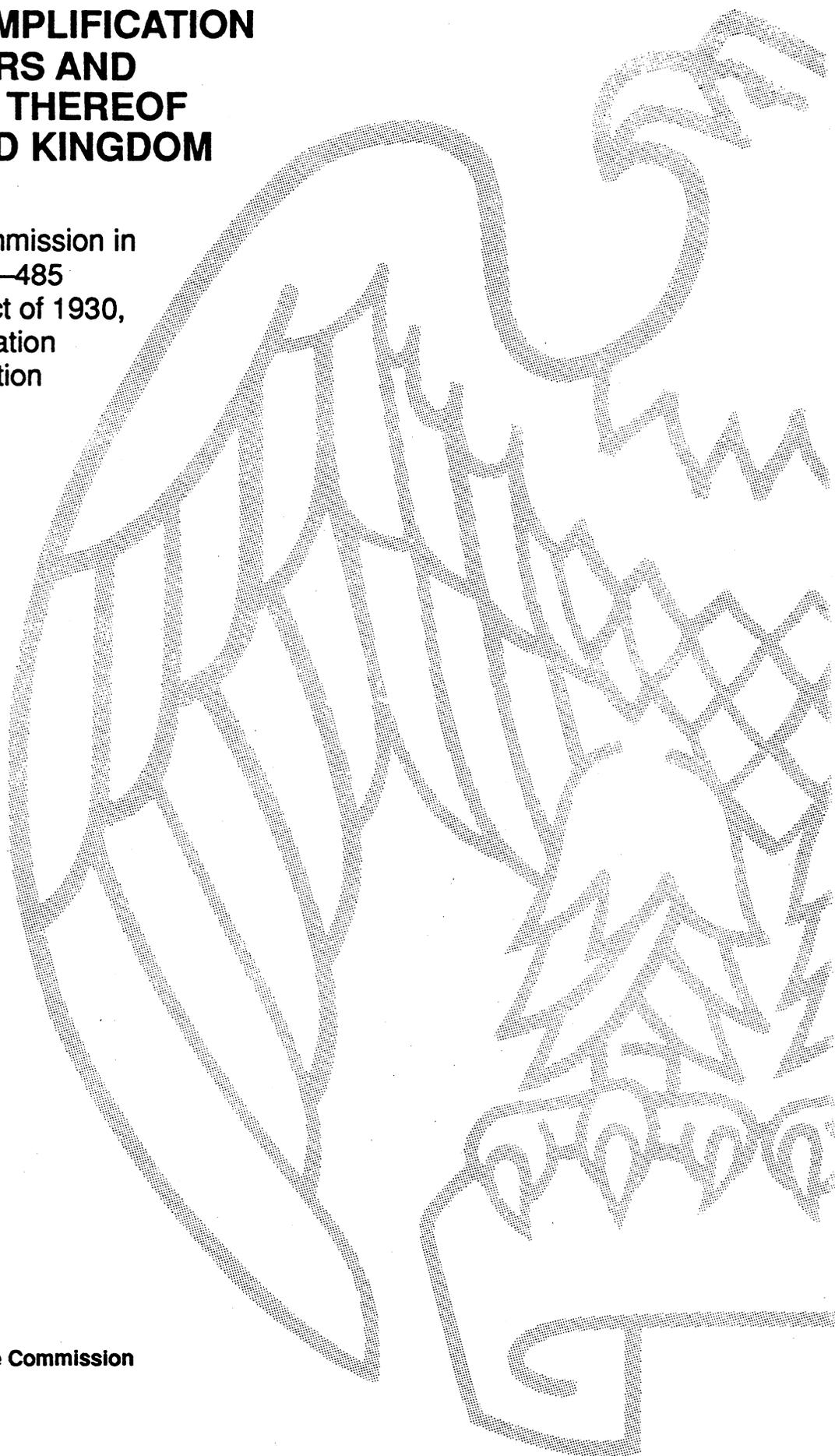


# **CERTAIN GENE AMPLIFICATION THERMAL CYCLERS AND SUBASSEMBLIES THEREOF FROM THE UNITED KINGDOM**

Determination of the Commission in  
Investigation No. 731-TA-485  
(Final) Under the Tariff Act of 1930,  
Together With the Information  
Obtained in the Investigation



**USITC PUBLICATION 2412**

**AUGUST 1991**

**United States International Trade Commission  
Washington, DC 20436**

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## CONTENTS

	<u>Page</u>
Determination.....	1
Views of the Commission.....	3
Concurring views of Acting Chairman Anne E. Brunsdale.....	23
Information obtained in the investigation.....	A-1
Introduction.....	A-3
Background.....	A-4
The product.....	A-4
Description and uses.....	A-4
Peltier-effect GATCs.....	A-6
Peltier-effect GATC subassemblies.....	A-8
Vapor-compression GATCs.....	A-9
Heat-only GATCs.....	A-10
Manufacturing process.....	A-10
U.S. tariff treatment.....	A-11
The nature and extent of sales at LTFV.....	A-11
The U.S. market.....	A-12
Apparent U.S. consumption.....	A-12
U.S. producers.....	A-12
Peltier-effect GATCs.....	A-15
Vapor-compression GATCs.....	A-16
Heat-only GATCs.....	A-17
Technological development.....	A-17
U.S. importers.....	A-18
Channels of distribution.....	A-20
Consideration of alleged material injury.....	A-21
U.S. capacity, production, and capacity utilization.....	A-21
U.S. producers' U.S. shipments.....	A-23
U.S. producers' exports.....	A-26
U.S. producers' inventories.....	A-26
U.S. employment, wages, and productivity.....	A-27
Financial experience of U.S. producers.....	A-30
Overall establishment operations.....	A-30
Operations on Peltier-effect GATCs.....	A-31
Operations on vapor-compression GATCs.....	A-31
Operations on Peltier-effect and vapor-compression GATCs combined.....	A-32
Operations on heat-only GATCs.....	A-32
Operations on all GATCs.....	A-33
Investment in productive facilities.....	A-33
Capital expenditures.....	A-34
Research and development expenses.....	A-34
Impact of imports on capital and investment.....	A-34
Consideration of the question of threat of material injury.....	A-35
U.S. inventories of GATCs from the United Kingdom.....	A-36
Ability of foreign producers to generate exports and the availability of export markets other than the United States....	A-37
LEP Scientific, Ltd.....	A-38

## CONTENTS

Information obtained in the investigation--continued	
Consideration of the question of threat of material injury--continued	
Ability of foreign producers to generate exports and the	
availability of export markets other than the United States--continued	
***.....	A-39
Techne, Ltd.....	A-39
British producers' trade data.....	A-40
Trends in the world industry.....	A-43
Consideration of the causal relationship between imports of the	
subject merchandise and the alleged material injury or threat	
thereof.....	A-44
U.S. imports.....	A-44
Market penetration by the subject imports.....	A-45
Other factors influencing the health of the domestic industry.....	A-45
Prices .....	A-51
Market characteristics.....	A-51
Price data.....	A-53
Price trends for Peltier-effect GATCs.....	A-54
Price trends for heat-only GATCs.....	A-55
Price trends for vapor-compression GATCs.....	A-56
Price comparisons for Peltier-type GATCs.....	A-56
Lost sales.....	A-57
Exchange rates.....	A-58
Appendix A - <u>Federal Register</u> notices.....	B-1
Appendix B - List of witnesses who appeared at the hearing.....	B-11
Appendix C - Features of various types of GATCs.....	B-13
Appendix D - Comments received from U.S. producers on the impact of	
imports of Peltier-effect GATCs on their growth,	
investment, ability to raise capital, and existing	
development and production efforts.....	B-17

## Figures

1. Peltier-effect GATC.....	A-8
2. Vapor-compression GATC.....	A-9
3. Heat-only GATC.....	A-10

## Tables

1. GATCs: U.S. shipments of domestic product, U.S. shipments of	
imports, and apparent U.S. consumption, by types, 1988-90,	
January-March 1990, and January-March 1991.....	A-13
2. GATCs: U.S. capacity, production, and capacity utilization,	
by types, 1988-90, January-March 1990, and January-March 1991..	A-22
3. GATCs: U.S. production, by firms, 1990.....	A-23
4. GATCs: Shipments by U.S. producers, by types, 1988-90, January-	
March 1990, and January-March 1991.....	A-24

## CONTENTS

	<u>Page</u>
Tables--Continued	
5. GATCs: End-of-period inventories of U.S. producers, by types, 1988-90, January-March 1990, and January-March 1991.....	A-27
6. Average number of production and related workers producing GATCs, hours worked, wages and total compensation paid to such employees, and hourly wages, hourly total compensation, productivity, and unit labor costs, by types, 1988-90, January-March 1990, and January-March 1991.....	A-28
7. Income-and-loss experience of U.S. producers on the overall operations of their establishments in which GATCs and subassemblies thereof are produced, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-31
8. Income-and-loss experience of U.S. producers on their operations producing Peltier-effect GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-31
9. Income-and-loss experience of Perkin Elmer Cetus on its operations producing vapor-compression GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-31
10. Income-and-loss experience of U.S. producers on their operations producing Peltier-effect and vapor-compression GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-32
11. Income-and-loss experience of U.S. producers on their operations producing heat-only GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-32
12. Income-and-loss experience of U.S. producers on their operations producing GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-33
13. Income-and-loss experience of U.S. producers on their operations producing GATCs and subassemblies thereof, by firms, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-33
14. Value of assets and return on assets of U.S. producers' establishments wherein GATCs and subassemblies thereof are produced, fiscal years 1988-90, January-March 1990, and January-March 1991.....	A-34
15. Peltier-effect GATCs: End-of-period inventories of U.S. imports from the United Kingdom, 1988-90, January-March 1990, and January-March 1991.....	A-37
16. Peltier-effect GATCs: LEP Scientific's capacity, production, inventories, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992.....	A-40
17. Peltier-effect GATCs: *** capacity, production, inventories, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992.....	A-41
18. Peltier-effect GATCs: Techne's capacity, production, inventories, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992.....	A-41

## CONTENTS

Page

## Tables--Continued

19.	Peltier-effect GATCs: Total U.K. capacity, production, inventories, capacity utilization, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992.....	A-41
20.	GATCs: U.K. Peltier-effect GATC shares of production and shipments to the United States, by firms, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992.....	A-41
21.	GATCs: U.S. imports from the United Kingdom, by types, 1988-90, January-March 1990, and January-March 1991.....	A-44
22.	GATCs: Shipments of U.S. imports from the United Kingdom, by types, 1988-90, January-March 1990, and January-March 1991..	A-44
23.	GATCs: U.S. shipments of domestic product, U.S. shipments of imports, apparent consumption, and market shares, by types, 1988-90, January-March 1990, and January-March 1991.....	A-46
24.	Peltier-effect GATCs: Weighted-average net f.o.b. lowest selling prices and average selling prices for the U.S.-produced products and those imported from the United Kingdom, by companies, by distribution channels, and by months, January 1989-March 1991..	A-54
25.	Heat-only GATCs: Weighted-average net f.o.b. lowest selling prices and average selling prices for the U.S.-produced products and those imported from the United Kingdom, by distribution channels, by companies, and by months, January 1989-March 1991.	A-55
26.	Vapor-compression GATCs: Estimated f.o.b. lowest and average selling prices to end users for the U.S.-produced product, by months, January 1989-March 1991.....	A-56
27.	Peltier-effect GATCs: Average margins of underselling (overselling) by imports from the United Kingdom sold to end users, by months, January 1989-March 1991.....	A-57
28.	Exchange rates: Indexes of nominal and real exchange rates of the British pound, and indexes of producer prices in the United States and the United Kingdom, by quarters, January 1988-March 1991.....	A-59
B-1.	Salient features of various U.S.-produced and imported GATCs, by type of GATC and by firm.....	B-15

Note.--Information that would reveal business proprietary operations of individual concerns may not be published and therefore has been deleted from this report. Such deletions are indicated by asterisks.

UNITED STATES INTERNATIONAL TRADE COMMISSION

Investigation No. 731-TA-485 (Final)

CERTAIN GENE AMPLIFICATION THERMAL CYCLERS AND SUBASSEMBLIES THEREOF  
FROM THE UNITED KINGDOM

Determination

On the basis of the record<sup>1</sup> developed in the subject investigation, the Commission determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. § 1673d(b)) (the act), that an industry in the United States is not materially injured or threatened with material injury, and the establishment of an industry in the United States is not materially retarded by reason of imports from the United Kingdom of certain gene amplification thermal cyclers and subassemblies thereof,<sup>2</sup> provided for in subheadings

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<sup>1</sup> The record is defined in sec. 207.2(f) of the Commission's Rules of Practice and Procedure (19 CFR § 207.2(f)).

<sup>2</sup> Certain gene amplification thermal cyclers consist of Peltier-effect in vitro gene amplification thermal cyclers, whether assembled or unassembled, and the subassemblies thereof specified below. Gene amplification thermal cyclers are microprocessor-based reaction controllers that regulate temperatures of biologic reagents through a programmed and highly controlled thermal regime. They are used in biotechnology applications, including a biological protocol called in vitro gene amplification, as well as in several related sequencing and radionucleotide labeling reactions. Peltier-effect machines use one or more thermoelectric modules for cooling of the biological sample, and the thermoelectric modules and/or electric resistive heaters for heating the biological samples.

Gene amplification thermal cyclers incorporate a metal sample block, one or more thermoelectric modules, one or more electronic thermal sensors, a heat exchanger, power supply circuitry, microprocessor-based logic circuitry, software, and a housing or enclosure. The following subassemblies are included in the scope of the investigation when they are manufactured according to specifications and operational requirements to dedicate them for use only in a gene amplification thermal cyler as defined in the preceding paragraph: (1) the sample block/thermoelectric module(s)/temperature sensor(s)/heat exchanger subassembly, which consists of the sample block, one or more thermoelectric modules, one or more electronic thermal sensors, and a heat exchanger, and which can include an electric resistive heater; (2) the housing or enclosure, whether finished or unfinished; (3) the membrane keypad used to program and control the machine; and (4) the software needed for operation.

8419.89.50 and 8419.90.90, respectively, of the Harmonized Tariff Schedule of the United States, that have been found by the Department of Commerce to be sold in the United States at less than fair value (LTFV).

#### Background

The Commission instituted this investigation effective April 26, 1991, following a preliminary determination by the Department of Commerce that imports of certain gene amplification thermal cyclers and subassemblies thereof from the United Kingdom were being sold at LTFV within the meaning of section 733(b) of the act (19 U.S.C. § 1673b(b)). Notice of the institution 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 May 15, 1991 (56 F.R. 22446). The hearing was held in Washington, DC, on July 3, 1991, and all persons who requested the opportunity were permitted to appear in person or by counsel.

## VIEWS OF THE COMMISSION

We unanimously determine that a domestic industry is not materially injured, or threatened with material injury, and that the establishment of a domestic industry is not materially retarded, by reason of imports of Peltier-effect gene amplification thermal cyclers or subassemblies thereof from the United Kingdom that are sold at less than fair value.

I. Like Product and Domestic Industry

In this, as in other Title VII investigations, we begin by deciding what the "like product" and "domestic industry" are. The domestic industry is "the domestic producers as a whole of a like product, or those producers whose collective output of the like product constitutes a major proportion of the total domestic production of that product . . ." <sup>1</sup> Section 771(10) of the Tariff Act of 1930 defines the "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 . . ." <sup>2</sup>

The Commerce Department determined that the articles subject to investigation are:

[C]ertain gene amplification thermal cyclers, consisting of Peltier-effect in vitro GATCs, whether assembled or unassembled, and the subassemblies thereof specified below. GATCs are microprocessor-based reaction controllers that regulate temperature of biologic reagents through a programmed and highly controlled thermal regime. GATCs incorporate a metal sample block, one or more thermoelectric modules, one or more electronic thermal sensors, a heat exchanger, power supply circuitry, microprocessor-based logic circuitry, software, and a housing or enclosure. GATCs are used in a variety of biotechnology applications, such as in vitro gene amplification, and sequencing and radionucleodide labeling reactions. Peltier-effect machines use one or more thermoelectric modules for cooling the biologic samples, and the thermoelectric modules and/or electric resistive

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<sup>1</sup> 19 U.S.C. § 1677(4)(a).

<sup>2</sup> 19 U.S.C. § 1677(10).

heaters for heating the biologic samples. Excluded from this investigation are vapor-compression thermal cyclers, which use a reversed Rankine cycle apparatus, and heat-only thermal cyclers.<sup>3</sup>

Commerce also included four subassemblies within the scope of the investigation, if they are manufactured according to specifications and operational requirements for use in a Peltier-effect gene amplification thermal cycler:

- (1) The sample block/thermoelectric sensor/heat exchanger subassembly, which consists of the sample block, one or more thermoelectric modules, one or more electronic thermal sensors, and a heat exchanger, and which can include an electric resistive heater;
- (2) the housing or enclosure, whether finished or unfinished;
- (3) the membrane keypad used to program and control a gene amplification thermal cycler; and
- (4) the software to operate the gene amplification thermal cycler.<sup>4</sup>

While Commerce defines which articles are within the class of merchandise allegedly subsidized or sold at less than fair value, the Commission determines what domestic products are like the ones Commerce defines.<sup>5</sup>

#### A. Gene Amplification Thermal Cycler Technology

In vitro gene amplification is a biochemical technique which allows scientists to duplicate minute fragments of impure DNA more than a millionfold in a few hours. It requires taking a sample of DNA, combining it with specific biological reagents, then repeatedly heating and cooling the resulting mixture. This cycling is now usually done in machines called gene amplification thermal cyclers (GATCs).

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<sup>3</sup> 56 Fed. Reg. 135 (July 15, 1991).

<sup>4</sup> Id.

<sup>5</sup> Algoma Steel Corp., Ltd v. U.S., 688 F. Supp. 639 (June 8, 1988), aff'd, 865 F. 2d 240 (Fed. Cir. 1989).

There are three different types of GATCs: Peltier-effect, heat-only and vapor-compression. They differ primarily in the way they heat and cool the DNA-reagent mixture.

Peltier-effect GATCs use one or more Peltier-effect modules, which are solid state electronic modules, to cool the mixture. Some Peltier-effect GATCs also use the Peltier modules to heat the mixture, while some use electric resistive heaters.<sup>6</sup> Vapor-compression GATCs use a mechanical heat pump to cool the mixture, and electric resistive heaters to heat it. These GATCs circulate a refrigerant chilled by a vapor-compression apparatus through channels in the sample block for cooling.<sup>7</sup> Heat-only GATCs cool the mixture by passing ambient air or tapwater over a heat exchanger attached to the container holding the mixture. Unlike Peltier-effect and vapor-compression GATCs, the heat-only type cannot actively pump heat, nor is it capable of attaining refrigeration temperatures unless an external water source or chiller is added.<sup>8</sup>

Petitioner asserted that the like product should include only Peltier-effect GATCs. Respondent argued that it should include all GATCs. Neither party has argued that the subassemblies should constitute separate like products.

#### 1. The Like Product Includes All GATCs

All three types of GATCs are microprocessor-based reaction controllers that regulate temperatures for small quantities of biological reagents through a programmed and highly controlled thermal regime. All three types are used for in vitro gene amplification, as well as several related sequencing and

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<sup>6</sup> Report at A-6-7.

<sup>7</sup> Report at A-9.

<sup>8</sup> Report at A-10.

radionucleotide labeling reactions.<sup>9</sup> The machines do not differ in their applications, with the exception that heat-only machines cannot, without outside cooling sources, perform at below ambient temperatures or refrigerate biological samples. Most buyers therefore seem to regard all types as interchangeable.<sup>10</sup>

GATCs differ most in their method of production. Peltier-effect GATCs are made by putting together four main subassemblies: a logic circuit board, power circuit board, sheet metal housing with keypad, and thermoelectric "alpha unit." Vapor-compression GATCs are made largely from mechanical subassemblies. These mechanical components differ greatly from electronic subassemblies, and their manufacture requires expensive equipment. The production of vapor compression GATCs is more capital intensive and involves a different set of skills and equipment than those employed in the production of Peltier-effect GATCs. The production process for heat-only GATCs differs from both those of Peltier-effect GATCs and vapor-compression GATCs.<sup>11</sup> Few of the subassemblies used in one type of GATC would be interchangeable with those used in the others.

Vapor-compression GATCs are generally more expensive than Peltier-effect GATCs, and Peltier-effect GATCs are generally more expensive than heat-only GATCs. These different price structures appear to be related to several different factors, including market perceptions of each type of GATC, the production cost, and particular features of each firm's machine.<sup>12</sup> There is,

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<sup>9</sup> Report at A-4.

<sup>10</sup> The investigation showed that several customers who cancelled their orders for petitioner's Peltier-effect machine bought other types of GATCs instead. Report at A-57-58.

<sup>11</sup> Report at A-11.

<sup>12</sup> Report at A-52.

however, some price overlap at the lower end of the GATC price spectrum. With respect to channels of distribution, all types of GATCs are sold through a distributor network and/or directly to end-users.<sup>13</sup>

To sum up, the different types of GATCs differ most in the inner workings of their heating and cooling systems. These differences are reflected in different manufacturing processes and prices. However, all GATCs are essentially interchangeable by the end user. Customers perceive all GATCs to be one product and purchasers generally investigate more than one type before buying.<sup>14</sup> Also, some laboratories use more than one type of GATC.

In our preliminary determination, we found the like product to be all GATCs, and stated that we would revisit the issue in any final investigation.<sup>15</sup> The additional evidence uncovered in this final investigation gives us no reason to change our original like product definition.

## 2. The GATC Subassemblies Do Not Constitute a Separate Like Product

Commerce's scope determination includes four GATC subassemblies "when they are manufactured according to specifications and operational requirements for use in a GATC." We thus must determine whether domestically produced components of GATCs like those within the scope of the investigation constitute a separate like product or products.<sup>16</sup>

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<sup>13</sup> Report at A-20.

<sup>14</sup> Report at 52.

<sup>15</sup> Certain Gene Amplification Thermal Cyclers and Subassemblies Thereof from the United Kingdom, Inv. No. 731-TA-485 (Preliminary), USITC Pub. 2346 at 9 (December 1990).

<sup>16</sup> Neither party has argued that the subassemblies should constitute a separate like product. However, this does not preclude the Commission from considering the issue.

In prior investigations where we examined whether components of "semi-finished" products should be included in the same like product as finished products, we considered: (1) the necessity for, and costs of, further processing; (2) the degree of interchangeability of articles at different stages of production; (3) whether the article at an earlier stage of production is dedicated to use in the finished article; (4) whether there are significant independent uses or markets for the finished and unfinished articles; and (5) whether the article at an earlier stage of production embodies or imparts to the finished article an essential characteristic or function.<sup>17</sup>

The subassemblies under investigation here do need further processing before they can be used for gene amplification. Assembling a GATC from its various components involves intricate technical work,<sup>18</sup> and the components are not interchangeable at different stages of production. The subassemblies at issue here are designed and used only in the manufacture of GATCs.<sup>19</sup> There are no known significant independent markets for the subassemblies at issue. Only one firm reported any sales of subassemblies, all of which were exported.

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<sup>17</sup> E.g., Certain Laser Light-Scattering Instruments and Parts Thereof from Japan, Inv. No. 731-TA-455 (Final), USITC Pub. 2238 at 10-11 (November 1990); Certain Residential Door Locks and Parts Thereof from Taiwan, Inv. No. 731-TA-433 (Final), USITC Pub. 2253 at 8 & n.16 (January 1990); Certain Telephone Systems and Subassemblies Thereof from Japan and Taiwan, Inv. Nos. 731-TA-426 and 428 (Final), USITC Pub. 2237 at 5, n.9 (November 1989); Antifriction Bearings (Other Than Tapered Roller Bearings) and Parts Thereof from the Federal Republic of Germany, France, Italy, Japan, Romania, Singapore, Sweden, Thailand, and the United Kingdom, Inv. Nos. 303-TA-19-20 and 731-TA-391-399 (Preliminary), USITC Pub. 2083 at 20-22 (May 1988).

<sup>18</sup> Report at A-9.

<sup>19</sup> See, e.g., Hearing Transcript at 67-69.

The record indicates that the individual components at issue impart essential characteristics to a GATC. For example, the "alpha" unit is necessary to provide heating and cooling; the membrane keyboard is necessary to operate the machine; and the software is essential to automate the machine.

In previous investigations, we have concluded that components dedicated to use in a finished product should be included in the same like product as the finished product, notwithstanding that the components are not interchangeable with the finished product, especially if they impart essential characteristics.<sup>20</sup> In this investigation, where an integrated process produces many of the subassemblies and the finished GATC; and where the subassemblies are only used to make GATCs, we find that the like product in this investigation includes both the finished GATC and dedicated subassemblies thereof.

Based on the foregoing, we determine that there is one like product, composed of all GATCs and subassemblies thereof. The domestic industry, consists of the domestic producers of GATCs and subassemblies thereof.

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<sup>20</sup> See High Information Flat Panel Displays and Subassemblies thereof from Japan, Inv. No 731-TA-469 (Preliminary), USITC Pub. 2311 at 10-13 (September 1990); Certain Residential Door Locks and Parts Thereof from Taiwan, Inv. No. 731-TA-433 (Final), USITC Pub. 2253 at 8-10 (January 1990); Certain Telephone Systems and Subassemblies Thereof from Japan, Korea, and Taiwan, Inv. No. 731-TA-426-428 (Preliminary), USITC Pub. 2156 at 13-15 (February 1989).

## II. Material Retardation

Petitioner alleged for the first time at the hearing that the development of a "truly state-of-the-art" GATC industry, or at least the development of second generation machines is being materially retarded by reason of LTFV imports from the United Kingdom.<sup>21 22</sup>

Respondent argues that it is well established that the introduction of a new product by an established industry does not justify application of the material retardation provision to that industry. Respondent urges that the domestic industry in the United States is well established regardless of how the industry is defined. Moreover, respondent contends that even if the material retardation standard is appropriate in this investigation, all industry indicators show that the domestic industry is performing significantly better than could reasonably be expected for any industry.<sup>23</sup>

In analyzing allegations of "material retardation by reason of the subject imports,"<sup>24</sup> the Commission has stated that "the establishment of any new industry is so inherently unique that material retardation must always be examined on a case by case basis."<sup>25</sup> In prior investigations, the Commission has determined first whether a domestic industry is already "established," and, if the industry is not "established," then determined whether the unestablished U.S. industry has been materially retarded by the LTFV

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<sup>21</sup> Hearing Transcript at 16, 32.

<sup>22</sup> We note that, while styled by the petitioner as a material retardation argument, the factual assertions behind the argument go to the impact of imports on future technological development, which the Commission considers in the context of threat and is expressly provided for in that context under 19 U.S.C. § 1677(7)(F)(i). We note that we have considered the argument advanced by petitioner in both contexts.

<sup>23</sup> Respondent's Post-hearing brief at 8.

<sup>24</sup> 19 U.S.C. § 1673d(b).

<sup>25</sup> Certain Dried Salted Codfish from Canada, Inv. No. 731-TA-199 (Preliminary), USITC Pub. 1571 (Sept. 1984) at 6.

imports.<sup>26</sup> If, however, the industry is "established," the material retardation standard is not applicable, and the Commission focuses on the standards of material injury and threat of material injury.<sup>27</sup>

The fact that there is some domestic production does not preclude the possibility that the domestic industry may not be established. In cases in which domestic companies have begun production, the Commission has examined whether domestic producers have stabilized their operations.<sup>28</sup>

In assessing in prior investigations whether new industries have stabilized their operations, the Commission has looked at several aspects of domestic operations including: (1) the date production began, (2) whether production has been steady or start-and-stop, (3) the volume of domestic production compared to the size of the domestic market as a whole, (4) whether the domestic industry has reached a "break even point", and (5) whether the activities involve the establishment of a new industry or are merely a new product-line of an established firm.<sup>29</sup>

The earliest domestic production for commercial sale of any type of GATC was in early 1988. Other companies have and continue to enter the market. Since there has been domestic production for over three years, the relevant inquiry is whether domestic operations have "stabilized". In the three years of domestic production, the reported data indicate steady and substantial

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<sup>26</sup> Certain Dried Salted Codfish from Canada, Inv. No. 731-TA-199 (Final), USITC Pub. 1711 (July 1985), aff'd, BMT Commodity Corp. v. United States, 11 CIT 524, 667 F. Supp. 880 (1987), aff'd, 852 F.2d 1285 (Fed. Cir. 1988), cert. denied, 109 S.Ct. 1120 (1989).

<sup>27</sup> Pressure Sensitive PVC Battery Covers from West Germany, Inv. No. 731-TA-452 (Preliminary), USITC Pub. 2265 (Mar. 1990) at 11, n.22; Benzyl Paraben from Japan, Inv. No. 731-TA-462 (Final), USITC Pub. 2355 (Feb. 1991) at 8.

<sup>28</sup> Codfish, USITC Pub. 1711 at 4.

<sup>29</sup> Battery Covers, USITC Pub. 2265 at 12-13; Benzyl Paraben, USITC Pub. 2355 at 9.

increases in both capacity and production for the domestic industry.<sup>30</sup> During the period of investigation, the vast majority of the domestic market was supplied by domestic producers.<sup>31</sup> A review of the financial data in the staff report indicates that the overwhelming majority of domestic producers have already reached the "break even" point in operations.<sup>32</sup> Finally, GATCs are a new product for some established companies, and in other instances a new product made by a newly established firm.

Based on the above factors, we find the domestic industry to be established. We therefore need not reach the question of whether the establishment of a domestic industry is being materially retarded by reason of the allegedly dumped imports.

### III. Condition of the Industry

In assessing the condition of the industry, we consider, among other factors, production, shipments, capacity, capacity utilization, inventories, employment, wages, financial performance, capital investments and research and development expenditures. No single factor is dispositive, and in each investigation we consider the particular nature of the industry involved and the relevant economic factors which have a bearing on the state of the industry.<sup>33</sup> Before describing the condition of the industry, we note that much of the information on which we base our decision is business proprietary,

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<sup>30</sup> Report at A-22.

<sup>31</sup> Report at A-45-47.

<sup>32</sup> Report at A-30-34.

<sup>33</sup> See 19 U.S.C. § 1677(7)(V)(iii), which requires us to consider the condition of the industry in the context of the business cycle and conditions of competition that are distinctive to the domestic industry. See also H.R. Rep. 317, 96th Cong., 1st Sess. at 46; S. Rep. 249, 96th Cong., 1st Sess. at 88.

and our discussion of the condition of the industry must necessarily be general in nature.

The GATC industry is relatively young, and it continues to develop rapidly. Apparent domestic consumption of GATCs increased dramatically throughout the period of investigation.<sup>34</sup> Domestic production<sup>35</sup> and capacity<sup>36</sup> have risen steadily throughout this period as well. Domestic shipments increased steadily throughout most of the period of investigation (from 885 units in 1988 to 3163 units in 1990), decreasing minimally in the interim (Jan.-Mar. 1991) period. (from 644 units to 642 units)<sup>37</sup> Capacity utilization decreased throughout most of the period of investigation<sup>38</sup> due to an expansion of capacity even more rapid than the increases in production. Employment trends paralleled the upward trends in production of GATCs.<sup>39</sup> The number of production workers and wages increased significantly throughout the period of investigation.<sup>40</sup> The trends in capital expenditures fluctuated somewhat throughout the period of investigation, increasing significantly from 1988 to 1989, then decreasing somewhat in 1990 (although remaining at levels significantly higher than 1988) and in the interim period (Jan.-Mar.).<sup>41</sup> <sup>42</sup> Inventories have been negligible throughout the period of investigation.<sup>43</sup>

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<sup>34</sup> Report at A-46.

<sup>35</sup> Report at A-22.

<sup>36</sup> Report at A-22.

<sup>37</sup> Report at A-24.

<sup>38</sup> Capacity utilization did increase slightly in the interim period, from 50.6 percent to 51.1 percent. Report at A-22.

<sup>39</sup> Report at A-27.

<sup>40</sup> Report at A-28.

<sup>41</sup> Report at A-34.

<sup>42</sup> We note that Perkin Elmer Cetus did not provide capital expenditures data.

<sup>43</sup> Report at A-26.

Research and development spending increased significantly throughout the period of investigation.<sup>44 45</sup> Although much of the financial information gathered in this investigation is confidential, we note that the financial performance of the industry was favorable throughout the period of investigation. The industry was profitable, and net sales rose throughout the period of investigation.<sup>46</sup> The industry as a whole recorded positive operating income levels and cash flow throughout the period of investigation. The level of the ratio of operating income to net sales does not indicate that the industry is injured. It is important to note that this industry could be characterized as an emerging industry in which growth, the ability to raise capital and to invest, cash flows, and development and production efforts are particularly relevant factors to consider when evaluating the condition of the industry. The continued ability of the GATC industry to fund existing development and production efforts indicates the lack of material injury to this industry.

Based on the foregoing, we conclude that the domestic GATC industry is not experiencing material injury.<sup>47</sup>

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<sup>44</sup> Report at A-34.

<sup>45</sup> We note that Perkin Elmer Cetus did not provide research and development expenditure data.

<sup>46</sup> We note that the Perkin Elmer Cetus did not provide financial data for the interim period. Report at A-33.

<sup>47</sup> Acting Chairman Brunsdale does not reach a separate legal conclusion concerning the presence or absence of material injury based on this information. While she does not believe an independent determination is either required by the statute or helpful, she finds the discussion of the condition of the domestic industry to be helpful in determining whether any injury resulting from the dumped imports is material. For her views regarding causation, see her Concurring Views, which follow.

#### IV. No Material Injury "By Reason" Of Imports<sup>48</sup>

Even if we had concluded that it was proper to characterize the condition of the domestic industry as materially injured, we would not have concluded that the material injury is "by reason of" the LTFV imports of Peltier-effect gene amplification thermal cyclers from the United Kingdom. In analyzing causation, the Commission is required to consider, inter alia, the volume of the imports subject to investigation, the effect of such imports on domestic prices, and the impact of such imports on the domestic industry.<sup>49</sup> Evaluation of these factors involves a consideration of: (1) whether the volume of imports, or increase in volume is significant, (2) whether there has been significant price underselling by the imported products, and (3) whether imports have otherwise depressed prices to a significant degree, or have prevented price increases.<sup>50</sup> In addition, the Commission must evaluate the impact of the imports on the domestic industry by examining other relevant economic factors, such as actual and potential changes in profits, productivity, capacity utilization, and investment.<sup>51</sup>

Imports of Peltier-effect gene amplification thermal cyclers began in mid-1990. While imports increased in volume and value during interim (Jan.-Mar.) 1991, they accounted for a small percentage of total domestic consumption.<sup>52</sup> The domestic industry's market share remained significant throughout the period of investigation.<sup>53</sup> At the same time, as discussed above, the U.S. industry has continued to expand at a rapid pace.

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<sup>48</sup> Commissioner Lodwick does not join in this section, entitled "No Material Injury "By Reason" of Imports".

<sup>49</sup> 19 U.S.C. § 1677(7)(B).

<sup>50</sup> 19 U.S.C. § 1677(7)(C)(i-ii).

<sup>51</sup> 19 U.S.C. § 1677(7)(C)(iii).

<sup>52</sup> Report at A-47.

<sup>53</sup> Report at A-47.

The Commission was unable to find any instances of underselling by the imported product. The Commission made twelve price comparisons, and found overselling in all instances.<sup>54</sup> While we recognize that LTFV imports may have injurious price effects even in the absence of significant underselling, we note that prices for the domestic product for most producers remained relatively stable throughout the period of investigation, indicating no price depressive effects due to imports. Only one producer reported price decreases, and it contended that the price decreases were not due to price competition from imports, but rather to the expansion of its product line.

The Commission also has examined the lost sales allegations made by petitioner. Most of these involved a number of back orders for Peltier-effect gene amplification thermal cyclers made through respondent USA/Scientific, where purchasers eventually terminated their orders for the petitioner MJ Research's GATC and purchased the imported machine offered by USA/Scientific. The Commission found that these sales generally were not lost on the basis of price, but rather, due to the quicker availability of the imported machine or other reasons not affected by price.<sup>55</sup>

Many of the causation arguments presented in this investigation revolve around the troubled relation between petitioner, MJ Research, a manufacturer of Peltier-effect gene amplification thermal cyclers, and USA/Scientific Plastics, a distributor of laboratory supplies and instruments. After entering into a non-exclusive distributorship arrangement with petitioner, USA/Scientific Plastics soon became the petitioner's largest source of sales.

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<sup>54</sup> Report at A-56.

<sup>55</sup> Report at A-57-58.

The relationship between the two companies quickly soured, however, and was terminated in early 1990.

Petitioner argues that at that time, respondent USA/Scientific began importing Peltier-effect thermal cyclers from the United Kingdom, and sold them for the same price as petitioner's machine. Petitioner further contends that these imported machines had additional features that should have commanded a much higher price, thereby causing it to lose sales.

USA/Scientific has argued a number of possible alternative causes of any alleged injury in an attempt to demonstrate that LTFV imports have not had an adverse impact on the domestic industry. For example, USA/Scientific alleges that, while selling the petitioner's product under a non-exclusive distribution agreement, deliveries by petitioner never met the sales volume, and fell behind schedule during the entire period, resulting in substantial number of lost sales and order cancellations.<sup>56</sup> It also maintains that it did not turn to imports because of low prices, because it paid more for the product it obtained in the United Kingdom than it was paying for the petitioner's product.<sup>57</sup> USA/Scientific argues that the same prices were charged for the two products only during a brief introductory period because of the need to supply customers in accordance with existing contracts which were to have been supplied by petitioner.<sup>58</sup>

In answering these allegations, petitioner MJ acknowledges that there were early problems with delivery and occasional problems with regard to the reliability and performance of the heat pumps in its machines. However, petitioner claims that USA/Scientific sales representatives tended to quote

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<sup>56</sup> Report at A-45.

<sup>57</sup> Respondent's Pre-hearing brief at 34.

<sup>58</sup> Hearing Transcript at 96.

overly optimistic delivery times, thereby contributing to the problem of late deliveries.<sup>59</sup> Petitioner also maintains that quality problems with its heat pump technology have been ironed out, and that since mid-1990, not one of its instruments which incorporates the improved technology has been returned for failure of its heat pump apparatus.<sup>60</sup>

It is not the purpose of the Commission to assess why the relationship between MJ Research and USA/Scientific broke down. The imported product has consistently been sold at the same or higher prices than the domestic product, and, as stated above, we generally found that sales were not lost due to price.

Research and development expenditures have increased significantly throughout the period of investigation. Several companies are in the process of developing improved gene amplification thermal cyclers, and others have introduced new gene amplification thermal cyclers into their product line. The evidence does not indicate that LTFV imports have thwarted research and development efforts by the domestic industry.

For the foregoing reasons, we find that LTFV imports of Peltier-effect gene amplification thermal cyclers from the United Kingdom were not a cause of material injury to the domestic industry producing gene amplification thermal cyclers.

#### V. No Threat of Material Injury

Section 771(7)(F) of the Tariff Act of 1930 directs the Commission to determine whether a U.S. industry is threatened with material injury by reason of dumped imports "on the basis of evidence that the threat of material injury

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<sup>59</sup> Report at A-49-50.

<sup>60</sup> Petitioner's Pre-hearing brief at 21.

is real and actual injury is imminent. Such a determination may not be made on the basis of mere conjecture or supposition." <sup>61</sup> The ten factors that the Commission must consider are:

(I) if a 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 subsidy is an export subsidy inconsistent with the Agreement),

(II) any increase in production capacity or existing unused capacity in the exporting country likely to result in a significant increase in imports of the merchandise to the United States,

(III) any rapid increase in United States market penetration and the likelihood that the penetration will increase to an injurious level,

(IV) the probability that imports of the merchandise will enter the United States at prices that will have a depressing or suppressing effect on domestic prices of the merchandise,

(V) any substantial increase in inventories of the merchandise in the United States,

(VI) the presence of underutilized capacity for producing the merchandise in the exporting country,

(VII) any other demonstrable adverse trends that indicate probability that importation (or sale for importation) of the merchandise (whether or not it is actually being imported at the time) will be the cause of injury,

(VIII) the potential for product shifting if production facilities owned or controlled by the foreign manufacturers, which can be used to produce products subject to investigation(s) under 1671 or 1673 of this title or to final orders under section 1671e or 1673e of this title, are also used to produce the merchandise under investigation,

(IX) in any investigation under this title which involves imports of both raw agricultural product (within the meaning of paragraph (4)(E)(iv) and any product processed from such raw agricultural product, the likelihood 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

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<sup>61</sup> 19 U.S.C. § 1677(7)(F)(ii).

to either the raw agricultural product or the processed agricultural product (but not both), and

(X) 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 like product.<sup>62</sup>

In addition, the Commission must consider whether dumping findings or the issuance of antidumping remedies against the same class of merchandise in foreign countries suggest a threat of material injury to the domestic industry.<sup>63</sup> We consider each applicable statutory consideration in turn.<sup>64</sup>

Producers in the United Kingdom began manufacturing Peltier-effect GATCs in 1989. The U.K. industry, much like the domestic industry, is experiencing growth. Production capacity increased throughout the period of investigation,<sup>65</sup> and U.K. producers project capacity will continue to increase in 1991 and 1992. Capacity utilization has been quite high during the period of investigation.<sup>66</sup> Capacity utilization is projected to decrease for 1991 and 1992 from 1990 levels.

U.K. producers began exporting GATCs to the United States in 1990. Exports to the United States increased in quantity during the interim period, and are projected to increase for the remainder of 1991 and 1992.<sup>67</sup> U.S. inventories of the imported product also increased during the interim period.<sup>68</sup> U.S. market share of the imported product increased slightly for

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<sup>62</sup> 19 U.S.C. § 1677(7)(F)(i), as amended by 1988 §§ 1326(b), 1329.

<sup>63</sup> See 19 U.S.C. § 1677(7)(F)(iii), as amended by 1988 Act § 1329.

<sup>64</sup> Because the petition does not allege a subsidy and does not concern agricultural products, statutory factors (I) and (IX) are not applicable. Because respondent produces no other products subject to antidumping or countervailing duty investigations or orders, statutory factor (VIII) is also inapplicable.

<sup>65</sup> Report at A-41.

<sup>66</sup> Report at A-41.

<sup>67</sup> Report at A-41.

<sup>68</sup> Report at A-37.

the interim (Jan.-Mar.) period compared to the share in 1990.<sup>69</sup> However, despite these increases in the trends for the U.K. industry, we do not believe that the domestic industry is threatened with material injury, as we find it unlikely that such penetration will increase imminently to an injurious level.

We are mindful of the fact that the industry in the U.K., like the U.S. industry, is relatively young and expanding. Industry trends may continue to increase. However, projected exports from the United Kingdom to the United States for 1992 are a relatively small percentage of 1991 U.S. consumption. Moreover, there is nothing in the record which would indicate that domestic consumption, which has increased significantly throughout the period of investigation, will decrease in 1992. Further, the data collected by the Commission staff indicate that prices for the domestic Peltier-type GATCs are generally lower than those of the British product.<sup>70</sup> There is insufficient evidence in the record to indicate that imports will have a price suppressive effect on domestic prices. We find, therefore, that there is insufficient evidence on the record that imports from the United Kingdom will have a price depressive or suppressive effect on the domestic prices in the foreseeable future.

We find no other demonstrable adverse trends that indicate that importation of Peltier-effect GATCs will materially injure the U.S. GATC industry. We find no evidence that there are production facilities owned or controlled by the United Kingdom manufacturers which can be used to produce products subject to antidumping or countervailing duty investigations or to

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<sup>69</sup> Report at A-46-47.

<sup>70</sup> Report at A-56.

final orders under sections 706 or 736 of the Tariff Act of 1930, as amended, and are also used to produce GATCs.

We stated in our preliminary determination that at least one domestic producer believes that the threat of imported merchandise being sold at LTFV undermines its ability to fund research and development, thereby thwarting its efforts to develop a more advanced product. We conclude, however, that the evidence does not demonstrate any actual or potential negative effects on efforts to develop a derivative or more advanced version of the like product. Research and development expenditures increased significantly throughout the period of investigation. Companies have been developing new and improved GATC models. The domestic industry also has substantial cash flow and earnings to fund continued development efforts, and there is no evidence that the dumped imports are having an effect on the domestic industry's ability to enter the capital market.

Therefore, we find no threat material injury to the domestic GATC industry by reason of dumped imports of Peltier-effect GATCs and subassemblies thereof from the United Kingdom.

CONCURRING VIEWS OF ACTING CHAIRMAN ANNE E. BRUNSDALE  
Gene Amplification Thermal Cyclers From the United Kingdom

Inv. No. 731-TA-485 (Final)

I agree with my colleagues that an industry in the United States is not being materially injured by reason of dumped GATCs from the United Kingdom. I am writing separately only to discuss my concurrence with the majority's determination to include all types of GATCs in the like product, and to make my usual micro-economic analysis of the key question of causation.

I. Domestic Like Product

In Polyethylene Terephthalate Film etc. from Japan and Korea, Inv. Nos. 731-TA-458 and 459 (Final) USITC Pub. 2383 (May 1991), I explained why I thought we could improve our like product analysis by refining our usual six, seven, or eight part test to focus instead on whether dumping would induce significant substitution between the potential like products by either producers or consumers. In analyzing like product questions in this way, we can more accurately identify the products that will be significantly and directly affected by any dumping of the articles subject to investigation.

In the preliminary investigation, I tentatively concluded that only domestically produced Peltier-effect GATCs should be the domestic like product. The record on the final investigation, however, shows a great deal of substitutability among consumers of all three types of GATCs. Nevertheless, the final investigation continued to show big differences in the prices for

each type of machine. This difference continues to make me leary of finding all GATCs to constitute one like product, because it does not make sense to have prices thousands of dollars apart for machines that seem nearly identical to their buyers. My best guess is that this price difference reflects the extreme youth of the industry, and consequently may also reflect either the uncertain quality or initially low quality of machines built by firms just entering the market. The record does show some narrowing of the price differences among the types of machines over the period of investigation. I also note that even had I included only Peltier-effect GATCs in the like product, I would still conclude that the dumped British GATCs are not materially injuring a domestic industry.

The other like product issue in this case is the question of whether the component parts of the Peltier-effect GATC should be included in the same like product as the assembled machine. I have not had occasion to analyze component parts in light of my opinion in Pet Film. But the conclusion that the component parts in this case should be included in the domestic like product follows rather easily from my premise that the Commission's like-product analysis should concentrate on identifying products that will be significantly and directly affected by dumping of the articles subject to investigation. When, as here, there is no real use for the components apart from assembly into finished GATCs, any dumping of finished machines will directly affect the production of component parts, and any dumping of the component

parts will directly affect the production of finished machines. Their very nature as component parts means that they are part of the same production process that creates finished GATCs.

## II. Material Injury by Reason of Dumped Imports

Those who follow Commission proceedings (or who have read my opinion in the preliminary investigation) are aware that my analysis of causation in title VII cases usually differs from that of my colleagues. In determining whether or not a domestic industry is materially injured by reason of dumped imports, I consider, as the statute directs, the volume and prices of the subject imports, the effects of these imports on the price in the United States of the like product, and the effects on the domestic industry producing the like product. See 19 U.S.C. Section 1677(7)(B). As is obvious from these statutory factors, and as I have stated so often in the past,<sup>1</sup> a coherent and transparent analysis of the kind demanded by the statute requires me to assess the domestic market and understand the role of the subject

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<sup>1</sup> See, e.g., Sparklers from China, Inv. No. 731-TA-464 (Final), USITC Pub. 2387, at 19-20 (June 1991) (Concurring Views of Acting Chairman Anne E. Brunsdale); Residential Door Locks and Parts Thereof From Taiwan, Inv. No. 731-TA-433 (Final), USITC Pub. 2253, at 33-36 (January 1990) (Additional Views of Chairman Anne E. Brunsdale); Electrical Conductor Aluminum Redraw Rod from Venezuela, Inv. Nos. 701-TA-287 (Final) and 731-TA-378 (Final), USITC Pub. 2103, at 42-46 (August 1988) (Dissenting Views of Chairman Anne E. Brunsdale); and Color Picture Tubes from Canada, Japan, the Republic of Korea, and Singapore, Inv. Nos. 731-TA-367-370 (Final), USITC Pub. 2046, at 23-32 (December 1987) (Additional Views of Vice Chairman Anne E. Brunsdale).

imports within that market. Economic analysis allows me to make that assessment.

Economic analysis involves little more than organizing and evaluating the evidence in the record in a manner that permits me to assess the impact of the dumped imports in a rigorous fashion. These tools are not surrogates for the statutory factors. They just let me analyze in a direct way the volume effect, the price effect, and the overall impact of the dumped imports on the domestic industry as the law specifically and unambiguously requires. 19 U.S.C. Section 1677(7)(B).

(A) The Volume and Prices of the Imports. The market share of the British GATCs was very small, both in value and in quantity in 1990 (the most recent year for which we have data). A-47. Such a small market share suggests that injury is unlikely, but to gauge the effect of the dumped imports on domestic prices and quantities fully, one also needs to know what a "fair" price for British GATCs, calculated under title VII, would be. In this case, that margin is also low -- 13.43 percent, on a weighted basis. In other words, if sold at a "fair" price, British GATCs would be 13.43 percent more expensive than they are currently.

(B) The Effect of the Imports on Domestic Prices.

The effect of British GATCs on the U.S. market is not determined by the volume of such imports and the dumping margin alone. One must place these imports and the prices at which they are sold in the context of the domestic market in which they compete. This requires an examination of the increase in the quantity of

GATCs sold that would result from a decline in the price of the product -- the elasticity of demand -- and the degree of substitutability between British and U.S. GATCs.

The evidence suggests that the elasticity of demand for GATCs is low. There are few, if any, substitutes for GATCs in replicating genetic material. Moreover, the cost of a GATC relative to the total cost of operating a molecular genetic research lab is small. The Commission staff therefore placed this elasticity in the range of -0.2 to -0.5. Economics Memorandum, INV-O-162 (Aug. 12, 1991) at 16.<sup>2</sup> I agree with this assessment, and conclude that most sales of British GATCs probably came at the expense of the U.S. industry. (There are no other, fairly traded, imports.)

Another characteristic of the market that has important implications for the degree of injury resulting from the dumped GATCs is the substitutability between those GATCs and GATCs made by domestic producers, which is measured by the elasticity of substitution. Our staff concluded that Peltier-effect GATCs were fairly substitutable and so estimated this elasticity to be in the range 3-5. The elasticity between the British GATCs and all domestic GATCs is bound to be lower. Moreover, the record contains strong evidence that the elasticity of substitution has varied over the period of the investigation. As Commissioners Rohr and Newquist note, British imports began in earnest in 1990

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<sup>2</sup> Neither petitioner nor respondent commented on staff's elasticities estimates. Economics Memorandum, INV-O-162 (Aug. 12, 1991) at 2.

when the relationship between petitioner and its main distributor broke down. The distributor began importing British GATCs to fill its orders, even though it was charged a higher price by the U.K. manufacturer. The evidence strongly suggests that it was availability rather than price that motivated this switch.

I suspect that the persistence of large price differences among the various types of GATCs reflects, at least in part, some of these initial quality or supply problems. I am therefore inclined to estimate that the elasticity of substitution is at or below the low end of the range for Peltier-effect machines alone.

The low dumping margin and small market share, together with the somewhat limited price competition among GATCs, lead me to doubt whether the domestic industry would make many additional sales even if the price of the British imports were 13.43 percent higher. And even if the price of British GATCs caused them to lose their entire market share to the domestic industry, that share is so small that it would not have a material impact on the industry's revenues. Consequently, but for the effects of dumping, the domestic industry's condition would have been about the same -- prosperous and growing.

I therefore concur with my colleagues' negative determination.<sup>3</sup>

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<sup>3</sup> I also agree with my colleagues' characterization of the various factors we must consider in deciding whether a domestic industry is threatened with material injury. Opin. at 20-226. I would only add that 19 U.S.C. Section 1677(7)(F)(ii) requires that any threat of injury be real and imminent, and our determination not be based on "mere conjecture or supposition." The record shows no evidence of a real and imminent threat.

**INFORMATION OBTAINED IN THE INVESTIGATION**



## INTRODUCTION

Following a preliminary determination by the Department of Commerce that imports of certain gene amplification thermal cyclers and subassemblies thereof<sup>1</sup> from the United Kingdom are being, or are likely to be, sold in the United States at less than fair value (LTFV) (56 F.R. 19638, April 29, 1991), the U.S. International Trade Commission, effective April 26, 1991, instituted investigation No. 731-TA-485 (Final) under section 735(b) of the Tariff Act of 1930 (19 U.S.C. § 1673d(b)) to determine whether an industry in the United States is materially injured or threatened with material injury, or the establishment of an industry in the United States is materially retarded, by reason of imports of such merchandise. Notice of the institution of the Commission's investigation and establishment of a schedule for its conduct, including a public hearing held in connection with the investigation, was posted in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, and published in the Federal Register on May 15, 1991 (56 F.R. 22446).<sup>2</sup> The hearing was held in Washington, DC, on July 3, 1991.<sup>3</sup>

Effective July 15, 1991, Commerce made its final LTFV determination, which was published in the Federal Register of July 15, 1991 (56 F.R. 32172).

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<sup>1</sup> For purposes of this investigation, certain gene amplification thermal cyclers consist of Peltier-effect in vitro gene amplification thermal cyclers, whether assembled or unassembled, and the subassemblies thereof specified below. Gene amplification thermal cyclers are microprocessor-based reaction controllers that regulate temperatures of biologic reagents through a programmed and highly controlled thermal regime. They are used in biotechnology applications, including a biological protocol called in vitro gene amplification, as well as in several related sequencing and radionucleotide labeling reactions. Peltier-effect machines use one or more thermoelectric modules for cooling of the biological sample, and the thermoelectric modules and/or electric resistive heaters for heating the biological samples.

Gene amplification thermal cyclers incorporate a metal sample block, one or more thermoelectric modules, one or more electronic thermal sensors, a heat exchanger, power supply circuitry, microprocessor-based logic circuitry, software, and a housing or enclosure. The following subassemblies are included in the scope of the investigation when they are manufactured according to specifications and operational requirements to dedicate them for use only in a gene amplification thermal cycler as defined in the preceding paragraph: (1) the sample block/thermoelectric module(s)/temperature sensor(s)/heat exchanger subassembly, which consists of the sample block, one or more thermoelectric modules, one or more electronic thermal sensors, and a heat exchanger, and which can include an electric resistive heater; (2) the housing or enclosure, whether finished or unfinished; (3) the membrane keypad used to program and control the machine; and (4) the software needed for operation.

Gene amplification thermal cyclers and subassemblies thereof are provided for in subheadings 8419.89.50 and 8419.90.90, respectively, of the Harmonized Tariff Schedule of the United States.

<sup>2</sup> Copies of cited Federal Register notices are presented in app. A.

<sup>3</sup> A list of witnesses appearing at the Commission's hearing is presented in app. B.

The applicable statute directs that the Commission make its final injury determination within 45 days after the final determination by Commerce.

## BACKGROUND

This investigation results from a petition filed by MJ Research, Inc., Watertown, MA, on November 14, 1990, alleging that an industry in the United States is materially injured or threatened with material injury by reason of LTFV imports of certain gene amplification thermal cyclers (hereafter referred to in this report as GATCs) and subassemblies thereof from the United Kingdom. In response to that petition the Commission instituted investigation No. 731-TA-485 (Preliminary) under section 733 of the Tariff Act of 1930 (19 U.S.C § 1673b(a)) and, on December 31, 1990, determined that there was such a reasonable indication of threat of material injury.

## THE PRODUCT

### Description and Uses

The imported products subject to this investigation are Peltier-effect in vitro<sup>4</sup> GATCs, whether assembled or unassembled, and specified subassemblies thereof. GATCs are microprocessor-based reaction controllers that regulate temperatures for small quantities of biologic reagents through a programmed and highly controlled thermal regime. They are used in biotechnology applications, including a biological protocol called in vitro gene amplification, as well as in several related sequencing and radionucleotide<sup>5</sup> labeling reactions. Peltier-effect machines use one or more thermoelectric modules for cooling biological samples and thermoelectric modules and/or electric resistive heaters for heating the biological samples. The following subassemblies are included in the scope of this investigation when they are manufactured according to specifications and operational requirements for use in a GATC: (a) the sample block/thermoelectric module(s)/temperature sensor(s)/heat exchanger subassembly, which consists of the sample block, one or more thermoelectric modules, one or more electronic temperature sensors, and a heat exchanger, and which can include an electric resistive heater; (b) the housing or enclosure, whether finished or unfinished, of the GATC; (c) the membrane keypad used to program and control the GATC; and (d) the software to operate the GATC.<sup>6</sup>

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<sup>4</sup> "In vitro" relates to a biological process made to occur in a laboratory vessel or other controlled experimental environment, rather than within a living organism or natural setting.

<sup>5</sup> Nucleotide is defined as "any of a group of molecules that, when linked together, form the building blocks of DNA or RNA: composed of a phosphate group, the bases adenine, cytosine, guanosine, and thymine, and a pentose sugar; in ribonucleic acid (RNA), the thymine base is replaced by uracil." (The Random House Dictionary of the English Language, Second Edition, unabridged, 1987.)

<sup>6</sup> The description provided on Peltier-effect in vitro GATCs and subassemblies thereof is from the "Scope of Investigation" section of the U.S. (continued...)

In vitro gene amplification is a new biochemical technique that allows scientists to take minute fragments of impure deoxyribonucleic acid (DNA) and amplify the DNA more than a millionfold in just a few hours through an automated procedure. The sample of DNA is combined with specific biologic reagents, then cycled repetitively through a highly specific thermal regime. Applications for the amplified DNA include much improved tests, such as for AIDS detection, diabetes, residual leukemia, lymphoma, and oncogene-linked cancers.

The first reported sale of GATCs was in \*\*\*. Such introduction followed the discovery in 1985 of how to duplicate DNA and the development of the DNA-duplicating enzyme by Perkin Elmer Cetus in 1987. Prior to the introduction of GATCs, the only similar products available were simple devices such as plastic bowls and hot plates. Some laboratory tests had been made by blotting techniques that were laborious and expensive, while for some diseases, no other laboratory techniques existed that could effectively distinguish the variations of the disease.

The petition identifies three types of GATCs: (1) the Peltier-effect type; (2) the vapor-compression type; and (3) the heat-only type.<sup>7</sup> Although there may be considerable differences in engineering, price, and performance among the types,<sup>8</sup> much of the sales literature associated with GATCs indicates that they are intended to serve many of the same markets.<sup>9</sup>

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<sup>6</sup> (...continued)

Department of Commerce's Federal Register notice of its final determination of sales at LTFV.

<sup>7</sup> Petition, p. 11. See app. C of this report for heating, cooling, and other features of the three types.

<sup>8</sup> At least two recent trade journal articles have evaluated the three types of GATCs. An article in Trends in Genetics, vol. 6, No. 8, August 1990, indicated that Peltier-effect GATCs were superior in consistency and equality of amplification in all wells than the other GATCs tested. An article in BioTechniques, vol. 9, No. 3, September 1990, found that the GATCs tested (a vapor-compression Perkin Elmer Cetus GATC, a heat-only Hybaid™ GATC, and a heat-only Biomed GATC) did not satisfactorily fulfill the requirement of guaranteeing temperature homogeneity for all samples of an individual run and run-to-run comparability. However, \*\*\*.

<sup>9</sup> For example, the imported Peltier-effect GATC of LEP Scientific is identified as "...ideal for restriction enzyme digestion, preparative work for DNA sequencing analyses, 'In-vitro' enzyme-mediated techniques, plus numerous biochemical reactions where precise control of temperature and time is essential" (petition Exhibit F, "Gene Machine II," from USA/Scientific Plastics). Perkin Elmer Cetus advertises that its vapor-compression unit has "...the ability to produce amplified DNA for a variety of research applications [such as] DNA hybridization, subcloning, restriction site creation, site-directed metagenesis, sequencing, genetic probes, DNA footprinting, and protein/DNA interaction" (sales literature from Perkin Elmer Corp., "Optimizing the PCR Advantage, The Perkin Elmer Cetus DNA Amplification System," Order No. L-1072C, April 1990). Hybaid™ thermal reactors, heat-only cyclers imported from the United Kingdom, are said to have applications that include "denaturation kinetics, restriction enzyme digests, DNA

(continued...)

## PELTIER-EFFECT GATCs

Peltier-effect GATCs use one or more Peltier-effect heat pumps, which are thermoelectric modules (solid-state electronic devices) for heating and/or cooling; some Peltier-effect GATCs have electric resistive heaters. Peltier-effect GATCs operate in the following manner. Biological samples are placed in small, individual, disposable, plastic vessels, or in a disposable, plastic, microtiter<sup>10</sup> plate. These plastic vessels or plates are then inserted into a metal sample plate that is attached to the Peltier-effect heat pumps or thermoelectric modules, which are attached on the other side to a heat exchanger. A microprocessor controller inside the GATC operates a power supply circuit, which supplies varying quantities of electricity to the thermoelectric heat pumps and/or the resistive heater.<sup>11</sup> By varying the current and polarity, the controller can precisely cycle the temperature of the sample block and its biological samples through a programmed thermal regime, with excess heat exhausted to ambient air through the heat exchanger. Each temperature cycle usually incorporates several different temperatures, generally ranging from about 4° to 100° Centigrade, and changes in temperature in the sequence must occur accurately and rapidly.

The Peltier-effect GATCs marketed by the petitioner and the respondent, LEP Scientific, Ltd., both incorporate a metal sample block, thermoelectric modules, electronic thermal sensors, a heat exchanger, power supply circuitry, microprocessor-based logic circuitry, proprietary software, and sheet metal housing. The petitioner's GATC has two Peltier devices, while the respondent's has a four-device configuration.<sup>12</sup> In addition, the respondent's Peltier-effect GATC includes interchangeable sample blocks, a printer port, and an external temperature calibration probe.<sup>13</sup> The petitioner's GATC and the imported GATC of Savant Corp. use Peltier-effect heat pumps for both

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<sup>9</sup> (...continued)

sequencing, and RNA and DNA probes" (sales literature from PGC Scientifics Corp. (National Labnet) covering the Hybaid™ thermal reactor, identification No. 465, undated). Ericomp, Inc., a U.S. manufacturer of the heat-only type of thermal cycler, advertises that its product is "...ideally suited for lab experiments that require the ability to heat and cool test samples automatically through repeated cycles for any of several user-defined time intervals and temperatures ranging from 25° to 100° Centigrade" (a higher upper limit on the low end than certain other producers) (sales literature from Ericomp, Inc., covering the Easy Cycler™ Series, including price list dated May 1, 1990.)

<sup>10</sup> To titrate is to ascertain the quantity of a given constituent by adding a liquid reagent of known strength and measuring the volume of reagent necessary to convert the constituent to another form.

<sup>11</sup> Peltier-effect GATCs are controlled electronically rather than mechanically, as are vapor-compression GATCs. With the Peltier-effect GATCs, all of the motors, pumps, compressors, valves, high-pressure lines, seals, and connectors used in vapor-compression GATCs are replaced by a thermoelectric module.

<sup>12</sup> Postconference brief of Howrey and Simon, p. 41.

<sup>13</sup> The imported British Peltier-effect GATC of Techne, Ltd., has an external temperature calibration probe, is self-calibrating, and has an "auto power-fail restart facility."

heating and cooling, while the GATCs of Coy Corp. (the other U.S. producer of Peltier-effect GATCs), of LEP Scientific, and apparently of Techne, use Peltier-effect heat pumps for cooling, but resistive heaters for heating.<sup>14</sup> Figure 1 depicts a Peltier-effect GATC.<sup>15</sup>

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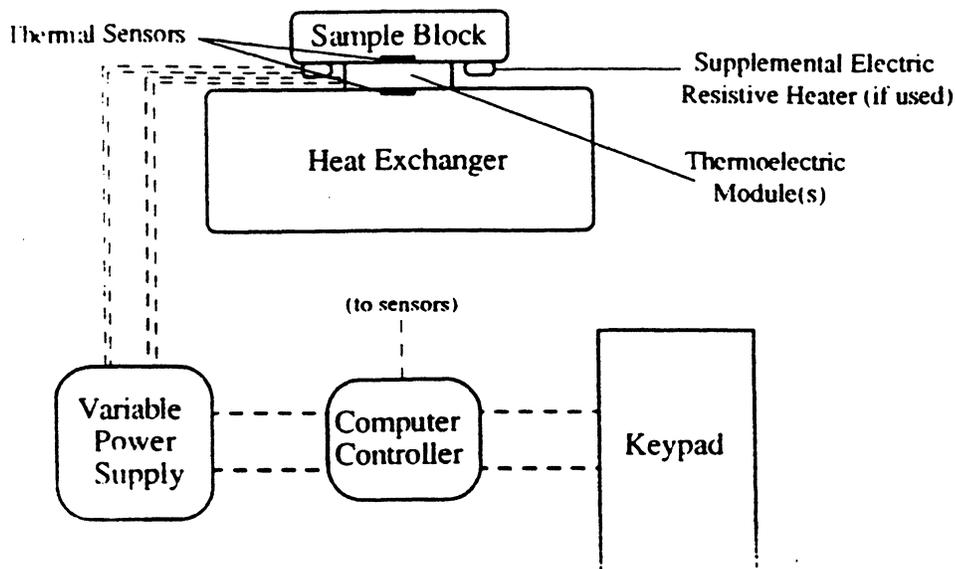
<sup>14</sup> In a Dec. 7, 1990 telephone conversation with Commission staff, \*\*\* said that the Coy Corp. GATC is different from the MJ Research GATC in that \*\*\* machine separates the heating from the cooling, and he believes that therefore \*\*\* machine has \*\*\*.

<sup>15</sup> With regard to the comparison between Peltier-effect and heat-only GATCs, the petitioner contends that Peltier-effect GATCs are superior in reproducibility, functionality, and convenience. The reproducibility of samples is allegedly superior because of better temperature consistency and accuracy; the functionality is allegedly superior, especially for the enzymatic manipulation of DNA (heat-only GATCs cannot be used on their own for below-ambient (refrigeration) purposes); and convenience is allegedly superior because Peltier-effect GATCs may be located anywhere electric power is available while many heat-only GATCs require connection to a source of tap water for cooling (postconference brief of MJ Research, p. 2, and conference exhibit #1, affidavit of Michael J. Finney, Chief Scientist, MJ Research, and Research Fellow, Dept. of Molecular Biology, Massachusetts General Hospital and Department of Genetics, Harvard Medical School).

The petitioner also contends that Peltier-effect GATCs are technologically different from vapor-compression GATCs, are superior to vapor-compression GATCs, e.g., allegedly have more precise electronic control and more even heating and cooling, and are also substantially lower in price (petition, pp. 16, 17, and postconference brief of MJ Research, pp. 3, 4).

The respondent contends that it is not possible to find the clear dividing lines among GATCs, and that all GATCs constitute one "like" product (postconference brief of respondent, p. 6). In its preliminary determination, the Commission found the like product to be all types of GATCs, but indicated that it would revisit the like product issue in any final investigation (views of the Commission, p. 9).

Figure 1  
Peltier-effect GATC



Source: MJ Research, Inc.

#### PELTIER-EFFECT GATC SUBASSEMBLIES

The petitioner identified four subassemblies that are unique to Peltier-effect GATCs. The first is the sample block/thermoelectric module(s)/temperature sensor(s)/heat exchanger subassembly, which includes the sample block, a precisely machined metal block designed to hold one or more of the four types of reaction vessels generally used. Other components of this assembly include thermoelectric modules, two or more temperature sensors, an electric resistive heater, and a heat exchanger. Of these components, only the heat exchanger is unique, since, as assembled, its only use would be as part of a Peltier-effect GATC.

The second subassembly is the sheet metal housing. The third subassembly is the membrane keypad used to program and control the machine; the specific keypad is almost always built to the specifications of the final manufacturer. The last subassembly is the proprietary software of the thermal cyclers. Such a programmed microchip would be wholly unique to the type of GATC for which it was programmed.

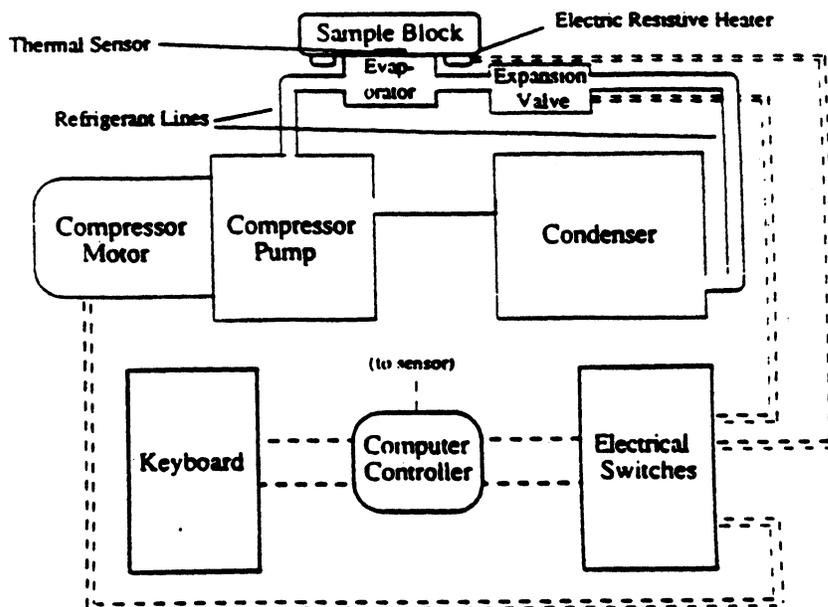
The petitioner's membrane keypads and sheet metal housings are designed to exact specifications before purchase. The petitioner writes its own software, and it is specific to the MJ Research machine. With regard to the principal subassembly (the sample block/thermoelectric module(s)/temperature

sensor(s)/heat exchanger subassembly), it is designed and assembled in-house.<sup>16</sup>

#### VAPOR-COMPRESSION GATCs

Vapor-compression GATCs are manufactured only by Perkin Elmer Cetus, and were one of the first GATCs introduced in the U.S. market. Vapor-compression machines use a reversed Rankine cycle apparatus, which is a mechanical heat pump, in order to cool the sample, whereas heating is achieved through the use of electric resistive heaters. Such heaters are attached to the sample block for heating, and for cooling the cyclor uses a circulating cooling fluid that passes through channels in the sample block itself. The coolant is chilled by a vapor-compression apparatus moving a refrigerant (a fluorocarbon) through a thermodynamic cycle; a mechanical expansion valve releases the high-pressure refrigerant into an expander. Figure 2 depicts the operation of a vapor-compression GATC.

Figure 2  
Vapor-compression GATC



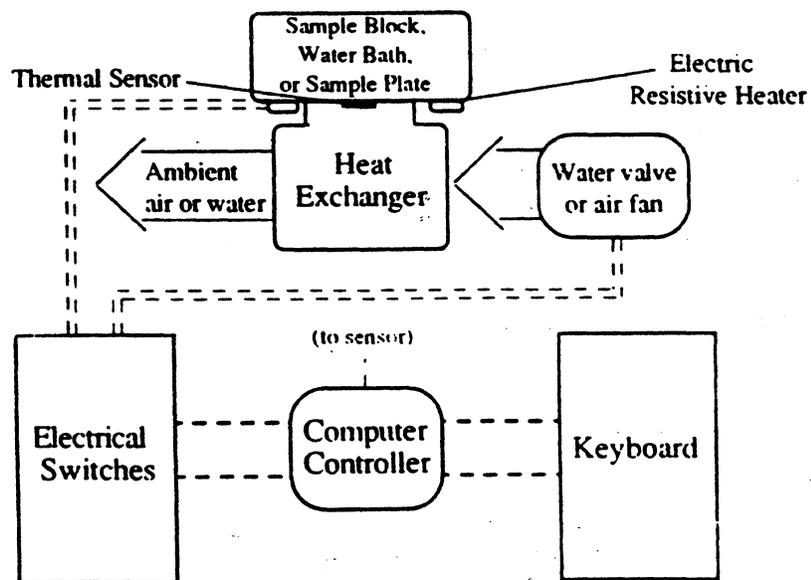
Source: MJ Research, Inc.

<sup>16</sup> John Finney, President of MJ Research, Inc., testified at the conference that with regard to subassemblies, "...the final assembly of them is a fairly intensive operation which involves the integration of electrical and mechanical components into a working system, the testing, debugging, reconstruction and ultimate calibration of which is no small part of the task. Achieving the type of temperature accuracy that we do in these machines requires a multistep process of calibration using the Bureau of Standards thermometers and such things." (Conference transcript, p. 86).

## HEAT-ONLY GATCs

Heat-only GATCs use electric resistive heaters to heat a sample block, a water bath, or the actual sample vessels. Cooling is accomplished by passing ambient air or tapwater over a heat exchanger attached to the block, bath, or vessel. Unlike the Peltier-effect and the vapor-compression GATCs, the heat-only type cannot actively pump heat, nor is it capable of attaining refrigeration temperatures unless an external water source or chiller is added (which raises its cost closer to that of the other types of GATCs). According to the petitioner, heat-only machines cannot refrigerate biological samples following the completion of a gene amplification procedure, which compromises their use by laboratories that run reactions overnight. The operational layout of a heat-only GATC is shown in figure 3.

Figure 3  
Heat-only GATC



Source: MJ Research, Inc.

## Manufacturing Process

The process of manufacturing Peltier-effect GATCs consists of assembling the four main components: the logic circuit board, the power circuit board, the sheet metal housing with keypad, and the sample block/thermoelectric module(s)/temperature sensor(s)/heat exchanger subassembly, referred to as the "alpha unit" by MJ Research. The logic--or computer--board and the power board are designed and assembled from individual components, usually supplied by various electronics distributors. The sheet metal housing and the keypad are manufactured, usually by outside suppliers, to fit the producer's specifications. The "alpha" components, with the exception of temperature sensors, are manufactured by or for the producer. The "alpha" unit, consisting of thermoelectric modules, temperature sensors, a heat exchanger,

insulation and a sample block, is then assembled and calibrated by the GATC producer.<sup>17</sup>

The process of manufacturing vapor-compression GATCs is somewhat different from that of Peltier-effect GATCs. The vapor-compression GATC consists largely of mechanical subassemblies, including a circulating coolant system with motors and valves, and a vapor-compression unit with high-pressure lines and a pump that moves a chlorofluorocarbon working fluid through a phase change. The manufacture of these components is greatly different from the manufacture of electronic subassemblies, involving a much larger quantity of capital equipment. The production process is more capital intensive and involves a somewhat different set of skills and equipment than the manufacturing process of Peltier-effect GATCs.<sup>18</sup>

The production processes for heat-only GATCs vary somewhat, both from those of Peltier-effect GATCs and vapor-compression GATCs, and among the various producers of heat-only GATCs.

In response to the question "Could you produce another type of gene amplification thermal cyler on the same equipment and machinery on which you produce your current type of thermal cyler?", \*\*\* responded "No."

Only two companies, \*\*\*, reported in the affirmative. However, each specified a caveat: \*\*\*.<sup>19</sup>

\* \* \* \* \*

#### U.S. Tariff Treatment

GATCs are provided for in the Harmonized Tariff Schedule of the United States (HTS) subheading 8419.89.50, while subassemblies thereof are provided for in HTS subheading 8419.90.90. The column 1-general or most-favored-nation rate of duty, applicable to imports from the United Kingdom, is 4.2 percent ad valorem for both HTS subheadings.

#### THE NATURE AND EXTENT OF SALES AT LTFV

Effective July 15, 1991, Commerce determined (in its final determination) that imports of Peltier-effect GATCs and subassemblies thereof from the United Kingdom are being, or are likely to be, sold in the United States at LTFV (56 F.R. 32172). Commerce's final determination assessed the LTFV margins for LEP Scientific, Ltd., and all other exporters, at 13.82 percent ad valorem. Effective August 8, 1991, Commerce amended the LTFV margins to 13.43 percent. In addition, Commerce made a negative determination of critical circumstances (see appendix A, p. B-8).

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<sup>17</sup> \*\*\*.

<sup>18</sup> Telephone conversations with \*\*\*.

<sup>19</sup> Questionnaire response, final investigation.

<sup>20</sup> Questionnaire response, final investigation.

## THE U.S. MARKET

### Apparent U.S. Consumption

Apparent U.S. consumption, as presented in this report, is calculated from U.S. shipments of both U.S. producers and importers, based on questionnaire responses (table 1).

Apparent U.S. consumption of Peltier-effect GATCs, by quantity, rose by \*\*\* percent from 1988 to 1989 and by \*\*\* percent from 1989 to 1990. Consumption further rose by \*\*\* percent from January-March 1990 to January-March 1991.

Apparent U.S. consumption of Peltier-effect GATCs as a share of total U.S. consumption of the combined types of GATCs rose, by quantity, from \*\*\* percent in 1988 to \*\*\* percent in 1989. The share declined to \*\*\* percent in 1990, but increased from \*\*\* percent in January-March 1990 to \*\*\* percent in January-March 1991.

Total reported apparent consumption of all types of GATCs combined nearly tripled, by quantity, from 1988 to 1989, and further rose by \*\*\* percent from 1989 to 1990. Apparent consumption increased only slightly from January-March 1990 to January-March 1991.

### U.S. Producers

The U.S. Peltier-effect GATC industry is only three to four years old. The only two domestic producers of Peltier-effect GATCs, MJ Research, Inc. (the petitioner) and Coy Corp., began production in \*\*\*. The industry continues to undergo rapid development. In vitro gene amplification is a new biochemical technique, heralded in the New England Journal of Medicine as "clearly one of the most substantial technical advances in molecular genetics in the past decade."<sup>21 22</sup> Both the petitioner and the respondent, the major importer of the subject product, assess that this technology soon will be widely available for clinical application. However, many domestic producers, importers, and foreign producers judge that the industry could become outmoded due to technological advances just as rapidly as it developed. (See section on "Trends in the World Industry.")

Commission staff mailed questionnaires to 17 domestic companies thought to produce GATCs. Staff confirmed that seven companies currently produce GATCs for sale--two manufacture the subject Peltier-effect GATCs; one, vapor-compression GATCs; and four, heat-only GATCs.

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<sup>21</sup> New England Journal of Medicine, Jan. 18, 1990, 332(3), p. 178.

<sup>22</sup> The petitioner asserts that the in vitro gene amplification process and the Peltier-effect thermal cyler technology were wholly developed within the United States (petition, p. 5; conference transcript, pp. 8-9.) The respondent counters that worldwide experimentation in product development occurred simultaneously (respondent's postconference brief of Dec. 7, 1990, p. 5).

Table 1

GATCs: U.S. shipments of domestic product, U.S. shipments of imports, and apparent U.S. consumption, by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan. - Mar. - -	
				1990	1991
	Quantity (units)				
Peltier-effect:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	885	2,370	3,163	644	642
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
	Value (1,000 dollars)				
Peltier-effect:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	7,626	13,633	17,601	3,626	3,595
Importers' U.S. shipments..	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***

Table continued on the following page.

Table 1--Continued

GATCs: U.S. shipments of domestic product, U.S. shipments of imports, and apparent U.S. consumption, by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
	Unit value				
Peltier-effect:					
Producers' U.S. shipments..	\$***	\$***	\$***	\$***	\$***
Importers' U.S. shipments..	( <sup>1</sup> )	( <sup>1</sup> )	***	( <sup>1</sup> )	***
Average.....	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	( <sup>1</sup> )				
Average.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	( <sup>1</sup> )	( <sup>1</sup> )	***	( <sup>1</sup> )	***
Average.....	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Average.....	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	8,617	5,752	5,565	5,630	5,600
Importers' U.S. shipments..	***	***	***	***	***
Average.....	***	***	***	***	***

<sup>1</sup> Not applicable.

Note--Unit values are calculated using data of firms supplying both quantity and value information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' names, locations, specific GATC products and position on the petition, are shown in the following tabulation:

<u>Firm</u>	<u>Location</u>	<u>Specific product</u>	<u>Product classification</u>	<u>Position on petition</u>
MJ Research, Inc.....	Watertown, MA	Gene Machine	Peltier-effect	Supports
Coy Corp., Inc.....	Ann Arbor, MI	Temp Cyclor	Peltier-effect	***
Perkin Elmer Cetus Corp..	Norwalk, CT	DNA Thermal Cyclor	Vapor-compression	***
	* * *	* * *	* * *	
BioTherm Corp.....	Ringwood, NJ	The BioOven	Heat-only	***
Ericomp, Inc.....	San Diego, CA	Easy Cyclor	Heat-only	***
Precision Scientific, Inc.....	Chicago, IL	Genetic Thermal Cyclor	Heat-only	***
Lab-Line Instruments, Inc.....	Melrose Park, IL	Programmable Thermal Blok	Heat-only	***
	* * *	* * *	* * *	

#### PELTIER-EFFECT GATCs

There are currently two U.S. producers of Peltier-effect GATCs: MJ Research, Inc. (the petitioner) and Coy Corp.

MJ Research, Inc., Watertown, MA, characterizes itself as "biotechnology leaders and innovators."<sup>23</sup> Two brothers--Michael J. Finney and John D. Finney--founded the company in 1986 to manufacture programmable controllers for use in pulse-filled electrophoresis. According to the petitioner, Michael Finney had discovered the utility of this technique while a graduate student at the Massachusetts Institute of Technology. At the time, the petitioner reports, "there were no off-the-shelf controllers on the market suitable for implementing the various pulse-field switching systems, so MJ Research built first two, then twenty, then a hundred such machines." In January 1988 the company set out to design and build a machine appropriate for implementing gene amplification and other sequencing reactions. Production of the Peltier-effect GATC began in late 1988 and the first units were shipped in \*\*\*.<sup>24</sup>

MJ Research has undergone \*\*\* since its inception. To accommodate rising demand for thermal cyclers, the company began to \*\*\*. In summer 1989

<sup>23</sup> Petition, p. 55.

<sup>24</sup> Petition, pp. 6-7; conference transcript, pp. 8-9; questionnaire in final investigation.

\* \* \* \* \*

Coy Corp, Inc., Ann Arbor, MI, manufactures a Peltier-effect GATC, the Temp Cyclor, at the company's headquarters in Ann Arbor. \*\*\*.

Coy began developing Peltier-effect GATCs in \*\*\* and production began in \*\*\*. Peltier-effect GATCs now account for about \*\*\* percent of the company's total business.<sup>26</sup> Coy Corp. has constructed a new production facility for GATCs \*\*\* in Ann Arbor, MI. The facility became operational on \*\*\*. \*\*\* of Coy called the move \*\*\*.<sup>27</sup>

#### VAPOR-COMPRESSSION GATCS

Perkin Elmer Cetus Corp., Norwalk, CT, is the sole producer of vapor-compression GATCs and the largest producer of GATCs. Perkin Elmer Cetus reports it began developing the product in \*\*\*.<sup>28</sup>

Perkin Elmer Cetus has a joint marketing agreement with the Cetus Corp. of California, a biotechnology company that developed and patented the Polymerase Chain Reaction (PCR) system and is reportedly the world's largest producer of reagents for in vitro gene amplification. Cetus holds the PCR trade name; Du Pont sued Cetus over the validity of its patent, but the patent was upheld.<sup>29</sup>

Perkin Elmer Cetus sells \*\*\* the DNA Thermal Cyclor, for automating the PCR process, for which Perkin Elmer Cetus holds the patent. \*\*\*. Perkin Elmer Cetus is also licensed under patent applications of Cetus Corp. directed to instrument-automating the PCR process. Perkin Elmer Cetus has patented the DNA Thermal Cyclor, and has other patents pending.<sup>30 31</sup>

Perkin Elmer Cetus is widely recognized as a leader in product design and market share of GATCs.<sup>32</sup> \*\*\* calls Perkin Elmer Cetus "the dominant presence in the market."<sup>33</sup> Perkin Elmer Cetus \*\*\*.<sup>34</sup>

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<sup>26</sup> Telephone conversations with \*\*\*, Nov. 23 and Nov. 26, 1990, and with \*\*\*, Dec. 3, 1990.

<sup>27</sup> Telephone conversations of July 17, 1991 with \*\*\*.

<sup>28</sup> Questionnaire response, final investigation.

<sup>29</sup> Telephone conversations with \*\*\* of Perkin Elmer Cetus on July 30, 1991.

<sup>30</sup> Questionnaire; telephone conversations with \*\*\* of Perkin Elmer Cetus, Nov. 26 and Dec. 3, 1990.

<sup>31</sup> On July 22, 1991, Perkin Elmer Cetus announced that it would sell its entire PCR technology business to Hoffman-La Roche Inc. of Nutley, New Jersey, and F. Hoffman-La Roche Ltd. of Basel, Switzerland. Cetus is expected to sell the domestic assets of its PCR Division to Hoffmann-La Roche and the Division's non-U.S. assets to F. Hoffmann-La Roche Ltd. The transaction will include all the patents and other intellectual property used directly in the PCR business. The parties expect the transaction to close by the end of 1991.

<sup>32</sup> Conversations with industry representatives from \*\*\*, and others.

<sup>33</sup> Letter of Nov. 29, 1990 from \*\*\*.

<sup>34</sup> Telephone conversations with \*\*\*. \*\*\*.

Perkin Elmer Cetus is widely recognized as a leader in product design and market share of GATCs.<sup>32</sup> \*\*\* calls Perkin Elmer Cetus "the dominant presence in the market."<sup>33</sup> Perkin Elmer Cetus \*\*\*.<sup>34</sup>

#### HEAT-ONLY GATCs

There are four active producers of heat-only GATCs: Lab-Line Instruments, Inc., Melrose Park, IL; BioTherm Corp., Ringwood, NJ; Ericomp, Inc., San Diego, CA; and Precision Scientific, Inc., Chicago, IL. All provided useable information in their questionnaire responses in the final investigation, as well as product and other information for the record.

Two producers of heat-only GATCs--Lab-Line and Precision Scientific--are primarily manufacturers of other products. Lab-Line builds more than 200 products, including incubators, shakers, water baths, ovens, and environmental chambers and its production of GATCs is small as a share of the company's overall production of all products.<sup>35</sup> Precision Scientific produces ovens, water baths, incubators, petroleum products, and laboratory apparatus. \*\*\*.

\*\*\*,<sup>36</sup> \*\*\*. \*\*\*.<sup>37</sup> \*\*\*.<sup>38</sup>

#### TECHNOLOGICAL DEVELOPMENT

\*\*\* experimenting with new technologies. In general, there seems to be less research and less development of new products among the U.S. producers of Peltier-effect GATCs than among their British counterparts (see section on "Ability of Foreign Producers to Generate Exports and the Availability of Export Markets other than the United States" and "Trends in the World Industry.")

\*\*\*. \*\*\*.<sup>39</sup> 40

During the final investigation, MJ Research's representatives made much of its development and anticipated sales of this new technology and its ability to provide field use in settings where portability, light weight, and a free-standing unit are a definite advantage.<sup>41</sup> In its posthearing brief, the company reported that \*\*\*. \*\*\*.<sup>42</sup>

<sup>32</sup> Conversations with industry representatives from \*\*\*, and others.

<sup>33</sup> Letter of Nov. 29, 1990 from \*\*\*.

<sup>34</sup> Telephone conversations with \*\*\*. \*\*\*.

<sup>35</sup> Telephone conversation with \*\*\*, June 3, 1991.

<sup>36</sup> Questionnaire response, final investigation.

<sup>37</sup> Questionnaire response, final investigation.

<sup>38</sup> Questionnaire response, final investigation.

<sup>39</sup> Questionnaire response, final investigation.

<sup>40</sup> MJ Research and the respondent disagree on the ease of such "field use" for GATCs (see respondent's posthearing brief, pp. 12 and 14, and MJ Research's July 18, 1991 letter to the Commission's investigator).

<sup>41</sup> See prehearing brief, posthearing brief, and transcript of the hearing.

<sup>42</sup> Posthearing brief, p. 3.

U.S. companies took anywhere from three months to two years in the initial development of GATCs. Each company's date it began development and production is shown in the following tabulation:

<u>Firm</u>	<u>Start date of development</u>	<u>Start date of production</u>
MJ Research, Inc.....	***	*** <sup>43</sup>
Coy Corp., Inc.....	***	***
Perkin Elmer Cetus Corp.....	***	***
BioTherm Corp.....	***	***
Ericomp, Inc.....	***	***
Precision Scientific, Inc...	***	***
Lab-Line Instruments, Inc...	***	***

Several firms reported they are developing a vapor-compression or heat-only product, but remain in early stages of product development and/or have built only prototypes and have not yet begun production en masse. \*\*\* has produced three engineering prototype \*\*\* GATCs not for sale. \*\*\*, product manager, likens the company's GATC to that of Perkin Elmer Cetus. The company reports it has had no orders for the unit, only inquiries. It anticipates commencing production in \*\*\*, and hopes to begin selling its GATC by \*\*\*.<sup>44</sup>

\*\*\* reported in the preliminary investigation that it started developing a GATC in \*\*\* and began production in \*\*\*. During that investigation, \*\*\* returned a questionnaire to the Commission with limited information.<sup>45</sup> \*\*\* now states that the heat-only GATC units it began building in \*\*\* were \*\*\*. The company reports it is currently negotiating with distributors and "mulling it over as to whether to gear up" production. \*\*\* also offered that he was "not convinced that the project is worthwhile right now," and that \*\*\*.<sup>46</sup>

Rumors have circulated in the GATC industry that \*\*\* is perfecting a heat-only product. But according to company sources, \*\*\*.<sup>47</sup>

#### U.S. Importers

U.S. importers' names, locations, and specific thermal cyler products are shown in the following tabulation:

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<sup>43</sup> The first units were shipped in \*\*\*, although there was earlier production.

<sup>44</sup> Telephone conversations with \*\*\*, and letter to the Commission from \*\*\*.

<sup>45</sup> \*\*\*, reported that the company sold \*\*\* units in \*\*\* and planned to ship \*\*\* units in \*\*\*.

<sup>46</sup> Telephone conversations with \*\*\*.

<sup>47</sup> \*\*\*.

<u>Firm</u>	<u>Location</u>	<u>Specific product</u>	<u>Product classification</u>
USA/Scientific Plastics.....	Ocala, FL	Gene Machine II	Peltier-effect
Savant Instruments... * * *	Farmingdale, NY	Savant Temperature Cyclers * * *	Peltier-effect * <sup>48</sup>
Techne, Inc..... * * *	Princeton, NJ	(PHC-3) Dri-Block Temperature Cyclers (PHC-1&2) * * *	Peltier-effect Heat-only *
National Labnet Co.....	Woodbridge, NJ	Hybrid Thermal Reactor, DNA Pacer	Heat-only
Science/Elec- tronics.....	Dayton, OH	Grant Autogene	Heat-only

The petition named USA/Scientific Plastics as the sole importer of Peltier-effect GATCs from the United Kingdom. Although not named in the petition, two other U.S. firms--Savant Instruments and Techne, Inc.--report purchases of the subject product from British manufacturers. While there are no known U.S. imports of vapor-compression GATCs, four U.S. importers buy heat-only GATCs from the United Kingdom.

USA/Scientific Plastics, Inc., Ocala, FL, purchases Peltier-effect GATCs from LEP Scientific, Ltd. of Andover, United Kingdom. USA/Scientific Plastic's first imports of the subject product were in \*\*\*. The company was founded \*\*\*. Its staff includes 35 employees located in Florida and Massachusetts, and 10 full-time sales people on the road.<sup>49</sup> USA/Scientific Plastics is a former distributor of MJ Research's Gene Machine, and much of the information developed in this investigation pertains to the troubled relationship between the two companies. (See section entitled "Other Factors Influencing the Health of the Domestic Industry" for a detailed account of the relationship.)

Savant Instruments, Farmingdale, NY, imports Peltier-effect GATCs from \*\*\*. \*\*\*. Savant is \*\*\* U.S. importer of the \*\*\*-built thermal cyclers, which is completely assembled in the United Kingdom and shipped to Savant.<sup>50</sup> Savant also manufactures centrifuges, not a subassembly in GATCs, but often used in the same laboratory by the same customers as GATCs.

<sup>48</sup> \*\*\* imported \*\*\* Peltier-effect \*\*\* thermal cyclers for internal laboratory use. The units were shipped from \*\*\*. The units were produced for the parent company under a private label by \*\*\*. \*\*\* reports that it does not intend to sell the \*\*\* units and has no plans for further purchases of \*\*\* units (letter from \*\*\*).

<sup>49</sup> Testimony of Richard E. McDonald, Vice President of USA/Scientific Plastics, Inc., conference transcript, p. 108.

<sup>50</sup> Fieldwork at \*\*\*.

\*\*\* reports it began producing GATCs because Savant, which \*\*\*, was looking to market a GATC. Savant approached \*\*\* about the possibility of \*\*\* manufacturing the product, as such an undertaking \*\*\*. \*\*\* offers that its engineering and plant facilities, \*\*\*, are well suited to GATC production. \*\*\*.<sup>51</sup>

Techne, Inc., Princeton, NJ, buys from Techne, Ltd. in Cambridge. Both companies are subsidiaries of Techne Corp., a holding company. \*\*\*.<sup>52</sup>

Four U.S. companies import heat-only GATCs from the United Kingdom. Techne, Inc. and Science/Electronics buy from Techne, Ltd. and \*\*\*, respectively. National Labnet purchases GATCs from Hybaid, Ltd. in Teddington, Middlesex, \*\*\*.<sup>53</sup>

The Commission received no information on importers from other countries.

#### Channels of Distribution

Producers and importers of all types of GATCs sell through distributors and/or directly to end users. However, a few producers also use manufacturer representatives to sell and promote the product through their contacts with the end user. Sales representatives do not purchase the machines as do distributors, but perform sales services for a specified sales commission. Both producers and distributors generally sell to end users at the recommended list price, while sales to distributors are generally made at a substantial discount below list price.<sup>54</sup> These distributors typically perform many sales functions for the producer such as advertising, printing literature, and staging sales demonstrations.

U.S. producers and importers that have an existing distribution system--\*\*\*--sell only to end users. Others such as \*\*\* do not have an extensive distribution sales force and are more likely to sell their GATCs through distributors. It is an advantage to have a sales force or distributor network because the product is new and the information concerning the various producers and technologies may not be known by potential purchasers. Moreover, distributors and their salesmen often have an existing relationship with end users through the sale of other related products, giving them an advantage in sales of GATCs. These relationships are especially important in this industry because sales are generally one GATC at a time.

As shown in the following tabulation, U.S. producers sold over \*\*\* percent of all types of GATCs to end users and \*\*\* percent through distributors during 1990, while U.S. importers sold nearly \*\*\* percent of all types of GATCs through distributors and the remaining \*\*\* percent to end users. For sales of Peltier-effect GATCs alone, both U.S. producers and importers sold most products directly to end users; however, \*\*\* reported

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<sup>51</sup> Conversation with \*\*\*.

<sup>52</sup> Fieldwork at Techne, Ltd., May 30, 1991.

<sup>53</sup> Letter from \*\*\*.

<sup>54</sup> \*\*\*.

sales of Peltier-effect GATCs through distributors during 1990. Imported heat-only GATCs are more likely to be sold through distributors, while domestically produced heat-only GATCs are sold almost equally between distributors and end users.

<u>Item</u>	<u>U.S. producers' sales to--</u>		<u>U.S. importers' sales to--</u>	
	<u>Distributors</u>	<u>End users</u>	<u>Distributors</u>	<u>End users</u>
	<u>In percent (based on quantity)</u>			
	*	*	*	*

MJ Research reported that it sold GATCs through \*\*\* distributor outlets, USA/Scientific Plastics and \*\*\*. However, USA/Scientific Plastics has \*\*\* distributor for MJ Research.<sup>55</sup> USA/Scientific Plastics accounted for over \*\*\* percent of total domestic sales of MJ Research's GATCs until the termination of their relationship in March 1990.

U.S. producers and importers reported in their questionnaire responses that nearly 60 percent of the end users who purchased GATCs during 1989-90 were universities, while an additional 15 to 20 percent of the purchasers were government-related agencies. Other end users cited were research laboratories and pharmaceutical laboratories. GATCs are marketed to these end users through trade shows, printed advertising in journals, and by direct contact.

#### CONSIDERATION OF ALLEGED MATERIAL INJURY

The information presented in this section of the report is based on the questionnaire responses of seven firms, which represent all active producers of Peltier-effect GATCs, the only known active producer of vapor-compression GATCs, and four known companies that manufactured heat-only GATCs during the period of investigation. The Commission sent questionnaires to 17 firms believed to produce the subject or possible "like" products.<sup>56</sup>

#### U.S. Capacity, Production, and Capacity Utilization

Capacity to produce Peltier-effect GATCs \*\*\* from 1989 to 1990. Capacity \*\*\* from January-March 1990 to January-March 1991 (table 2).<sup>57</sup> The increase in capacity from 1988 to 1990 is attributable to \*\*\*.<sup>58</sup>

<sup>55</sup> \*\*\*.

<sup>56</sup> Staff requested full data on GATCs and on subassemblies thereof, including purchases, shipments, employment, financial, and pricing data, but few companies provided data on subassemblies.

<sup>57</sup> The Commission's questionnaire requested producers of GATCs to report their "full production capability" of GATCs. "Full production capability" is defined as the maximum level of production that can be reasonably expected to be obtained under normal operating conditions.

<sup>58</sup> To accommodate rising demand for thermal cyclers, \*\*\*. \*\*\*.

Table 2

GATCs: U.S. capacity, production, and capacity utilization, by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
<u>Average-of-period capacity (units)</u>					
Peltier-effect.....	( <sup>1</sup> )	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Total.....	1,104	5,028	9,143	2,286	2,300
<u>Production (units)</u>					
Peltier-effect.....	***	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Total.....	1,071	3,392	5,380	1,081	1,099
<u>Capacity utilization (percent)</u>					
Peltier-effect.....	( <sup>1</sup> )	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Average.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Average.....	94.0	67.5	58.8	50.6	51.1

<sup>1</sup> Not available.

Note.--Capacity utilization is calculated using data of firms providing both capacity and production information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Production of Peltier-effect GATCs, which began at the end of 1988, jumped from \*\*\* units in 1988 to \*\*\* and \*\*\* units in 1989 and 1990, respectively. Production levels of Peltier-effect GATCs fluctuated little from January-March 1990 (\*\*\*) units) to January-March 1991 (\*\*\*) units). Capacity utilization for Peltier-effect GATCs declined by \*\*\* percentage points from 1989 to 1990, and \*\*\* from January-March 1990 to January-March 1991.

Capacity to produce all GATCs, and actual production of this product, increased substantially from 1988 to 1989 and again from 1989 to 1990.<sup>59</sup> Capacity and production rose slightly during the interim period of 1991. Capacity utilization declined in 1989 and 1990, and rose slightly in January-March 1991 compared with the corresponding period of the previous year. U.S. producers' reported production and shares of production, by firms, are shown in table 3. During 1990, MJ Research's production accounted for \*\*\* percent of U.S. Peltier-effect GATC production and \*\*\* percent of total GATC production. Coy Corp. accounted for \*\*\* percent of U.S. Peltier-effect GATC production, and \*\*\* percent of total U.S. GATC production. Together, these two companies comprised \*\*\* percent of the total production of GATCs. Perkin Elmer Cetus, the sole producer of vapor-compression GATCs, accounted for \*\*\* percent of the total production of all three types of GATCs.

Table 3  
GATCs: U.S. production, by firms, 1990<sup>1</sup>

Item	Heat-only companies	Coy Corp.	MJ Research Inc.	Perkin Elmer Cetus	Total
	*	*	*	*	*

<sup>1</sup> The data reported in the table are for the 2 producers of Peltier-effect GATCs, the only producer of vapor-compression GATCs, and the four producers of heat-only GATCs.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### U.S. Producers' U.S. Shipments

U.S. producers' U.S. shipments of Peltier-effect GATCs increased from \*\*\* units valued at \$\*\*\* in 1988 to \*\*\* units valued at \$\*\*\* in 1989, and declined somewhat from 1989 to 1990, both by quantity and by value (table 4). Such shipments rose by \*\*\* units from January-March 1990 to January-March 1991.

U.S. producers' U.S. shipments of all GATCs rose by 168 percent from 1988 to 1989, by quantity, and by 78.8 percent, by value. Such shipments further increased from 1989 to 1990--33.5 percent by quantity and 29.1 percent by value. During the interim period of 1991, overall producers' U.S. shipments fell slightly both by quantity and by value.

<sup>59</sup> Total U.S. capacity to produce GATCs (9,143 units) in 1990 was substantially higher than apparent consumption of GATCs (\*\*\* units) in that year. Total U.S. capacity to produce Peltier-effect GATCs (\*\*\* units) was substantially higher than consumption of Peltier-effect GATCs (\*\*\* units) in that year.

Table 4

GATCs: Shipments by U.S. producers, by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
<u>Quantity (units)</u>					
Peltier-effect:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
Vapor-compression:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
Heat-only:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
All GATCs:					
Domestic shipments.....	885	2,370	3,163	644	642
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
<u>Value (1,000 dollars)</u>					
Peltier-effect:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
Vapor-compression:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
Heat-only:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***
All GATCs:					
Domestic shipments.....	7,626	13,633	17,601	3,626	3,595
Exports.....	***	***	***	***	***
Total.....	***	***	***	***	***

Table continued on the following page.

Table 4--Continued  
 GATCs: Shipments by U.S. producers, by types, 1988-90, January-March 1990,  
 and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
	Unit value				
Peltier-effect:					
Domestic shipments.....	\$***	\$***	\$***	\$***	\$***
Exports.....	(1)	***	***	***	***
Average.....	***	***	***	***	***
Vapor-compression:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Average.....	***	***	***	***	***
Peltier-effect plus vapor- compression:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Average.....	***	***	***	***	***
Heat-only:					
Domestic shipments.....	***	***	***	***	***
Exports.....	***	***	***	***	***
Average.....	***	***	***	***	***
All GATCs:					
Domestic shipments.....	8,617	5,752	5,565	5,630	5,600
Exports.....	***	***	***	***	***
Average.....	***	***	***	***	***

<sup>1</sup> Not applicable.

Note.--Unit values are calculated using data of firms supplying both quantity and value information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' U.S. shipments of vapor-compression GATCs accounted for the largest share of total U.S. shipments during the period of investigation. By quantity, the share \*\*\* from \*\*\* percent in 1988 to \*\*\* percent in 1989, but \*\*\* to \*\*\* percent in 1990. Such shipments \*\*\* from \*\*\* percent in January-March 1990 to \*\*\* percent in January-March 1991. \*\*\* vapor-compression GATCs accounted for the majority of all GATC shipments during the period examined.

The unit value of all shipments of Peltier-effect GATCs \*\*\* from 1988 to 1989, but declined by \*\*\* percent from 1989 to 1990, and then declined by \*\*\* percent from January-March 1990 to January-March 1991. The unit value of all GATCs decreased by \*\*\* percent from 1988 to 1989, but rose by \*\*\* percent from 1989 to 1990 and increased slightly from January-March 1990 to January-March 1991. The unit values varied substantially by type of GATC, with vapor-compression GATCs having by far the highest unit values.

#### U.S. Producers' Exports

U.S. producers' exports of all GATCs climbed during the period of investigation, and accounted for a significant share of U.S. producers' total shipments of GATCs.<sup>60</sup> Total exports of GATCs increased more than \*\*\* from 1988 to 1989, more than \*\*\* from 1989 to 1990, and further rose by \*\*\* percent from January-March 1990 to January-March 1991.

U.S. producers' exports, as a share of total shipments, rose from \*\*\* percent in 1988 to \*\*\* percent in 1989 and to \*\*\* percent in 1990. Such exports \*\*\* from \*\*\* percent in January-March 1990 to \*\*\* percent in January-March 1991.

U.S. producers' exports of Peltier-effect GATCs increased from \*\*\* units in 1988 to \*\*\* units valued at \$\*\*\* in 1989 and \*\*\* units valued at \$\*\*\* in 1990. Exports \*\*\* by \*\*\* percent, by quantity, and by \*\*\* percent, by value, from January-March 1990 to January-March 1991, due to \*\*\* during this period.

#### U.S. Producers' Inventories

\*\*\*. \*\*\* (table 5). Nearly all GATC producers manufacture the product based on orders.

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<sup>60</sup> \*\*\* reported that its principal export markets were \*\*\* (questionnaire response, final investigation). The company reports it competes \*\*\*. \*\*\* reported exports to \*\*\*, while \*\*\* reported shipments to \*\*\*. Of the heat-only GATC companies, \*\*\* reported exports to \*\*\*. \*\*\* reported no exports. Information on the foreign markets of the other heat-only companies was not available.

Table 5

GATCs: End-of-period inventories of U.S. producers, by types, 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. Employment, Wages, and Productivity

Trends in the number of production and related workers (table 6) paralleled the upward trends in production and shipments of GATCs. The number of workers producing Peltier-effect GATCs increased from \*\*\* in 1988 to \*\*\* in 1989, and further rose to \*\*\* in 1990. The number of workers increased from \*\*\* to \*\*\* from January-March 1990 to January-March 1991. Hours worked, wages, and total compensation paid to these workers increased accordingly.

Hourly wages paid to workers producing Peltier-effect GATCs declined by \*\*\* percent from 1988 to 1989, while hourly total compensation remained constant. Hourly wages and hourly total compensation rose by \*\*\* percent and \*\*\* percent, respectively, from 1989 to 1990. The initial decline is due to \*\*\* paid throughout the period under investigation. \*\*\*.<sup>61</sup>

The trends in reported employment indicators for workers producing all GATCs were nearly identical to those for the Peltier-effect GATCs.

Two producers--\*\*\*--reported that they had laid off workers during the period under investigation. \*\*\* explained:

\* \* \* \* \*<sup>62</sup>

\*\*\* indicated that, for financial reasons, it permanently reduced its staff at work in the manufacture of heat-only GATCs. The company laid off \*\*\*.

Only one U.S. GATC producer, Precision Scientific, employs unionized workers. The United Steel Workers of America represents the company's personnel.

GATC-producing companies typically are small and employees working in them must be flexible. Employees typically are trained to carry out a variety of duties. \*\*\* reports it only has \*\*\* full-time employees to do all jobs related to GATCs. \*\*\*.<sup>63</sup> Employee flexibility is critical, especially if the company produces more than one product. As \*\*\* explains, "All employees are cross-trained to perform a variety of functions on many different products."<sup>64</sup>

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<sup>61</sup> Telephone conversation with \*\*\*.  
<sup>62</sup> Questionnaire response, final investigation.  
<sup>63</sup> Telephone conversation with \*\*\*.  
<sup>64</sup> \*\*\*.

Table 6

Average number of production and related workers producing GATCs, hours worked,<sup>1</sup> wages and total compensation paid to such employees, and hourly wages, hourly total compensation, productivity, and unit labor costs,<sup>2</sup> by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
Number of production and related workers (PRWs)					
Peltier-effect.....	***	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Total.....	11	34	52	32	35
Hours worked by PRWs (1,000 hours) <sup>1</sup>					
Peltier-effect.....	***	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Total.....	10	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )
Wages paid to PRWs (1,000 dollars)					
Peltier-effect.....	***	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Total.....	70	473	699	( <sup>3</sup> )	( <sup>3</sup> )
Total compensation paid to PRWs (1,000 dollars)					
Peltier-effect.....	***	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Subtotal.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Total.....	113	645	926	168	220
Hourly wages paid to PRWs					
Peltier-effect.....	\$***	\$***	\$***	\$***	\$***
Vapor-compression.....	***	***	***	***	***
Average.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Average.....	7.00	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )

Table continued on the following page.

Table 6--Continued

Average number of production and related workers producing GATCs, hours worked,<sup>1</sup> wages and total compensation paid to such employees, and hourly wages, hourly total compensation, productivity, and unit labor costs,<sup>2</sup> by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
<u>Hourly total compensation paid to PRWs</u>					
Peltier-effect.....	\$***	\$***	\$***	\$***	\$***
Vapor-compression.....	***	***	***	***	***
Average.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Average.....	11.30	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )
<u>Productivity (units per 1,000 hours)</u>					
Peltier-effect.....	***	***	***	***	***
Vapor-compression.....	***	***	***	***	***
Average.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Average.....	107.1	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )
<u>Unit labor costs</u>					
Peltier-effect.....	\$***	\$***	\$***	\$***	\$***
Vapor-compression.....	***	***	***	***	***
Average.....	***	***	***	***	***
Heat-only.....	***	***	***	***	***
Average.....	106	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )	( <sup>3</sup> )

<sup>1</sup> Includes hours worked plus hours of paid leave time.

<sup>2</sup> On the basis of total compensation paid.

<sup>3</sup> Not available.

Note.--Ratios are calculated using data of firms supplying both numerator and denominator information.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

### Financial Experience of U.S. Producers

Six U.S. producers--BioTherm, Coy, Ericomp, MJ Research, Perkin Elmer Cetus, and Precision Scientific--accounting for \*\*\* percent of production of all GATCs in 1990, provided income-and-loss data on their GATCs and on their establishment operations.<sup>65</sup>

#### OVERALL ESTABLISHMENT OPERATIONS

Ericomp, BioTherm, and Coy commenced production of GATCs in \*\*\*, respectively. Their reported data are the same for overall establishment and GATC operations. MJ Research's sales of GATCs have accounted for \*\*\* percent or more of sales of its overall establishment operations since \*\*\*, when it started producing GATCs. MJ Research produced \*\*\* in its establishment during the period of investigation. Precision Scientific started production of GATCs in \*\*\* and its sales of GATCs accounted for only \*\*\* percent of sales of its overall establishment operations in 1990. Perkin Elmer Cetus commenced production of GATCs in \*\*\* and it provided data for 1988, 1989, and 1990 on its GATCs operations only; these same data were also used for its overall establishment operations. The overall establishment income-and-loss data for all six reporting firms are presented in table 7.

Table 7

Income-and-loss experience of U.S. producers on the overall operations of their establishments wherein GATCs and subassemblies thereof are produced, fiscal years 1988-90, January-March 1990, and January-March 1991.

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### OPERATIONS ON PELTIER-EFFECT GATCs

Coy and MJ Research produce only Peltier-effect GATCs and/or subassemblies thereof. Their combined income-and-loss data are shown in table 8. They accounted for \*\*\* percent of production of Peltier-effect GATCs throughout the period of investigation. Since MJ Research started its shipments of Peltier-effect GATCs \*\*\*, 1988 data represent only Coy Corp. Only \*\*\* reported sales of \*\*\*.

Net sales of Peltier-effect GATCs and subassemblies thereof jumped from \$\*\*\* in 1988 to \$\*\*\* in 1989 for the two producers combined and then \*\*\* to \$\*\*\* in 1990. Such sales \*\*\* by about \*\*\* percent from \$\*\*\* in January-March 1990 to \$\*\*\* in the corresponding period of 1991.

<sup>65</sup> Data of MJ Research, Inc. were verified by the Commission. Data were revised because the company's \*\*\*. For overall establishment operations, the revised data showed \*\*\*, \*\*\*.

Table 8

Income-and-loss experience of U.S. producers on their operations producing Peltier-effect GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The average operating income margin for the two firms' operations on Peltier-effect GATCs and subassemblies thereof \*\*\* from \*\*\* percent in 1988 to \*\*\* percent in 1989 and then \*\*\* to \*\*\* percent in 1990. As a share of net sales, selling, general, and administrative (SG&A) expenses \*\*\* from \*\*\* percent in 1988 to \*\*\* percent in 1989 and then \*\*\* to \*\*\* percent in 1990. During January-March 1991, the operating income margin \*\*\* percent compared with a margin of \*\*\* percent in the corresponding period of 1990. During January-March, as a share of net sales, cost of goods sold \*\*\*, while SG&A expenses \*\*\* in 1991 compared with 1990. Net income margins followed the same trend as did operating income margins during the period of investigation.

The key financial data by firm are presented in the following tabulation:

<u>Item</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>January-March--</u>	
				<u>1990</u>	<u>1991</u>
* * * * *					

**OPERATIONS ON VAPOR-COMPRESSSION GATCs**

Perkin Elmer Cetus, the only producer of vapor-compression GATCs, accounting for \*\*\* percent of the production of vapor-compression GATCs throughout the period of investigation, supplied income-and-loss data. These data are shown in table 9. Perkin Elmer Cetus started its production of vapor-compression GATCs in \*\*\*. Net sales of vapor-compression GATCs \*\*\* from \$\*\*\* in 1988 to \$\*\*\* in 1990. During the same period, the number of units sold \*\*\*; however, the average sale price \*\*\*. Per-unit cost of goods sold \*\*\* from 1988 to 1989, but \*\*\* in 1990, whereas unit SG&A expenses \*\*\* each year. Operating income in absolute dollars \*\*\* from \$\*\*\* in 1988 to \$\*\*\* in 1990, \*\*\*.

Table 9

Income-and-loss experience of Perkin Elmer Cetus on its operations producing vapor-compression GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

**OPERATIONS ON PELTIER-EFFECT AND VAPOR-COMPRESSSION GATCs COMBINED**

The financial data for Peltier-effect and vapor-compression GATCs combined are presented in table 10. Net sales \*\*\* from \$\*\*\* in 1988 to \$\*\*\* in 1990. The operating income margin \*\*\* from \*\*\* percent in 1988 to \*\*\* percent in 1989 and \*\*\* percent in 1990. During January-March 1990 and 1991, data are for only Peltier-effect operations because Perkin Elmer Cetus did not provide interim data on its vapor-compression GATC operations.

Table 10

Income-and-loss experience of U.S. producers on their operations producing Peltier-effect plus vapor-compression GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

**OPERATIONS ON HEAT-ONLY GATCs**

BioTherm Corp., Ericomp, and Precision Scientific produce only heat-only GATCs. Their combined income-and-loss data are presented in table 11. They accounted for \*\*\* percent of production of heat-only GATCs in 1990. BioTherm Corp., Ericomp, and Precision Scientific commenced their production of heat-only GATCs in \*\*\*, respectively. \*\*\*.

Table 11

Income-and-loss experience of U.S. producers on their operations producing heat-only GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

\*\*\*. Net sales of heat-only GATCs \*\*\* by \*\*\* from \$\*\*\* in 1988 to \$\*\*\* in 1989 and then \*\*\* by \*\*\* percent to \$\*\*\* in 1990. Such sales \*\*\* during January-March 1990 and 1991. \*\*\*. Operating \*\*\* margins \*\*\* from \*\*\* percent in 1988 to \*\*\* percent in 1990 after a \*\*\* margin of \*\*\* percent was reported in 1989. \*\*\* margins rose from \*\*\* percent in January-March 1990 to \*\*\* percent in the corresponding period of 1991. The key financial data by firm are presented in the following tabulation:

<u>Item</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>January-March--</u>	
				<u>1990</u>	<u>1991</u>
* * * * *					

## OPERATIONS ON ALL GATCs

Net sales of all GATCs rose by \*\*\* percent from \$\*\*\* in 1988 to \$\*\*\* in 1990 (table 12). Such sales \*\*\* by \*\*\* percent from \$\*\*\* in January-March 1990 to \$\*\*\* in January-March 1991. The largest producer, Perkin Elmer Cetus, did not provide data for the interim periods. The aggregate operating income \*\*\* in absolute dollars from \$\*\*\* in 1988 to \$\*\*\* in 1990. However, during the same period, operating income margins \*\*\* from \*\*\* percent to \*\*\* percent. During January-March, operating income \*\*\* from \$\*\*\*, or \*\*\* percent of net sales, in 1990 to \$\*\*\*, or \*\*\* percent of net sales, in 1991. The key financial data by firms are presented in table 13.

Table 12

Income-and-loss experience of U.S. producers on their operations producing GATCs and subassemblies thereof, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 13

Income-and-loss experience of U.S. producers on their operations producing GATCs and subassemblies thereof, by firms, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

## INVESTMENT IN PRODUCTIVE FACILITIES

The value of property, plant, and equipment and total assets of the reporting firms are presented in table 14. The return on book value of fixed assets and the return on total assets are also shown in the table. Coy Corp. and Perkin Elmer Cetus did not provide total assets data. For Peltier-effect GATC operations, operating and net returns on the book value of fixed assets followed generally the same trend as the ratios of operating and net income to net sales. For all GATC operations, operating and net returns on the book value of fixed assets and on total assets rose from 1988 to 1989 and then declined in 1990; such returns increased in January-March 1991 compared with January-March 1990. However, such returns are \*\*\* among GATC producers because their investment in productive assets is \*\*\* compared with operating and net income. The return on heat-only GATCs is \*\*\* because it reflects mainly the return of \*\*\*.

Table 14

Value of assets and return on assets of U.S. producers' establishments wherein GATCs and subassemblies thereof are produced, fiscal years 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### CAPITAL EXPENDITURES

The capital expenditures incurred by the reporting firms are shown in the following tabulation (in thousands of dollars):

<u>Item</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>January-March--</u>	
				<u>1990</u>	<u>1991</u>
	*	*	*	*	*

Perkin Elmer Cetus did not provide capital expenditures data. \*\*\*.

#### RESEARCH AND DEVELOPMENT EXPENSES

The research and development expenses reported by the responding firms are shown in the following tabulation (in thousands of dollars):

<u>Item</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>January-March--</u>	
				<u>1990</u>	<u>1991</u>
	*	*	*	*	*

Perkin Elmer Cetus did not supply research and development expenses data. The majority of research and development expenses for Peltier-effect GATCs were incurred by \*\*\*, and such expenditures for heat-only GATCs were reported by \*\*\*. \*\*\*.

#### IMPACT OF IMPORTS ON CAPITAL AND INVESTMENT

The Commission requested each producer to describe any actual and/or potential negative effects of imports of Peltier-effect GATCs and subassemblies thereof from the United Kingdom on its growth, investment, ability to raise capital, and existing development and production efforts (including efforts to develop a derivative or improved version of its products). The producers' responses are presented in appendix D.

CONSIDERATION OF THE QUESTION OF  
THREAT OF MATERIAL INJURY

Section 771(7)(F)(i) of the Tariff Act of 1930 (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 any merchandise, the Commission shall consider, among other relevant factors<sup>66</sup>--

(I) If a 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 subsidy is an export subsidy inconsistent with the Agreement),

(II) any increase in production capacity or existing unused capacity in the exporting country likely to result in a significant increase in imports of the merchandise to the United States,

(III) any rapid increase in United States market penetration and the likelihood that the penetration will increase to an injurious level,

(IV) the probability that imports of the merchandise will enter the United States at prices that will have a depressing or suppressing effect on domestic prices of the merchandise,

(V) any substantial increase in inventories of the merchandise in the United States,

(VI) the presence of underutilized capacity for producing the merchandise in the exporting country,

(VII) any other demonstrable adverse trends that indicate the probability that the importation (or sale for importation) of the merchandise (whether or not it is actually being imported at the time) will be the cause of actual injury,

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<sup>66</sup> Section 771(7)(F)(ii) of the act (19 U.S.C. § 1677(7)(F)(ii)) provides that "Any determination by the Commission under this title that an industry in the United States is threatened with material injury shall be made on the basis of evidence that the threat of material injury is real and that actual injury is imminent. Such a determination may not be made on the basis of mere conjecture or supposition."

(VIII) the potential for product-shifting if production facilities owned or controlled by the foreign manufacturers, which can be used to produce products subject to investigation(s) under section 701 or 731 or to final orders under section 736, are also used to produce the merchandise under investigation,

(IX) 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), and

(X) 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 like product.<sup>67</sup>

Item (I), regarding subsidies, and item (IX), regarding agricultural products, are not relevant in this case. Information on the volume, U.S. market penetration, and pricing of imports of the subject merchandise (items (III) and (IV) above) is presented in the section entitled "Consideration of the causal relationship between imports of the subject merchandise and the alleged material injury or threat thereof;" and information on the effects of imports of the subject merchandise on U.S. producers' existing development and production efforts (item (X)) is presented in the section entitled "Consideration of alleged material injury." Available information on U.S. inventories of the subject products (item (V)); foreign producers' operations, including the potential for "product-shifting" (items (II), (VI), and (VIII) above); any other threat indicators, if applicable (item (VII) above); and any dumping in third-country markets, follows.

#### U.S. Inventories of GATCs from the United Kingdom

USA/Scientific's U.S. inventories of Peltier-effect GATCs from the United Kingdom amounted to \*\*\* units as of June 1991; \*\*\*.<sup>68</sup> \*\*\* provided

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<sup>67</sup> 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 GATT 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."

<sup>68</sup> These units are included as British exports to the United States in tables 16 and 19.

the following tabulation detailing its supplier's shipments, inventories maintained in a warehouse in Orlando, FL, and units released from that warehouse to USA/Scientific's custody in Ocala, FL for sale.<sup>69</sup> (USA/Scientific noted that the warehouse \*\*\*):

\* \* \* \* \*

The \*\*\* other importers of Peltier-effect GATCs reported the following inventories: \*\*\* had \*\*\* units in stock as of December 31, 1990 and \*\*\* units as of March 31, 1991, while \*\*\* reported \*\*\*.

Information on end-of-period inventories of U.S. imports from the United Kingdom is presented in table 15.

Table 15

Peltier-effect GATCs: End-of-period inventories of U.S. imports from the United Kingdom, 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Ability of Foreign Producers to Generate Exports and the Availability of Export Markets other than the United States

Commission staff identified three British producers of Peltier-effect GATCs. LEP Scientific, Ltd.; Andover, named in the petition, is the major exporter of this product from the United Kingdom to the United States. \*\*\* and Techne, Ltd. in Cambridge, also export Peltier-effect GATCs to the United States.

All three British companies have been developing, in conjunction with research teams of local universities, a Peltier-effect GATC over a period of several years. All report that the Peltier technology was especially difficult to perfect, but that there is a demand for the specific Peltier product. According to \*\*\*, the Peltier device is "compact, easy to manufacture...Peltier is easier to produce, technically more adept, you don't have to plug it into a water supply. Not as much mechanics are involved and this makes it more reliable and easier to service...It is esthetically more attractive, more elegant."<sup>70</sup>

\*\*\* chose a four-Peltier device, as opposed to a two-Peltier device such as that of MJ Research's. \*\*\* explained that a four-Peltier device increases the uniformity across the block, creates a larger surface area, and thus does

<sup>69</sup> Letter of July 23, 1991, from Howrey & Simon, counsel for LEP Scientific; and conversations with Howrey & Simon, July 30, 1991.

<sup>70</sup> Fieldwork, May \*\*\* 1991.

not stress each Peltier device as much. The results, \*\*\*, are reportedly more accurate this way.<sup>71</sup>

With respect to any additional or special features of the British Peltier-effect GATCs, the companies' engineers reported the following: LEP Scientific reported its product had interchangeable blocks, external calibration, solid-state heating and cooling, two-piece design, and remote operation.<sup>72</sup> Techne reported that its GATC is self-calibrating, and has auto-calibration of the external probe, ramp rate in degrees per second, and auto power-fail restart facility.<sup>73</sup> \*\*\* reported its GATC had \*\*\* additional or special features.<sup>74</sup>

\* \* \* \* \*

\*\*\* regard Perkin Elmer Cetus as their most formidable competitor. As \*\*\* expressed, Perkin Elmer Cetus is "by far the biggest." They listed the British company Hybaid next, followed by each other, the German firm Biometra, the Japanese company Astek, and the American producers Ericomp and Coy.

\* \* \* \* \*<sup>75</sup>

#### LEP SCIENTIFIC, LTD.

LEP Scientific, Ltd., Andover, began building Peltier prototypes in \*\*\*, and went into commercial production in \*\*\*. Sales to USA/Scientific began in \*\*\*. \*\*\*.

LEP primarily manufactures three products, including a blood group analyzer and a hemostasis machine. LEP's third product, the GATC, accounted for \*\*\* percent of the company's total sales for fiscal year 1990.<sup>76</sup>

\* \* \* \* \*<sup>77 78</sup>

LEP employs a total of \*\*\* people, including \*\*\* staff, and \*\*\* full-time production workers who work on all three products. The GATC parts--an incubator, microprocessor unit, and alpha unit--\*\*\*.<sup>79</sup>

LEP devotes floor space to each of its operations in these proportions: production, \*\*\* percent; research and development, \*\*\* percent; stores, \*\*\* percent; offices, \*\*\* percent.<sup>80</sup>

<sup>71</sup> Fieldwork at \*\*\*, May 28, 29, and 30, 1991.

<sup>72</sup> \*\*\*.

<sup>73</sup> \*\*\*.

<sup>74</sup> Telephone conversations with \*\*\*.

<sup>75</sup> Fieldwork at \*\*\*, May \*\*\* 1991.

<sup>76</sup> Foreign producer questionnaire response, final investigation.

<sup>77</sup> Foreign producer questionnaire response, final investigation.

<sup>78</sup> Fieldwork, May 28, 1991.

<sup>79</sup> Fieldwork, May 28, 1991.

<sup>80</sup> Fieldwork and questionnaire response.

LEP teamed up with USA/Scientific Plastics after LEP's managing director met a USA/Scientific representative at an exhibition. At that time LEP was toying with entering into an agreement with \*\*\*, but decided to sign an exclusive licensing agreement with USA/Scientific Plastics after further contact and consideration. No agreement between the two companies \*\*\*. <sup>81</sup>

\*\*\* is LEP's major market, and LEP sells to distributors in \*\*\*. \*\*\* is the company's second largest market, while \*\*\* is the third. LEP has representatives in \*\*\*.

LEP reports that there are \*\*\* and that LEP does not anticipate \*\*\* this year. The production of GATCs for all markets has and will be \*\*\* for 1991, as LEP \*\*\*. The company has \*\*\*. Production capacity for 1992 is expected to \*\*\*. However, LEP expects to \*\*\* its production and sales for the European market, and, in 1992, begin selling GATCs \*\*\*.

LEP \*\*\*. As of June 6, 1991, the company reported \*\*\* instruments in total stock, \*\*\* of which were free stock. <sup>82</sup> During 1990 and 1991, the company \*\*\*. (See "U.S. inventories of GATCs from the United Kingdom.")

\*\*\*

\*\*\* not named in the petition, contemplated entering the Peltier-effect GATC market toward the end of \*\*\* and began commercial manufacturing of the product in \*\*\*. \*\*\* teamed up with a research group at \*\*\* to develop the Peltier-effect GATC. The group \*\*\*.

\*\*\*. The company produces the GATC on the same equipment and machinery it uses to manufacture these other products. \*\*\* reports that its engineering and plant facilities, including \*\*\*, are well suited to GATC production.

\*\*\* emphasizes that it entered the Peltier-effect GATC market only \*\*\*. Savant \*\*\*. <sup>83</sup> \*\*\* began selling to Savant in \*\*\*.

The GATC product resulting from this agreement is \*\*\*. Savant \*\*\*. \*\*\* sales force \*\*\* sales of the company's GATC. The \*\*\* thermal cycler is \*\*\*. \*\*\*. <sup>84</sup> \*\*\*.

\*\*\* reports it has \*\*\*.

#### TECHNE, LTD.

Techne, Ltd., Cambridge, also not named in the petition, held production of Peltier-effect GATCs \*\*\* while engaging in a research project \*\*\*. The company had been manufacturing (and continues to make) two types of heat-only

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<sup>81</sup> Fieldwork, conversations with \*\*\*, May 28, 1991.

<sup>82</sup> Foreign producer questionnaire response, final investigation, and fieldwork, May 28, 1991.

<sup>83</sup> \*\*\*.

<sup>84</sup> \*\*\*.

GATCs (PHC-1 and PHC-2), products which it likens to those of the American producers of heat-only GATCs, Precision Scientific, Lab-Line, and Ericomp. Techne's sales in the United Kingdom and shipments to the United States \*\*\*.<sup>85</sup>

Techne, Ltd. is primarily a manufacturer of laboratory equipment. The company manufactures GATCs on the same equipment and machinery used in the production of its other products. Techne employs \*\*\* assembly line workers and engineers, but those workers are not dedicated to manufacturing any particular product.

GATCs (of all types) accounted for about \*\*\* percent of the company's total sales of all products in 1990 and company representatives project \*\*\* for 1991 and 1992.<sup>86</sup> Techne currently produces \*\*\*.<sup>87</sup> Techne estimates that sales of Peltier-effect GATCs will account for \*\*\* percent of the firm's total sales in 1990-91.

Techne sells \*\*\*. In North America, Techne, Ltd. has contracted with Techne, Inc. to \*\*\*. Techne, Ltd. sold the PHC-1 and PHC-2 in 1988 and 1989, respectively, \*\*\*, Techne, Inc. \*\*\*.

Techne reports \*\*\*.

#### BRITISH PRODUCERS' TRADE DATA

Commission staff made direct requests to the three foreign producers of Peltier-effect GATCs and also asked that counsel representing LEP Scientific, Ltd. and Techne, Ltd. in the investigation provide information on these companies' Peltier-effect GATC operations.<sup>88</sup> The information solicited consisted of production, inventories, capacity, home-market shipments, and exports to the United States and all other countries, for each of the periods covered by the investigation. The request also asked for projections for these same factors for 1991 and 1992. Tables 16-20 present the data received.

Table 16

Peltier-effect GATCs: LEP Scientific's capacity, production, inventories, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

<sup>85</sup> Questionnaire response.

<sup>86</sup> \*\*\*.

<sup>87</sup> \*\*\*.

<sup>88</sup> A request for data on the Peltier-effect GATC industry in the United Kingdom was also made of the U.S. embassy in London. A response was received in July, which contained no useful additional information not already on the record.

Table 17

Peltier-effect GATCs: \*\*\* capacity, production, inventories, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 18

Peltier-effect GATCs: Techne's capacity, production, inventories, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 19

Peltier-effect GATCs: Total U.K. capacity, production, inventories, capacity utilization, and shipments, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 20

GATCs: U.K. Peltier-effect GATC shares of production and shipments to the United States, by firms, 1988-90, January-March 1990, January-March 1991, and projections for 1991 and 1992

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

No British company produced Peltier-effect GATCs before 1989. U.K. combined production capacity for Peltier-effect GATCs jumped \*\*\* percent from 1989 to 1990, and rose \*\*\* percent from January-March 1990 to January-March 1991. This \*\*\* trend was due mainly to \*\*\*. Projected production capacity nearly doubled from 1990 to 1991 and is projected to further increase by an estimated \*\*\* percent from 1991 to 1992, due mainly to \*\*\*.

LEP entered the market in \*\*\*, and the company's production capacity for Peltier-effect GATCs \*\*\* percent from 1989 to 1990, but \*\*\* by \*\*\* percent

from January-March 1990 to January-March 1991. LEP projected that capacity would \*\*\* by \*\*\* percent from 1991 to 1992. \*\*\*.

\*\*\* entered the market in \*\*\* and estimated its capacity to produce Peltier-effect GATCs at \*\*\* units during that year. The company's capacity \*\*\* from \*\*\* units in January-March 1990 to \*\*\* units in January-March 1991, and the company projects its capacity to produce the subject product at \*\*\*.

Techne, which began production in \*\*\*, assessed its capacity at \*\*\* units in 1991 and projected \*\*\* in 1992.

Overall British production of Peltier-effect GATCs rose by \*\*\* percent from 1989 to 1990, and \*\*\* by percent from January-March 1990 to the corresponding period of 1991. Again, LEP accounted for \*\*\* the initial activity, \*\*\* its production from \*\*\* units in 1989 to \*\*\* units in 1990. However, LEP's production of the subject product \*\*\* by \*\*\* percent from \*\*\* units in January-March 1990 to \*\*\* units in January-March 1991. LEP attributed its \*\*\* in production and capacity to \*\*\*.

\*\*\* accounted for \*\*\* percent of the production (\*\*\*) of Peltier-effect GATCs during 1990, its first year in the market, and \*\*\* its share of production to \*\*\* percent (\*\*\*) in January-March 1991. Upon entering the market in 1991, Techne comprised \*\*\* percent of the production (\*\*\*) of the subject product during January-March 1991.

\*\*\* projected a production increase from 1991 to 1992, an overall rise of \*\*\* percent. \*\*\*.

During 1990, the United States accounted for \*\*\* percent of total shipments of Peltier-effect GATCs by U.K. producers. The percentage of exports to the United States \*\*\* from \*\*\* in January-March 1990 to \*\*\* percent in January-March 1991. \*\*\*. LEP reported \*\*\* exports to the United States during January-March 1990 or January-March 1991, or plans to export during the rest of 1991. The company projects it will export \*\*\* units to the United States in 1992, an estimated \*\*\* percent of its total projected shipments during that year.

\*\*\* sold \*\*\* units (\*\*\*) percent of its total shipments) in the United States during 1990, and \*\*\* units (\*\*\*) percent of its total shipments) during January-March 1991. The company projects \*\*\* and estimates it will sell \*\*\*.

Techne sold \*\*\* units (\*\*\*) percent of its total shipments) in the United States during January-March 1991. The firm projects \*\*\*.

Although the U.S. Department of Commerce's final determination of sales at LTFV was based on an investigation of LEP Scientific, that firm projects \*\*\* exports to the United States in 1991. \*\*\* and Techne will be \*\*\* exporters of the subject product to the United States in 1991, \*\*\*.

There is no evidence of the existence of any dumping findings or antidumping remedies in GATT-member countries on Peltier-effect GATCs from the United Kingdom.

There are no known British producers of vapor-compression GATCs and three known British producers of heat-only GATCs that export to the United States. Techne, Ltd., Cambridge, introduced the heat-only product into the U.S. market in \*\*\*. Techne, Ltd. sells to Techne, Inc.<sup>89</sup> Of the remaining \*\*\* exporters to the United States of heat-only GATCs, Hybaid, Ltd., Teddington, sells to National Labnet, while \*\*\* sells to Science/Electronics.

National Labnet imported \*\*\* units in 1990, \*\*\* units in January-March 1990, and \*\*\* units in January-March 1991, and provided no projections for 1991 or 1992.<sup>90</sup> Science/Electronics projected it would buy \*\*\* or \*\*\* units from its British supplier in 1991. Techne, Inc. \*\*\* its imports from \*\*\* units in 1988 to \*\*\* units in 1989, and \*\*\* this level to \*\*\* units in 1990. Its imports of heat-only GATCs \*\*\* from \*\*\* units in January-March 1990 to \*\*\* units during the corresponding period of 1991. The company projects it will import \*\*\* heat-only units in 1991.<sup>91</sup>

#### Trends in the World Industry

World Peltier-effect GATC production is concentrated in the United States and the United Kingdom. The U.S. industry is three to four years old, with the only two domestic producers of Peltier-effect GATCs, MJ Research, Inc. (the petitioner) and Coy Corp., entering the market in 1988. The British industry is one to two years old. LEP began production of Peltier-effect GATCs in \*\*\*, \*\*\* in \*\*\*, and Techne in \*\*\*.

The industry continues to undergo rapid development, and is rife with rumor about which new and existing companies are experimenting with Peltier-effect products. German and Japanese companies are said to be working on developing Peltier-effect GATC models. Foreign producers of GATCs of unknown type that do not export to the United States include three German companies-- Biometra, Biomed Theres, and Landgraf.

Many industry sources assess that the Peltier technology soon will be widely available for clinical application. Despite this general enthusiasm, however, sources in the United States and the United Kingdom underscore the uncertainty of a new and dynamic industry. Domestic producers, importers, and foreign producers all assess that the industry could become outmoded due to technological advances just as quickly as it developed. As \*\*\* explained, "In two years the product may not exist because it can't be used en masse--a more automated product would have to be developed." \*\*\* further explained: "Someone could come up with new product and the demand for Peltier-effect GATCs could be phased out as quickly as it grew--or it could double...We could sell 1 unit or 1,000." As a result, few companies are stepping wholeheartedly into production of their new GATC prototypes.<sup>92</sup>

Experimentation is not limited to Peltier technology. In the months since the preliminary investigation, staff has learned of several new

<sup>89</sup> Fieldwork, \*\*\*.

<sup>90</sup> Questionnaire response, final investigation.

<sup>91</sup> Telephone conversation with \*\*\*, Dec. 20, 1990.

<sup>92</sup> \*\*\*.

potential producers of heat-only and vapor-compression GATCs for the domestic market. \*\*\* for example, have been developing prototypes and considering whether to produce GATCs.

**CONSIDERATION OF THE CAUSAL RELATIONSHIP BETWEEN IMPORTS OF THE SUBJECT MERCHANDISE AND THE ALLEGED MATERIAL INJURY OR THREAT THEREOF**

**U.S. Imports**

Table 21 presents U.S. imports of Peltier-effect GATCs from the United Kingdom.<sup>93</sup> Such imports, which began in 1990, amounted to \*\*\* units, valued at \$\*\*\* (with a unit value of \$\*\*\*) during that year. Of the \*\*\* units imported, \*\*\* were by USA/Scientific Plastics. In addition, the British producer LEP Scientific, Ltd. shipped \*\*\* units to the United States during 1990 and \*\*\* units during January-March 1991. USA/Scientific Plastics received its first imports of Peltier-effect GATCs for commercial sale in \*\*\* 1990. Savant's imports began in \*\*\* and Techne's began in \*\*\*.

Imports of heat-only GATCs began in 1988 and rose from \*\*\* units in 1988 to \*\*\* units in 1989 and \*\*\* units in 1990. Imports declined by \*\*\* percent from January-March 1990 to the comparable period of 1991. \*\*\*.

Table 21

GATCs: U.S. imports from the United Kingdom, by types, 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Importers' U.S. shipments of GATCs from the United Kingdom are presented in table 22.

Table 22

GATCs: Shipments of U.S. imports from the United Kingdom, by types, 1988-90, January-March 1990, and January-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

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<sup>93</sup> \*\*\*.

### Market Penetration by the Subject Imports

Table 23 details the U.S. market shares of GATCs accounted for by U.S. producers and by the subject imports from the United Kingdom.

Imports of Peltier-effect GATCs from the United Kingdom began in 1990. During that year, they accounted for \*\*\* percent, by quantity, of apparent U.S. consumption of Peltier-effect GATCs, and \*\*\* percent of the apparent U.S. consumption of all GATCs. Measured by value, the subject imports accounted for \*\*\* percent of apparent U.S. consumption of Peltier-effect GATCs, and \*\*\* percent of the apparent U.S. consumption of all GATCs.

There were no subject imports during January-March 1990. During the corresponding period of 1991, imports of Peltier-effect GATCs accounted for \*\*\* percent, by quantity, of apparent U.S. consumption of Peltier-effect GATCs, and \*\*\* percent of the apparent U.S. consumption of all GATCs. Measured by value, the subject imports accounted for \*\*\* percent of apparent U.S. consumption of Peltier-effect GATCs, and \*\*\* percent of the apparent U.S. consumption of all GATCs.

### Other Factors Influencing the Health of the Domestic Industry

Much material on the record and discussion at the conference has dealt with the troubled relationship between the petitioner, MJ Research, and the respondent, USA/Scientific Plastics, a former distributor of the petitioner's.

USA/Scientific Plastics maintains that it began to import the LEP product because there were delivery and reliability problems with the MJ Research product.<sup>94</sup> A summary of the arguments presented on both sides follows:

(1) Delivery schedules--USA/Scientific Plastics alleges that, while selling the product supplied by the petitioner under a non-exclusive distribution agreement, deliveries by MJ Research never met the sales volume, and fell further behind during the entire period, resulting in substantial numbers of sales and order cancellations.<sup>95</sup>

MJ Research submitted the following tabulation:<sup>96</sup>

\* \* \* \* \*

MJ Research reports that its product has been \*\*\*. MJ Research \*\*\*.<sup>97</sup>

<sup>94</sup> Respondent's postconference brief, pp. 31-38; conference transcript, pp. 107-143.

<sup>95</sup> \*\*\*, conference, and telephone conversations with USA/Scientific Plastics.

<sup>96</sup> Final questionnaire response.

<sup>97</sup> Petitioner's postconference brief, p. 6.

Table 23

GATCs: U.S. shipments of domestic product, U.S. shipments of imports,<sup>1</sup> apparent consumption, and market shares, by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan.-Mar.--	
				1990	1991
<u>Quantity (units)</u>					
Peltier-effect:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	885	2,370	3,163	644	642
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
<u>Value (1,000 dollars)</u>					
Peltier-effect:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	7,626	13,633	17,601	3,626	3,595
U.S. imports.....	***	***	***	***	***
Apparent consumption.....	***	***	***	***	***

See footnote at end of table.

Table 23--Continued

GATCs: U.S. shipments of domestic product, U.S. shipments of imports,<sup>1</sup> apparent consumption, and market shares, by types, 1988-90, January-March 1990, and January-March 1991

Item	1988	1989	1990	Jan. -Mar. --	
				1990	1991
Share of the quantity of U.S. consumption (percent)					
Peltier-effect:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Peltier-effect.....	***	***	***	***	***
Other.....	***	***	***	***	***
Share of the value of U.S. consumption (percent)					
Peltier-effect:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Peltier-effect plus vapor-compression:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Heat-only:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
All GATCs:					
Producers' U.S. shipments..	***	***	***	***	***
Importers' U.S. shipments..	***	***	***	***	***
Peltier-effect.....	***	***	***	***	***
Other.....	***	***	***	***	***

<sup>1</sup> All imports were from the United Kingdom.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

According to MJ Research, \*\*\*.<sup>98</sup>

\* \* \* \* \*

\* \* \* \* \*

(2) Faulty equipment--The respondents allege that an unusually high proportion of MJ's machines were defective.<sup>101</sup>

\*\*\* of USA/Scientific reported \*\*\* returns of MJ Research's GATCs.<sup>102</sup> MJ Research responds that these returns instead "are associated with the substitution of a British-made LEP machine after \*\*\* had written to these customers offering immediate delivery of the feature-laden LEP machine at the same price as a backordered MJ Research machine.<sup>103</sup> MJ Research documents \*\*\* returns in 1989, the first year of its operation and \*\*\* in 1990 (see tabulation under "delivery schedules"). The company further states that, "Since MJ Research introduced its proprietary Peltier-effect technology last summer, not one single machine, either new or repaired, that incorporates the technology has been returned for repair of its Peltier-effect heat pumping apparatus."<sup>104</sup>

The material on the record concerning the performance of MJ Research's Peltier-effect GATCs is \*\*\*.<sup>105 106</sup>

John Hansen of MJ Research submitted this statement at the request of Commission staff: \*\*\*.<sup>107 108</sup>

MJ Research reported the following analysis of its GATCs shipped to end users in the United States during January 1-September 30, 1990: \*\*\*.<sup>109</sup>

MJ Research experienced \*\*\*. The last GATCs shipped by MJ Research \*\*\*.

While MJ Research acknowledges some early problems with its product, the company also claims that USA/Scientific Plastic's sales force was inexperienced in assisting customers in product installation and repairs and that \*\*\*.  
\*\*\*.<sup>110</sup>

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<sup>98</sup> Fieldwork of Nov. 28, 1990; petitioner's postconference brief of Dec. 7, 1990.

<sup>99</sup> Telephone conversations with \*\*\*.

<sup>100</sup> \*\*\*.

<sup>101</sup> Respondent's postconference brief, Dec. 7, 1990, pp. 33-35.

<sup>102</sup> Transcript of hearing, p. 92.

<sup>103</sup> MJ Research's posthearing brief, pp. 4-5.

<sup>104</sup> MJ Research's posthearing brief, p. 6.

<sup>105</sup> Telephone conversation with \*\*\*, Dec. 18, 1990.

<sup>106</sup> Telephone conversations with \*\*\*, Nov. 26 and 30, 1990.

<sup>107</sup> Most underwent upgrades, e.g., new software and added features.

<sup>108</sup> Memorandum from John Hansen, Dec. 18, 1990.

<sup>109</sup> Memorandum from MJ Research, Dec. 20, 1990.

<sup>110</sup> \*\*\*.

MJ Research also reports that \*\*\*.<sup>111</sup>

\* \* \* \* \*

(3) Industry assessments--This investigation has generated considerable information, unsolicited by Commission staff, from domestic producers (irrespective of their position on the petition), importers, and foreign producers about the reasons for MJ Research's filing the petition and the relationship between that company and USA/Scientific Plastics. The views of \*\*\* were typical. He attributed the problems to "two companies arguing...The relationship went bad. Now they're arguing with one another."<sup>112</sup>

Many industry sources, both domestic and foreign, have indicated that Peltier technology is particularly difficult to perfect and that MJ Research's early problems exemplify this difficulty. \*\*\*, after much experimentation, concluded that "Peltier is not a viable product."

No company other than MJ Research reported sales cancelled prior to shipment in its questionnaire response. Only \*\*\* reported any returns, a total of \*\*\* during the period of investigation.

(4) Analysis--Staff assessment of the facts leading up to the dissolution of the MJ Research-USA/Scientific Plastics relationship in the spring of 1990 is as follows:

From 1988 through the spring of 1990, MJ Research experienced technical problems owing to the fact that the heat pumps in its thermal cyclers were "generic" heat pumps that were procured from outside vendors and were inadequate for the rigorous demands placed upon them in the PCR/thermal cycling process. MJ Research admitted to this at the hearing:

"The Peltier-effect gene amplification thermal cycler industry at that time was wholly dependent on the supply of commercially available Peltier junction heat pumps manufactured by three companies in the United States . . . These manufacturers were all failing to produce heat pumps which withstood the rigors of repeated temperature cycling. All manufacturers of gene amplification thermal cyclers who made Peltier junction cyclers used modules from these suppliers. And all of them experienced failures of these modules."<sup>113</sup>

MJ Research realized the limitations of the commercially available heat pumps and worked to develop a new type of Peltier-effect heat pump. \*\*\*.<sup>114</sup> Through additional efforts, MJ Research arrived at a design for a new type of heat pump in March 1990 and commenced building its production capacity in

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<sup>111</sup> Petitioner's postconference brief, p. 8.

<sup>112</sup> Telephone conversation with \*\*\*.

<sup>113</sup> Testimony of John Finney, hearing transcript, p. 13. Also, in its prehearing brief MJ Research stated: \*\*\*.

<sup>114</sup> Prehearing brief of MJ Research, p. 21.

April 1990. In the meantime, however, MJ Research was quoting long lead times (perhaps 16-to-18 weeks) for its thermal cyclers:<sup>115</sup>

" . . . we had a backlog of a hundred or more booked orders at that time . . . We had delayed them. We were preparing to introduce our new Peltier effect heat pumps . . . We were delaying the shipment of those rather than ship them with the . . . domestically commercially available Peltier effect modules. We were holding on to those, and we were not aware of the impending introduction of the British thermal cyclers."<sup>116</sup>

USA/Scientific Plastics, as a distributor of the MJ Research GATC, was faced with irate customers who demanded delivery of the GATCs and in some cases who had machines that needed repair. After learning that the LEP Scientific Plastics GATC was available, it made a business decision to switch suppliers. Although the list price for the LEP Scientific GATC was established at \$4,995, customers who had been offered the MJ Research "Gene Machine" at \$3,995 were sold the greater-feature-laden LEP Scientific "Gene Machine II" for the same price; otherwise, orders taken between May 1990 and October 1990 were sold primarily at \$4,995.<sup>117</sup>

" . . . the \$39.95 (sic) price was extended to customers that we had offered outstanding price quotations, a formal price quotation either in a formal bid request situation, or a price quotation provided by one of our sales representatives to the customer . . . We felt very obligated to honor either existing purchase orders or outstanding price quotations. I felt that to do otherwise would be a bait and switch almost sort of tactic, to invite people to purchase a product from us and then say well now, here is one for \$49.95 (sic)."<sup>118</sup>

The severing of the relationship with USA/Scientific Plastics caused substantial problems for MJ Research:

"As a result, many of our sales were switched to the LEP Scientific machine . . . and the sale of MJ Research instruments dropped precipitously . . . This devastated our cash flow while demanding that even more be spent on sales and marketing . . . I made the only choice I could: To persevere as rapidly as we could. We scraped by on our reduced resources and introduced our Peltier junction heat pump several

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<sup>115</sup> MJ Research contends that USA/Scientific Plastics was promising delivery much sooner, thereby leading to unrealistic expectations on the part of customers.

<sup>116</sup> Testimony of John Finney, hearing transcript, p. 47.

<sup>117</sup> Testimony of Niki Faldemolaei, hearing transcript, p. 105.

<sup>118</sup> Testimony of Eugene Platter, hearing transcript, pp. 105, 106.

months later in July of 1990, but we didn't reach full production until December."<sup>119</sup>

Since MJ Research introduced its proprietary new Peltier effect modules in July 1990, there reportedly have not been any failures of the heat pumps.<sup>120</sup>

## Prices

### MARKET CHARACTERISTICS

GATCs are principally employed in molecular genetic research using the in vitro gene amplification technique. Through this technique, the thermal cyclers provides an automated procedure to amplify DNA in a short time, allowing closer analysis by researchers. Three U.S. producers and four importers reported that GATCs may also perform incubations, sequencing reactions, ligation reactions, and radiolabelling.<sup>121</sup> However, \*\*\*.<sup>122</sup>

U.S. producers and importers generally agreed that the three types of in vitro GATCs compete to some degree in the marketplace.<sup>123</sup> However, the petitioner, MJ Research, and the principle importer, USA/Scientific Plastics, disagreed on the level of competition. MJ Research estimates that vapor-compression GATCs compete with its Peltier-effect GATC in roughly 60 to 70 percent of its uses, while heat-only GATCs compete with its Peltier-effect GATC in approximately 35 to 40 percent of its uses.<sup>124</sup> The respondent, USA/Scientific Plastics, argued that its field experience in selling both the domestic and imported product indicates vapor-compression GATCs compete with Peltier-effect GATCs over 90 percent of the time, whereas heat-only GATCs compete with Peltier-effect GATCs 75 percent of the time.<sup>125 126</sup>

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<sup>119</sup> Testimony of John Finney, hearing transcript, pp. 15, 16.

<sup>120</sup> Testimony of John Finney, hearing transcript, p. 51. Also, MJ Research stated in its prehearing brief (p. 21): "In mid-1990, we began shipping a whole new thermoelectric technology, and since that time, not one instrument--new or repaired--that incorporates this technology has been returned to MJ Research for failure of its heat pump apparatus."

<sup>121</sup> USA/Scientific reported that other than in vitro gene amplification, GATCs may also be used in sample incubation, protein denaturation, sequencing, Nick translations, hybridizations, plasma preparations, protein and enzyme digests, nucleic acid denaturation, and DNA typing.

<sup>122</sup> \*\*\*.

<sup>123</sup> See section of this report entitled "The Products" for a description of the three types of machines and their differences.

<sup>124</sup> Conference transcript, p. 92.

<sup>125</sup> Conference transcript, p. 164. USA/Scientific Plastics also submitted a list of \*\*\* sales of either MJ Research's or LEP's GATCs that were allegedly lost to competitive thermal cyclers. Of the \*\*\* instances where USA/Scientific Plastics could identify the winning supplier, \*\*\* purchased \*\*\* Perkin Elmer Cetus' vapor-compression GATCs, \*\*\* purchased heat-only GATCs, and \*\*\* purchased Peltier-effect GATCs.

<sup>126</sup> \*\*\*.

\*\*\* reported that all types of GATCs currently compete against one another, but that the superior quality of the Peltier-effect technology will eventually differentiate itself from the other types of GATCs.<sup>127</sup> \*\*\* agreed that this differentiation will grow as knowledge increases in the scientific community.

Purchasers of GATCs generally investigate more than one type of GATC prior to actual purchase.<sup>128</sup> \*\*\* of the purchasers responding to the Commission's questionnaire indicated purchasing more than one type of GATC for use at the same facility. \*\*\*<sup>129</sup> reported a purchasing policy that required price quotations from a minimum of \*\*\* vendors. The University's final purchases are based on the \*\*\* for the GATC that meets the end user's product specifications and performance requirements.<sup>130</sup> Other end users reported similar purchasing policies requiring price quotations from different GATC suppliers.<sup>131</sup>

The different types of GATCs have price structures that appear to be related to either the production cost or real features of the machine, and to the market perception of each firm's product. Vapor-compression GATCs are significantly more expensive than Peltier-effect GATCs, and Peltier-effect GATCs are generally more expensive than heat-only GATCs.<sup>132</sup> In addition, the high price charged by Perkin Elmer Cetus for its vapor-compression machine incorporates, among other factors, the superior name recognition of the company and its service to end users as well as recognition derived from its patents in this industry. Prices for GATCs also reflect the specific channel of distribution (distributor/dealer or end user), any additional options or accessories included in the sale, and in some cases, discounts granted for purchases of more than a single machine.

The various product features of the three types of GATCs vary between different producers and models. Such features include printer interface capability, sample well capacity, external calibration, programmable operations, separate key pad module, interchangeable heating blocks, and machine size. Among Peltier-effect GATCs, the U.K.-produced LEP machine, marketed as "Gene Machine II" by USA/Scientific Plastics, Inc., offers most of these features. The respondents report that these features were \*\*\*.<sup>133</sup> The current list price of the Gene Machine II is \$4,995, while comparable GATC models produced by MJ Research and Coy carry a list price of \$3,995 and

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<sup>127</sup> \*\*\*.

<sup>128</sup> \*\*\*.

<sup>129</sup> \*\*\*.

<sup>130</sup> Product performance specifications, such as ease of use, programming capability, cycle speed, accuracy, and flexibility, vary somewhat depending on the department submitting the purchase order.

<sup>131</sup> Eighty-five percent of the end users reported considering three or more suppliers of GATCs prior to purchase.

<sup>132</sup> Perkin Elmer Cetus currently markets the "DNA Thermal Cycler", the "DNA Thermal Cycler 480," and the "GeneAmp System" with a list price of \$5,900, \$7,000, and \$12,000, respectively. Perkin Elmer Cetus GATCs remain the highest priced in the marketplace.

<sup>133</sup> Posthearing brief, p. 6.

\$3,500, respectively. Savant's U.K.-produced Peltier-effect GATC, which offers printer interface capabilities, is priced at \$3,895.

U.S. producers and importers publish and generally follow price lists. Distributors pay producers approximately \*\*\* percent to \*\*\* percent of list price,<sup>134</sup> but end users are typically charged the full list price whether purchasing directly from the producer or through a distributor. \*\*\*.<sup>135</sup> Of the \*\*\* of Peltier-effect GATCs, \*\*\*. U.S. producers and importers of other types of GATCs reported discount programs based on volume or purchasing source, e.g., government or educational purchasers. \*\*\*.<sup>136</sup>

Prices for GATCs are quoted f.o.b. warehouse and the purchasers generally pay for transportation. U.S. producers and importers report that these transportation costs are minor, generally less than 2 percent. Sales terms are typically net 30, although one producer \*\*\*.

U.S. producers and importers of all types of GATCs reported average order lead times ranging between 5 days to 8 weeks during January 1988-March 1991. U.S. producers of Peltier-effect GATCs reported average lead times between \*\*\*.<sup>137</sup> \*\*\*.<sup>138</sup> Perkin Elmer Cetus reported order lead times of \*\*\* for vapor-compression GATCs, while U.S. producers and importers of heat-only GATCs reported lead times between \*\*\*.

USA/Scientific Plastics has argued that any injury suffered by the petitioner was caused by its own delivery problems in early 1990 and that these problems led USA/Scientific Plastics to terminate its distributor relationship with MJ Research.<sup>139</sup> MJ Research contends that while its order lead times were long during the start-up phase of this product,<sup>140</sup> its experience was not different from the experience of other GATC manufacturers. Moreover, it contended that \*\*\*.<sup>141</sup>

MJ Research reported lead times that were generally \*\*\*. MJ Research quoted lead times of \*\*\*. Currently, MJ Research reports average lead times of \*\*\*.

## PRICE DATA

The Commission requested U.S. producers and importers of GATCs to provide U.S. f.o.b. prices from January 1989 through March 1991 for all types

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<sup>134</sup> \*\*\* stated that his firm's prices to distributors vary from sale to sale but are generally discounted \*\*\* percent from the original list price.

<sup>135</sup> \*\*\*.

<sup>136</sup> \*\*\*.

<sup>137</sup> \*\*\*.

<sup>138</sup> USA/Scientific Plastics reported an order lead time of \*\*\*. Savant reported order lead times between \*\*\*. Savant reported its first U.S. sale of a GATC in September 1990. One reason for the \*\*\* lead times by importers is their \*\*\*. Counsel for USA/Scientific Plastics reported that \*\*\*.

<sup>139</sup> \*\*\*.

<sup>140</sup> MJ Research's GATCs were first sold during \*\*\*.

<sup>141</sup> \*\*\*.

of GATCs. U.S. producers and importers were requested to report their lowest-price sale in each month, before and after discounts, and the average price for sales of each type of GATC.

Five U.S. producers and seven importers of GATCs provided usable data for lowest price and average price sales, but not necessarily for each thermal cyclor type or for each month of the subject period.<sup>142 143</sup> Perkin Elmer Cetus accounted for \*\*\* percent of U.S.-produced shipments of vapor-compression GATCs and over \*\*\* percent of U.S.-produced shipments of all types of GATCs during January 1989-March 1991.

#### Price Trends for Peltier-effect GATCs

In general, prices for both U.S.-produced and imported Peltier-effect GATCs \*\*\* (table 24). Lowest prices and average prices were similar in most cases, indicating that most producers and importers offered one price to nearly all customers for the GATC during each period.

Table 24

Peltier-effect GATCs: Weighted-average net f.o.b. lowest selling prices and average selling prices for the U.S.-produced products and those imported from the United Kingdom, by companies, by distribution channels, and by months, January 1989-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

U.S. producers' combined weighted-average prices to end users for the Peltier-effect GATC \*\*\* during the entire period, ending at a level \*\*\* percent \*\*\* than prices at the beginning of the period. The apparent \*\*\* in weighted-average prices was due to the shifts in product mix over the period of investigation; in reality, prices of individual machines were \*\*\* during January 1989-March 1991. \*\*\*.

<sup>142</sup> Two U.S. producers (MJ Research and Coy Corp.) and two importers (USA/Scientific Plastics and Savant) provided pricing information on Peltier-effect thermal cyclers. One U.S. producer (Perkin Elmer Cetus) provided pricing information on vapor-compression thermal cyclers. Two U.S. producers (BioTherm and Precision Scientific) and \*\*\* importers (National Labnet, \*\*\*, Science/Electronics, \*\*\*) provided pricing information on heat-only thermal cyclers.

<sup>143</sup> Techne reported \*\*\* of imported Peltier-effect GATCs during the period of investigation. However, Techne currently imports three different models of a Peltier-effect GATC manufactured in the United Kingdom. \*\*\*. \*\*\* first domestic sale of imported Peltier-effect GATCs occurred on \*\*\* and during \*\*\*, Techne sold \*\*\* imported Peltier-effect GATCs. (Telephone conversation with \*\*\*).

U.S. importers' weighted-average prices for the Peltier-effect GATC \*\*\*, but \*\*\* percent for the period. \*\*\* in the U.S. importers' weighted-average price during the \*\*\* were in part a result of \*\*\*. Between December 1990 and January 1991, U.S. importers' weighted-average prices \*\*\*, but they then \*\*\* during the first quarter of 1991.

Average unit prices for Savant \*\*\* during the \*\*\* of 1991, after \*\*\* during the \*\*\* part of 1990. \*\*\*,<sup>144</sup>

USA/Scientific Plastics reported sales information on all \*\*\* of its U.S. shipments of the imported British product during the period January 1989-March 1991. The first sale occurred in \*\*\*. \*\*\* sales were made at an introductory price of \$3,995;<sup>145</sup> the remainder were made \*\*\*.<sup>146 147</sup> USA/Scientific Plastics reported that the \$3,995 price was an introductory offer given only to end users to whom USA/Scientific Plastics already had offered price quotes of this amount for the MJ Research product when USA/Scientific Plastics was acting as MJ Research's distributor. Among these customers were those who had cancelled their orders from MJ Research because of unsatisfactory delivery based on quoted delivery times.<sup>148</sup> USA/Scientific Plastics \*\*\*.<sup>149</sup>

**Price Trends for Heat-only GATCs**

The lowest prices reported for U.S.-produced heat-only GATCs \*\*\* (table 25).

**Table 25**  
Heat-only GATCs: Weighted-average net f.o.b. lowest selling prices and average selling prices for the U.S.-produced products and those imported from the United Kingdom, by distribution channels, by companies, and by months, January 1989-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

<sup>144</sup> The list prices of Savant's and USA/Scientific Plastics' imported GATCs are \$3,895 and \$4,995, respectively.

<sup>145</sup> Posthearing brief, p. 5.

<sup>146</sup> The difference between USA/Scientific Plastics' lowest price and its average price was due to its offering \*\*\* during this time period.

<sup>147</sup> \*\*\*.

<sup>148</sup> USA/Scientific Plastics reported that \*\*\* of these sales were orders for MJ Research machines cancelled due to delivery problems, and \*\*\* were from customers with outstanding formal price quotations for which orders had not been placed, or who were important reference laboratories. Reference laboratories are well-known end users that are willing to talk to prospective purchasers concerning the performance of the machine.

<sup>149</sup> As of Oct. 1, 1990, USA/Scientific Plastics \*\*\*.

\* \* \* \* \*

Prices of individual importers \*\*\*.<sup>150</sup>

#### Price Trends for Vapor-compression GATCs

During the period of investigation, prices for vapor-compression GATCs \*\*\* (table 26).<sup>151</sup> The initial list price of \$7,915 was reduced 25 percent during 1990.<sup>152</sup> \*\*\*.<sup>153</sup>

Table 26

Vapor-compression GATCs: Estimated f.o.b. lowest and average selling prices to end users for the U.S.-produced product, by months, January 1989-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Price Comparisons for Peltier-type GATCs

The reported sales information for U.S. producers' and importers' monthly weighted-average lowest-price shipments of Peltier-effect GATCs to end users during January 1989-March 1991 resulted in 12 direct price comparisons (table 27).<sup>154</sup> All 12 price comparisons showed that importers' weighted-average prices were greater than those of U.S. producers. These margins of overselling occurred both before and after the discontinuation of USA/Scientific's special introductory price of \$3,995. Importers' weighted-average prices exceeded U.S. producers' weighted-average prices by margins that ranged between \*\*\* percent and \*\*\* percent. USA/Scientific Plastics' prices to end users were equal to or greater than MJ Research's prices to end users, and were greater than Coy Corp.'s prices to end users.<sup>155</sup> Savant's prices to end users were \*\*\*.

<sup>150</sup> As a policy \*\*\* does not offer discounts.

<sup>151</sup> Perkin Elmer Cetus, the only producer of vapor-compression GATCs, provided list prices, discount policies, and GATC shipments, by months during the period of investigation, for its "DNA Thermal Cycler". Actual prices for the largest sale and total sales in each month were \*\*\*.

<sup>152</sup> \*\*\* stated that reductions in the list price of the "DNA Thermal Cycler" were \*\*\*. \*\*\*.

<sup>153</sup> \*\*\*.

<sup>154</sup> Price data for sales of U.K.-produced Peltier-effect GATCs to distributors were not reported by importers.

<sup>155</sup> USA/Scientific Plastics reported to the Commission that its purchase price for the British Peltier-effect GATCs was \*\*\*. The list price of the imported Peltier-effect GATC was \$4,995 throughout the period of investigation. USA/Scientific Plastics' purchase price for MJ Research's GATC was \*\*\*. Throughout the period of investigation the MJ Research list price was \$3,995. (Posthearing brief, appendix 1, p. 6.)

Table 27

Peltier-effect GATCs: Average margins of underselling (overselling) by imports from the United Kingdom sold to end users, by months, January 1989-March 1991

\* \* \* \* \*

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Lost Sales

\*\*\* specific allegations of lost sales were reported to the Commission by the petitioner, MJ Research, during the preliminary investigation and \*\*\* during the final investigation.<sup>156 157</sup> These allegations involved \*\*\* imported GATCs sold by \*\*\* to \*\*\* different purchasers during the period \*\*\*, and \*\*\* imported GATC sold by \*\*\*. MJ Research alleged total lost sales of \*\*\*.<sup>158 159</sup> The Commission staff contacted all purchasers cited.

The \*\*\* firms investigating purchases of GATCs through the distributor USA/Scientific Plastics acknowledged cancelling the purchase of the MJ Research machine. \*\*\* purchasers reported that they cancelled these orders due to delivery problems of the manufacturer, MJ Research.<sup>160</sup> These purchasers cited manufacturer lead times and backorders of \*\*\* as the main reason for cancelling the orders. \*\*\* bought the imported British Peltier-effect GATC, \*\*\* bought a U.S.-produced heat-only GATC from \*\*\*, and \*\*\* bought a Perkin Elmer Cetus vapor-compression GATC.<sup>161</sup>

\*\*\* purchasers reported that they cancelled the MJ Research GATC after the distributor, USA/Scientific Plastics, told them that it no longer distributed the MJ Research product. \*\*\* of these purchasers bought the

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<sup>156</sup> \*\*\*.

<sup>157</sup> \*\*\* reported that they had lost sales due to imports but were unable to cite specific examples. \*\*\* reported that any sale to any other manufacturer constituted a lost sale. \*\*\* presently not being injured by imports and did not currently consider importers to be competitors in the marketplace. Phone conversation with \*\*\*.

<sup>158</sup> \*\*\* alleged lost sale was quoted at the list price (\$3,995) and the others were priced at \*\*\* to USA/Scientific Plastics, which would have charged the end user \*\*\*.

<sup>159</sup> In each of these lost sale allegations, MJ Research could only provide to the Commission the name of the alleged purchasing organization and its cancelled purchase order numbers. This was because \*\*\*.

<sup>160</sup> The \*\*\* purchasers were: \*\*\*.

<sup>161</sup> \*\*\* reported that two months after he placed his order, USA/Scientific Plastics could not give him a delivery time for the MJ Research GATC. He then contacted MJ Research directly, who informed him that \*\*\* had slowed the delivery of his GATC. \*\*\* required a machine immediately and cancelled the order for the MJ Research product, placing a new order with \*\*\*. A \*\*\* GATC was delivered within two weeks.

imported British Peltier-effect GATC from USA/Scientific Plastics and \*\*\* bought a Perkin Elmer Cetus vapor-compression GATC.

The \*\*\* purchasers who bought the imported British Peltier-effect GATC reported that the availability of this GATC and not price was the main factor in their decision to purchase the British product. These purchasers reported that they paid \*\*\* for the imported product as that quoted to them by \*\*\*. These purchasers received the imported British product within \*\*\* of their order. \*\*\*.

MJ Research alleged \*\*\* lost sale in \*\*\* not involving USA/Scientific plastics. \*\*\*.<sup>162</sup> \*\*\*.

#### Exchange rates

Quarterly data reported by the International Monetary Fund indicate that during January-March 1988 through January-March 1991 the nominal value of the British pound fluctuated, appreciating 7.6 percent overall relative to the U.S. dollar (table 28).<sup>163</sup> Adjusted for movements in producer price indexes in the United States and the United Kingdom, the real value of the British currency appreciated 11.2 percent overall between January-March 1988 and the first quarter of 1991.

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<sup>162</sup> \*\*\*.

<sup>163</sup> International Financial Statistics, May 1991.

Table 28

Exchange rates:<sup>1</sup> Indexes of nominal and real exchange rates of the British pound, and indexes of producer prices in the United States and the United Kingdom,<sup>2</sup> by quarters, January 1988-March 1991

Period	U.S. producer price index	British producer price index	Nominal exchange rate index	Real exchange rate index <sup>3</sup>
1988:				
January-March.....	100.0	100.0	100.0	100.0
April-June.....	101.6	101.4	102.6	102.4
July-September.....	103.1	102.6	94.4	94.0
October-December....	103.5	103.8	99.6	99.9
1989:				
January-March.....	105.8	105.2	97.3	96.8
April-June.....	107.7	106.6	90.6	89.7
July-September.....	107.3	107.8	88.9	89.3
October-December....	107.7	109.2	88.2	89.5
1990:				
January-March.....	109.3	110.9	92.3	93.6
April-June.....	109.1	113.2	93.2	96.8
July-September.....	111.0	114.3	103.6	106.7
October-December....	114.4	115.6	108.3	109.4
1991:				
January-March <sup>4</sup> .....	113.5	117.3	107.6	111.2

<sup>1</sup> Exchange rates expressed in U.S. dollars per British pound.

<sup>2</sup> Producer price indexes--intended to measure final product prices--are based on period-average quarterly indexes presented in line 63 of the International Financial Statistics.

<sup>3</sup> The real exchange rate is derived from the nominal rate adjusted for relative movements in producer prices in the United States and the United Kingdom.

<sup>4</sup> Derived from exchange rate and price data reported for January only.

Note.--January-March 1988 = 100.

Source: International Monetary Fund, International Financial Statistics, May 1991.



B-1

**APPENDIX A**

**FEDERAL REGISTER NOTICES**

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**INTERNATIONAL TRADE  
COMMISSION**

[Investigation No. 731-TA-485 (Final)]

**Certain Gene Amplification Thermal  
Cyclers and Subassemblies Thereof  
From the United Kingdom**

**AGENCY:** United States International  
Trade Commission.

**ACTION:** Institution and scheduling of a  
final antidumping investigation.

**SUMMARY:** The Commission hereby gives notice of the institution of final antidumping investigation No. 731-TA-485 (Final) under section 735(b) of the Tariff Act of 1930 (19 U.S.C. 1673d(b)) (the act) to determine whether an industry in the United States is materially injured, or is threatened with material injury, or the establishment of an industry in the United States is materially retarded, by reason of imports from the United Kingdom of certain gene amplification thermal cyclers and subassemblies thereof.<sup>1</sup>

<sup>1</sup> For purposes of this investigation, certain gene amplification thermal cyclers consist of Peltier-effect *in vitro* gene amplification thermal cyclers, whether assembled or unassembled, and the subassemblies thereof specified below. Gene amplification thermal cyclers are microprocessor-based reaction controllers that regulate temperatures of biologic reagents through a programmed and highly controlled thermal regime. They are used in biotechnology applications, including a biological protocol called *in vitro* gene amplification, as well as in several related sequencing and radioisotope labeling reactions. Peltier-effect machines use one or more thermoelectric modules for cooling of the biological sample, and the thermoelectric modules and/or

provided for in subheadings 8419.80.50 and 8419.90.90, respectively, of the Harmonized Tariff Schedule of the United States.

For further information concerning the conduct of this investigation, hearing procedures, and rules of general application, consult the Commission's Rules of Practice and Procedure, part 201, subparts A through E (19 CFR part 201, as amended by 58 FR 11918, Mar. 21, 1991), and part 207, subparts A and C (19 CFR part 207, as amended by 58 FR 11918, Mar. 21, 1991).

**EFFECTIVE DATE:** April 28, 1991.

**FOR FURTHER INFORMATION CONTACT:** Janine Wedel (202-252-1178), Office of Investigations, U.S. International Trade Commission, 500 E Street SW., Washington, DC 20438. Hearing-impaired persons can obtain information on this matter by contacting the Commission's TDD terminal on 202-252-1810. Persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202-252-1000.

**SUPPLEMENTARY INFORMATION:**

**Background.**—This investigation is being instituted as a result of an affirmative preliminary determination by the Department of Commerce that imports of certain gene amplification thermal cyclers and subassemblies thereof from the United Kingdom are being sold in the United States at less than fair value within the meaning of section 733 of the act (19 U.S.C. 1673b). The investigation was requested in a petition filed on April 28, 1991, by MJ Research, Inc., Watertown, MA.

**Participation in the investigation and public service list.**—Persons wishing to participate in the investigation as parties must file an entry of appearance with the Secretary to the Commission.

electric resistive heaters for heating the biologic samples.

Gene amplification thermal cyclers incorporate a metal sample block, one or more thermoelectric modules, one or more electronic thermal sensors, a heat exchanger, power supply circuitry, microprocessor-based logic circuitry, software, and a housing or enclosure. The following subassemblies are included in the scope of the investigation when they are manufactured according to specifications and operational requirements to dedicate them for use only as a gene amplification thermal cycler as defined in the preceding paragraph: (1) The sample block/thermoelectric/sensor/heat exchanger subassembly, which consists of the sample block, one or more thermoelectric modules, one or more electronic thermal sensors, and a heat exchanger, and which can include an electric resistive heater; (2) the housing or enclosure, whether finished or unfinished; (3) the membrane keypad used to program and control the machine; and (4) the software needed for operation.

as provided in § 201.11 of the Commission's rules, not later than twenty-one (21) days after publication of this notice in the *Federal Register*. The Secretary will prepare a public service list containing the names and addresses of all persons, or their representatives, who are parties to this investigation upon the expiration of the period for filing entries of appearance.

**Limited disclosure of business proprietary information (BPI) under an administrative protective order (APO) and BPI service list.**—Pursuant to § 207.7(a) of the Commission's rules, the Secretary will make BPI gathered in this final investigation available to authorized applicants under the APO issued in the investigation, provided that the application be made not later than twenty-one (21) days after the publication of this notice in the *Federal Register*. A separate service list will be maintained by the Secretary for those parties authorized to receive BPI under the APO.

**Staff report.**—The prehearing staff report in this investigation will be placed in the nonpublic record on June 18, 1991, and a public version will be issued thereafter, pursuant to § 207.21 of the Commission's rules.

**Hearing.**—The Commission will hold a hearing in connection with this investigation beginning at 9:30 a.m. on July 3, 1991, at the U.S. International Trade Commission Building. Requests to appear at the hearing should be filed in writing with the Secretary to the Commission on or before June 24, 1991. A nonparty who has testimony that may aid the Commission's deliberations may request permission to present a short statement at the hearing. All parties and nonparties desiring to appear at the hearing and make oral presentations should attend a prehearing conference to be held at 9:30 a.m. on June 27, 1991, at the U.S. International Trade Commission Building. Oral testimony and written materials to be submitted at the public hearing are governed by § 201.6(b)(2), 201.13(f), and 207.23(b) of the Commission's rules.

**Written submissions.**—Each party is encouraged to submit a prehearing brief to the Commission. Prehearing briefs must conform with the provisions of § 207.22 of the Commission's rules; the deadline for filing is June 28, 1991. Parties may also file written testimony in connection with their presentation at the hearing, as provided in § 207.23(b) of the Commission's rules, and posthearing briefs, which must conform with the provisions of § 207.24 of the Commission's rules. The deadline for

filing posthearing briefs is July 17, 1991; witness testimony must be filed no later than three (3) days before the hearing. In addition, any person who has not entered an appearance as a party to the investigation may submit a written statement of information pertinent to the subject of the investigation on or before July 17, 1991. All written submissions must conform with the provisions of § 201.8 of the Commission's rules; any submissions that contain BPI must also conform with the requirements of § 201.6, 207.3, and 207.7 of the Commission's rules.

In accordance with § 201.16(c) and 207.3 of the rules, each document filed by a party to the investigation must be served on all other parties to the investigation (as identified by either the public or BPI service list), and a certificate of service must be timely filed. The Secretary will not accept a document for filing without a certificate of service.

**Authority:** This investigation is being conducted under authority of the Tariff Act of 1930, title VII. This notice is published pursuant to § 207.20 of the Commission's rules.

Issued: May 3, 1991.

By order of the Commission.

Kenneth R. Mason,  
Secretary.

[FR Doc. 91-11512 Filed 5-14-91; 8:45 am]

BILLING CODE 7030-02-01

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**(A-412-808)**

**Final Determination of Sales at Less Than Fair Value: Gene Amplification Thermal Cyclers and Subassemblies Thereof, From the United Kingdom**

**AGENCY:** Import Administration, International Trade Administration, Department of Commerce.

**EFFECTIVE DATE:** July 15, 1991.

**FOR FURTHER INFORMATION CONTACT:** Joel Fischl, Office of Antidumping Investigations, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW., Washington, DC 20230; telephone (202) 377-1778

**Final Determination**

We determine that imports of gene amplification thermal cyclers and

subassemblies thereof (GATCs) from the United Kingdom are being, or are likely to be, sold in the United States at less than fair value, as provided in section 735(a) of the Tariff Act of 1930, as amended (19 U.S.C. 1673d(a)) (the Act). The estimated weighted-average margins are shown in the "Continuation of Suspension of Liquidation" section of this notice.

#### Case History

Since publication of the preliminary determination on April 29, 1991 (56 FR 19638), the following events have occurred.

Verification of the questionnaire response submitted by the respondent was conducted at Wessex Instrumentation Limited, the manufacturing plant of LEP Scientific Limited (LEP), in Andover, United Kingdom, and LEP's sales office in Milton Keynes, United Kingdom, from May 13 through 17, 1991.

Respondent submitted comments for the record in its case brief on June 13, 1991. Petitioner did not submit comments. No hearing was requested.

#### Scope of Investigation

The products covered by this investigation are certain gene amplification thermal cyclers, consisting of Peltier-effect in-vitro GATCs, whether assembled or unassembled, and the subassemblies thereof specified below. GATCs are microprocessor-based reaction controllers that regulate temperatures of biologic reagents through a programmed and highly controlled thermal regime. GATCs incorporate a metal sample block, one or more thermoelectric modules, one or more electronic thermal sensors, a heat exchanger, power supply circuitry, microprocessor-based logic circuitry, software, and a housing or enclosure. GATCs are used in a variety of biotechnology applications, such as in vitro gene amplification, and sequencing and radionucleotide labeling reactions. Peltier-effect machines use one or more thermoelectric modules for cooling the biologic samples, and thermoelectric modules and/or electric resistive heaters for heating the biologic samples. Excluded from this investigation are vapor compression thermal cyclers, which use a reversed Rankine cycle apparatus, and heat-only thermal cyclers.

The following subassemblies are included in the scope of the investigation when they are manufactured according to specifications and operational requirements for use only in a GATC as defined in the preceding paragraph: (a)

The sample block/thermoelectric sensory/heat exchanger subassembly, which consists of the sample block, one or more thermoelectric modules, one or more electronic thermal sensors, and a heat exchanger, and which can include an electric resistive heater; (b) the housing or enclosure, whether finished or unfinished, for the GATC; (c) the membrane keypad used to program and control a GATC; and (d) the software to operate the GATC. GATCs are currently classifiable under the subheading 8419.89.5075 of the Harmonized Tariff Schedule (HTS). GATC subassemblies are currently classifiable under HTS subheading 8419.90.9060. Although the HTS subheadings are provided for convenience and customs purposes, our written description of the scope of this proceeding is dispositive.

#### Period of Investigation

Normally, the Department selects as its POI the six-month period ending in the month in which the petition is filed. However, in this investigation, LEP reported that all of its U.S. sales were made prior to this six-month period (June 1, 1990 through November 30, 1990). Consequently, we extended the POI to cover the period March 1, 1990 through November 30, 1990, as permitted by 19 CFR 353.42(b).

#### Such or Similar Comparisons

We have determined for purposes of the final determination that all of the products investigated comprise a single category of "such or similar" merchandise.

#### Fair Value Comparisons

To determine whether sales of GATCs from the United Kingdom to the United States were made at less than fair value, we compared the United States price to the foreign market value (FMV), as specified in the "United States Price" and "Foreign Market Value" sections of this notice. We compared U.S. sales of GATCs to the most similar home market sales of GATCs. We also compared sales of GATCs at the same commercial level of trade, in accordance with 19 CFR 353.58. As noted in the Department's verification report, LEP considers an original equipment manufacturer (OEM) to be a distributor that sells the merchandise under its own label. Affixing such a label is the only "alteration" made to the merchandise by the OEM. Therefore, for purposes of this final determination, as in the preliminary determination, we consider OEMs and distributors to be at the same level of trade.

#### United States Price

We based United States price on purchase price, in accordance with section 772(b) of the Act, both because the GATCs were sold to unrelated purchasers in the United States prior to importation into the United States, and because ESP methodology was not indicated by other circumstances. We calculated purchase price based on f.o.b. factory or delivery prices. We made deductions, where appropriate, for foreign inland freight, U.S. duty, U.S. brokerage, inland freight, and airline entry fees, in accordance with section 772(d)(2) of the Act. In accordance with section 772(d)(1)(C) of the Act, we added to the United States price the amount of the United Kingdom value-added tax (VAT) that would have been collected if the merchandise had not been exported.

#### Foreign Market Value

In order to determine whether there were sufficient sales of GATCs in the home market to serve as a viable basis for calculating FMV, we compared the volume of home market sales of GATCs to the volume of third country sales of GATCs, in accordance with section 773(a)(1) of the Act. LEP had a viable home market with respect to sales of GATCs made during the POI.

We calculated FMV based on f.o.b. factory prices to unrelated customers in the home market. We made deductions, where appropriate, for discounts. We deducted home market packing costs and added U.S. packing costs.

Pursuant to 19 CFR 353.56, we made circumstance of sale adjustments, where appropriate, for differences in credit expenses, post-sale warehousing, advertising expenses, warranty/technical service expenses, and royalty payments. We also made a circumstance of sale adjustment on sales of GATC instruments for promotional expenses incurred on demonstration instruments provided to the U.S. customer. We made adjustments for physical differences in merchandise, in accordance with 19 CFR 353.57. Finally, we made a circumstance of sale adjustment for the VAT.

We recalculated LEP's imputed credit expense on U.S. sales because LEP calculated its credit expense on certain U.S. sales based on warehouse withdrawal date, rather than shipment date. For those sales of GATCs for which payment was outstanding as of verification, we used the date of this final determination as the date of payment as best information available (BIA). (See Comment 3.)

In its February 28, 1991, questionnaire response, LEP claimed access to U.S. financing and used the U.S. short-term interest rate to impute U.S. credit, citing *LMI—La Metalli Industriale, S.p.A. v. United States*, 912 F.2d 455 (Fed. Cir. 1990). However, respondent could not support this claim at verification, did not raise this issue in its brief, and, in fact, has revised its data in its post-verification submission to follow the Department's approach. Accordingly, the U.S. credit expense for the final determination, as in the preliminary determination, is imputed using the home market interest rate and the appropriate credit period.

#### Currency Conversion

We made currency conversions based on the official exchange rates in effect on the dates of the U.S. sales as certified by the Federal Reserve Bank.

#### Interested Party Comments

**Comment 1:** Respondent contends in its January 11, 1991, letter to the Department that the Department should dismiss the petition because the petitioner did not file this case "on behalf of" the U.S. industry. Specifically, the respondent contends that the petitioner lacks standing because (1) the International Trade Commission (ITC) has defined the "like product" in this investigation to include three products—Peltier-effect thermal cyclers, vapor-compression thermal cyclers, and heat-only thermal cyclers, and (2) petitioner's production of Peltier-effect thermal cyclers represents only a "minority" of U.S. domestic production of the "like product". Absent affirmative support for the petition by the U.S. domestic producers of vapor-compression thermal cyclers and heat-only thermal cyclers, the Department is required, according to the respondent, to reject the petition for lack of standing.

**DOC Position:** To determine whether a petitioner has standing to bring a petition, the Department must determine (1) whether the petitioner is an "interested party" within the meaning of the statute, and (2) whether the petitioner has filed the petition "on behalf of" the relevant U.S. domestic industry. See section 732 of the Act. MJ Research, the petitioner in this investigation, satisfied both of these requirements. MJ Research is necessarily an "interested party" because, as a producer of the Peltier-effect thermal cycler, it is a U.S. producer of the "like product." See section 771 of the Act.

MJ Research also satisfies the second statutory requirement of filing the petition "on behalf of" the relevant U.S.

domestic industry. Absent evidence of opposition to the petition by other members of the U.S. domestic industry, the Department presumes that a sole U.S. domestic petitioner is representative of the entire industry, even if the production of the petitioner represents less than a majority of the U.S. industry in terms of volume and value. The U.S. Court of International Trade (CIT) recently affirmed this presumption in *NTN Bearings Corp. of America v. United States*, Slip Op. 91-73 (February 28, 1991), (*NTN Bearings*).

Because there was no opposition to the petition filed by MJ Research in this investigation, the Department reasonably presumed that MJ Research was representative of the U.S. industry. Accordingly, the Department concludes that the petitioner filed the petition "on behalf of" the GATC industry. MJ Research both is an "interested party" and filed the petition "on behalf of" the U.S. industry, and, therefore, has standing to file and maintain the petition in this investigation.

**Comment 2:** Respondent contends that U.S. credit expenses for GATC sales should be calculated based on the date of withdrawal from the unrelated U.S. warehouse rather than on the date of shipment from LEP. Respondent contends that, pursuant to the sales agreement, there is no obligation of payment until the merchandise is withdrawn from warehouse, and that LEP still holds title to the instruments while they remain in the U.S. warehouse. Accordingly, LEP considers the date of withdrawal from the U.S. warehouse to be the time the Department should begin to impute credit expenses.

**DOC Positions:** We disagree. In accordance with our standard practice, we recalculated U.S. credit expenses for the GATC instruments sales based on date of shipment rather than date of withdrawal from the U.S. warehouse. See e.g., Final Results of Antidumping Administrative Review: Large Power Transformers from Japan (56 FR 29215, June 28, 1991); Final Determination of Sales at Less Than Fair Value: Silicon Metal from Brazil (56 FR 26977, June 12, 1991); and Color Television Receivers from Republic of Korea: Final Results of Antidumping Administrative Review (56 FR 12701, March 27, 1991). At verification the Department confirmed that, although there were several shipments of GATC instruments during the POI which were all warehoused at one point in the United States, these shipments were all part of a single sale. The price and quantity of the instruments were fixed at the date of sale and prior to entry into the United

States. Regardless of when LEP and USA/Scientific contractually arranged for payment to be made, LEP bears an opportunity cost while the merchandise is being shipped and warehoused. Therefore, measurement of respondent's credit costs appropriately begins as of date of shipment of the merchandise.

**Comment 3:** Respondent contends that U.S. credit expenses should reflect the correct payment dates as verified by the Department.

**DOC Position:** We agree. At verification we discovered that LEP reported the date of payment as the date that the credit amount is entered into LEP's accounting system, which is not necessarily the same day payment is actually credited to its bank account. The correct payment dates (i.e., the dates on which the company's bank account is credited) were used in the final determination.

However, at verification LEP failed to demonstrate payment for two U.S. transactions which had been withdrawn from warehouse, and for a third which remains in storage. As BIA, we used the date of the final determination as the date of payment for these transactions.

**Comment 4:** Respondent argues that no deduction should be made from U.S. price for movement expenses with respect to the first, second, and third shipments of instruments from LEP. LEP contends it inadvertently reported foreign inland freight and air freight expenses for the third shipment although those expenses were not actually incurred. Respondent also argues that, although it was agreed that LEP "would assume the movement expenses associated with the first two shipments," no deduction should be made to U.S. price for movement expenses with respect to these shipments since LEP has not yet paid these expenses.

**DOC Position:** We agree with respondent that no deduction should be made for movement expenses regarding the third shipment. At verification we noted on LEP's shipping invoice instructions that these movement expenses were borne by the U.S. customer. Therefore, because LEP did not incur the expense, we made no deduction for these expenses in the final determination.

We disagree with respondent's claim regarding the first two shipments. At verification we noted that, although LEP had not paid the movement charges associated with the first two shipments, LEP's shipping instructions on the shipping invoices specified that LEP was obligated to pay the movement expenses. The fact that LEP had not yet

paid its movement expenses for these first two shipments during the POI is no basis for determining that these expenses ultimately will not be borne by LEP. Therefore, we have deducted movement expenses incurred on the first two shipments in the final determination.

**Comment 5:** Respondent contends that demonstration instrument (*i.e.*, promotional sales) provided to USA/Scientific are a promotional expense incurred by LEP which are directly related to the sales under investigation. Therefore, respondent urges the Department to make a circumstance of sale adjustment to reflect the costs associated with providing these demonstration instruments to its U.S. customer. LEP argues that since these instruments were being newly introduced into the United States, the demonstration instruments were necessary as a promotional tool in order to stimulate future sales in the U.S. market. LEP points out that the agreement to provide these demonstration instruments was integral to finalizing the sale of the GATCs to USA/Scientific.

**DOC Position:** We agree. At verification we confirmed that these demonstration instruments were not intended to be resold in the United States. Instead they were intended for USA/Scientific's use in promoting sales of LEP's GATC instruments in the United States. Therefore, for purposes of the final determination, we have made a circumstance of sale adjustment for sales of GATC instruments to reflect the costs of these promotional instruments. Moreover, since the promotional instruments are complete instruments, intended for demonstrating the performance of complete instruments, this circumstance of sale adjustment has been made only with respect to sales of complete GATC instruments, and not subassemblies.

**Comment 6:** Respondent argues that no deduction should be made for U.S. warehousing expenses, although LEP originally reported a U.S. warehousing charge in its questionnaire response. The charge reported, LEP contends, was based on a quote from the warehousing company of the costs associated with holding instruments in an unrelated warehouse. LEP argues that because the Department confirmed at verification that it has not yet been billed nor has it paid U.S. warehousing costs, no deduction should be made.

**DOC Position:** We disagree. Although LEP had not yet been billed or paid for the storage of the GATC instruments in the unrelated U.S. warehouse, LEP had been quoted a price and is obligated to

pay for the warehousing of the merchandise. While LEP did not pay this warehousing expense during the POI, it nonetheless remains an expense that will be borne by LEP on the sales in question. Therefore, the Department has calculated and allocated a post-sale warehousing expense on the warehoused merchandise based on the price quoted to LEP.

**Comment 7:** Respondent argues that "should the Department determine that the total home market technical service/warranty amount invoiced during the nine-month period of investigation is the proper methodology for calculating this expense, then the correct total amount, as described in LEP's June 6, 1991 submission, should be used for purposes of the Department's final determination."

**DOC Position:** The Department is basing the technical service/warranty expense on the actual expenses incurred on sales subject to this investigation. Therefore, for purposes of the final determination, the Department is using the revised technical service/warranty expense submitted by LEP in its June 6, 1991, post-verification submission, in order to account for three additional warranty expenses.

#### *Continuation of Suspension of Liquidation*

We are directing the U.S. Customs Service to continue to suspend liquidation, under section 733(d) of the Act, of all entries of GATCs as defined in the "Scope of Investigation" section of this notice that are entered, or withdrawn from warehouse, for consumption on or after the date of publication of this notice in the *Federal Register*. The U.S. Customs Service shall continue to require a cash deposit or posting of a bond equal to the estimated amounts by which the foreign market value of the GATCs from the United Kingdom exceeds the United States price as shown below. This suspension of liquidation will remain in effect until further notice.

The weighted-average dumping margins are as follows:

<i>Manufacturer/Producer/ Exporter</i>	<i>Margin percent- age</i>
LEP Scientific Limited.....	13.62
All Others.....	13.62

#### *ITC Notification*

In accordance with section 735(d) of the Act, we have notified the ITC of our determination. In addition, we will make available to the ITC all nonprivileged

and nonproprietary information relating to this investigation. We will allow the ITC access to all privileged and business proprietary information in our files, provided the ITC confirms in writing that it will not disclose such information, either publicly or under administrative protective order, without the written consent of the Deputy Assistant Secretary for Investigations, Import Administration.

If the ITC determines that material injury, or threat of material injury, does not exist with respect to GATCs, the proceeding will be terminated and all securities posted as a result of the suspension of liquidation will be refunded or cancelled. However, if the ITC determines that such injury does exist, the Department will issue an antidumping duty order directing Customs officials to assess antidumping duties on all GATCs from the United Kingdom, on or after the effective date of the suspension of liquidation, equal to the amount by which the foreign market value exceeds the U.S. price.

This determination is published pursuant to section 735(d) of the Act (19 U.S.C. 1673(d)) and 19 CFR 353.20(a)(4).

Dated: July 8, 1991.

Eric L. Garfinkel,  
Assistant Secretary for Import  
Administration.

[FR Doc. 91-16776 Filed 7-12-91; 8:45 am]  
GATTING CODE 3010-00-0

[A-412-006]

**Amendment to Final Determination of Sales at Less Than Fair Value: Gene Amplification Thermal Cyclers and Subassemblies Thereof From the United Kingdom**

**Agency:** Import Administration, International Trade Administration, Commerce.

**EFFECTIVE DATE:** August 14, 1991.

**FOR FURTHER INFORMATION CONTACT:** Joel Fischl, Office of Antidumping Investigations, Import Administration, International Trade Administration, U.S. Department of Commerce, 14th Street and Constitution Avenue, NW, Washington, DC 20230; telephone (202) 377-1778.

**ASSIGNMENT TO THE FINAL DETERMINATION**

We are amending the final determination of the antidumping duty investigation of gene amplification thermal cyclers and subassemblies thereof (GATCs) from the United Kingdom (56 FR 32172, July 15, 1991) to announce the Department's negative determination of critical circumstances and to correct a clerical error in the calculations.

**Scope of Investigation**

The products covered by this investigation are certain gene amplification thermal cyclers, consisting of Peltier-effect in vitro GATCs, whether assembled or unassembled, and the subassemblies thereof. For a complete description of the merchandise covered by this investigation, see Final Determination of Sales at Less Than Fair Value.

**Gene Amplification Thermal Cyclers and Subassemblies Thereof (56 FR 32172, July 15, 1991)**

**Final Negative Determination of Critical Circumstances**

M.J. Research, petitioner, alleged the existence of critical circumstances in its November 30, 1990, petition. Section 735(e)(3) of the Act provides that the Department will determine that critical circumstances exist if we determine that:

(A) (i) There is a history of dumping in the United States or elsewhere of the class or kind of merchandise which is the subject of the investigation, or

(ii) The person by whom, or for whose account, the merchandise was imported knew or should have known that the exporter was selling the merchandise which is the subject of the investigation at less than its fair value, and

(B) There have been massive imports of the class or kind of merchandise

which is the subject of the investigation over a relatively short period.

In determining if there is a history or knowledge of dumping, we normally consider either an outstanding antidumping order in the United States or elsewhere on the subject merchandise, or margins of 25 percent or more, as being sufficient to satisfy the requirements of section 735(e)(1)(A). (See, e.g., Final Determination of Sales at Less Than Fair Value: Heavy Forged Hand Tools, Finished or Unfinished, With or Without Handles, from the People's Republic of China, 56 FR 241, January 3, 1991). Since there are no outstanding antidumping orders on GATCs from the United Kingdom, or elsewhere, and the final dumping margin is less than 25 percent, we cannot find a history, nor impute knowledge, of dumping under section 735(e)(1)(A). Therefore, in accordance with section 735(e)(1), we determine that critical circumstances do not exist with respect to imports of the subject merchandise from the United Kingdom.

**Clerical Error Allegation**

On July 23 and 24, 1991 we received submissions from respondent, LEP Scientific Limited (LEP), timely filed, alleging that the Department erred in calculating the foreign market value (FMV). Specifically, LEP claimed that:

(1) When calculating credit, the Department should have used the date of the final determination as payment date for home market sales with outstanding payment dates, as it did in the U.S. market and

(2) The Department should not have applied a U.S. dollar/pound sterling conversion factor to the reported U.S. duty since the duty was already reported in U.S. dollars.

Regarding the first allegation, we disagree with LEP that any clerical error was made. Regarding the second clerical error allegation, we agree that the currency conversion factor was applied incorrectly. Although LEP's July 6, 1991, submission indicated that U.S. duty was incurred in pounds sterling, the amounts reported in the data base were verified to have been denominated in U.S. dollars. Therefore, pursuant to section 735(e) of the Act, we are correcting the ministerial error published in our final determination of sales at less than fair value.

We are directing the U.S. Customs Service to continue to suspend liquidation, under section 773(d) of the Act, of all entries of GATCs as defined in the "Scope of Investigation" section of this notice that are entered, or withdrawn from warehouse, for

consumption on or after the date of publication of this notice in the Federal Register. The U.S. Customs Service shall continue to require a cash deposit or posting of a bond equal to the estimated amounts by which the foreign market value of the GATCs from the United Kingdom exceeds the United States price as shown below. This suspension of liquidation will remain in effect until further notice. The amended weighted-average dumping margins are as follows:

Manufacturer/producer/exporter	Margin percentage	Critical circumstances
LEP Scientific Limited	13.43	No.
All others	13.43	No.

#### *ITC Notification*

In accordance with section 735(d) of the Act, we have notified the ITC of our determination. In addition, we will make available to the ITC all nonprivileged and nonproprietary information relating to this investigation. We will allow the ITC access to all privileged and business proprietary information in our files, provided the ITC confirms in writing that it will not disclose such information, either publicly or under administrative protective order, without the written consent of the Deputy Assistant Secretary for Investigations, Import Administration.

If the ITC determines that material injury, or threat of material injury, does not exist with respect to GATCs, the proceeding will be terminated and all securities posted as a result of the suspension of liquidation will be refunded or cancelled. However, if the ITC determines that such injury does exist, the Department will issue an antidumping duty order directing Customs officials to assess antidumping duties on all GATCs from the United Kingdom, on or after the effective date of the suspension of liquidation, equal to the amount by which the foreign market value exceeds the U.S. price.

This amended final determination is published pursuant to section 735(d) of the Act (19 U.S.C. 1673d(e) (1991) and 19 CFR 353.23(c).

Dated: August 8, 1991.

Eric I. Garfinkel,  
Assistant Secretary for Import  
Administration.

[FR Doc. 91-18354 Filed 8-13-91; 8:45 am]

BILLING CODE 2510-06-01



APPENDIX B

LIST OF WITNESSES  
WHO APPEARED AT THE HEARING

CALENDAR OF PUBLIC HEARING

Those listed below appeared as witnesses at the United States International Trade Commission's hearing:

Subject : CERTAIN GENE AMPLIFICATION THERMAL CYCLERS AND  
SUBASSEMBLIES THEREOF FROM THE UNITED KINGDOM

Inv. No. : 731-TA-485 (Final)

Date and time: July 3, 1991 - 9:30 a.m.

Sessions were held in connection with the investigation in the Main Hearing Room of the United States International Trade Commission, 500 E St. SW., Washington, DC.

In support of the imposition of antidumping duties

MJ Research, Incorporated  
Watertown, MA

John Finney, President

John Hansen, Director of Special Projects

Michael Nussbaum, Electrical Engineer

In opposition to the imposition of antidumping duties

Howrey & Simon  
Washington, DC  
On behalf of--

USA/Scientific Plastics, Incorporated

Eugene Platter, President

Niki Faldemolaei, Product Manager

LEP Scientific Limited

Phil Checketts, Director of Sales and Marketing

Michael A. Hertzberg) --OF COUNSEL  
Juliana Cofrancesco )

APPENDIX C

FEATURES OF VARIOUS TYPES OF GATCs

### Features of Various Types of GATCs

All GATCs can amplify nucleic acid by the patented temperature cycling method known as polymerase chain reaction (PCR), and may also perform other functions. However, the various types of GATCs have quite different technical approaches which can affect their effectiveness and ease of use in specific applications. Peltier-effect GATCs are identified by their use of a Peltier device in at least the cooling of the units, vapor-compression GATCs by a certain mechanical refrigeration process, and heat-only GATCs by the fact that they are indeed "heat-only" and have no built-in cooling system for below-ambient (refrigeration) purposes. The Peltier-effect/vapor-compression/heat-only distinctions may be somewhat lessened when types of heating devices and various features are examined.

Salient features of GATCs for which information was provided are presented in table B-1. Peltier-effect and vapor-compression GATCs can refrigerate below ambient temperatures on their own;<sup>1</sup> heat-only GATCs cannot be used for such purposes on their own, but can be so used in connection with a refrigeration or chilling device of some sort. Various GATCs perform their functions to a greater or lesser degree of accuracy and ease of use depending on the various features that are built-in or offered separately.

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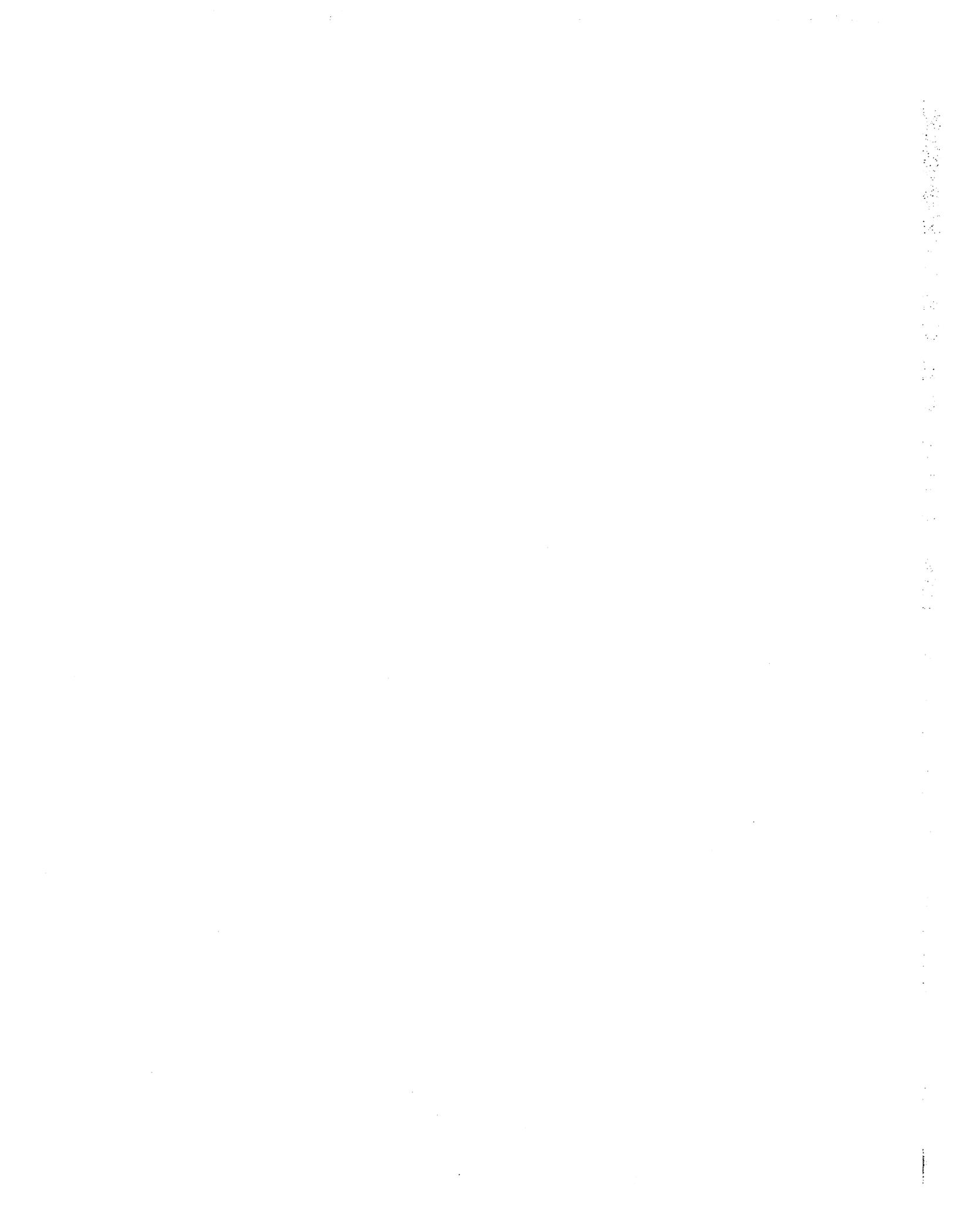
<sup>1</sup> Petitioner stated that with regard to below-ambient applications, Peltier-effect GATCs are capable of, and are specified for, a "far greater accuracy than the Perkin Elmer vapor compression machines, which state that their accuracy is only plus or minus I believe three degrees C and below ambient applications." (Testimony of John Hansen, MJ Research, hearing transcript, p. 58.)

Table B-1  
Salient features of various U.S.-produced and imported GATCs, by type of GATC and by firm

Features	U.S.-produced										Imported from the United Kingdom			
	Vapor compression					Heat-only					Peltier		Heat-only	
	Perkin Elmer	Cotus	Research	Coy	Research	BioTherm	Ericomp	Lab-Line	JEP	Savant	Techne	Hybaid 1/	Techne	
Type of heating:														
Peltier.....	Yes 2/	No	Yes 2/	No	No	No	No	No	No	Yes	No	No	No	
Resistive heaters.....	No 2/	Yes 3/	No	No	No	No	No	Yes	No	No	Yes	No	No	
Cartridge heaters.....	No	No	Yes	No	Yes	No	No	No	No	No	No	No	Yes 5/	
Halogen/tungsten lamp.....	No	No	No	No	No	No	No	No	No	No	Yes	No	No	
Type of cooling:														
Peltier.....	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	No	No	No	
Refrigeration compressor.....	No	No	No	No	No	No	No	Yes	No	No	No	No	Yes 5/	
Tap water source (external)....	No	No	No	No	No	Yes	Yes	No	No	No	No	No	Yes	
Tap water source (recirculating).....	No	No	No	No	No	No	Yes	No	No	No	No	No	No	
Air cooled with a fan.....	No	No	No	No	No	No	Yes	No	No	No	No	No	No	
Can refrigerate below ambient temperature.....	Yes	Yes	Yes	Yes	Yes	5/	5/	Yes	Yes	Yes	5/	5/	5/	
Can be used for ligation reactions.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	
Can be used for below-ambient radiolabelling reactions.....	Yes	Yes	Yes	Yes	Yes	5/	5/	Yes	Yes	Yes	Yes	5/	5/	
Temperature probe is standard equipment.....	No 6/	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Time-delay programming.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	
Has stored programs.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Has end-of-run temperature storage.....	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Has end-of-run audible alarm.....	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	
Capacity (number of tubes).....	60 7/	35	48	200	29/58	36	40	49	49	40	54	54	54	
Accuracy (plus or minus, in degrees C).....	***	***	***	***	***	***	***	***	8/	*** 2/	***	*** 9/	*** 9/	
Temperature range (in degrees C).....	***	***	***	***	***	***	***	***	***	***	***	***	***	
Other features.....	12/	13/	13/	14/	14/	15/	15/	16/	17/	13/	13/	13/	13/	

1/ As sold by National Labnet.  
 2/ \*\*\*.  
 3/ Embedded water/resistive heaters.  
 4/ Even though this is a heat-only machine, Techne indicated that it has a refrigeration compressor. The apparent contradiction has not been resolved.  
 5/ Heat-only GATCs cannot be used for refrigeration purposes on their own; however, they can be used for such purposes if they are used in connection with a refrigeration or chilling device of some sort.  
 6/ It is a \$100 option.  
 7/ For the PTC-100-60 model.  
 8/ Savant indicated \*\*\*; \*\*\*.  
 9/ As reported by Techne.  
 10/ \*\*\*.  
 11/ \*\*\*.  
 12/ "Chart recorder output; twelve pre-programmed protocols; compact size; light weight; no need for external refrigeration or water connection."  
 13/ Did not report additional or special features.  
 14/ "Can be used with microscope slides."  
 15/ "20 programs w/8 segments per program, block uniformity +/- [\*\*\*] C, assured soak time, adj. ramp and soak time."  
 16/ "Interchangeable blocks, external calibration, solid-state heat/cool, 2-piece design/remote operation."  
 17/ "Printer option."

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission and from public sources.



APPENDIX D

COMMENTS RECEIVED FROM U.S. PRODUCERS ON THE IMPACT OF IMPORTS OF  
Peltier-effect GATCS ON THEIR GROWTH, INVESTMENT, ABILITY TO RAISE  
CAPITAL, AND EXISTING DEVELOPMENT AND PRODUCTION EFFORTS

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