.1
Other and unknown	22.0	19.0	24.1	23.4	19.4
Overall U.S. shipments	100.0	100.0	100.0	100.0	100.0

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

Table IV-12 presents U.S. producers and importers' U.S. shipments by size of the container in 2015 from domestic production, China, all other sources, and all imported sources combined. The vast majority of U.S. shipments were in bulk containers by U.S. producers in 2015.[23] For U.S. shipments of imports from China, the majority *** were sent to customers in 30-pound containers in 2015. For U.S. shipments from sources other than China, the majority *** percent were sent to customers in bulk sizes.

Table IV-12

R-134a: U.S. producers and importers' U.S. shipments, by size of container, 2015

* * * * * * *

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[23] ***.

PART V: PRICING DATA

FACTORS AFFECTING PRICES

Raw material costs

The primary raw materials used in the production of R-134a are hydrogen fluoride (HF) which is made from fluorspar, and a chlorocarbon, trichloroethylene (TCE) or perchloroethylene (PCE).[1] U.S. producers' ratio of raw materials to the total cost of goods sold decreased from 72.1 percent in 2013 to 60.2 percent in 2015, and was 62.0 percent in interim 2016 compared to 62.8 percent in interim 2015. On average, U.S. producers' unit raw material costs declined from January 2013-September 2016, although the pattern varied by firm (see Part VI).

U.S. producers' responses regarding changes in raw material prices varied. *** reported that raw material costs have been fairly stable since 2013. *** reported that raw materials prices declined along with oil prices, and *** reported that raw material prices have fluctuated. Importers' responses also varied, with 4 of 24 importers reporting increased raw material costs, 10 reporting no change, 9 reporting fluctuating costs, and 1 reporting decreased costs. At the hearing, petitioners stated that raw material prices have not affected prices for R-134a since fluorspar prices dropped to a low level in 2012 and have remained low since 2013.[2]

U.S. inland transportation costs

*** responding U.S. producers and almost all responding importers reported that they typically arrange transportation to their customers. U.S. producers reported that their U.S. inland transportation costs ranged from 4 to 5 percent while most importers reported costs ranging between 1 and 7 percent.[3]

PRICING PRACTICES

Pricing methods[4]

U.S. producers and importers reported using a variety of pricing methods (table V-1). U.S. producers reported using transaction-by-transaction negotiations, contracts, and price

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[1] *Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, p. V-1. TCE is used by *** and PCE is used by ***.

[2] Hearing transcript, pp. 105-108 (Buterbaugh, Geosits, Pacillo, and Carillo).

[3] ***. Seventeen importers reported 1 to 7 percent, and seven reported higher costs (14 to 100 percent).

[4] As noted in Part II, Honeywell's shipment information including pricing data and answers to market related questions are included with the U.S. producers in Parts II and V.

lists. Most importers (16 of 27) reported using transaction-by-transaction negotiations, and a smaller number of importers reported contracts, set price lists, and other methods.

Table V-1
R-134a: U.S. producers and importers reported price setting methods, by number of responding firms[1]

Method	U.S. producers	U.S. importers
Transaction-by-transaction	4	16
Contract	4	6
Set price list	3	4
Other	1	7
Responding firms	4	27

[1] The sum of responses down may not add up to the total number of responding firms as each firm was instructed to check all applicable price setting methods employed.

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

Petitioners stated that some distributors of Chinese refrigerants sell under uniform prices to all market segments, often via weekly or monthly price lists.[5] They reported that these price lists are referenced in the OEM bidding process since most customers, including OEMs with aftermarket service arms have access to these price lists.[6] According to petitioners, in some cases, the list price offered by distributors of Chinese R-134a in 30-pound cylinders is lower than domestic producers' selling price for bulk product.[7] Petitioners also report that some customers, including ***, are now using reverse auctions in their purchasing of R-134a.[8] AutoZone reported using reverse auctions *** to procure R-134a.[9]

As shown in table V-2, U.S. producers sold a much higher percentage of their R-134a via contracts than did importers of Chinese R-134a. About half of U.S. producers' sales in 2015 were on a spot or short-term contract basis and about half were through annual or longer-term contracts. Importers reported selling most of their R-134a in the spot market.

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[5] Conference transcript, pp. 20-21 (Haun). Petitioners also reported that Chinese prices for R-134a in 30-pound cylinders have affected prices for bulk R-134a. Petitioners also reported that importer ***. HFC Coalition's prehearing brief, p. 17.

[6] Conference transcript, p. 50 (Sassano); HFC Coalition's postconference brief, p. 7.

[7] Hearing transcript, p. 40 (Haun).

[8] Hearing transcript, p. 44 (Geosits). HFC Coalition's posthearing brief, exh. 1, pp. 17-20. Petitioners described reverse auctions as follows: "Typically, a purchaser will invite potential suppliers to participate in the auction by providing information on the product to be purchased and providing instructions on how to participate. Suppliers would then register for the auction, and place bids once the auction begins. Once a supplier places a bid price, it is able to see how its price ranks among other bidders and can lower its bid price to improve its rank. That is, price is the only information upon which bidders compete for position." HFC Coalition's posthearing brief, exh. 1, p. 17.

[9] Hearing transcript, pp. 128-129 (Lammers). ***. Respondents' posthearing brief, exh. 10. ***. HFC Coalition's posthearing brief, exh. 1, pp. 17-20.

Table V-2
R-134a: U.S. producers' and importers' shares of U.S. commercial shipments by type of sale, 2015

Item	U.S. producers	Subject U.S. importers
	Share (percent)	
Share of commercial U.S. shipments.-- Long-term contracts	***	0.3
Annual contract	***	10.3
Short-term contracts	***	17.0
Spot sales	***	72.5
Total	100.0	100.0

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

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

U.S. producers *** reported that their long-term contracts averaged *** years; ***. *** U.S. producers *** reported annual contracts. U.S. producers *** reported that their long term contracts *** and *** reported offering meet-or-release provisions under annual contracts.

Arkema negotiates annual or longer term contracts with set prices and quantities with many of its OEM and distributor customers, and almost all of its contracts have an immediate release clause.[10] OEM automotive producers generally purchase R-134a under annual or multi-year contracts, and receive bulk product on a just in time basis.[11] According to petitioners, automotive OEMs, as well as stationary OEMs, are aware of pricing in the aftermarket through their service arms and have used spot prices in the aftermarket to negotiate their contract prices.[12] Respondents assert that there is no record evidence that pricing in the automotive aftermarket adversely affect pricing of R-134a for HVAC or other applications.[13]

One purchaser reported that it purchases R-134a daily, 9 purchase weekly, 12 purchase monthly, 7 purchase quarterly, 2 purchase annually, and 7 reported purchasing at other frequencies. Most responding purchasers (31 of 38) reported that their purchasing frequency had not changed since 2013. Most responding purchasers contact 1 to 3 suppliers before making a purchase, although some firms contact more, for example *** reported contacting 5 to 10 suppliers.

Sales terms and discounts

*** U.S. producers and most importers (17 of 25) typically quote prices on a delivered basis. U.S. producer *** reported offering ***, *** reported ***, and *** reported ***.[14] Most

[10] Hearing transcript, p. 40 (Haun).
[11] Hearing transcript, p. 41 (Geosits).
[12] Hearing transcript, pp. 41-42, 94-95 (Geosits), pp. 94-96 (Haun), pp. 96-97 (Bachman).
[13] Respondent's posthearing brief, Answers to Commissioner questions, pp. 1-7.
[14] Petitioners stated that after the negative determination of the related investigations in 2014, customers approached the U.S. producers requesting refunds on price increases that they had already paid. Conference transcript, p. 11 (Cannon), pp. 31 and 70 (Geosits), p. 69 (Haun); HFC Coalition's

(*continued*...)

importers (17 of 27) reported no discount policy. Five importers reported offering quantity discounts, three reported total volume discounts, and five reported other types of discounts, including discounts for early payment, total value of the order, prices based on product mix, and discounts to meet competition. Importer *** reported offering some discounts based on total annual volume for its commercial accounts, ***.

*** U.S. producers *** reported offering sales terms of net 30 days, and *** also reported a variety of other sales terms. Fifteen of 26 responding importers reported sales terms of 30 days, two importers each reported offering sales terms of net 60 and 2/10 net 30, and eight importers also reported other sales terms.

Petitioners stated that Chinese producers will occasionally offer U.S. importers 365-day payment terms, and in at least one case did not require payment from a retailer until the retailer sold the 30-pound cylinders or 12-ounce cans of R-134a.[15]

Price leadership

Twenty-one of the 38 responding purchasers identified price leaders in the R-134a market, including U.S. producers Chemours (12 purchasers), Mexichem (5), and Arkema (5), and Honeywell (2), as well as importers and repackagers Weitron (4), Technical Chemical (3), and IDQ (2). Additional firms named as price leaders by one purchaser each were BMP, National, TT International, Bluestar Sinochem, Scningbo, Automart, and Airgas.

In describing the price leaders, *** stated that Arkema and Mexichem publish notices of price increases and decreases, and *** stated that Chemours is considered the market leader for U.S.-produced product. *** stated that it is *** and that the repackagers from which it purchases have provided letters that indicate that Mexichem and Chemours tend to be the leaders and initiate price changes within a few days of each other. It also stated that Bluestar and Sinochem are generally considered the benchmark for Chinese prices. *** stated that Weitron is a good indicator of upward and downward price trends, that Automart and Airgas exert downward pressure on prices, and that Mexichem attempts to raise prices. *** stated that BMP emails weekly price sheets offering very low prices and that these lists are distributed widely. *** stated that Chemours, Arkema, Honeywell, and *** frequently publish price changes and that there is industry-wide reaction to these price changes.

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 R-134a products shipped to unrelated U.S. customers during January 2013 to September 2016:

(…*continued*)
postconference brief, pp. 3, 27. As noted in Part II, Mexichem stated that it rebated *** to customers as a result of the 2014 negative determination. ***. Mexichem's posthearing brief, exh. 1. ***. ***. HFC Coalition's prehearing brief, exh. 2.

[15] HFC Coalition's prehearing brief, p. 10.

Product 1.-- R-134a in bulk sold to repackers and distributors;

Product 2.-- R-134a in 30-pound containers with an automotive valve sold to distributors;

Product 3.-- R-134a in 30-pound containers with an HVAC valve sold to distributors or wholesalers;

Product 4.-- R-134a in 30-pound containers with an automotive valve sold to retailers;

Product 5.-- R-134a in 12-ounce containers sold to distributors.

Three U.S. producers and Honeywell, and 18 importers provided usable pricing data for sales of the requested products, although not all firms reported pricing for all products for all quarters.[16] Pricing data reported by these firms accounted for approximately 38.2 percent of reported U.S. producers' shipments of R-134a and 82.5 percent of reported U.S. shipments of subject imports from China in 2015.[17]

Price data for products 1-5 are presented in tables V-3 to V-7 and figures V-1 to V-5. The quantity of sales varied greatly by product. Product 1 was by far the largest volume pricing product for U.S. producers, accounting for *** percent of the total volume of pricing data for U.S. produced-product, followed by product 2 (*** percent), and products 3-5 (*** percent each). For importers, product 1 accounted for a smaller percentage (*** percent) since many firms import this bulk product directly from China and do not resell it in bulk form (see section on direct imports). Product 2 was the largest volume product for subject import sales (*** percent), and products 3, 4, and 5, accounted for *** percent, respectively.

Table V-3
R-134a: Weighted-average f.o.b. prices and quantities of domestic and imported product 1 and margins of underselling/(overselling), by quarters, January 2013-September 2016

* * * * * * *

Table V-4
R-134a: Weighted-average f.o.b. prices and quantities of domestic and imported product 2 and margins of underselling/(overselling), by quarters, January 2013-September 2016

* * * * * * *

[16] 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.

[17] ***.

Table V-5
R-134a: Weighted-average f.o.b. prices and quantities of domestic and imported product 3 and margins of underselling/(overselling), by quarters, January 2013-September 2016

* * * * * * *

Table V-6
R-134a: Weighted-average f.o.b. prices and quantities of domestic and imported product 4 and margins of underselling/(overselling), by quarters, January 2013-September 2016

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Table V-7
R-134a: Weighted-average f.o.b. prices and quantities of domestic and imported product 5 and margins of underselling/(overselling), by quarters, January 2013-September 2016

* * * * * * *

Figure V-1
R-134a: Weighted-average prices and quantities of domestic and imported product 1, by quarters, January 2013-September 2016

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Figure V-2
R-134a: Weighted-average prices and quantities of domestic and imported product 2, by quarters, January 2013-September 2016

* * * * * * *

Figure V-3
R-134a: Weighted-average prices and quantities of domestic and imported product 3, by quarters, January 2013-September 2016

* * * * * * *

Figure V-4
R-134a: Weighted-average prices and quantities of domestic and imported product 4, by quarters, January 2013-September 2016

* * * * * * *

Figure V-5
R-134a: Weighted-average prices and quantities of domestic and imported product 5, by quarters, January 2013-September 2016

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Price trends

In general, prices decreased during January 2013 to September 2016. The general trend for most pricing products was flat to declining prices in 2013, relatively large price increases in 2014, followed by price decreases in 2015, and then a slight price increase in 2016.[18] The quantity of sales of each product was generally much higher in the first two quarters of each year, reflecting the seasonal demand for R-134a in the automotive and stationary A/C aftermarkets.

Table V-8 summarizes the price trends, by country and by product. As shown in the table, domestic price decreases ranged from *** percent from January 2013 to September 2016 and import price decreases ranged from *** to *** percent.[19] Domestic prices for product 3 increased by *** percent.

Table V-8
R-134a: Summary of weighted-average f.o.b. prices for products 1-5 from the United States and China

Item	Number of quarters	Low price (dollars per pound)	High price (dollars per pound)	Change in price over period[1] (percent)
Product 1:				
United States	15	***	***	***
China	13	***	***	***
Product 2:				
United States	15	***	***	***
China	15	***	***	***
Product 3:				
United States	15	***	***	***
China	15	***	***	***
Product 4:				
United States	15	***	***	***
China	15	***	***	***
Product 5:				
United States	15	***	***	***
China	15	***	***	***

[1] Percentage change from the first quarter of 2013 to third quarter 2016. China product 1 change is second quarter 2013 to third quarter 2016.

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

[18] Importer *** reported that its sales price for product 2 was approximately $1.00 per pound higher in 2014 (third quarter) than in 2013, 2015, or 2016. It explained that the reason was the antidumping and countervailing duty investigations in that year. Email from *** to USITC staff, January 20, 2017.

Petitioners state that the price increases in 2014 were limited to spot sales to the automotive and HVAC aftermarket and that prices to OEMs did not increase in 2014. HFC Coalition's posthearing brief, exh. 1, p. 15.

[19] The price decrease for China product 1 from second quarter 2013 to third quarter 2016 was *** percent.

Price comparisons

As shown in table V-9, prices for R-134a imported from China were below those for U.S.-produced R-134a in 47 of 73 instances (46.0 million pounds); margins of underselling ranged from 0.8 to 39.6 percent. In the remaining 26 instances (14.1 million pounds), prices for R-134a from China were between 1.2 and 58.1 percent above prices for the domestic R-134a. Subject imports were priced lower than domestic product in a majority of instances for all pricing products, except product 3 (R-134a in 30-pound containers with an HVAC valve sold to distributors or wholesalers).

Table V-9
R-134a: Instances of underselling/overselling and the range and average of margins, by country, January 2013-September 2016

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	47	45,977,612	12.9	0.8	39.6
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	26	14,157,210	(15.1)	(1.2)	(58.1)

[1] These data include only quarters in which there is a comparison between the U.S. and subject product. Comparisons were possible in all but two quarters.

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

Direct imports/purchase costs

Six importers reported imports of bulk R-134a from China for internal use or repackaging since January 1, 2013 and provided quarterly import purchase cost data.[20] Import purchase cost data for bulk R-134a and U.S. price data for bulk R-134a sold to repackagers and distributors (pricing product 1) are presented in table V-10 and figure V-6.[21]

Table V-10
R-134a: Weighted average f.o.b. prices and quantities of domestic pricing product 1 and weighted-average landed-duty paid (LDP) import costs and quantities of bulk R-134a for internal consumption/repackaging, by quarters, January 2013-September 2016

* * * * * * *

Figure V-6
R-134a: Weighted average f.o.b. prices and quantities of domestic pricing product 1 and weighted-average landed-duty paid (LDP) costs and quantities of bulk R-134a for internal consumption/repackaging

* * * * * * *

Importers that reported imports of product 1 for internal use or repackaging were asked to provide additional information regarding their import costs. These firms were asked about factors that add to the cost of directly importing. Five of the six importers that reported directly importing R-134a reported information regarding such costs (table V-11); *** did not report any such costs. Two firms reported logistical or supply chain costs, one reported warehousing costs, two reported insurance costs, and two reported other costs including port fees and customs clearance costs. Reported total costs ranged from 1 to 18 percent.

Three of the six importers (***) reported that they compare import costs to U.S. producers' prices when determining the additional transaction costs of directly importing, two importers (***) reported comparing costs to both importers' and to U.S. producers' prices, and one importer (***) reported comparing costs to neither U.S. producers' or importers' prices.

When asked to describe benefits of directly importing bulk R-134a instead of purchasing from another importer or from a U.S. producer, importers stated that consistent supply and availability, and overall cost/competitive pricing were benefits.

Two importers, ***, estimated margins saved by directly importing (*** and *** percent, respectively). Five of the six importers reported estimates for U.S. inland-transportation costs and other logistical costs from the point of importation to their distribution

[20] These importers include ***. These firms' reported direct imports accounted for *** percent of total imports of R-134a in 2015 as reported in questionnaires, but a smaller percentage in 2013 (*** percent) and 2014 (*** percent). ***.

[21] Respondents stated that domestic producers are not willing to sell bulk R-134a in sufficient quantities or at prices that would give their competitors an edge in the downstream markets for 30-pound cylinders or 12-ounce cans. Respondents' postconference brief, p. 27.

network; these firms reported that such costs accounted for *** to *** percent of the total cost of R-134a imported from China.

Table V-11
R-134a: Importers' reported costs of direct imports

Type of cost	Firms reporting	Shares of LDP value (percent)	Additional explanations
Logistical or supply chain	***	***	--
Warehousing	***	***	--
Insurance	***	***	Marine insurance and brokerage fees
Currency conversion	--	--	--
Other	***	***	Port fee, customs clearance, documentation, courier fees
Total[1]	***	1, 2, 4, 9, 18	

[1] Sum of reported costs in rows above for each importer. ***, which reported 18 percent, accounted for a small share of the volume of direct import price data.

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

LOST SALES AND LOST REVENUE

In the preliminary phase of the investigation, the Commission requested that U.S. producers of R-134a report purchasers where they experienced instances of lost sales or revenue due to competition from imports of R-134a from China since January 2013. The petitioning firms identified 34 firms where they allegedly lost sales or revenue (21 consisting of only lost sales allegations, 2 consisting of only lost revenue allegations, and 11 consisting of both types of allegations).[22] Allegations during the preliminary phase spanned the period 2013-15. Methods of sale varied and included request for quote bids, individual sales, and contract negotiations.

In the final phase of the investigation, all three responding U.S. producers (***) reported that they had to reduce prices and roll back announced price increases, and all three (***) also reported that they had lost sales. As noted in Part II, purchaser questionnaire responses were received from 38 firms.[23] Responding purchasers reported purchasing 38,981 short tons of R-134a in 2015 (table V-12).

Table V-12
R-134a: Purchasers' responses to purchasing patterns

* * * * * * *

[22] ***.

[23] Nineteen purchasers submitted lost sales lost revenue survey responses in the preliminary phase; six of these purchasers did not submit purchaser questionnaire responses in the final phase.

Of the 38 responding purchasers, 19 reported that, since 2013, they had purchased imported R-134a from China instead of U.S.-produced R-134a (table V-13). Eighteen of these 19 purchasers reported that subject import prices were lower than prices of U.S.-produced R-134a, and 17 of these purchasers reported that price was a primary reason for the decision to purchase imported R-134a rather than U.S.-produced R-134a. Thirteen purchasers reported the quantity of subject imports that they purchased instead of domestic product; these purchases totaled 19,209 short tons. Two purchasers identified a reason other than price for purchasing imported rather than U.S.-produced R-134a: *** stated that it purchased from a related company and *** stated that U.S. producers could not commit to providing adequate supply.

Table V-13
R-134a: Purchasers' responses to purchasing imports instead of domestic product

* * * * * * *

Of the 38 responding purchasers, 13 reported that U.S. producers had reduced prices in order to compete with lower-priced imports from China, 8 reported that U.S. producers had not reduced price to compete with subject imports, and 17 reported that they did not know (table V-14).[24] Purchasers' estimated price reduction ranged from 10 to 50 percent. In describing the price reductions, some purchasers indicated that there was a steady drop in prices, others described price drops with annual negotiations, and one purchaser noted price variations related to the prior and current antidumping investigations.

Table V-14
R-134a: Purchasers' responses to U.S. producer price reductions

* * * * * * *

[24] The 13 purchasers that reported that U.S. producers had reduced prices to compete with imports from China include repackagers, automotive and HVAC distributors, and foam and aerosol manufacturers. Of the three automotive OEMs that provided purchaser questionnaire responses, one reported "no" and two reported "don't know."

PART VI: FINANCIAL EXPERIENCE OF U.S. PRODUCERS

BACKGROUND

Three U.S. producers, Arkema, Chemours, and Mexichem, reported usable financial results on their R-134a operations.[1] All three U.S. producers are part of large, publicly traded multinational businesses.[2] As noted in the *Cost of goods sold and gross profit* section below, U.S. producers vary in terms of the level of input integration.

With respect to notable changes during the period, DuPont's Performance Chemicals segment was spun-off and became a publicly traded company (Chemours) in July 2015.[3] While it reportedly did not affect the manufacturing operations of Chemours, some aspects of the company's SG&A cost structure ***.[4]

[1] Chemours reported its financial results on the basis of generally accepted accounting principles (GAAP). Arkema and Mexichem reported their financial results on the basis of International Financial Reporting Standards (IFRS). All three companies reported their financial results for calendar-year periods. Staff verified the R-134a financial results of Chemours during the final phase of the Commission's HFC blends and components investigation. HFC blends and components verification report. EDIS Document No. 602217 (pages 8 and 10 only).

[2] Arkema's R-134a operations are part of the company's fluorogases business, which is in turn part of its Industrial Specialties segment. Arkema 2014 Reference Document, p. 17. With regard to its R-134a operations, Arkema stated that they are ***. Petitioners' postconference brief (Exhibit 1), p. 8.

Chemours' R-134a operations are part of its Fluoroproducts segment. Chemours 2015 10-K, p. 3. ***. Petitioners' postconference brief (Exhibit 1), p. 8.

Mexichem's R-134a operations are part of the company's Fluorine segment. Mexichem 2014 annual report, p. 94. As noted in Petitioners' postconference brief, "Mexichem does not produce other refrigerants or HFC blends in the United States. Its return on investment is therefore evaluated on the basis of the R-134a business." Petitioners' postconference brief (Exhibit 1), p. 8.

[3] In the third quarter of 2013, DuPont decided to spin off its performance chemicals business of which R-134a is a part. *Shift in Agricultural Sales Timing, Lower Chemical Prices Weigh On DuPont's Earnings Growth*, http://www.forbes.com/sites/greatspeculations/2014/04/24/shift-in-agricultural-sales-timing-lower-chemical-prices-weigh-on-duponts-earnings-growth/, retrieved January 31, 2017. Chemours became a separate publicly traded company in July 2015. Chemours 2015 10-K, p. 3.

[4] HFC blends and components conference transcript, p. 89 (Buterbaugh). ***. March 29, 2016 e-mail with attachment from *** to USITC auditor.

As noted in Part III, the three U.S. producers' R-134a operations experienced *** during the period examined.[5] Arkema noted that ***.[6] With regard to operating issues related to *** ***.[7] Mexichem, which reported ***.[8]

OPERATIONS ON R-134A

Income-and-loss data for the U.S. industry's R-134a operations are presented in table VI-1. Table VI-2 presents corresponding changes in average unit values and table VI-3 presents a variance analysis of the U.S. industry's financial results.[9] Selected company-specific financial information is presented in table VI-4.

[5] The R-134a operations of U.S. producers require planned outages for routine maintenance, as well as the replacement of catalyst. ***. Petitioners' postconference brief, Exhibit 1, pp. 1-2. Chemours schedules planned outages (or turnarounds) every two years which generally last around 30 to 35 days. Prior to these outages, inventory is increased in order to accommodate operations during the planned downtime. Turnaround activity reportedly includes planned maintenance, equipment inspection, and necessary repairs. Hearing transcript, p. 35, p. 72, p. 91 (Buterbaugh). ***. Petitioners' postconference brief, Exhibit 1, pp. 1-2. Mexichem reported that it plans for a 45-day plant outage approximately every three years, which includes catalyst replacement, as well as primary maintenance. The majority of this activity is reportedly capitalized. Conference transcript, pp. 75-76, p. 78 (Pacillo).

[6] ***. March 29, 2016 e-mail with attachment from *** to USITC auditor.

[7] March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. *** U.S. producer questionnaire response to II-3c. The 2014 turnaround was originally scheduled to last *** days with the ***. Petitioner's posthearing brief, exhibit 1, p. 7. ***. HFC blends and components verification report. EDIS Document No. 602217 (pages 8 and 10 only). ***.

[8] March 29, 2016 e-mail with attachment from *** to USITC auditor.

[9] The Commission's variance analysis is calculated in three parts: sales variance, cost of goods sold (COGS) variance, and SG&A expenses variance. Each part consists of a price variance (in the case of the sales variance) or a cost or expense variance (in the case of the COGS and SG&A expenses variance), and a volume variance. The sales or cost/expense variance is calculated as the change in unit price or per-unit cost/expense times the new volume, while the volume variance is calculated as the change in volume times the old unit price or per-unit cost/expense. As summarized at the bottom of table VI-3, the price variance is from sales, the cost/expense variance is the sum of those items from the COGS and SG&A variances, respectively, and the volume variance is the sum of the volume components of the net sales, COGS, and SG&A expenses variances. In general, the utility of the Commission's variance analysis is enhanced when product mix remains the same throughout the period. As noted below, product mix, in terms of company-specific share of bulk versus non-bulk sales, did change to some extent during the period.

Table VI-1
R-134a: Results of operations of U.S. producers, 2013-15, January-September 2015, and January-September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Quantity (short tons)				
Commercial sales	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
Swaps	***	***	***	***	***
Total net sales	97,709	97,664	69,898	55,817	75,661
	Value (1,000 dollars)				
Commercial sales	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
Swaps	***	***	***	***	***
Total net sales	451,925	410,267	299,201	222,086	298,302
Cost of goods sold.-- Raw materials	261,056	253,243	170,488	140,841	172,654
Conversion costs[1]	100,862	103,916	112,599	83,472	105,871
Total COGS	361,918	357,159	283,087	224,313	278,525
Gross profit	90,007	53,108	16,114	(2,227)	19,777
SG&A expense	45,241	35,808	23,414	16,141	31,498
Operating income or (loss)	44,766	17,300	(7,300)	(18,368)	(11,721)
Interest expense	956	380	(2)	12	4
All other expenses	16,150	17,912	9,128	8,613	4,996
All other income	623	3	0	28	17
Net income or (loss)	28,283	(989)	(16,426)	(26,965)	(16,704)
Depreciation/amortization	25,038	28,589	26,695	21,485	19,977
Cash flow	53,321	27,600	10,269	(5,480)	3,273
	Ratio to net sales (percent)				
Cost of goods sold.-- Raw materials	57.8	61.7	57.0	63.4	57.9
Conversion costs[1]	22.3	25.3	37.6	37.6	35.5
Average COGS	80.1	87.1	94.6	101.0	93.4
Gross profit	19.9	12.9	5.4	(1.0)	6.6
SG&A expense	10.0	8.7	7.8	7.3	10.6
Operating income or (loss)	9.9	4.2	(2.4)	(8.3)	(3.9)
Net income or (loss)	6.3	(0.2)	(5.5)	(12.1)	(5.6)

Table continued on following page.

Table VI-1--Continued
R-134a: Results of operations of U.S. producers, 2013-15, January-September 2015, and January-September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Ratio to total COGS (percent)				
Cost of goods sold.-- Raw materials	72.1	70.9	60.2	62.8	62.0
Conversion costs[1]	27.9	29.1	39.8	37.2	38.0
Average COGS	100.0	100.0	100.0	100.0	100.0
	Unit value (dollars per short ton)				
Commercial sales	***	***	***	***	***
Internal consumption	***	***	***	***	***
Transfers to related firms	***	***	***	***	***
Swaps	***	***	***	***	***
Total net sales	4,625	4,201	4,281	3,979	3,943
Cost of goods sold.-- Raw materials	2,672	2,593	2,439	2,523	2,282
Conversion costs[1]	1,032	1,064	1,611	1,495	1,399
Average COGS	3,704	3,657	4,050	4,019	3,681
Gross profit	921	544	231	(40)	261
SG&A expense	463	367	335	289	416
Operating income or (loss)	458	177	(104)	(329)	(155)
Net income or (loss)	289	(10)	(235)	(483)	(221)
	Number of firms reporting				
Operating losses	***	***	***	***	***
Net losses	***	***	***	***	***
Data	3	3	3	3	3

[1] ***.

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

Table VI-2
R-134a: Changes in average per short ton values, between calendar years and partial periods

Item	Between calendar years			Between partial year period
	2013-15	2013-14	2014-15	2015-16
Total net sales	(345)	(424)	80	(36)
Cost of goods sold.--				
Raw materials	(233)	(79)	(154)	(241)
Conversion costs	579	32	547	(96)
Average COGS	346	(47)	393	(337)
Gross profit	(691)	(377)	(313)	301
SG&A expense	(128)	(96)	(32)	127
Operating income or (loss)	(563)	(281)	(282)	174
Net income or (loss)	(524)	(300)	(225)	262

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

Table VI-3
R-134a: Variance analysis on the operations of U.S. producers, 2013-15, January-September 2015, and January-September 2016

Item	Between calendar years			Between partial year period
	2013-15	2013-14	2014-15	2015-16
Net sales:				
Price variance	(24,092)	(41,450)	5,573	(2,740)
Volume variance	(128,632)	(208)	(116,639)	78,956
Net sales variance	(152,724)	(41,658)	(111,066)	76,216
COGS:				
Cost variance	(24,182)	4,592	(27,469)	25,536
Volume variance	103,013	167	101,541	(79,748)
COGS variance	78,831	4,759	74,072	(54,212)
Gross profit variance	(73,893)	(36,899)	(36,994)	22,004
SG&A expenses:				
Cost/expense variance	8,950	9,412	2,214	(9,619)
Volume variance	12,877	21	10,180	(5,738)
Total SG&A expense variance	21,827	9,433	12,394	(15,357)
Operating income variance	(52,066)	(27,466)	(24,600)	6,647
Summarized as:				
Price variance	(24,092)	(41,450)	5,573	(2,740)
Net cost/expense variance	(15,232)	14,004	(25,255)	15,917
Net volume variance	(12,742)	(21)	(4,918)	(6,530)

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

Table VI-4
R-134a: Results of operations of U.S. producers, by firm, 2013-15, January-September 2015, and January-September 2016

* * * * * * *

Revenue

The majority of R-134a sales volume was classified as commercial sales (*** percent), followed by transfers (*** percent), swaps (*** percent), and a relatively small amount of internal consumption (*** percent).[10] Company-specific information in table VI-4 shows that U.S. producers varied in terms of the relative importance of these categories. *** U.S. producer reported revenue in all four categories.

Volume

The pattern of R-134a revenue during 2013 through interim 2016 reflects a combination of changes in volume and average value, which alternated in terms of their relative importance. The revenue section of the variance analysis (table VI-3) shows that volume played a minor role in terms of explaining the decline in total revenue in 2014, the principal driver being the large negative price variance. As shown in table VI-4, Mexichem was the *** U.S. producer to report *** sales volume in 2014 (a trend the firm ***)[11] while Arkema and Chemours *** sales volume.

In 2015, the larger decline in total revenue, partially offset by a positive price variance, was due to a negative volume variance. While *** U.S. producers contributed to this pattern, the magnitude of company-specific declines in 2015 sales volume ***.[12]

At the end of the period, higher total revenue was the result of the positive interim 2015-16 volume variance. Table VI-4 shows that company-specific interim period sales volume was mixed with Arkema reporting *** sales volume in interim 2016 compared to interim 2015, Chemours reporting *** sales volume, and Mexichem reporting *** sales volume. The large positive and negative swings in sales volume reported by *** (see footnotes 7 and 20).

[10] HFC swap arrangements allow U.S. producers to focus on the production of specific components, maximize economies of scales, and avoid the additional investments necessary to produce all HFC components. See *Hydrofluorocarbon Blends and Components from China, Inv. Nos. 731-TA-1279 (Final)*, USITC Publication 4629, August 2016, p. VI-4. With respect to HFC components in general, swap transactions are nonmonetary exchanges (specifically exchanges of inventory for similar products) that would be recognized at carrying value, as opposed to fair value. Under these circumstances and because the earnings process has not been completed, profit or loss on swap transactions would generally not be recognized. Wiley GAAP 2002, p. 363. Wiley GAAP 2012, pp. 830-831. As presented in this section of the report and analogous to the Commission's treatment of internal consumption, R-134a manufactured *** and given up in a swap exchange has been reported at fair market value and therefore contributes to profit or loss on reported R-134a financial results.

[11] March 29, 2016 e-mail with attachment from *** to USITC auditor.

[12] See footnotes 7 and 20 regarding ***.

Value

The revenue section of the variance analysis (table VI-3) shows that price variances were negative in 2013-14, positive in 2014-15, and then negative in interim 2015-16. With regard to the overall pattern of change in total revenue (positive or negative), price variance was the principal factor only in 2013-14. As shown in table VI-4 and while magnitudes varied, company-specific average revenue values were directionally the ***. In contrast, the company-specific pattern of change in average revenue values in 2014-15 was ***.[13]

Notwithstanding some variations in the directional pattern of the sub-categories of revenue, *** U.S. producers reported lower overall average revenue values in interim 2016 compared to interim 2015. Arkema reported *** average revenue value ***, by Mexichem ***, and Chemours ***.

Cost of goods sold and gross profit

Raw material

As noted in Part I of this report, primary R-134a raw material inputs are hydrofluoric acid (HF) and a chlorine starting component (perchloroethylene (PCE) or trichloroethylene (TCE), depending on the underlying production process).[14] ***. As a share of company-specific variable manufacturing costs, HF ranged from *** and the chlorine starting component ranged from ***. As shown in table VI-1, total raw material costs as a share of COGS ranged from a high of 72.1 percent in 2013 to a low of 60.2 percent in 2015 and was 62.0 percent in interim 2016.

While the U.S. industry's average raw material cost declined somewhat during the period (see table VI-1), the pattern of company-specific average raw material cost varied. ***, which consistently reported the lowest average raw material cost, was also the *** company to report declines in average raw material cost throughout the period (see table VI-4).[15] *** reported *** increases in average raw material costs throughout the full-year period and then a

[13] ***. March 30-31, 2016 e-mail correspondence between *** and USITC auditor. ***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. April 1, 2016 e-mail from *** to USITC auditor.

***. January 12, 2017 e-mail with attachments from *** to USITC auditor.

[14] The Commission's current practice requires that relevant cost information associated with inputs purchased from related suppliers correspond to the manner in which this information is reported in the U.S. producer's own accounting books and records. See *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final)*, USITC Publication 4503, December 2014, pp. 23 and 37. ***. *** U.S. producer questionnaire response (final) to III-7.

As part of a larger group of related companies, Mexichem is the only U.S. producer that is fully integrated with respect to fluorine-based inputs; i.e., Mexichem's affiliates in Mexico mine fluorine and produce the HF used in Mexichem's U.S. R-134a production. ***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. ***. Petitioners' postconference brief (Exhibit 1), p. 3. ***. Ibid.

[15] ***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. January 12, 2017 e-mail with attachment from *** to USITC auditor.

*** decline in interim 2016.[16] *** reported an increase in its average raw material cost in 2014 followed by decreases in 2015 and interim 2016.[17]

Conversion costs

Table VI-1 shows that conversion costs (direct labor plus other factory costs) increased as a share of total COGS from 27.9 percent in 2013 to 39.8 percent in 2015 and was marginally higher in interim 2016 (38.0 percent) compared to interim 2015 (37.2 percent).[18] While *** of the U.S. producers reported increases in average conversion costs during 2013-15, the magnitude of company-specific increases varied. Table VI-4 shows that *** company-specific average conversion costs and that overall increases during the full-year period were in a similar range.[19] ***.[20] ***.[21]

Table VI-4 shows that the U.S. producers reported a range of average COGS with ***, respectively, reporting the highest and lowest averages throughout the period. Some of this difference appears to be attributable to the fact that the U.S. producers vary in terms of characteristics such as company-specific share of bulk versus non-bulk sales; i.e., *** sell R-134a primarily in bulk whereas *** company-specific share of bulk sales is somewhat smaller. The underlying cost structure of each U.S. producer also reflects differences such as the specific inputs used, level of input integration, and product focus.[22]

Gross profit

As shown in table VI-1, the industry's gross profitability declined on an absolute basis and as a ratio to sales throughout the full-year period. On a company-specific basis, however, the pattern of gross profit was *** for each U.S. producer (see table VI-4).

***. ***.[23] In interim 2016 and while Chemours reported ***.

***. *** was ***, on an absolute basis and as a ratio to sales, compared to interim 2015. With regard to this pattern, Arkema stated that ***.[24]

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[16] ***. January 12, 2017 e-mail with attachments from *** to USITC auditor.

[17] ***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. January 12, 2017 e-mail with attachment from *** to USITC auditor.

[18] ***, direct labor and other factory costs are presented together as conversion costs.

[19] ***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. January 12, 2017 e-mail with attachment from *** to USITC auditor.

***. January 12, 2017 e-mail with attachment from *** to USITC auditor.

[20] March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. January 12, 2017 e-mail with attachments from *** to USITC auditor. ***. HFC blends and components verification report. EDIS Document No. 602217 (pages 8 and 10 only).

[21] January 12, 2017 e-mail with attachments from *** to USITC auditor.

[22] ***. January 19, 2017 e-mail from *** to USITC auditor.

***. January 19, 2017 e-mail with attachments from *** to USITC auditor.

***. January 19, 2017 e-mail with attachments from *** to USITC auditor.

[23] ***.

***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. See footnotes 7 and 20. ***. Ibid.

[24] January 12, 2017 e-mail with attachment from *** to USITC auditor.

***.[25] Similar to the pattern reported by *** gross profit was lower on an absolute basis and as a ratio to sales in interim 2016 compared to interim 2015. As described by ***.[26]

SG&A expenses and operating income or loss

As shown in table VI-1, the contraction in the U.S. industry's overall gross profit ratio largely explains the declines in corresponding operating profit during 2013-14 and the operating losses in 2015 (full year and interim period) and interim 2016; i.e., positive gross profit only recovered and exceeded corresponding SG&A expenses in 2013 and 2014. While the U.S. industry reported an operating loss in interim 2016, the loss was somewhat lower compared to interim 2015. This relative improvement generally reflects *** positive gross profit at the end of the period. As noted above and as shown in table VI-4, *** reported lower gross profit on an absolute basis and as ratio to sales in interim 2016 compared to interim 2015.

While the U.S. industry reported a modest decline in total SG&A expenses during the full-year period (see table VI-1), the positive impact on operating results was minimal and only partially offset corresponding declines in absolute gross profit. As shown in table VI-4, *** reported SG&A expense ratios (total SG&A expenses divided by total revenue) which fluctuated somewhat but remained within relatively narrow company-specific ranges.[27] The higher level of total SG&A expenses in interim 2016 compared to interim 2015 primarily reflects ***, which confirmed that the increase in SG&A expenses in interim 2016 reflects higher sales volume.[28]

Interest expense, other expenses, and net income or loss

While operating and net results share the same directional pattern (see table VI-1), the lower level of net income in 2013, the net loss in 2014, and the higher level of net losses in 2015 (full year and interim period) and interim 2016 reflect the inclusion, in net income, of other expenses reported by ***.[29] Smaller amounts of interest expense and other income were reported by ***.

CAPITAL EXPENDITURES AND RESEARCH AND DEVELOPMENT EXPENSES

Table VI-5 presents U.S. producers' R-134a capital expenditures and research and development (R&D) expenses by firm.

[25] ***. March 29, 2016 e-mail with attachment from *** to USITC auditor. ***. Ibid.
[26] January 12, 2017 e-mail with attachment from *** to USITC auditor.
[27] ***.
[28] January 19, 2017 e-mail with attachments from *** to USITC auditor.
[29] ***. Ibid.
***. March 29, 2016 e-mail with attachment from *** to USITC auditor.

Table VI-5
R-134a: Capital expenditures and research and development (R&D) expenses of U.S. producers, 2013-15, January-September 2015, and January-September 2016

Item	Calendar year			January-September	
	2013	2014	2015	2015	2016
Capital expenditures	**Value ($1,000)**				
Arkema	***	***	***	***	***
Chemours	***	***	***	***	***
Mexichem	***	***	***	***	***
Total capital expenditures	***	***	***	***	***
R&D expenses	**Value ($1,000)**				
Arkema	***	***	***	***	***
Chemours	***	***	***	***	***
Mexichem	***	***	***	***	***
Total R&D expenses	***	***	***	***	***

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

*** accounted for the majority of the U.S. industry's capital expenditures. *** reported its highest level of capital expenditures in 2013 followed by declines in 2014 and 2015.[30]

***.[31] ***.[32]

As shown in table VI-5, *** reported *** of the U.S. industry's R&D expenses. According to the company, R&D is ***.[33]

ASSETS AND RETURN ON INVESTMENT

Table VI-6 presents data on U.S. producers' R-134a total assets, asset turnover (sales divided by total assets), and return on assets.[34]

[30] ***. March 29, 2016 e-mail with attachment from *** to USITC auditor.

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

[32] *** U.S. producer questionnaire response to III-13 (note 1). See also footnotes 7 and 20.

[33] *** U.S. producer questionnaire response to III-13 (note 2). In its 2015 10-K and with regard to its overall operations, Chemours stated that "{w}e perform research and development activities in all of our segments with the majority of our efforts focused in the Fluoroproducts segment. The Fluoroproducts segment efforts center on developing new sustainable fluorochemicals and new applications and formulations for fluoropolymers that meet customers' technical requirements." Chemours 2015 10-K, p. 14.

[34] With respect to a company's overall operations, staff notes that a total asset value (i.e., the bottom line value on the asset side of a company's balance sheet) reflects an aggregation of a number of assets which, in many instances, are not product specific. For producers who manufacture products in addition to R-134a, high-level allocation factors were necessary to report a total asset value specific to U.S. R-134a operations. The ability of U.S. producers to assign total asset values to discrete products lines affects the meaningfulness of calculated asset turnover and corresponding return on investment. For the chemical manufacturing industry in general and with respect to the period covered by this investigation, average asset turnover ratios ranged from a low of 0.64 in the second quarter of 2014 to a high of 0.84 in the third quarter of 2015. Chemical Manufacturing Efficiency Information & Trends, http://csimarket.com/Industry/industry_Efficiency.php?ind=101&hist=11, retrieved February 8, 2017.

Table VI-6
R-134a: U.S. producers' total assets, asset turnover, and return on assets, 2013-15

Item	Calendar year		
	2013	2014	2015
Total assets	**Value ($1,000)**		
Arkema	***	***	***
Chemours	***	***	***
Mexichem	***	***	***
Total assets	264,625	266,080	261,416
Asset turnover	**Net sales to assets (multiple)**		
Arkema	***	***	***
Chemours	***	***	***
Mexichem	***	***	***
Average asset turnover	1.7	1.5	1.1
Return on assets	**Operating income (loss) to assets (percent)**		
Arkema	***	***	***
Chemours	***	***	***
Mexichem	***	***	***
Average return on assets	16.9	6.5	(2.8)

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

CAPITAL AND INVESTMENT

The Commission requested U.S. producers of R-134a to describe any actual or potential negative effects on their return on investment or their growth, investment, ability to raise capital, existing development and production efforts (including efforts to develop a derivative or more advanced version of the product), or the scale of capital investments as a result of imports of R-134a from China. Table VI-7 tabulates the responses on actual negative effects on investment, growth and development, as well as anticipated negative effects. Table VI-8 presents the narrative responses of U.S. producers regarding actual and anticipated negative effects on investment, growth and development.

Table VI-7
R-134a: Negative effects of imports from subject sources on investment, growth, and development since January 1, 2013

Item	No	Yes
Negative effects on investment	0	3
Cancellation, postponement, or rejection of expansion projects		2
Denial or rejection of investment proposal		0
Reduction in the size of capital investments		2
Return on specific investments negatively impacted		2
Other		3
Negative effects on growth and development	0	3
Rejection of bank loans		0
Lowering of credit rating		0
Problem related to the issue of stocks or bonds		0
Ability to service debt		0
Other		3
Anticipated negative effects of imports	0	3

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

Table VI-8
R-134a: Narrative responses of U.S. producers regarding actual and anticipated negative effects of imports from subject sources on investment, growth, and development since January 1, 2013

* * * * * * *

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 CHINA

The Commission issued foreign producers' or exporters' questionnaires to 28 firms believed to produce and/or export R-134a from China.[3] Useable responses were received from eight firms: Jiangsu Bluestar Green Technology Co. Ltd. (formerly Jiangsu Kangtai Fluorine Chemical Co. Ltd.) ("Bluestar"); Dolphin; Dongyue; Juhua; Sanmei; Sinochem Taicang; Sinochem Modern Environmental Protection Chemicals (Xian) Co. Ltd. ("Sinochem Xian"); and Weitron International Refrigeration Equipment (Kunshan) Co. Ltd. ("Weitron Kunshan").[4]

Two responding firms (Dolphin and Weitron Kunsan) are exporters of R-134a and do not produce R-134a in China. Chinese exporter Dolphin ***. Dolphin exported ***. The other Chinese exporter, Weitron Kunshan, ***. Weitron Kunshan exported ***.[5] The tabulation below presents these firms' reported resales of R-134a exported to the United States from China in 2015.

* * * * * * *

Table VII-1 presents summary data on producers of R-134a in China by firm in 2015. This summary data does not include exports of R-134a by Chinese exporters Dolphin and Weitron Kunshan. Table VII-2 presents information on responding Chinese producers' changes in operations since January 2013. There was one reported plant opening by *** and four firms reported expansions. No responding Chinese producer or exporter anticipated any changes to their operations concerning R-134a.

Table VII-1
R-134a: Summary data on producers in China, by firm, 2015

Firm	Production (short tons)	Share of reported production (percent)	Exports to the United States (short tons)	Share of reported exports to the United States (percent)	Total shipments (short tons)	Share of firm's total shipments exported to the United States (percent)
Bluestar	***	***	***	***	***	***
Dongyue	***	***	***	***	***	***
Juhua	***	***	***	***	***	***
Sanmei	***	***	***	***	***	***
Sinochem Taicang	***	***	***	***	***	***
Sinochem Xian	***	***	***	***	***	***
Total	158,985	100.0	12,658	100.0	158,835	8.0

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

[3] These firms were identified through a review of information submitted in the petition, a review of proprietary Customs data, and the record in the preliminary phase of this investigation.

[4] For data on the number of responding foreign firms and their share of U.S. imports from China, please refer to Part I, "Summary Data and Data Sources."

[5] ***.

Table VII-2
R-134a: Chinese producers' reported changes in operations, since January 1, 2013

* * * * * * *

No Chinese producer reported production of other products on the same machinery as R-134a. However, *** firms reported that there were able to switch production (capacity) between R-134a and other products, namely R-32, R-125, and R-143a, using the same equipment and/or labor. *** stated that it will switch production when the price of R-134a is low, or if demand is high, *** stated that switching production depends on market demand, and *** stated that the price of each product is the main factor affecting the ability to switch production.

Chinese producers were asked to report constraints on their capacity to produce R-134a. Firms reported market demand, environmental considerations, the plant capacity, maintenance, supply of raw material, and access to skilled labor. In addition, Sanmei stated ***.

Table VII-3 presents information on the R-134a operations of the responding producers and resales by exporters in China beginning in January 2013. Imports from China were subject to preliminary countervailing duty rates in April 2014[6] and antidumping margins in May 2014[7] until the Commission found that such imports did not cause or threaten to cause material injury to the domestic industry at its meeting on November 12, 2014[8] and published its determinations in the *Federal Register* on December 9, 2014.[9] China's exports of R-134a to the United States declined from 2013 to 2014, but increased from 2014 to 2015. China's home market shipments increased from 2013 to 2015 and were higher in January to September 2016 than in January to September 2015. One firm *** cited the antidumping duty investigation on R-134a in the United States specifically as the reason for limiting its production capacity and three additional firms noted general market demand as a factor.

[6] *Countervailing Duty Investigation of 1,1,1,2 Tetrafluoroethane from the People's Republic of China: Preliminary Determination and Alignment of Final Determination with Final Antidumping Determination*, 79 FR 21895, April 18, 2014.

[7] *1,1,1,2-Tetrafluroethane from the People's Republic of China: Antidumping Duty Investigation, Preliminary Determination of Sales at Less Than Fair Value, Affirmative Preliminary Determination of Critical Circumstances, in Part, and Postponement of Final Determination*, 79 FR 30817, May 29, 2014.

[8] *USITC news release*, https://www.usitc.gov/press_room/news_release/2014/er1112ll233.htm, retrieved March 13, 2017.

[9] *1,1,1,2-Tetrafluoroethane from China: Determinations*, 70 FR 73102, December 9, 2014.

Table VII-3
R-134a: Data on industry in China, 2013-15, January to September 2015, and January to September 2016, and projections for calendar years 2016 and 2017

Item	Actual experience					Projections	
	Calendar year			January to September		Calendar year	
	2013	2014	2015	2015	2016	2016	2017
	Quantity (short tons)						
Capacity	141,076	162,347	169,063	129,058	131,248	167,581	167,581
Production	132,286	143,599	158,985	120,060	125,032	164,586	164,213
End-of-period inventories	6,644	6,438	6,588	9,047	10,083	6,741	6,941
Shipments:							
Home market shipments:							
Internal consumption/ transfers	1,928	1,802	2,589	1,842	2,925	3,436	3,435
Commercial shipments	60,351	69,764	81,696	58,462	65,721	82,956	82,296
Subtotal, home market shipments	62,279	71,566	84,285	60,304	68,646	86,392	85,731
Export shipments to:							
United States	14,204	3,064	12,658	7,648	11,922	12,378	7,300
All other markets	55,741	69,175	61,892	49,499	40,969	65,663	70,982
Total exports	69,945	72,239	74,550	57,147	52,891	78,041	78,282
Total shipments	132,224	143,805	158,835	117,451	121,537	164,433	164,013
	Ratios and shares (percent)						
Capacity utilization	93.8	88.5	94.0	93.0	95.3	98.2	98.0
Inventories/production	5.0	4.5	4.1	5.7	6.0	4.1	4.2
Inventories/total shipments	5.0	4.5	4.1	5.8	6.2	4.1	4.2
Share of shipments:							
Home market shipments:							
Internal consumption/ transfers	1.5	1.3	1.6	1.6	2.4	2.1	2.1
Commercial shipments	45.6	48.5	51.4	49.8	54.1	50.4	50.2
Subtotal, home market shipments	47.1	49.8	53.1	51.3	56.5	52.5	52.3
Export shipments to:							
United States	10.7	2.1	8.0	6.5	9.8	7.5	4.5
All other markets	42.2	48.1	39.0	42.1	33.7	39.9	43.3
Total exports	52.9	50.2	46.9	48.7	43.5	47.5	47.7
Total shipments	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Quantity (short tons)						
Resales exported to U.S.[1]	***	***	***	***	***	***	***
Total exports to U.S.	***	***	***	***	***	***	***
	Ratios and shares (percent)						
Share of total exports to U.S.--							
Exported by producers	***	***	***	***	***	***	***
Exported by resellers[1]	***	***	***	***	***	***	***
Adjusted share of total shipments exported to U.S.[1]	***	***	***	***	***	***	***

[1] Resales exported to the U.S. include data ***.

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

Table VII-4 presents data from 2013 to 2015 on the top destinations for exports from China of certain refrigerants, including R-134a and out-of-scope merchandise such as other fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons. In both quantity and value, the United States was China's top destination for exports of certain refrigerants for the entire three year period. In terms of unit value, China's exports of certain refrigerants to countries other than the United States were mixed, with unit values higher to countries such as Saudi Arabia, Mexico, and Canada and lower to countries such as South Africa, Columbia, and Venezuela than China's exports to the United States in 2013 and 2015. The unit values of China's exports to the United States decreased while the quantity and value increased in 2015.

Table VII-4

Certain refrigerants: Exports from China of related products,[1] by country, 2013-15

Exports from China	Calendar year		
	2013	2014	2015
	Quantity (short tons)		
Exports from China to the United States	57,065	42,129	64,108
Exports from China to other major destination markets.--Netherlands	12,388	17,942	23,334
Japan	14,734	16,613	17,344
Korea	11,466	11,694	11,637
Taiwan	7,014	7,424	8,281
Brazil	5,987	8,313	7,742
Mexico	1,734	3,514	7,472
Thailand	4,536	4,980	7,052
France	2,835	5,010	5,960
All other destination markets	77,173	85,703	84,060
Total China exports	194,932	203,323	236,990
	Value (1,000 dollars)		
Exports from China to the United States	184,244	135,733	192,031
Exports from China to other major destination markets.--Netherlands	45,121	60,349	97,655
Japan	61,079	62,221	64,316
Korea	38,556	37,458	39,754
Taiwan	21,495	21,779	23,535
Brazil	18,992	21,790	21,676
Mexico	5,634	9,391	17,937
Thailand	13,241	12,588	18,256
France	14,370	16,233	19,482
All other destination markets	257,731	252,954	255,803
Total China exports	660,462	630,495	750,444

Table continued.

Table VII-4--Continued

Certain refrigerants: Exports from China of related products,[1] by country, 2013-15

Exports from China	Calendar year		
	2013	2014	2015
	Unit value (dollars per short ton)		
Exports from China to the United States	3,229	3,222	2,995
Exports from China to other major destination markets.--Canada	3,642	3,363	4,185
Mexico	4,145	3,745	3,708
Korea	3,363	3,203	3,416
South Africa	3,065	2,934	2,842
Colombia	3,172	2,621	2,800
Costa Rica	3,248	2,672	2,400
Venezuela	2,919	2,527	2,589
Saudi Arabia	5,069	3,240	3,269
All other destination markets	3,340	2,952	3,043
Total China exports	3,388	3,101	3,167
	Share of quantity (percent)		
Exports from China to the United States	29.3	20.7	27.1
Exports from China to other major destination markets.--Canada	6.4	8.8	9.8
Mexico	7.6	8.2	7.3
Korea	5.9	5.8	4.9
South Africa	3.6	3.7	3.5
Colombia	3.1	4.1	3.3
Costa Rica	0.9	1.7	3.2
Venezuela	2.3	2.4	3.0
Saudi Arabia	1.5	2.5	2.5
All other destination markets	39.6	42.2	35.5
Total China exports	100.0	100.0	100.0

[1] Includes all compounds under HS 290339: other fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons.

Source: Official exports statistics of the China as reported by China Customs in the GTIS/GTA database using HTS subheading 2903.39 accessed January 24, 2017.

U.S. INVENTORIES OF IMPORTED MERCHANDISE

Table VII-5 presents data on U.S. importers' reported inventories of R-134a. Six U.S. importers reported imports of R-134a from Sanmei as well as other producers/exporters in China. R-134a, the molecule, does not have a shelf life as long as it is kept in a controlled environment (such as a standard warehouse with temperatures below 200 degrees).[10] It can be kept in a steel cylinder with a rubber gasket in the valve. The shelf life is limited by the cylinder, not the R-134a molecule. Over time, the rubber valve will deteriorate and the steel on the cylinder may rust so the optimal time to keep R-134a in inventory is approximately up to six years in a warehouse.[11] [12]

Table VII-5
R-134a: U.S. importers' end-of-period inventories of imports by source, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September	
	2013	2014	2015	2015	2016
	Inventories (short tons); Ratios (percent)				
Imports from China: Inventories	6,081	6,204	7,053	5,830	10,598
Ratio to U.S. imports	40.8	78.3	48.2	40.6	39.8
Ratio to U.S. shipments of imports	51.2	80.6	51.8	39.7	48.7
Ratio to total shipments of imports	50.6	80.4	51.3	39.2	48.5
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 all import 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.

[10] Hearing transcript, p. 201 (Lammers).

[11] Hearing transcript, p. 201 (Dayton).

[12] One importer, *** explained that after the worldwide shortage of HF (the key raw material for refrigerants, including R-134a) in 2010 and 2011, it bought and sold "above the average amounts of product" and that it carried "overpriced" inventory when prices "plummeted in 2012." It did import and buy domestically in 2013 to "cost average" its inventory. It still holds inventory of imported and purchased R-134a and stated that in addition to low prices, the recent United Nations Global Harmonization System (GHS) requirement to put uniform marking to identify hazardous products has made it difficult to sell old inventory without the recent GHS labeling requirements. *** also stated that R-134a can have a shelf life of 20 years or more, as long as it is contained under pressure. ***.

U.S. IMPORTERS' OUTSTANDING ORDERS

The Commission requested importers to indicate whether they imported or arranged for the importation of R-134a from China or other sources after September 30, 2016. No responding importer arranged for imports from China while five importers *** reported that they arranged for imports from nonsubject countries Germany, India, and the United Kingdom. Table VII-6 presents data reported by U.S. importers concerning their arranged imports of R-134a.

Table VII-6
R-134a: Arranged imports, October 2016 through September 2017

Item	Period				
	Oct-Dec 2016[1]	Jan-Mar 2017	Apr-Jun 2017	Jul-Sept 2017	Total
	Quantity (short tons)				
China	***	***	***	***	***
All other sources	***	***	***	***	***
Total U.S. imports	***	***	***	***	***

[1] Based on official Commerce statistics, imports of R-134a in the October to December 2016 period were 563 short tons from China, 1,007 short tons from all other sources, with total U.S. imports of 1,571 short tons.

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

ANTIDUMPING OR COUNTERVAILING DUTY ORDERS IN THIRD-COUNTRY MARKETS

On April 19, 2010, India issued preliminary antidumping duty orders on producers and exporters of R-134a under subheading 2903.39.19 from China and Japan.[13] On July 15, 2011, final antidumping duty rates were issued by India on R-134a under subheading 2903.39.19 from China and Japan for a period of five years. The final duty rates included $1.15 per kilogram for producer/exporter Sinochem Environmental Protection (Taicang) Co. Ltd., $1.36 per kilogram for producer Sinochem Environmental Protection (Taicang) Co. Ltd. and exporter Du-Pont Trading (Shanghai) Co. Ltd., and $.1.15 per kilogram on producer/exporter Sinochem Environmental Protection Chemicals (Xian) Co. A duty rate of $1.41 per kilogram was placed on any other Chinese producer/exporter combinations. Finally, imports from any Japanese producer/exporter combinations were assigned a duty rate of $0.69 per kilogram.[14] On April 10, 2015, India initiated a sunset review concerning the antidumping duty order on R-134a from

[13] Government of India CUSTOMS Notification No. 52/2010, April 19, 2010.
[14] Government of India CUSTOMS Notification No. 61/2011, July 15, 2011.

China only.[15] On July 11, 2016, India issued an antidumping duty of $1.22 per kilogram on imports of R-134a from China until July 10, 2021.[16]

INFORMATION ON NONSUBJECT COUNTRIES

As previously noted in *Part IV*, table IV-3, the United Kingdom was a supplier of R-134a in each of the three years and also in interim 2016. Germany was the next largest supplier of R-134a from 2013 to September 2016, but the vast majority of the imports from Germany entered the U.S. market in 2014. In 2014, two other nonsubject countries were also sources of imports of R-134a: France and Japan. The increase in imports from nonsubject countries in 2014 may have been due to the temporary imposition of antidumping duties on imports from China.

Table VII-7 presents countries' global exports of a basket category of goods, including R-134a, during 2013-15. The basket category of exports includes all compounds of "other fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons." Further information on production of R-134a in the UK and Germany, the two largest sources of nonsubject imports since 2013 is provided below.

[15] Government of India CUSTOMS Notification No. 15/23/2014, April 10, 2015.

[16] Government of India CUSTOMS Notification No. 30/2016, retrieved on January 31, 2017 from http://www.cbec.gov.in/htdocs-cbec/customs/cs-act/notifications/notfns-2016/cs-add2016/csadd30-2016.pdf.

Table VII-7

Certain refrigerants: Global exports by exporter,[1] 2013-15

Exporter	Calendar year		
	2013	2014	2015
	Quantity (short tons)		
United States	91,027	90,190	69,867
China	194,932	203,323	236,990
All other major exporters.--Netherlands	23,973	28,977	28,596
France	19,919	16,105	18,347
Japan	11,638	10,036	15,787
United Kingdom	12,369	12,408	15,442
Germany	10,440	11,210	11,850
Belgium	9,472	10,417	10,646
Italy	4,669	5,539	5,427
India	594	1,030	2,823
Singapore	3,342	2,896	2,476
Spain	5,657	4,484	1,288
All other exporters	13,980	10,622	6,978
Total global exports	402,011	407,237	426,518
	Value (1,000 dollars)		
United States	625,070	493,852	407,259
China	660,462	630,495	750,444
All other major exporters.--Netherlands	173,428	212,944	252,318
France	122,929	95,093	89,382
Japan	147,697	151,692	202,826
United Kingdom	97,663	102,956	119,652
Germany	70,410	69,531	69,610
Belgium	59,331	54,445	53,382
Italy	35,338	34,284	37,419
India	6,537	9,200	17,804
Singapore	22,196	18,856	15,431
Spain	25,477	20,657	5,420
All other exporters	92,478	77,778	77,058
Total global exports	2,139,015	1,971,782	2,098,004

Table continued.

Table VII-7--Continued

Certain refrigerants: Global exports by exporter,[1] 2013-15

Exporter	Calendar year		
	2013	2014	2015
	Unit value (dollars per short ton)		
United States	6,867	5,476	5,829
China	3,388	3,101	3,167
All other major exporters.--Netherlands	7,234	7,349	8,824
France	6,172	5,905	4,872
Japan	12,691	15,115	12,847
United Kingdom	7,896	8,298	7,748
Germany	6,744	6,203	5,874
Belgium	6,264	5,226	5,014
Italy	7,569	6,189	6,895
India	11,007	8,933	6,307
Singapore	6,641	6,512	6,233
Spain	4,504	4,607	4,207
All other exporters	6,615	7,322	11,043
Total global exports	5,321	4,842	4,919
	Share of quantity (percent)		
United States	22.6	22.1	16.4
China	48.5	49.9	55.6
All other major exporters.--Netherlands	6.0	7.1	6.7
France	5.0	4.0	4.3
Japan	2.9	2.5	3.7
United Kingdom	3.1	3.0	3.6
Germany	2.6	2.8	2.8
Belgium	2.4	2.6	2.5
Italy	1.2	1.4	1.3
India	0.1	0.3	0.7
Singapore	0.8	0.7	0.6
Spain	1.4	1.1	0.3
All other exporters	3.5	2.6	1.6
Total global exports	100.0	100.0	100.0

[1] Includes all compounds under HS 290339: other fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons.

Source: Official exports statistics of various reporting statistical authorities the GTIS/GTA database using HTS subheading 2903.39, accessed January 24, 2017.

The United Kingdom

There are no production facilities for R-134a in the United Kingdom. Mexichem UK has a fluorocarbon production facility there, but it was converted from production of R-134a to production of R-125 during 2001-06.[17] While the facility no longer produces R-134a, Mexichem UK does purify R-134a. Mexichem exports standard R-134a to the United Kingdom, where R-134a is purified before imported into the U.S. market.[18] The purified R-134a is used in pharmaceutical applications such as metered dose inhalers (MDIs) to treat lung/breathing issues. Table VII-8 presents exports from the United Kingdom of R-134a and related products.

Table VII-8
Certain refrigerants: Exports from the United Kingdom of related products,[1] by country, 2013-15

Exports from the United Kingdom	Calendar year		
	2013	2014	2015
	Quantity (short tons)		
Exports from the United Kingdom to the United States	1,112	901	915
Exports from the United Kingdom to other major destination markets.-- France	2,117	2,161	2,587
Spain	2,256	2,380	2,289
Ireland	663	573	1,672
Netherlands	666	918	1,579
India	1,140	1,135	1,542
Saudi Arabia	278	488	552
United Arab Emirates	572	602	512
Italy	438	285	502
All other destination markets	3,128	2,965	3,292
Total United Kingdom exports	12,369	12,408	15,442
	Value (1,000 dollars)		
Exports from the United Kingdom to the United States	12,822	15,276	10,023
Exports from the United Kingdom to other major destination markets.-- France	17,325	14,986	16,208
Spain	14,303	15,996	14,175
Ireland	5,268	4,725	11,075
Netherlands	3,415	5,046	8,931
India	6,573	6,669	8,462
Saudi Arabia	7,083	9,498	12,510
United Arab Emirates	3,808	4,009	5,869
Italy	3,560	2,726	3,892
All other destination markets	23,505	24,025	28,505
Total United Kingdom exports	97,663	102,956	119,652

Table continued.

[17] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. VII-9.

[18] *1,1,1,2-Tetrafluoroethane from China, Inv. Nos. 701-TA-509 and 731-TA-1244 (Final),* USITC Publication 4503, December 2014, p. VII-9.

Table VII-8--Continued

Certain refrigerants: Exports from the United Kingdom of related products,[1] by country, 2013-15

Exports from the United Kingdom	Calendar year		
	2013	2014	2015
	Unit value (dollars per short ton)		
Exports from the United Kingdom to the United States	11,530	16,952	10,959
Exports from the United Kingdom to other major destination markets.--			
France	8,184	6,935	6,264
Spain	6,341	6,722	6,194
Ireland	7,950	8,252	6,624
Netherlands	5,131	5,496	5,656
India	5,764	5,878	5,488
Saudi Arabia	25,498	19,462	22,662
United Arab Emirates	6,653	6,661	11,463
Italy	8,137	9,549	7,752
All other destination markets	7,514	8,102	8,658
Total United Kingdom exports	7,896	8,298	7,748
	Share of quantity (percent)		
Exports from the United Kingdom to the United States	9.0	7.3	5.9
Exports from the United Kingdom to other major destination markets.--			
France	17.1	17.4	16.8
Spain	18.2	19.2	14.8
Ireland	5.4	4.6	10.8
Netherlands	5.4	7.4	10.2
India	9.2	9.1	10.0
Saudi Arabia	2.2	3.9	3.6
United Arab Emirates	4.6	4.9	3.3
Italy	3.5	2.3	3.3
All other destination markets	25.3	23.9	21.3
Total United Kingdom exports	100.0	100.0	100.0

[1] Includes all compounds under HS 290339: other fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons.

Source: Official exports statistics of the United Kingdom as reported by Eurostat in the GTIS/GTA database using HTS subheading 2903.39, accessed January 24, 2017.

Germany

Solvay Fluor produces R-134a in Germany. While most of the product is intended for refrigerant and foam blowing applications, some of the R-134a is further purified for pharmaceutical uses.[19] Solvay produces its own HF from fluorspar, some of which it sources from its mines in Namibia and Bulgaria.[20] Table VII-9 presents exports from Germany of R-134a and related products.

Table VII-9

Certain refrigerants: Exports from Germany of related products,[1] by country, 2013-15

Exports from Germany	Calendar year		
	2013	2014	2015
	Quantity (short tons)		
Exports from Germany to the United States	203	2,396	346
Exports from Germany to other major destination markets.--			
France	2,539	1,860	1,990
United Kingdom	653	657	1,142
Italy	554	593	1,102
Netherlands	608	676	1,002
Spain	604	412	898
Belgium	675	603	732
Czech republic	781	716	731
Poland	242	233	511
All other destination markets	3,582	3,063	3,397
Total Germany exports	10,440	11,210	11,850

Table continued.

[19] Solvay Chemicals, Fluor Products, http://www.solvaychemicals.com/EN/products/Fluor/Fluor.aspx (retrieved December 2, 2013).

[20] Solvay Chemicals, hydrogen fluoride brochure, October 11, 2011.

Table VII-9--Continued

Certain refrigerants: Exports from Germany of related products,[1] by country, 2013-15

Exports from Germany	Calendar year		
	2013	2014	2015
	Value (1,000 dollars)		
Exports from Germany to the United States	1,905	10,097	3,402
Exports from Germany to other major destination markets.-- France	21,792	18,370	17,324
United Kingdom	7,495	6,930	9,113
Italy	3,230	2,682	4,560
Netherlands	2,765	3,208	3,404
Spain	3,205	2,504	4,041
Belgium	6,602	5,892	5,901
Czech republic	3,883	3,200	3,174
Poland	1,257	1,114	1,927
All other destination markets	18,275	15,533	16,763
Total Germany exports	70,410	69,531	69,610
	Unit value (dollars per short ton)		
Exports from Germany to the United States	9,398	4,213	9,832
Exports from Germany to other major destination markets.-- France	8,583	9,877	8,707
United Kingdom	11,470	10,554	7,982
Italy	5,831	4,522	4,137
Netherlands	4,545	4,747	3,397
Spain	5,310	6,081	4,499
Belgium	9,788	9,763	8,066
Czech republic	4,974	4,468	4,340
Poland	5,187	4,773	3,774
All other destination markets	5,102	5,071	4,935
Total Germany exports	6,744	6,203	5,874
	Share of quantity (percent)		
Exports from Germany to the United States	1.9	21.4	2.9
Exports from Germany to other major destination markets.-- France	24.3	16.6	16.8
United Kingdom	6.3	5.9	9.6
Italy	5.3	5.3	9.3
Netherlands	5.8	6.0	8.5
Spain	5.8	3.7	7.6
Belgium	6.5	5.4	6.2
Czech republic	7.5	6.4	6.2
Poland	2.3	2.1	4.3
All other destination markets	34.3	27.3	28.7
Total Germany exports	100.0	100.0	100.0

[1] Includes all compounds under HS 290339: other fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons.

Source: Official exports statistics of Germany as reported by Eurostat in the GTIS/GTA database using HTS subheading 2903.39, accessed January 24, 2017.

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
81 FR 12523 March 9, 2016	*1,1,1,2-Tetrafluoroethane (R–134a) from China; Institution of Antidumping Duty Investigation and Scheduling of Preliminary Phase Investigation*	https://federalregister.gov/a/2016-05245
81 FR 18830 April 1, 2016	*1, 1, 1, 2-Tetrafluoroethane from the People's Republic of China: Initiation of Less Than Fair Value Investigation*	https://federalregister.gov/a/2016-07316
81 FR 23750 April 22, 2016	*1,1,1,2-Tetrafluoroethane (R-134a) from China; Determination*	https://www.federalregister.gov/d/2016-09337
81 FR 69786 October 7, 2016	*1,1,1,2-Tetrafluoroethane (R-134a) from the People's Republic of China: Preliminary Determination of Sales at Less-Than-Fair Value and Affirmative Determination of Critical Circumstances, in Part, and Postponement of Final Determination*	https://www.gpo.gov/fdsys/pkg/FR-2016-10-07/pdf/2016-24358.pdf
81 FR 86699 December 1, 2016	*1,1,1,2-Tetrafluoroethane (R-134a) from the People's Republic of China; Amended Preliminary Affirmative Determination of Sales at Less-Than Fair Value*	https://www.federalregister.gov/d/2016-28823
81 FR 78186, November 7, 2016	*1,1,1,2-Tetrafluoroethane (R-134a) from China; Scheduling of the Final Phase of an Antidumping Duty Investigation*	https://www.federalregister.gov/d/2016-26780
82 FR 12192, March 1, 2017	*1,1,1,2 Tetrafluoroethane (R–134a) from the People's Republic of China: Final Determination of Sales at Less Than Fair Value and Affirmative Determination of Critical Circumstances, in Part*	https://www.gpo.gov/fdsys/pkg/FR-2017-03-01/pdf/2017-03961.pdf

APPENDIX B

LIST OF HEARING WITNESSES

CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject: 1,1,1,2-Tetrafluoroethane (R-134a) from China

Inv. No.: 731-TA-1313 (Final)

Date and Time: February 23, 2017 - 9:30 a.m.

Sessions were held in connection with this investigation in the Main Hearing Room (Room 101), 500 E Street SW, Washington, DC.

OPENING REMARKS:

Petitioner (**James R. Cannon, Jr.**, Cassidy Levy Kent (USA) LLP)
Respondents (**Max F. Schutzman**, Grunfeld, Desiderio, Lebowitz, Silverman & Klestadt LLP)

In Support of the Imposition of Antidumping Duty Order:

Cassidy Levy Kent (USA) LLP
Schagrin Associates
Washington, DC
on behalf of

The American HFC Coalition and its individual members
District Lodge 154 of the International Association of Machinists and Aerospace Workers

Richard Rowe, President *and* Chief Executive Officer, Arkema, Inc.

Glenn Haun, Director of Sales, Arkema, Inc.

Matthew T. Ritter, Global Business Director, Fluorochemicals, Arkema, Inc.

Dean McCoy, Arkema, Inc., International Association of Machinists and Aerospace Workers

Magen L. Buterbaugh, Global Business Director, Fluorochemicals and General Manager North America, The Chemours Company, LLC

In Support of the Imposition of
Antidumping Duty Order (continued):

James Bachman, Commercial Director North America, The Chemours Company, LLC

Lesley A. Aulick, Global Business and Market Manager, Refrigerants, The Chemours Company, LLC

Antonio Carillo Rule, Chief Executive Officer, Mexichem, S.A. de C.V.

Peter Geosits, Commercial Director, Mexichem Fluor, Inc.

John Pacillo, Operations Director, Mexichem Fluor, Inc.

Deirdre Maloney, Senior Trade Advisor, Cassidy Levy Kent (USA) LLP

James R. Cannon, Jr.)
Nazak Nikakhtar)
) – OF COUNSEL
Paul W. Jameson)
Christopher T. Cloutier)

In Opposition to the Imposition of
Antidumping Duty Order:

Grunfeld, Desiderio, Lebowitz, Silverman & Klestadt LLP
Washington, DC
on behalf of

Zhejiang Quhua Fluor-Chemistry Co., Ltd.
Sinochem Environmental Protection Chemicals Co., Ltd.
Zhejiang Sanmei Chemical Industry Co., Ltd.
Jiangsu Bluestar Green Technology Co., Ltd.

John Mathew, Chief Operating Officer, Vision Global Technology, Inc.

Deborah Dayton, President, Weitron, Inc.

Jim Dougan, Vice President, Economic Consulting Services

In Opposition to the Imposition of
Antidumping Duty Order (continued):

Cara Groden, Economist, Economic Consulting Services

Max F. Schutzman)
Ned H. Marshak) – OF COUNSEL
Kavita Mohan)

deKieffer & Horgan, PLLC
Washington, DC
on behalf of

Autozone, Inc.

John Lammers, Vice President of Merchandising, Autozone, Inc.

J. Kevin Horgan) – OF COUNSEL

REBUTTAL/CLOSING REMARKS:

Petitioner (**James R. Cannon, Jr.**, Cassidy Levy Kent (USA) LLP)
Respondents (**Ned H. Marshak**, Grunfeld, Desiderio, Lebowitz, Silverman & Klestadt LLP)

APPENDIX C

SUMMARY DATA

Table C-1
R-134a: Summary data concerning the U.S. market, 2013-15, January to September 2015, and January to September 2016
(Quantity=short tons; Value=1,000 dollars; Unit values, unit labor costs, and unit expenses=dollars per short ton; Period changes=percent--exceptions noted)

	Reported data					Period changes			
	Calendar year			January to September		Calendar year			Jan-Sept
	2013	2014	2015	2015	2016	2013-15	2013-14	2014-15	2015-16
U.S. consumption quantity:									
Amount	82,215	84,348	70,454	56,718	82,303	(14.3)	2.6	(16.5)	45.1
Producers' share (fn1)	79.6	81.3	76.5	76.6	68.5	(3.2)	1.7	(4.9)	(8.1)
Importers' share (fn1):									
China	19.3	14.1	21.9	21.8	30.3	2.6	(5.2)	7.8	8.5
All others sources	1.0	4.5	1.6	1.6	1.2	0.6	3.5	(2.9)	(0.4)
All import sources	20.4	18.7	23.5	23.4	31.5	3.2	(1.7)	4.9	8.1
U.S. consumption value:									
Amount	369,685	358,962	279,738	221,643	323,111	(24.3)	(2.9)	(22.1)	45.8
Producers' share (fn1)	83.1	84.2	79.0	78.3	68.1	(4.1)	1.1	(5.2)	(10.3)
Importers' share (fn1):									
China	15.4	11.0	18.1	18.7	30.0	2.8	(4.4)	7.2	11.4
All others sources	1.6	4.9	2.9	3.0	1.9	1.3	3.3	(2.0)	(1.1)
All import sources	16.9	15.8	21.0	21.7	31.9	4.1	(1.1)	5.2	10.3
U.S. imports from:									
China:									
Quantity	15,900	11,916	15,429	12,361	24,953	(3.0)	(25.1)	29.5	101.9
Value	56,860	39,421	50,760	41,337	96,943	(10.7)	(30.7)	28.8	134.5
Unit value	$3,576	$3,308	$3,290	$3,344	$3,885	(8.0)	(7.5)	(0.6)	16.2
Ending inventory quantity	6,081	6,204	7,053	5,830	10,598	16.0	2.0	13.7	81.8
All other sources:									
Quantity	838	3,820	1,135	933	1,011	35.4	355.8	(70.3)	8.3
Value	5,764	17,415	8,071	6,666	6,200	40.0	202.1	(53.7)	(7.0)
Unit value	$6,878	$4,559	$7,111	$7,146	$6,135	3.4	(33.7)	56.0	(14.1)
Ending inventory quantity	***	***	***	***	***	***	***	***	***
All import sources:									
Quantity	16,738	15,736	16,564	13,294	25,963	(1.0)	(6.0)	5.3	95.3
Value	62,624	56,836	58,830	48,003	103,143	(6.1)	(9.2)	3.5	114.9
Unit value	$3,741	$3,612	$3,552	$3,611	$3,973	(5.1)	(3.5)	(1.7)	10.0
Ending inventory quantity	***	***	***	***	***	***	***	***	***
U.S. producers':									
Average capacity quantity	114,363	107,925	88,078	62,955	85,301	(23.0)	(5.6)	(18.4)	35.5
Production quantity	100,031	96,586	72,223	58,848	74,101	(27.8)	(3.4)	(25.2)	25.9
Capacity utilization (fn1)	87.5	89.5	82.0	93.5	86.9	(5.5)	2.0	(7.5)	(6.6)
U.S. shipments:									
Quantity	65,477	68,612	53,890	43,424	56,340	(17.7)	4.8	(21.5)	29.7
Value	307,061	302,126	220,908	173,640	219,968	(28.1)	(1.6)	(26.9)	26.7
Unit value	$4,690	$4,403	$4,099	$3,999	$3,904	(12.6)	(6.1)	(6.9)	(2.4)
Export shipments:									
Quantity	***	***	***	***	***	***	***	***	***
Value	***	***	***	***	***	***	***	***	***
Unit value	***	***	***	***	***	***	***	***	***
Ending inventory quantity	8,632	7,811	9,831	10,589	8,066	13.9	(9.5)	25.9	(23.8)
Inventories/total shipments (fn1)	8.8	8.0	14.1	14.2	8.0	5.2	(0.8)	6.1	(6.2)
Production workers	209	209	205	206	205	(1.9)	0.0	(1.9)	(0.5)
Hours worked (1,000s)	486	487	486	361	358	0.0	0.2	(0.2)	(0.8)
Wages paid ($1,000)	19,111	19,809	20,553	14,999	15,358	7.5	3.7	3.8	2.4
Hourly wages (dollars)	$39.32	$40.68	$42.29	$41.55	$42.90	7.5	3.4	4.0	3.3
Productivity (short tons per 1,000 hours)	205.8	198.3	148.6	163.0	207.0	(27.8)	(3.6)	(25.1)	27.0
Unit labor costs	$191	$205	$285	$255	$207	49.0	7.3	38.8	(18.7)
Net sales:									
Quantity	97,709	97,664	69,898	55,817	75,661	(28.5)	(0.0)	(28.4)	35.6
Value	451,925	410,267	299,201	222,086	298,302	(33.8)	(9.2)	(27.1)	34.3
Unit value	$4,625	$4,201	$4,281	$3,979	$3,943	(7.5)	(9.2)	1.9	(0.9)
Cost of goods sold (COGS)	361,918	357,159	283,087	224,313	278,525	(21.8)	(1.3)	(20.7)	24.2
Gross profit or (loss)	90,007	53,108	16,114	(2,227)	19,777	(82.1)	(41.0)	(69.7)	fn2
SG&A expenses	45,241	35,808	23,414	16,141	31,498	(48.2)	(20.9)	(34.6)	95.1
Operating income or (loss)	44,766	17,300	(7,300)	(18,368)	(11,721)	fn2	(61.4)	fn2	(36.2)
Net income or (loss)	28,283	(989)	(16,426)	(26,965)	(16,704)	fn2	fn2	1,560.9	(38.1)
Capital expenditures	***	***	***	***	***	***	***	***	***
Unit COGS	$3,704	$3,657	$4,050	$4,019	$3,681	9.3	(1.3)	10.7	(8.4)
Unit SG&A expenses	$463	$367	$335	$289	$416	(27.7)	(20.8)	(8.6)	44.0
Unit operating income or (loss)	$458	$177	$(104)	$(329)	$(155)	fn2	(61.3)	fn2	(52.9)
Unit net income or (loss)	$289	$(10)	$(235)	$(483)	$(221)	fn2	fn2	2,220.6	(54.3)
COGS/sales (fn1)	80.1	87.1	94.6	101.0	93.4	14.5	7.0	7.6	(7.6)
Operating income or (loss)/sales (fn1)	9.9	4.2	(2.4)	(8.3)	(3.9)	(12.3)	(5.7)	(6.7)	4.3
Net income or (loss)/sales (fn1)	6.3	(0.2)	(5.5)	(12.1)	(5.6)	(11.7)	(6.5)	(5.2)	6.5

Notes:

fn1.--Reported data are in percent and period changes are in percentage points.
fn2.--Undefined.

Source: Compiled from data submitted in response to Commission questionnaires and official U.S. imports statistics (for details on import data used, see Part IV).

APPENDIX D

U.S. PRODUCERS (INCLUDING NONSUBJECT PRODUCER HONEYWELL), U.S. IMPORTERS, AND U.S. PURCHASERS' RESPONSES ON REGULATIONS AFFECTING PRODUCTION, REPLACEMENTS, AND DEMAND FOR R-134A

Table D-1

R-134a: U.S. producers and Honeywell's responses on regulatory changes to R-134a on production since January 1, 2013

* * * * * * *

Table D-2

R-134a: U.S. producers and Honeywell's responses on developments of R-134a replacements since January 1, 2013

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Table D-3

R-134a: U.S. producers and Honeywell's responses on regulatory changes to R-134a on demand since January 1, 2013

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Table D-4

R-134a: U.S. importers' responses on restrictions on imports of R-134a since January 1, 2013

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Table D-5

R-134a: U.S. purchasers' responses on regulatory changes to R-134a on demand since January 1, 2013

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APPENDIX E

U.S. PRODUCERS AND U.S. IMPORTERS' U.S. SHIPMENTS OF R-134A BY APPLICATION

Table E-1

R-134a: U.S. producers' and U.S. importers' U.S. shipments to automotive OEMs application, 2013-15, January to September 2015, and January to September 2016

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Table E-2

R-134a: U.S. producers' and U.S. importers' U.S. shipments to automotive aftermarket application, 2013-15, January to September 2015, and January to September 2016

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Table E-3

R-134a: U.S. producers' and U.S. importers' U.S. shipments to all automotive applications, 2013-15, January to September 2015, and January to September 2016

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Table E-4

R-134a: U.S. producers' and U.S. importers' U.S. shipments to stationary OEMs application, 2013-15, January to September 2015, and January to September 2016

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Table E-5

R-134a: U.S. producers' and U.S. importers' U.S. shipments to stationary aftermarket application, 2013-15, January to September 2015, and January to September 2016

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Table E-6

R-134a: U.S. producers' and U.S. importers' U.S. shipments to all stationary applications, 2013-15, January to September 2015, and January to September 2016

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Table E-7

R-134a: U.S. producers' and U.S. importers' U.S. shipments to foam expansion and propellant application, 2013-15, January to September 2015, and January to September 2016

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Table E-8

R-134a: U.S. producers' and U.S. importers' U.S. shipments to other and unknown applications, 2013-15, January to September 2015, and January to September 2016

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Table E-9

R-134a: U.S. producers' and U.S. importers' U.S. shipments by all applications, 2013-15, January to September 2015, and January to September 2016

Item	Calendar year			January to September		Between calendar years			Between partial year periods
	2013	2014	2015	2015	2016	2013-15	2013-14	2014-15	2015-16
	Quantity (short tons)					Change (percent)			
Overall U.S. shipments.-- U.S. producers	65,477	68,612	53,890	43,424	56,340	(17.7)	4.8	(21.5)	29.7
U.S. importers.-- China	11,886	7,696	13,609	11,027	16,330	14.5	(35.3)	76.8	48.1
Nonsubject sources	766	3,976	1,347	1,219	1,064	75.8	419.1	(66.1)	(12.7)
All import sources	12,652	11,672	14,956	12,246	17,394	18.2	(7.7)	28.1	42.0
Apparent U.S. consumption	78,129	80,284	68,846	55,670	73,734	(11.9)	2.8	(14.2)	32.4
	Value (1,000 dollars)					Change (percent)			
Overall U.S. shipments.-- U.S. producers	307,061	302,126	220,908	173,640	219,968	(28.1)	(1.6)	(26.9)	26.7
U.S. importers.-- China	69,856	39,456	60,986	48,529	73,310	(12.7)	(43.5)	54.6	51.1
Nonsubject sources	4,781	18,997	8,640	7,759	6,304	80.7	297.3	(54.5)	(18.8)
All import sources	74,637	58,453	69,626	56,288	79,614	(6.7)	(21.7)	19.1	41.4
Apparent U.S. consumption	381,698	360,579	290,534	229,928	299,582	(23.9)	(5.5)	(19.4)	30.3
	Unit value (dollars per ton)					Change (percent)			
Overall U.S. shipments.-- U.S. producers	4,690	4,403	4,099	3,999	3,904	(12.6)	(6.1)	(6.9)	(2.4)
U.S. importers.-- China	5,877	5,127	4,481	4,401	4,489	(23.7)	(12.8)	(12.6)	2.0
Nonsubject sources	6,242	4,778	6,414	6,365	5,925	2.8	(23.4)	34.2	(6.9)
All import sources	5,899	5,008	4,655	4,597	4,577	(21.1)	(15.1)	(7.0)	(0.4)
Apparent U.S. consumption	4,885	4,491	4,220	4,130	4,063	(13.6)	(8.1)	(6.0)	(1.6)
	Share of quantity (percent)					Change (percentage points)			
Overall U.S. shipments.-- U.S. producers	83.8	85.5	78.3	78.0	76.4	(5.5)	1.7	(7.2)	(1.6)
U.S. importers.-- China	15.2	9.6	19.8	19.8	22.1	4.6	(5.6)	10.2	2.3
Nonsubject sources	1.0	5.0	2.0	2.2	1.4	1.0	4.0	(3.0)	(0.7)
All import sources	16.2	14.5	21.7	22.0	23.6	5.5	(1.7)	7.2	1.6
Apparent U.S. consumption	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0

Source: Compiled from data submitted in response to Commission questionnaire and Honeywell's questionnaire response, question II-10.