

UNITED STATES INTERNATIONAL TRADE COMMISSION

FERRICYANIDE AND FERROCYANIDE PIGMENTS
(IRON BLUE PIGMENTS)

Report to the President
on Investigation No. TA-201-11
Under Section 201 of the Trade Act of 1974



USITC Publication 767
Washington, D.C.
April 1976

UNITED STATES INTERNATIONAL TRADE COMMISSION

COMMISSIONERS

Will E. Leonard, Chairman
Daniel Minchew, Vice Chairman
George M. Moore
Catherine Bedell
Joseph O. Parker
Italo H. Ablondi

Kenneth R. Mason, Secretary to the Commission

Address all communications to
United States International Trade Commission
Washington, D. C. 20436

C O N T E N T S

	<u>Page</u>
Report to the President-----	1
Determinations, findings, and recommendations of the Commission-----	3
Views of Commissioners Moore, Bedell, and Parker-----	4
Views of Chairman Leonard and Vice Chairman Minchew-----	9
Views of Commissioner Ablondi-----	25
Information obtained in the investigation:	
Introduction-----	A-1
Description and uses:	
Description-----	A-3
Uses-----	A-4
Manufacturing and technology-----	A-5
U.S. tariff treatment-----	A-6
Domestic producers-----	A-7
The question of increased imports:	
U.S. imports-----	A-9
Ratio of U.S. imports to domestic production-----	A-10
Importers-----	A-11
Importers' shipments-----	A-12
Importers' inventories-----	A-12
Importers' markets-----	A-12
The question of serious injury or the threat of serious injury:	
Former producers-----	A-14
U.S. production-----	A-14
Capacity-----	A-15
U.S. producers' shipments of iron blue pigments-----	A-16
Prices-----	A-17
Price comparison of domestic and imported iron blue pigments-----	A-18
Prices versus costs-----	A-20
U.S. producers' inventories-----	A-20
Exports-----	A-21
Employment-----	A-23
Man-hours-----	A-24
Productivity-----	A-26
U.S. producers' efforts to compete with imports-----	A-27
Profit-and-loss experience of U.S. producers-----	A-28
Overall operations of the establishments in which iron blue pigments are produced-----	A-28
Iron blue pigments operations-----	A-28
Production capacity in Western Europe, the United Kingdom, and Japan-----	A-29

CONTENTS

	<u>Page</u>
Information obtained in the investigation--Continued	
The question of imports as a substantial cause of serious injury:	
Demand factors-----	A-31
Printing ink market-----	A-31
Carbon paper market-----	A-32
Plastics industry-----	A-33
Coatings industry-----	A-34
U.S. consumption-----	A-34
Statements by former producers-----	A-37
Possible competitive products-----	A-38
Effluent treatment-----	A-41
YPS production by major iron blue pigments producers----	A-42
Appendix A. Statistical tables-----	A-44
Appendix B. Figures-----	A-62
Appendix C. Savings in manufacturing cost by American Cyanamid Co., 1970-75-----	A-66
Appendix D. Letter of January 30, 1976, and report from Mr. Minoru Tsutsui, Professor of chemistry, Texas A & M University-----	A-69
Appendix E. Letter of January 28, 1976, and report from Mr. D. McGarrity, Market Development Manager, American Cyanamid Co.-----	A-77

CONTENTS

Appendix Tables

	<u>Page</u>
1. Iron blue pigments: U.S. producers' shipments, including interplant transfers, by types, 1971-75-----	A-45
2. Iron blue pigments: U.S. imports, by types, 1971-75-----	A-46
3. Iron blue pigments: U.S. imports for consumption, by principal sources, 1965-75-----	A-47
4. Iron blue pigments: U.S. importers' shipments, by types, 1971-75-----	A-48
5. Iron blue pigments: U.S. production, 1960-75-----	A-49
6. U.S. producers' capacity to produce iron blue pigments, 1969-76-----	A-50
7. Utilization of U.S. producers' capacity to produce iron blue pigments, 1969-75-----	A-51
8. Iron blue pigments: U.S. producers' shipments, including interplant transfers, 1960-75-----	A-52
9. Indexes of the value of shipments of the U.S. durable and nondurable goods industry, the chemicals and allied products industry, and the iron blue pigments industry, 1971-75-----	A-53
10. Milori iron blue pigments: Net delivered selling prices received by U.S. producers and importers, annual and by quarters, 1971-75-----	A-54
11. Alkali-resistant iron blue pigments: Net delivered selling prices received by 2 U.S. producers and 1 importer, 1971-75-----	A-55
12. Toning iron blue pigments: Net delivered selling prices received by 2 U.S. producers and 1 importer, 1971-75-----	A-56
13. Iron blue pigments: U.S. producers' exports, 1971-75-----	A-57
14. Iron blue pigments: Profit-and-loss experience of 2 U.S. producers on their overall operations in establishments in which iron blue pigments were produced, 1971-75-----	A-58
15. Iron blue pigments: Profit-and-loss experience of 3 U.S. producers on their iron blue pigment operations, 1971-75-----	A-59

CONTENTS

Appendix Tables
(Continued)

	<u>Page</u>
16. Iron blue pigments: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-75-----	A-60
17. U.S. producers' net delivered selling prices of milori iron blue pigments and unit value of U.S. producers' sales of phthalocyanine blue pigments, alpha form, 1968-75-----	A-61

Figures

1. Iron blue pigments manufacture-----	A-63
2. Milori iron blue pigments: Prices of importers and domestic producers, by quarters, 1971-75-----	A-64
3. U.S. producers' net delivered selling prices of milori iron blue pigments and unit value of U.S. producers' sales of phthalocyanine blue pigments, alpha form, 1968-75-----	A-65

Note.--The whole of the Commission's report to the President may not be made public since it contains certain information that would result in the disclosure of the operations of individual concerns. This published report is the same as the report to the President, except that the above-mentioned information has been omitted. Such omissions are indicated by asterisks.

REPORT TO THE PRESIDENT

U.S. International Trade Commission,
April 2, 1976.

To the President:

In accordance with section 201(d)(1) of the Trade Act of 1974 (88 Stat. 1978), the United States International Trade Commission herein reports the results of an investigation made under section 201(b)(1) of that act, relating to certain pigments.

The investigation to which this report relates was undertaken to determine whether--

ferricyanide and ferrocyanide blue pigments, provided
for in item 473.28 of the Tariff Schedules of the
United States,

are being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.

The investigation was instituted on October 30, 1975, upon receipt of a petition filed on October 2, 1975, by American Cyanamid Co.

Notice of the institution of the investigation and hearing to be held in connection therewith was published in the Federal Register of November 6, 1975 (40 F.R. 51691). A public hearing in connection with the investigation was conducted on January 13, 1976, in the Commission's hearing room in Washington, D.C. All interested parties were afforded an opportunity to be present, to produce evidence, and to be heard. A

transcript of the hearing and copies of briefs submitted by interested parties in connection with the investigation are attached. 1/

The information for this report was obtained from fieldwork, from responses to questionnaires sent to the domestic manufacturers, importers, and consumers, and from the Commission's files, other Government agencies, and evidence presented at the hearings and in briefs filed by interested parties.

There were no significant imports of ferricyanide and ferrocyanide blue pigments from countries whose imports are presently subject to the rates of duty set forth in column 2 of the TSUS. The import relief recommended herein, therefore, is not addressed to imports from such countries. The recommended import relief measure could involve the imposition of a rate of duty on imports from countries whose imports are currently subject to the rate of duty in column 1 which is higher than the present rate set forth in column 2. Should such recommended, or any other, rate of duty that could be higher than the column 2 rate be proclaimed by the President, it would be necessary for him to conform column 2 by proclaiming a rate therefor that is the same as that proclaimed for column 1, but not less than the current rate in column 2. Thus, if the recommended import relief were to be proclaimed, the conforming column 2 treatment would be "2.7¢ per lb.+ 18% (or 15%, 12%, 9%, or 6% *ad valorem*, respectively) but not less than 8¢ per lb."

1/ Attached to the original report sent to the President, and available for inspection at the U.S. International Trade Commission, except for material submitted in confidence.

Determination, Findings, and Recommendation
of the Commission

On the basis of its investigation, the Commission determines 1/ that ferricyanide and ferrocyanide blue pigments, provided for in item 473.28 of the Tariff Schedules of the United States, are being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing articles like or directly competitive with the imported articles.

Findings and recommendations

Chairman Leonard, Vice Chairman Minchew 2/ and Commissioners Moore, Bedell, and Parker find and recommend that, in lieu of the existing rates of duty, the imposition of rates of duty, as follows, is necessary to prevent or remedy such injury or the threat thereof:

Ferricyanide and ferrocyanide blue pigments, provided
for in item 473.28 of the TSUS

<u>1st</u> <u>Year</u>	<u>2d</u> <u>Year</u>	<u>3d</u> <u>Year</u>	<u>4th</u> <u>Year</u>	<u>5th</u> <u>Year</u>
2.7¢ per lb. + 18% ad val.	2.7¢ per lb. + 15% ad val.	2.7¢ per lb. + 12% ad val.	2.7¢ per lb. + 9% ad val.	2.7¢ per lb. + 6% ad val.

Commissioner Ablondi, having found in the negative, abstains from making any recommendation of import relief.

1/ Commissioners Moore, Bedell, and Parker determine that increased imports are a substantial cause of the threat of serious injury to the domestic industry; Chairman Leonard and Vice Chairman Minchew determine that increased imports are a substantial cause of serious injury to the domestic industry. Commissioner Ablondi determines that increased imports are not a substantial cause of serious injury, or the threat thereof, to the domestic industry.

2/ Vice Chairman Minchew notes that he has made a recommendation of remedy since the Commission has made an affirmative determination.

Views of Commissioners George M. Moore,
Catherine Bedell, and Joseph O. Parker

We concur with our colleagues who also have made an affirmative determination in this case in that imports of the articles concerned are entering the United States in increased quantities and that the domestic industry under consideration consists of the facilities in the United States devoted to the production of iron blue pigments.

The facts show clearly that the domestic industry is threatened with serious injury, a substantial cause of which is the increased importation of iron blue pigments.

The Trade Act of 1974 cites certain factors which the Commission shall consider with respect to threat of serious injury. These are:

a decline in sales, a higher and growing inventory, and a downward trend in production, profits, wages, or employment (or increasing underemployment) in the domestic industry concerned.

Domestic producers' shipments of iron blue pigments reached an all-time high in 1968. Thereafter shipments declined steadily in the period 1969-1972, but rose slightly in 1973-1974 before declining again in 1975. Even during the high demand years, 1973-1974, domestic shipments did not reach the 1968-1969 levels.

Domestic producers' inventories of iron blue pigments were at abnormally high levels during the period 1971-1973. These inventories decreased in 1974 when both producers and consumers were meeting an increasing share of their requirements from inventories rather than production.

As with domestic shipments, domestic production reached an all-time high of 12.1 million pounds in 1968 and then with the exception of 1971 declined steadily until 1974. The increase in 1974, however, did not raise domestic production to 1968-1969 levels. Domestic production declined to *** million pounds in 1975.

The three firms accounting for over *** percent of domestic production reported their profit and loss experience to the Commission for the period 1971-1975.

* * * * *

Employment of production and related workers decreased from *** in 1971 to *** in 1975. Most of this decline occurred in 1975. Man-hours worked by production and related workers declined steadily between 1971 and 1975, with the exception of 1974 when there was a slight increase. Man-hours worked by these workers totalled *** thousand hours in 1971 and declined to *** thousand hours by 1975.

In addition to considering the factors listed above, the Trade Act of 1974 states that the Commission is to consider all economic factors which it considers relevant. Since 1968, foreign producers have increased their share of domestic consumption. The ratio of imports to domestic consumption increased from approximately

10 percent in 1968 to approximately ***percent in 1975. Producers in Japan, Great Britain and other countries in Western Europe have a combined producing capacity exceeding present capacity in the United States. In the period 1968-1975, an increasing amount of this capacity has been used to supply the U.S. market. The Commission investigation revealed that the foreign producers are capable of supplying an ever increasing quantity of iron blue pigments to the United States. Information was received during the investigation that one foreign producer was modernizing its iron blue pigment facilities in order to increase efficiencies and production.

Substantial cause

The Trade Act of 1974 defines "substantial cause" to be "a cause which is important and not less than any other cause." During the Commission investigation a price comparison was made between the net delivered selling prices of a representative type of imported and domestic iron blue pigments. Over the period 1971-1975, the imported product consistently undersold the domestic product. Prices of imports ranged from 12 to 19 percent below domestic prices.

While both domestic and imported prices increased during this period domestic price increases did not keep pace with costs. Prices for domestically-produced iron blue pigments increased 36 percent between 1972 and 1975. During this period the cost of iron blue pigments produced by American Cyanamid Co. increased *** percent while the cost of iron blue pigments produced by Hercules, Inc. increased *** percent.

The inability of the domestic industry to raise prices to offset increased costs can be shown by comparing the price experience of the iron blue pigment industry with the price experience of other chemical products. Using 1971 as a base year with an index 100, the price index of all chemicals and allied products rose to 175 in 1975. In this same period the price index for iron blue pigments rose only to 140. Since there are no other commercially substitutable pigments competing with iron blue pigments, this inability to raise prices to keep pace with cost increases can be attributed only to the presence of low-priced imports.

The inability to raise prices, in turn, prevented the domestic industry from achieving reasonable levels of profitability. The evidence shows that imports will continue to trend upward. Furthermore, the evidence shows that as the imports increase the domestic industry will be supplying a decreasing percentage of domestic consumption. In addition, the domestic industry will be unable to raise prices to meet its mounting costs and to justify the capital investment necessary to maintain and to increase production efficiencies.

On the basis of these considerations, we find increased imports to be a substantial cause (not less than any other cause) of the serious injury threatening the domestic industry.

Determination

After considering the evidence obtained by the Commission in this investigation, we have determined that iron blue pigments

provided for in item 473.28 of the TSUS are being imported in such increased quantities as to be a substantial cause of the threat of serious injury to the domestic industry producing like or directly competitive articles.

Views of Chairman Leonard and
Vice Chairman Minchew

On October 2, 1975, the United States International Trade Commission received a petition filed by American Cyanamid Co. requesting an investigation under section 201(b)(1) of the Trade Act of 1974 (Trade Act) with respect to imports of certain pigments. On October 30, 1975, the Commission instituted an investigation to determine whether ferricyanide and ferrocyanide blue pigments (hereinafter referred to as iron blue pigments), provided for in item 473.28 of the Tariff Schedules of the United States (TSUS), are being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing articles like or directly competitive with the imported articles.

Section 201(b)(1) of the Trade Act requires that each of the following criteria be met if the Commission is to make an affirmative determination in this investigation and thus find a domestic industry eligible for import relief (which term as used in this statement of views includes import restraints as well as adjustment assistance):

- (1) That imports of the articles concerned are entering the United States in increased quantities;
- (2) That the domestic industry producing articles like or directly competitive with the imported articles concerned is being seriously injured or threatened with serious injury; and
- (3) That increased imports are a substantial cause of the serious injury, or the threat thereof, to the domestic industry producing articles like or directly competitive with the imported articles concerned.

Since these criteria are cumulative, the failure to satisfy any one of them necessitates a negative determination, i.e., that a domestic industry is not eligible for import relief.

Determination

After considering the evidence obtained by the Commission in this investigation, we have determined that iron blue pigments provided for in item 473.28 of the TSUS are being imported in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing like or directly competitive articles. Further, we find the increase in duty set out previously in this report 1/ to be necessary to remedy the serious injury we find to exist.

Domestic industry

In order to identify the relevant "domestic industry" for the purpose of the investigation, it is necessary to determine what facilities of those firms producing iron blue pigments are to be included within the domestic industry. It is also necessary to ascertain whether there are articles other than iron blue pigments which are "like or directly competitive" with the relevant imported articles in order that the facilities devoted to the production of these like or directly competitive articles can be included within the domestic industry or industries.

1/ See p. 3, supra.

Although there are currently only four firms producing iron blue pigments, four other firms ceased production of these pigments during 1970-73. The former producers were also included in the Commission's investigation. One of the firms currently producing iron blue pigments, which accounts for approximately***percent of domestic production, produces these pigments for captive consumption. The remainder of the domestic production of iron blue pigments is accounted for by the other three firms, each of which also produces numerous other chemical products. It is necessary, therefore, to determine which portions of these firms are to be included within the relevant domestic industry.

As noted in the report of the Committee on Ways and Means on the bill that became the Trade Act, the extent to which a portion of a firm's activities can be distinguished and considered separately as a part of the domestic industry is at least partly dependent upon the availability of accounting information for that portion. 1/ During the course of the Commission's investigation, accounting information which permits the Commission to view the portions of the relevant firms devoted to the production of iron blue pigments separately was obtained. There is also a very practical economic basis for separating the operations of these firms devoted to the production of iron blue pigments from their other

1/ Trade Reform Act of 1973: Report of the Committee on Ways and Means. . . , H. Rept. No. 93-571 (93d Cong., 2d sess.) 1973, p. 46.

operations. Generally speaking, the facilities devoted to the production of iron blue pigments are separate and distinct from the facilities devoted to the production of other articles. Most of the equipment used in the production of iron blue pigments cannot ever be practically converted to other uses because of high conversion costs. For the most part, therefore, the facilities devoted to the production of iron blue pigments are dedicated to that use alone.

Since separate accounting information is available for the portion of the relevant firms' total operations devoted to the production of iron blue pigments, and there is a practical economic basis for distinguishing iron blue pigment operations from the total operations, we find that the domestic industry includes only the facilities within the relevant firms devoted to the production of iron blue pigments.

Having identified the portions of the firms producing iron blue pigments which are to be included within the domestic industry, it is also necessary to ascertain if there are articles other than iron blue pigments which are like or directly competitive with the imported articles concerned in order to determine if the facilities devoted to producing such articles should be included within the domestic industry or industries for purposes of this investigation. The Commission's investigation established that phthalocyanine blue pigments can be used for some of the same purposes as iron blue pigments. If phthalocyanine blue pigments are "like or directly competitive" with iron blue pigments, within the meaning of the Trade Act, the facilities

devoted to the production of phthalocyanine blue pigments must be included within the domestic industry or industries.

While the Trade Act does not define the term "like or directly competitive," the report of the Committee on Finance on the bill which became the Trade Act states:

. . . "like" articles are those which are substantially identical in inherent or intrinsic characteristics (i.e., materials from which made, appearance, quality, texture, etc.), and "directly competitive" articles are those which, although not substantially identical in their inherent or intrinsic characteristics, are substantially equivalent for commercial purposes, that is, are adapted to the same uses and are essentially interchangeable therefor. 1/

Phthalocyanine blue pigment is an inorganic pigment, and iron blue pigment is an organic pigment. The two pigments are not, therefore, substantially identical in inherent or intrinsic characteristics (i.e., materials from which made), and cannot be said to be "like".

Further, it cannot be said that phthalocyanine blue pigments and iron blue pigments are directly competitive. The report of the Committee on Finance states that directly competitive articles must be "substantially equivalent for commercial purposes" and then expands upon this phrase by stating that the articles must be adapted to the same uses and essentially interchangeable therefor.

The Commission's investigation revealed that although there is some overlap in the use of phthalocyanine blue pigments and iron blue pigments, there are several uses of the one group which are not uses

1/ Trade Reform of 1974: Report of the Committee on Finance . . . , S. Rept. No. 93-1298 (93d Cong., 2d sess.), 1974, p. 122.

of the other group. Phthalocyanine blue pigments are used in automobile paints and high-quality color printing ink, but iron blue pigments cannot be so used. Iron blue pigments, on the other hand, have qualities which make them better adapted to use in the production of carbon paper.

In addition, the Commission's investigation established that the two articles are not essentially interchangeable. While phthalocyanine blue pigments exhibit up to 2.5 times the color strength of iron blue pigments, the former pigments are approximately five times as expensive as the latter and this differential is widening. Iron blue pigments are used in the production of publication gravure inks and in the production of plastic trash bags, whereas phthalocyanine blue pigments are not because of the cost differential. Generally speaking, the difference in the cost effectiveness between phthalocyanine blue pigments and iron blue pigments prevents them from being essentially interchangeable. Therefore, they are not directly competitive.

Since phthalocyanine blue pigments are not like or directly competitive with iron blue pigments, the domestic facilities devoted to the production of the former are not the domestic industry or within the domestic industry to be examined here for injury. The Commission's investigation did not reveal any other pigments which can be considered as like or directly competitive with iron blue pigments.

On the basis of the factors noted above, we find that the domestic industry in this investigation is composed of the domestic facilities devoted to the production of iron blue pigments.

Increased imports

As set forth above, the first of the criteria which must be met for an affirmative determination is that imports must be entering the United States in increased quantities. Such increases may be either actual or relative. 1/

Important to a determination of whether or not there are increased imports is the time period over which import trends are viewed. While the Trade Act contains no specific limitations, the report of the Committee on Finance states:

The increase in imports referred to would generally be such increases as have occurred since the effectiveness of the most recent trade agreement concessions proclaimed by the President, i.e., as of now, the effectiveness of the Kennedy Round concessions beginning in 1968. 2/

The use of the word "generally" in the above passage and the statute gives the Commission some discretion in selecting the period over which to examine imports; we believe it appropriate in this investigation to examine the period 1968-75. 3/ This period clearly reflects the trend of imports of iron blue pigments.

1/ For the views of Chairman Leonard with regard to the term "increased imports," see Birch Plywood Door Skins: Report to the President on Investigation No. TA-201-1 . . ., USITC Publication 743, 1975, pp. 13-19.

2/ Trade Reform Act of 1974: Report of the Committee on Finance . . . , p. 120.

3/ See the views of Chairman Leonard in Stainless Steel Table Flatware: Report to the President on Investigation No. TA-201-8 . . ., USITC Publication No. 759, 1976, pp. 22-23. See also Views of Vice Chairman Minchew in Stainless Steel and Alloy Tool Steel: Report to the President on Investigation No. TA-201-5 . . ., pp. 38-39.

In 1968, imports of iron blue pigments amounted to approximately 1.2 million pounds. Thereafter, imports increased steadily through 1973, when they totaled approximately 5.2 million pounds. There was a slight decline in 1974 to approximately 5.1 million pounds, and imports declined sharply in 1975 to approximately 2.9 million pounds. In spite of the substantial decline in 1975, imports of iron blue pigments were 142 percent higher than in 1968.

Although imports declined in both 1974 and 1975, they were still well above the 1968 level. There is an absolute increase in imports. It is unnecessary, therefore, to consider whether there is a relative increase in imports; in the terms of the statute, the first criterion is met--there are increased imports.

Serious injury 1/

The term "serious injury" is not defined in the Trade Act. Section 201(b)(2) of the Trade Act does, however, set forth guidelines to be considered by the Commission in making its determination as to serious injury. This section states:

In making its determinations under paragraph (1), the Commission shall take into account all economic factors which it considers relevant, including (but not limited to)--

1/ For the views of Chairman Leonard on the meaning of the term "serious injury", see Bolts, Nuts, and Screws of Iron or Steel: Report to the President on Investigation No. TA-201-2 . . ., USITC Publication 747, 1975, pp. 9-12.

(A) with respect to serious injury, the significant idling of productive facilities in the industry, the inability of a significant number of firms to operate at a reasonable level of profit, and significant unemployment or underemployment within the industry. . . .

Idling of productive facilities.--During the period 1969-74 the capacity of domestic producers to manufacture iron blue pigments decreased from *** million pounds to *** million pounds, declining further to *** million pounds in 1975. A large part of this decline in productive capacity is accounted for by the four firms which ceased producing iron blue pigments during this period. As noted in our discussion of the domestic industry, the facilities devoted to the production of iron blue pigments cannot, generally speaking, be economically converted to other uses.

Even the decreasing capacity which existed during this period was not fully utilized. In 1969-75 utilization of capacity decreased irregularly to *** percent. These factors indicate that there has been a significant idling of productive facilities.

Profitability.--Throughout the period 1971-75, two companies, American Cyanamid Co. and Hercules, Inc., accounted for the bulk of domestic production of iron blue pigments. As a result of the four firms' ceasing production during that period, American Cyanamid Co. and Hercules, Inc., accounted for an increasingly larger share of domestic production. Between them, the two companies now account for over ***percent of domestic production,

* * * * *

Therefore, when either of these firms suffered losses in a given year on its iron blue pigment operations, a large segment of the domestic industry operated unprofitably for that year.

* * * * *

For the three firms (including Harshaw Chemical Co.) reporting to the Commission, which accounted for over *** percent of domestic production, there were combined net operating

* * * The ratio of combined net operating profit or loss to net sales for these three firms fluctuated between a ratio of net operating * * * percent in 1975 and a ratio of net operating * * * percent in 1974. In a highly capital intensive industry, these facts demonstrate that a significant portion of the domestic industry was unable to operate profitably during most of the period 1971-75.

Employment.--The average number of production and related workers employed in the production of iron blue pigments decreased from *** in 1971 to *** in 1975. Most of this decrease occurred in 1975. Man-hours worked by production and related workers in the production of iron blue pigments decreased from *** in 1971 to *** in 1975, with the greatest decrease occurring in 1975.

Prices.--As a part of the Commission's investigation, data were gathered on the net delivered selling price of iron blue pigments during 1971-75.

Milori blue pigments account for over 90 percent of the production of iron blue pigments and can, therefore, be considered as representative of the domestic price of iron blue pigments. The data reveal that domestic prices increased from 64 cents per pound in 1971 to 90 cents per pound in 1975. This price increase did not keep pace with the price increases for all chemical and allied products or all industrial commodities. Using 1971 as a base year, the price index of iron blue pigments increased to 140.6. During the same period the price index for all chemical and allied products and for all industrial commodities rose to 175 and 150, respectively.

On the basis of the factors set forth above, we find the second criterion above, that the domestic industry is seriously injured, is satisfied.

Substantial cause 1/

Pursuant to section 201(b)(4) of the Trade Act, substantial cause is defined as "a cause which is important and not less than any other cause." Therefore, the third criterion set forth above is satisfied if increased imports are an important cause and not less than any other cause of the requisite serious injury.

1/ For the views of Chairman Leonard and Vice Chairman Minchew on the meaning of "substantial cause," see Wrapper Tobacco: Report to the President on Investigation No. TA-201-3. . . , USITC Publication 746, 1975, pp. 4-7, and also Stainless Steel and Alloy Tool Steel: Report to the President on Investigation No. TA-201-5. . . , USITC Publication 756, 1976, pp. 25-26 and pp. 45-46.

During the course of the Commission's investigation, a comparison was made of the net delivered selling price of domestically produced and imported milori iron blue pigments during 1971-75.

The imported iron blue pigments consistently undersold the domestic product throughout the period under examination. The ratio of importers' prices to U.S. producers' prices ranged between 81 percent and 88 percent. There is no evidence that this price differential can be attributed to qualitative differences in the products.

The net delivered selling prices for domestically produced milori iron blue pigments increased from 66 cents per pound in 1972 to 90 cents per pound in 1975, or by approximately 35 percent. During the same period, however, the cost of iron blue pigments produced by American Cyanamid Co. and Hercules, Inc., increased by *** percent, respectively. As previously noted, the price index for milori iron blue pigments did not keep pace with either the price index for chemicals and allied products or the price index for all industrial commodities. Remembering that, for most uses, there are no other pigments which are commercially substitutable for iron blue pigments, the so-called suppressed state of domestic iron blue pigment prices cannot be due to competition from other pigments, but must be traced to the surge of lower priced imports in this market.

In 1969 the ratio of imports to domestic consumption of iron blue pigments was 12 percent. This ratio increased steadily through 1973, when it reached 34 percent. In the 2 succeeding years this ratio declined

slightly, but remained at *** percent even in 1975, when the demand for iron blue pigments declined significantly.

The impact of imports is clearly revealed by an examination of the experience of the domestic industry during the years of greatest import penetration. In 1972, imports of iron blue pigments rose by approximately 60 percent over the 1971 level, the largest percentage and absolute increase during the period 1968-75. The highest ratio of average inventories to shipments occurred in 1972, * * *

In 1973, imports increased by approximately 20 percent over the 1972 level. The increase in this year was the second largest in absolute terms in the period 1968-75. The second highest ratio of average inventories to shipments occurred in 1973, * * *

There is no doubt that the recession of 1975 contributed significantly to the serious injury suffered by the domestic industry in 1975. However, our determination is not based on the experience of the domestic industry in that year alone. As set forth in the discussion above, the domestic industry experienced losses, idle productive facilities, decreasing employment and man-hours worked, and an inability to raise prices commensurate with cost increases throughout the period under examination. The recession of 1975 merely added to the serious injury already present due to imports.

The Commission's investigation also revealed that while the domestic industry did incur costs for environmental and occupational,

health, and safety equipment, the bulk of these costs were limited to a single year.

Increased imports are an important cause of the serious injury suffered by the domestic industry, and no other cause of this injury is more important than increased imports. Therefore, the third criterion discussed above, that increased imports are a substantial cause of the serious injury suffered by the domestic industry, is met.

Conclusion as to eligibility for import relief

Having determined that the three criteria set forth above have been satisfied, we make an affirmative determination with respect to eligibility of the subject industry for import relief.

Finding with respect to import relief

Section 201(d)(1) of the Trade Act provides, in part, that if the Commission finds with respect to any article, as a result of its investigation, the serious injury or threat thereof described in section 201(d)(1), it shall--

(A) find the amount of the increase in, or imposition of, any duty or import restriction on such article which is necessary to prevent or remedy such injury, or

(B) if it determines that adjustment assistance under chapters 2, 3, and 4 can effectively remedy such injury, recommend the provision of such assistance. . . .

In view of our determination of serious injury and of the eligibility of the domestic iron blue pigments industry for relief, we find that the increased tariffs set out previously in this report 1/ are

1/ See p. 3, supra.

required in order to remedy the serious injury.

The Commission has determined that the relief which would most effectively remedy the domestic industry's serious injury is a tariff of 2.7 cents per pound plus 18 percent ad valorem in the first year, with decreases of 3 percentage points during each of the next 4 years. In arriving at the above duty, the duties which theoretically would have been necessary to equalize delivered prices of imported and domestically produced iron blue pigments in the recent past years were calculated.

The following results emerged:

1971 - -	-2.7¢/lb. + 31% ad. val.
1972 - -	-2.7¢/lb. + 29% ad. val.
1973 - -	-2.7¢/lb. + 24% ad. val.
1974 - -	-2.7¢/lb. + 27% ad. val.
1975 - -	-2.7¢/lb. + 18% ad. val.

A duty of 2.7 cents per pound plus 18% ad valorem for 1976 is simply an extension of the theoretical duty for 1975 which would have been necessary to equalize domestic and imported prices. The Commission decided to decrease this duty by 3 percentage points each year for the years 1977-80 because: (1) as unit values of imports increase, which is the case for the past several years, smaller tariffs are necessary to be applied to such values in order to equalize price differentials between domestic and imported iron blue pigments; 1/ and (2) in this manner the duties are

1/ This reasoning is valid at least when the rate of increase in the average unit value of imports is greater than the rate of increase in domestic prices. In the recent past this has indeed been the case. Projected differences in inflation rates between the United States and supplying countries are likely to result in a continuation of this trend in the near future.

phased downward over the 1977-80 period in order to avoid a precipitous decline in the duty (which might otherwise occur) in the final year and in order to encourage adjustment to the import competition by not "cushioning" the industry too much from such competition.

The Commission is of the opinion that the relief specified above would afford domestic producers the option of raising prices in order to cope with the large cost increases which have recently occurred in the iron blue pigments industry. Moreover, this tariff would enable domestic producers to take various measures during the next few years which would enable them to be competitive in the marketplace when the tariff reverts to 2.7 cents per pound in 1981. Producers would most likely modernize facilities, and would increase their production capacity in order to supply the increasing share of the market which they are expected to capture. Indeed, there is evidence that the domestic industry could substantially increase capacity by the installation of new equipment in a relatively short time period but has not done so because the capacity would have gone unused in the face of the stiff import competition. In summary, the tariff recommended by the Commission would enable domestic producers to expand capacity, modernize facilities, capture a greater segment of the market, and achieve the economies of scale necessary to become a viable competitor within 5 years.

Views of Commissioner Italo H. Ablondi

On October 2, 1975, the United States International Trade Commission received a petition filed by the American Cyanamid Co. of Wayne, N.J., requesting an investigation under section 201 of the Trade Act of 1974. On October 30, 1975, the Commission instituted an investigation to determine whether ferricyanide and ferrocyanide blue pigments (iron blue pigments), provided for in item 473.28 of the Tariff Schedules of the United States (TSUS), are being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.

Section 201(b)(1) of the Trade Act requires that each of the following conditions be met before the Commission can recommend import relief to the President:

- (1) Imports of an article into the United States are increasing (either actually or relative to domestic production);
- (2) The domestic industry producing an article like or directly competitive with the imported article is being seriously injured or threatened with serious injury; and
- (3) Increased imports are a substantial cause (i.e., an important cause and not less than any other cause) of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article.

Since the criteria for an affirmative finding are cumulative, failure to satisfy any one of the criteria must necessarily result in a negative determination.

Determination

On the basis of all the information obtained by the Commission during this investigation, I have concluded that iron blue pigments are not being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article. Specifically, I find that the second criterion, that of serious injury or the threat thereof, has not been met.

Domestic industry

Section 201(b)(3) of the Trade Act of 1974 specifies that in determining the domestic industry producing an article like or directly competitive with an imported article, the Commission--

(b) may, in the case of a domestic producer which produces more than one article, treat as part of such domestic industry only that portion of subdivision of the producer which produces the like or directly competitive article

Accordingly, in this case the domestic industry consists, in my opinion, of only those facilities which are directly involved in the production of iron blue pigments. Such facilities are utilized solely for the purpose of producing iron blue pigments, and could not possibly be used

to produce any other product without substantial modification. For example, production vats and filter presses of American Cyanamid, one of the largest producers, can only be utilized for the production of iron blue pigments. Production vats of Hercules, Inc., the other major domestic producer, could conceivably be used in the production of other pigments, but only after considerable cleaning and/or alteration. Facilities of Borden, Inc., which produces small quantities of iron blue pigments for captive use, could only be converted to other uses after considerable expenditures. Facilities of Harshaw Chemical Co., which produces only one grade of iron blue pigments in small quantities, are similar to those of American Cyanamid in that they cannot be utilized or modified in order to produce another product.

In so determining the domestic industry, various problems are raised as to the procedures used by the large, multiproduct companies to apportion costs. Sales of iron blue pigments account for only one-tenth of 1 percent of the four firms' total sales. In view of the fact that iron blue pigments constitute such a minute fraction of total production, it becomes incumbent upon the domestic producers to establish costs with greater specificity.

Serious injury

The Trade Act of 1974 does not specifically define the term "serious injury." Instead, the Commission is directed to take into account, as indicia of serious injury, "all economic factors which it considers relevant," including certain factors set out in the act.

Upon consideration of all such data I have concluded that the requisite degree of injury has not been established.

Data submitted to the Commission revealed that during the height of import penetration (1972-74), gross profits in the industry nearly doubled, increasing from * * * in 1972 to * * * million in 1974. Although the industry did experience some net losses, such losses were admittedly attributable to various large capital expenditures and, significantly, to overwhelming and as yet unexplained administrative costs. For instance, the domestic producers alleged that in 1975 the cost per pound of goods sold increased by nearly * * * percent. Such large and sudden increases are of a degree which is inconsistent with previously experienced cost increases in this industry, and calls into question the methodology used by the companies to apportion costs.

The competitive advantage for the two large multinational corporations which account for nearly all of domestic production has been greatly enhanced in recent years. After four marginal domestic producers of iron blue pigments discontinued production between 1970 and 1973, the remaining two large multinational firms benefited, actually increasing their shipments in every year from 1971 to 1974. Economies of scale realized by these producers, as well as their vertical integration with respect to their production of the major raw material (yellow prussiate of soda), should contribute immensely to their present ability to compete effectively in this industry. Moreover, demand for iron blue pigments has consistently trended upward.

All these factors make it difficult to discern any basis upon which a finding of serious injury could be made.

Data reveal that employment in the domestic industry * * * remained virtually constant during the height of import penetration. Significantly, the only large decrease in employment was experienced in 1975, a year in which imports declined by approximately 40 percent from the 1974 level.

Domestic consumption of iron blue pigments exceeded domestic capacity to produce in 1973 and 1974 by * * * million pounds and * * * million pounds, respectively. Imports during those 2 years were necessary to bridge the gap between consumption and capacity to produce. Capacity utilization in the domestic industry increased approximately * * * percent between 1970 and 1974.

With respect to threat of serious injury to the domestic industry, the present upturn in the U.S. economy, coupled with the fact that nearly all economic indicators point to a continuation of the upturn, suggests that the market for iron blue pigments will continue the upward trend experienced between 1969 and 1974.

In view of the foregoing information, there is no basis upon which to conclude that the subject industry is suffering, or is threatened with, serious injury.

INFORMATION OBTAINED IN THE INVESTIGATION

Introduction

Following receipt on October 2, 1975, of a petition filed by the American Cyanamid Co. of Wayne, N.J., the United States International Trade Commission, on October 30, 1975, instituted an investigation under section 201 of the Trade Act of 1974 to determine whether ferricyanide and ferrocyanide blues (hereinafter referred to as iron blue pigments), provided for in item 473.28 of the Tariff Schedules of the United States (TSUS), are being imported into the United States in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing an article like or directly competitive with the imported article. Notice of the Commission's investigation and hearing was published in the Federal Register on November 6, 1975 (40 F.R. 51691).

A public hearing was held on January 13, 1976, in the Commission's hearing room in Washington, D.C. Importers as well as current and former U.S. producers of iron blue pigments testified at the hearing.

The petitioner alleges that an increase in imports of iron blue pigments into the United States is a substantial cause of serious injury, and the threat of further injury, to the domestic industry producing such pigments. The petitioner also alleges that domestic output and employment are declining.

The petitioner believes that one or both of the following actions would remedy the alleged injury:

1. Proclaiming a tariff rate and quota on iron blue pigments by increasing the duty to 15 percent of the American selling price after the importation of 2 million pounds of iron blue pigments. The proposed tariff-rate quota would be in effect for 5 years.
2. Limiting imports to 3 million pounds in any year for a 5-year period.

The Commission has not conducted any previous investigations concerning iron blue pigments.

The information contained in this report was obtained from importers, consumers, and domestic and foreign producers of iron blue pigments; from trade associations; from the U.S. Customs Service, the U.S. Department of Commerce, and the U.S. Environmental Protection Agency; and from the Commission's files.

Description and Uses

Description

Ferricyanide and ferrocyanide blues (iron blue pigments) are forms of ferric ammonium ferrocyanide, which is a blue, inorganic chemical. The pigments are fine powders which are principally used to impart color to inks, carbon papers, plastics, and paints.

The different end-use applications require different product grades, which vary in particle size, shade, texture, oil absorption, and other characteristics. Each of the different product grades may be produced with the same equipment and labor force, and may be marketed in a similar manner.

The common pigment grade names (milori, toning, alkali-resistant, chinese, green tone, and red tone) are satisfactory for marketing purposes but are not sufficiently precise to describe pigments with specific chemical and physical characteristics. Within each general pigment grade are many different products identified by product numbers, which vary slightly in characteristics and end-use applications.

All of the pigments imported into the United States in significant quantities are also produced by domestic firms. According to the printing ink and carbon paper manufacturers surveyed by the Commission, the domestic and imported iron blue pigments are interchangeable and comparable in quality. Domestic manufacturers produce additional grades which are not imported.

In 1975, the milori pigment grades accounted for about 91 percent of U.S. producers' shipments and about * * * percent of imports. Alkali-resistant and toning pigment grades accounted for about * * * percent of all imports and about * * * percent of U.S. producers' shipments (tables 1 and 2 in the appendix). In this report all product grades of iron blue pigments will be treated together as the product "iron blue pigment".

Uses

The principal use of iron blue pigments is in the production of publication gravure and flexographic inks. Gravure inks are used in advertising supplements, merchandising catalogs, and magazines for which high color quality is not essential. Flexographic inks are used to print flexible product packages such as cellophane grocery wrapping, bread wrappers, and some cardboard packages. Other uses of iron blue pigments are in the production of one-time-use blue carbon paper, plastic trash bags (green plastic bags derive their color from a mixture of iron blue and chrome yellow pigments), and paints. Although iron blue pigments continue to be used in certain paints, the importance of this market declined sharply during the 1950's and early 1960's when phthalocyanine blue pigments largely displaced iron blue pigments in the production of paint for automobiles.

Manufacturing and Technology

Iron blue pigments are produced by a reaction of ferrous sulfate (copperas) and sodium ferrocyanide (yellow prussiate of soda) in the presence of ammonium sulfate (fig. 1). The resulting precipitate (powder) is dissolved in sulfuric acid and oxidized with sodium bichromate or sodium chlorate, yielding the iron blue precipitate. The pigment is washed, filtered, dried, ground, and bagged.

All iron blue pigment production in the United States is by a "batch process", wherein the chemical reactions and subsequent washing processes are completed in large striking tanks. American Cyanamid, the petitioner, uses a continuous filtering system. The other domestic producers use conventional filter-presses, which are somewhat less efficient. The drying operation takes place in ovens, which may also be used to dry other pigments.

The different grades of pigment, such as alkali-resistant, toning, and milori blues, are obtained by varying the amount of ammonium sulfate, the amount of heat, the rate of agitation, and the duration of the oxidation process. After the pigment is produced, additional treatment with cationic (positive), anionic (negative), or nonionic surface-active agents may drastically alter the physical characteristics of the pigment particles. The various pigment grades may be produced with the same equipment and by the same workers, and shipped through the same distribution channels.

U.S. Tariff Treatment

The current rate of duty on iron blue pigments is 2.7 cents per pound, effective January 1, 1969. The rate under the Tariff Act of 1930 was 8 cents per pound. As a result of the Kennedy Round staged rate reductions, the duty on iron blue pigments was to be reduced from 3.4 cents per pound in 1967 to 1.7 cents per pound in 1972. However, in accordance with general note 3(f) to schedule XX, the latest duty reduction became effective on January 1, 1969, and the 1969 duty rate is the current rate on this product. 1/

In 1975 the ad valorem equivalent of the duty was 4.4 percent on total imports, on imports from Japan, 5.1 percent, and 4.0 percent on imports from the United Kingdom.

1/ Lower rates of duty for ferricyanide and ferrocyanide blue pigments were to become effective in 1970, 1971, and 1972 unless the European Community and the United Kingdom did not proceed with certain reductions provided for in their respective schedules annexed to the 1967 Geneva Protocol to the GATT. These two participants did not so proceed, and the President so proclaimed (Presidential Proclamation 3950, Dec. 24, 1969, 34 F.R. 20299, effective date Jan. 1, 1970), with the result that the rate of duty effective in 1969 will continue in effect unless or until the President proclaims that the participants have agreed to proceed.

Imports of iron blue pigments from all beneficiary developing countries are eligible for duty-free treatment for the purposes of the Generalized System of Preferences pursuant to sec. 503 of the Trade Act of 1974. In 1975, there were no imports of iron blue pigments from any beneficiary developing countries.

Domestic Producers

There are four domestic producers of iron blue pigments. These companies produce a wide variety of products, including other pigments and chemicals. Total sales of all products and shipments of iron blue pigments for these companies in 1975 are shown below.

Total sales of all products and shipments of iron blue pigments
by four U.S. producers, 1975

(In millions of dollars)

Company	Total sales	Shipments of iron blue pigments
American Cyanamid Co -----	1,930	* * *
Borden, Inc -----	3,367	* * *
Harshaw Chemical-----	* * *	* * *
Hercules, Inc -----	1,413	* * *

Source: Compiled from U.S. producers' responses to questionnaires
of the U.S. International Trade Commission.

American Cyanamid and Hercules produce a wide assortment of iron blue pigment grades; they accounted for about * * * percent of U.S. production in 1975, compared with * * * percent in 1970. Borden produces iron blue pigments for captive consumption in its printing ink division; Harshaw produces only one grade of the pigment. As indicated in the table above, iron blue pigments constitute a very small portion of the domestic producers' sales of all products. Domestic producers are located in West Virginia, Ohio, New York, and Kentucky.

Borden and Harshaw import iron blue pigments. Borden consumes the imported pigments captively in its printing ink division.

Harshaw imports iron blue pigments for resale in the United States.

The major markets for domestically produced iron blue pigments in 1975 were printing ink producers (44 percent), carbon paper producers (23 percent), coatings producers (11 percent), plastics producers (11 percent), and all other uses (11 percent). Shifts in the major markets between 1972 and 1975 are shown in the following table.

Iron blue pigments: Percentage distribution of U.S. producers' shipments, 1/ by end-use markets, 1972 and 1975

End-use market	:	1972	:	1975
Printing ink-----	:	38.5	:	43.9
Carbon paper-----	:	24.5	:	23.3
Coatings-----	:	18.9	:	10.9
Plastics-----	:	5.1	:	11.0
Other <u>2/</u> -----	:	13.0	:	10.9
Total-----	:	100.0	:	100.0

1/ Owing to incomplete data, shipments by Borden, Inc., and Harshaw Chemical Co. are not included. These companies accounted for * * * percent (in terms of quantity) of shipments of U.S.-produced iron blue pigments in 1975.

2/ Includes shipments to wholesalers, jobbers, Federal, state, and local governments, and intracompany transfers.

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

The Question of Increased Imports

U.S. imports

U.S. imports of iron blue pigments increased from 1.2 million pounds in 1968 to 2.9 million pounds in 1975, or by 142 percent. Imports increased every year from 1968 to 1973, but decreased in both 1974 and 1975. The quantity of iron blue pigments imported decreased 2.2 million pounds between 1974 and 1975, or by 44 percent, as shown in the following tabulation:

<u>1,000 pounds</u>	:	<u>1,000 pounds</u>
1968-----	1,157	1972----- 4,322
1969-----	1,566	1973----- 5,260
1970-----	2,102	1974----- 5,133
1971-----	2,681	1975----- 2,916

Source: Compiled from official statistics of the U.S. Department of Commerce.

The principal sources of U.S. imports of iron blue pigments during the 1968-75 period were the United Kingdom, Japan, and West Germany (table 3). The United Kingdom had traditionally been the principal supplier until 1971. Japan was the principal supplier in 1971-75, except for 1974, when the United Kingdom again emerged as the principal supplier. Countries other than the United Kingdom, Japan, and West Germany supplied an annual average of about 300,000 pounds to the U.S. market during the 1968-75 period; the principal countries supplying such imports were Poland, Belgium, and the Netherlands.

The fact that the dollar was devalued 28 percent relative to the yen and 31 percent relative to the Deutsche mark between 1971 and 1973 might have had some effect on the quantity of imports of iron blue pigments from Japan (which has declined every year since 1972) and that from West Germany (which has declined since 1973).

Ratio of U.S. imports to domestic production

The ratio of U.S. imports to domestic production of iron blue pigments increased annually from 9.6 percent in 1968 to 52.2 percent in 1973, but decreased to 49.1 percent in 1974 and * * * percent in 1975.

Iron blue pigments: U.S. production and imports for
consumption, 1968-75

Year	Production	Imports	Ratio of imports to production
	<u>1,000 pounds</u>	<u>1,000 pounds</u>	<u>Percent</u>
1968-----	12,102	1,157	9.6
1969-----	11,674	1,566	13.4
1970-----	10,416	2,102	20.2
1971-----	10,774	2,681	24.9
1972-----	10,372	4,322	41.7
1973-----	10,074	5,260	52.2
1974-----	10,460	5,133	49.1
1975-----	<u>1/</u> * * *	2,916	* * *

1/ Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Importers

Fifteen firms are known to have imported iron blue pigments into the United States during the 1971-75 period. Most of these firms are small importers which either arrange for delivery directly to a customer, or place the iron blue pigments in a warehouse for future sale.

Most of the iron blue pigments imported from Japan in recent years have been entered by large importer-distributors such as Mitsui & Co. (U.S.A.) and Sumitomo Shoji America, Inc., both wholly owned subsidiaries of Japanese firms. Dainichiseika Color & Chemical Co., presently the only major producer of iron blue pigments in Japan, has an office in New York City which imports iron blue pigments. In addition, six U.S.-owned firms have imported iron blue pigments from Japan in recent years.

Imports of iron blue pigments from the United Kingdom have been entered primarily by the Filo Color & Chemical Co., located in New York City. Imports of iron blue pigments from West Germany have been entered primarily by Degussa, Inc., an importer-distributor which is a wholly owned subsidiary of Degussa, a producer of iron blue pigments in West Germany.

Iron blue pigments are also imported by the Harshaw Chemical Co., which presently produces only one grade of iron blue pigment in small quantities; it formerly produced many grades of iron blue pigments in significant quantities.

Importers' shipments

Importers' shipments of iron blue pigments increased from 2.8 million pounds in 1972 to 4.2 million pounds in 1974, but decreased to 3.3 million pounds in 1975 (table 4). Importers' shipments increased 17 percent between 1972 and 1975, even though imports in 1975 were 33 percent lower than in 1972. The reason for this occurrence is that importers reduced their inventories by over 600,000 pounds in 1975.

Importers' inventories

Importers' inventories of imported iron blue pigments on December 31 increased from approximately 305,000 pounds in 1971 ^{1/} to 437,000 pounds in 1972, to 904,000 pounds in 1973, and to 1.1 million pounds in 1974, but then decreased to 401,000 pounds in 1975.

Importers' markets

The major markets for imported iron blue pigments in 1975 were printing-ink producers (57.5 percent), carbon paper producers (14.5 percent), plastics producers (3.5 percent), and coatings producers (2.8 percent). About 22 percent of imported iron blue pigments were shipped to other customers in 1975, but nearly all of these shipments are believed ultimately to have been used for the production of printing ink and carbon paper. Shifts in the major end-use markets between 1972 and 1975 are shown in the following table.

^{1/} Excluding inventory data from two major U.S. importers of iron blue pigments.

Iron blue pigments: Percentage distribution of importers' shipments, by end-use markets, 1972 and 1975

End-use market	: 1972	: 1975
Printing ink-----	65.1	57.5
Carbon paper-----	18.9	14.5
Plastics-----	-	3.5
Coatings-----	1.1	2.8
Other ^{1/} -----	14.9	21.7
Total-----	100.0	100.0

^{1/} Includes shipments to wholesalers, jobbers, other importers, the Federal Government, and others.

Source: Compiled from importers' responses to questionnaires of the U.S. International Trade Commission.

When the above table is compared with the table showing percentage distribution of U.S. producers' shipments (seep. A-8), it is apparent that a greater proportion of the imported iron blue pigments is used in printing-ink production, and far smaller proportions are used in plastics and coatings.

Nearly one-third of the shipments to ink producers in 1972 and about one-tenth of such shipments in 1975 consisted of shipments to U.S. producers or former producers of iron blue pigments. These companies either use the pigments in the manufacture of ink or process and resell them mainly to printing ink producers.

The Question of Serious Injury or the Threat of Serious Injury

Former producers

Four companies discontinued production of iron blue pigments during the 1968-75 period. In 1970, three of these companies accounted for about * * * percent of total U.S. production. 1/

The companies which discontinued production are listed below:

<u>Company and State</u>	<u>Year</u>
Chemetron Corp., Michigan-----	1973
Hilton-Davis Chemical Co., Ohio-----	* * *
H. Kohnstamm & Co., Inc., New Jersey-----	1970
Reichhold Chemical Co., New York-----	* * *

These companies have continued manufacturing other pigments and chemicals since terminating production of iron blue pigments.

* * * * *

U.S. production

U.S. production of iron blue pigments decreased from a peak of 12.1 million pounds in 1968 to 10.4 million pounds in 1970. Production rose to 10.8 million pounds in 1971, and then decreased to 10.1 million pounds in 1973. Owing to high demand for iron blue pigments in 1974, production increased to 10.5 million pounds, but the business slowdown of late 1974 and 1975 caused domestic producers to cut back production, and it decreased to * * * million pounds in 1975, or by * * * percent.

1/ Data from Reichhold Chemical Co. are not available. Reichhold Chemical Co. discontinued production in * * * .

Prior to 1965, annual U.S. production of iron blue pigments averaged about 9.8 million pounds. Table 5 shows annual U.S. production of iron blue pigments for the years 1960-75.

The following table compares the production of iron blue pigments with production of chemicals and all manufactured products during the period 1969-75.

Indexes of the quantity of U.S. production of iron blue pigments, chemicals, and all manufactured products, 1969-75

1969=100				
Year	Iron blue pigments	Chemical products	All manu- factured products	
1969-----	100.0	100.0	100.0	
1970-----	89.2	99.8	95.2	
1971-----	92.3	105.0	95.2	
1972-----	88.8	115.9	103.2	
1973-----	86.3	124.8	113.3	
1974-----	89.6	128.2	112.6	
1975-----	<u>1/</u> * * *	<u>2/</u> 117.4	<u>2/</u> 100.6	

1/ Based on full-year data compiled from responses to questionnaires of the U.S. International Trade Commission.

2/ Data are for January-November 1975, annualized.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Capacity

U.S. producers' annual capacity 1/ to produce iron blue pigments decreased from * * * million to * * * million pounds during 1969-75, as shown in table 6. Four companies have discontinued production, and

1/ Data do not include capacity of Reichhold Chemical Co., which discontinued iron blue pigment production in * * * .

one producer has reduced available capacity by about * * * pounds. The two largest producers increased capacity by a total of * * * pounds during the period, and accounted for about * * * percent of total U.S. capacity in 1975. Utilization, based on theoretical capacity to produce iron blue pigments, fluctuated without any apparent trend during the 1969-75 period, as shown in table 7.

Representatives of the two largest producers stated that they would consider further capacity increases if the profitability of their iron blue pigment operations increased. A representative of a major producer stated that his company's annual capacity could be increased by * * * * * One former producer indicated an interest in resuming iron blue pigment production if the profit situation improved.

U.S. producers' shipments of iron blue pigments

U.S. shipments (including interplant transfers) of iron blue pigments decreased 17 percent between 1968 and 1972, from 11.3 million pounds to 9.4 million pounds (table 8). Shipments increased 15 percent to 10.8 million pounds in 1974, and then dropped sharply, by * * * percent, to * * * million pounds in 1975. Producers' shipments slightly exceeded U.S. production in 1975 owing to inventory decreases in that year.

The value of shipments changed very little during 1968-72, averaging \$6.2 million. The value of shipments increased by 43 percent between 1972 and 1974, from \$6.1 million to \$8.8 million. Shipments

in 1975 amounted to * * * million, or * * * percent less than in 1974. The unit value of shipments increased 59 percent during 1968-75, from \$0.56 per pound to \$0.89 per pound.

Milori iron blue pigments accounted for about 86 percent of both quantity and value of producers' shipments from 1971 to 1975 (table 1).

In terms of constant 1971 dollars, producers' shipments of iron blue pigments increased at a slower rate than shipments of both the durable and nondurable goods industry and the chemicals and allied products industry from 1971 and 1974 (table 9). In 1975 shipments in the iron blue pigments industry were * * * percent of the 1971 level, shipments in the durable and nondurable goods industry were 87 percent of the 1971 level, and shipments in the chemicals industry were 86 percent of the 1971 level.

Prices

Price data for this investigation were collected on (a) the net delivered selling price at which the greatest volume of iron blue pigments was sold, and (b) the quantity sold at that price. Prices charged by a given U.S. producer or importer might vary slightly depending on the size of the shipment, the type of iron blue pigment, and various pricing practices employed by the producer or importer.

Since milori iron blue pigments account for the great bulk of both domestically produced and imported iron blue pigments, all prices quoted in the following discussion are prices of milori iron

blue pigments, unless otherwise specified. Table 10 and figure 2 compare U.S. producers' and importers' prices for milori iron blue pigments during the 1971-75 period.

Prices for domestically produced iron blue pigments increased from 64 cents per pound in 1971 to 90 cents per pound in 1975. This increase was less than the wholesale price increases for chemicals and allied products and all industrial commodities during the same period. Price indexes for these groups of commodities are shown in the following table.

Price indexes for milori iron blue pigments, chemicals and allied products, and industrial commodities, 1971-75

(1971=100)				
Year	: Milori iron	: Chemicals and	: Industrial	
	: blue pigments	: allied products	: commodities	
1971-----	: 100.0	: 100.0	: 100.0	
1972-----	: 103.1	: 100.0	: 103.4	
1973-----	: 107.8	: 105.6	: 110.5	
1974-----	: 129.7	: 140.8	: 135.0	
1975-----	: 140.6	: 175.0	: 150.1	

Source: U.S. Department of Commerce, Survey of Current Business, except data on milori iron blue pigments, which were compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Price comparison of domestic and imported iron blue pigments.--

Price data obtained by the Commission indicate that imported iron blue pigments are priced below domestically produced iron blue pigments (table 10). The average annual price for imported iron blue pigments was 52 cents per pound, compared with 64 cents per pound for domestically

produced iron blue pigments, in 1971 and 79 cents per pound, compared with 90 cents per pound for domestically produced iron blue pigments, in 1975. Between 1971 and 1975, the average annual prices for imported iron blue pigments were consistently from 10 to 14 cents per pound below the average annual prices for domestically produced iron blue pigments. Price ranges of imported iron blue pigments also tend to be lower than price ranges of domestically produced iron blue pigments, although there is some overlap.

Imported alkali-resistant and toning iron blue pigments are also priced below their domestic counterparts. The price for imported alkali-resistant iron blue pigments in 1975 was * * * per pound, compared with * * * per pound for domestically produced alkali-resistant iron blue pigments (table 11). The price for imported toning iron blue pigments was * * * per pound in 1975, compared with * * * per pound for domestically produced toning iron blue pigments (table 12).

The fact that imports have consistently been priced below the domestic product, coupled with the fact that domestic prices have increased at a lower rate than prices for chemicals and allied products and all industrial commodities, indicates the possibility of price suppression in the iron blue pigments industry. The petitioner affirmed that--

. . . we were faced with increasing competition from imports being offered to our customers at prices lower than list prices of our domestic iron blue pigments. In most cases, we were unable to meet the lower prices for imported material. We lost that business. To have increased list prices to an acceptable level of profit would have further jeopardized or lost sales volume. 1/

Prices versus costs.--Prices for domestically produced iron blue pigments increased 36 percent between 1972 and 1975. During this period, the cost of iron blue pigments sold by American Cyanamid Co. increased * * * percent (see p. A-28), while the cost of iron blue pigments sold by Hercules, Inc., increased * * * percent (see p. A-28). American Cyanamid Co. stated that between 1972 and 1975, raw material costs (which account for * * * percent of production costs) increased 64 percent, energy costs increased 108 percent, and environmental costs increased 289 percent (rising labor costs, believed to account for about 20 percent of the total cost of producing iron blue pigments are of less significance). 2/

The president of Chemetron Corp., which terminated production of iron blue pigments in 1973, stated that--

* * * * *

U.S. producers' inventories

U.S. producers' yearend inventories of iron blue pigments during 1968-75 are shown in the following tabulation (data do not include Reichhold Chemical Co.; data for 1974 and 1975 include Borden, Inc.):

1/ Transcript of the hearing, p. 18.

2/ Transcript of the hearing, p. 17.

3/ Letter of the U.S. International Trade Commission dated Feb. 2, 1976.

* * * * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

U.S. producers attribute the inflated inventories during 1971 and 1972 to reduction in demand for their product. The reduced inventories in 1973 and 1974 are attributed to unusually high demand for iron blue pigments. Demand declined abruptly in late 1974, but producers continued to reduce inventories.

Ratios of U.S. producers' average annual inventories to their shipments for 1969-75 are shown in the following tabulation:

* * * * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Exports

Iron blue pigments are not separately classified in the export data published by the U.S. Department of Commerce. However, data on exports of iron blue pigments have been compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

U.S. producers' exports of iron blue pigments increased from 210,000 pounds, valued at \$136,000, in 1971 to 355,000 pounds, valued at \$227,000 in 1972, but then decreased steadily to 45,000 pounds, valued at \$58,000, in 1975 (table 13). The major market for exports of U.S.-produced iron blue pigments during the 1971-75 period was Italy. The principal reasons for the decline of U.S.

exports of iron blue pigments were (1) a major U.S. exporter of iron blue pigments stopped its production of iron blue pigments in 1973, and (2) foreign demand for U.S.-produced iron blue pigments declined in 1975, probably because of economic conditions abroad.

Employment

Data on employment were compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission. Firms were requested to report the number of production and related workers engaged in the production of (1) all products and (2) iron blue pigments, at the firms' establishments where iron blue pigments were produced.

The number of production and related workers engaged in the production of iron blue pigments in the United States declined from * * * workers in 1971 to * * * workers in 1975, or by 31 percent. Nearly all of the decline occurred in 1975.

The number of production and related workers engaged in the production of all products at U.S. establishments where iron blue pigments were produced increased from 2,361 workers in 1971 to 2,514 workers in 1973, but decreased to 2,076 workers in 1975, as shown in the table below.

Average number of production and related workers employed in U.S. establishments where iron blue pigments were produced, 1971-75

Item	: 1971	: 1972	: 1973	: 1974	: 1975
Production and related workers:	:	:	:	:	:
engaged in the production :	:	:	:	:	:
of--	:	:	:	:	:
All products-----	2,361	2,349	2,514	2,505	2,076
Iron blue pigments-----	* * *	* * *	* * *	* * *	* * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

The two major U.S. producers of iron blue pigments also employ * * * workers in the production of yellow prussiate of soda (YPS), which is a major raw material for iron blue pigments. These workers are directly affected by developments in the iron blue pigments industry.

It is evident from the following table that employment of production and related workers in the iron blue pigments industry decreased more rapidly and to a greater extent than production employment for chemicals and allied products and for all nondurable goods.

Indexes of employment of production and related workers in industries producing iron blue pigments, chemicals and allied products, and all nondurable goods, 1971-75

(1971=100)				
Year	: Iron blue : : pigments : : industry :	Chemicals : and allied : products industry :	: All : nondurable : goods industry :	
1971-----	100.0	100.0	100.0	
1972-----	94.2	100.2	101.4	
1973-----	90.6	103.4	104.0	
1974-----	94.2	105.5	102.3	
1975-----	69.1	<u>1/</u> 98.1	<u>1/</u> 94.4	

1/ January-November average.

Source: U.S. Department of Commerce, Survey of Current Business, except data on the iron blue pigments industry, which were compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Man-hours.--Man-hours worked by production and related workers engaged in the production of iron blue pigments declined from * * * hours in 1971 to * * * hours in 1975.

Man-hours worked by production and related workers engaged in the production of all products in U.S. establishments where iron blue pigments were produced increased from 4.0 million hours in 1971 to 4.3 million hours in 1974, but decreased to 3.6 million hours in 1975.

Man-hours worked by production and related workers in U.S. establishments where iron blue pigments were produced, 1971-75

(In thousands of man-hours)

Item	: 1971	: 1972	: 1973	: 1974	: 1975
Man-hours worked by production and related workers engaged in the production of--	:	:	:	:	:
All products-----	3,983	3,897	4,160	4,254	3,558
Iron blue pigments-----	* * *	* * *	* * *	* * *	* * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission,

Approximately * * * man-hours of employment were expended in 1975 in the production of YPS by the two major U.S. producers of iron blue pigments.

Productivity.--Domestic output per man-hour worked by production and related workers is presented in index form for the iron blue pigments industry and for all manufacturing in the United States in the following table.

Indexes of output per man-hour in the iron blue pigments industry and in all U.S. manufacturing, 1971-75
(1971=100)

Year	Output per man-hour in--	
	Iron blue pigments industry	All U.S. manufacturing
1971-----	100.0	100.0
1972-----	107.5	105.6
1973-----	109.6	111.4
1974-----	110.4	112.2
1975-----	92.5	111.1

Source: Data on the iron blue pigments industry compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission; data on all U.S. manufacturing from the Bureau of Labor Statistics.

Productivity in the iron blue pigments industry increased more slowly than productivity for all U.S. manufacturing between 1971 and 1974. The productivity increases which did occur were in large part due to technological and productivity improvements by the domestic producers, such as American Cyanamid's installation of more efficient continuous filtration and recovery equipment.

Productivity decreased in the iron blue pigments industry in 1975. Man-hours worked decreased by only 24 percent between 1974 and 1975, while production decreased * * * percent. Productivity per worker has historically declined during periods of recession.

U.S. producers' efforts to compete with imports

Low profits have restricted research and development (R. & D.) expenditures in recent years. Most research is directed toward improving the production processes and reducing costs. The following tabulation shows total R. & D. expenditures and the ratio of such expenditures to sales:

<u>R. & D.</u> <u>Expenditures</u>	<u>Ratio of R. & D.</u> <u>expenditures to sales</u> <u>(percent)</u>
1971-----	* * *
1972-----	* * *
1973-----	* * *
1974-----	* * *
1975-----	* * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

The major domestic producers introduce new and improved products frequently, and offer a wider range of products than the importers. The product mix is constantly scrutinized by producers to weed out unprofitable items.

The major domestic producers have made significant expenditures for production equipment in recent years. Increased productivity is partially due to efficient new equipment. Domestic producers' purchases of new equipment and building improvements for iron blue pigment production in 1971-75 are shown in the following tabulation (one producer's analysis of resulting cost savings is given in App. C):

	<u>1,000 dollars</u>
1971-----	* * *
1972-----	* * *
1973-----	* * *
1974-----	* * *
1975-----	* * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Profit-and-loss experience of U.S. producers

The data reported in this section represent the financial experience of the three U.S. producers which accounted for approximately * * * percent of all the iron blue pigments produced in the United States during the year 1974. The three producers are American Cyanamid Co., Harshaw Chemical Co., and Hercules, Inc. The accounting year for each of the producers ended December 31.

Overall operations of the establishments in which iron blue pigments are produced.--The three producers were requested to submit profit-and-loss data on their overall operations of the establishments in which iron blue pigments are produced. One company * * * instead submitted profit-and-loss data for its total company operations.

* * * * *

Iron blue pigments operations.--

* * * * *

Production capacity in Western Europe, the United Kingdom, and Japan

Production capacity of iron blue pigments in Western Europe (excluding the United Kingdom) is presently believed to be 11 million or 12 million pounds, or roughly equivalent to capacity in the United States. One large producer of iron blue pigments in Europe is Degussa (West Germany), a major supplier of iron blue pigments to the U.S. market. A fairly wide range of synthetic, inorganic, and organic pigment colors (including iron blue pigments) is produced at a plant owned by Hercules, Inc., in Ten Horn, the Netherlands, 1/ but none of the iron blue pigments produced there have been exported to the United States.

Production capacity of iron blue pigments in the United Kingdom is believed to be about * * * million pounds. The only known producer of iron blue pigments in the United Kingdom is Manox, Ltd., with manufacturing facilities in Manchester. Manox, Ltd., began manufacturing iron blue pigments in the 1930's under the name of Hardman & Holden, Ltd., and is believed to be the longest-established exporter of iron blue pigments to the United States, having been active in the U.S. market since 1945. Manox produces many different grades of iron blue pigments as well as special formulations for some of its large customers.

* * * * *

1/ Transcript of the hearing, p. 98.

It is also reported that Manox is modernizing its iron blue pigments facilities in Manchester.

Production of iron blue pigments in Japan increased from approximately 7 million pounds in 1970 to 8.1 million pounds in 1973, but decreased to about 6.5 million pounds in 1974 and to less than 5 million pounds (estimated) in 1975. Japan exported about 26 percent of its production of iron blue pigments to the United States in 1973 and 27 percent in 1974. There is presently only one major producer of iron blue pigments in Japan, although reportedly there were four producers in 1970.

The Question of Imports as a Substantial
Cause of Serious Injury

Demand factors

The demand for iron blue pigments is derived from the demand for printing inks, carbon paper, plastic trash bags, and coatings. The amount of iron blue pigments consumed in the printing-ink industry is dependent upon the demand for advertising supplements in newspapers, for magazines, for merchandising catalogs (e.g., Sears and Montgomery Ward), and for cellophane packaging wrap. Technological changes in the printing industry, such as current increases in gravure printing, have increased demand for iron blue pigments. The demand for carbon paper is dependent upon general business activity and the demand for office products. The demand for iron blue pigments in plastics is affected by consumer preference for green trash bags (which contain an iron blue and a chrome yellow pigment mixture). Demand for refinishing, truck, and farm equipment paints is the primary factor in the demand for iron blue pigments in the coatings industry. Although iron blue pigments are no longer used in auto paint, they are used in touchup paints for older vehicles.

Printing-ink market.--Printing-ink manufacturers purchased about 49 percent of total shipments of domestically produced and imported iron blue pigments in 1975. Iron blue pigments are primarily used in publication gravure and flexographic inks, and a small amount is used in the toning of black inks. Publication gravure inks are used in printing from a recessed plate, while flexographic inks are printed

from a typographic rubber plate. The demand for publication gravure and flexographic inks grew rapidly from 1972 to 1974, but decreased in 1975 owing to the economic recession.

According to official statistics of the U.S. Department of Commerce, total product shipments of publication gravure inks increased from \$17.8 million in 1967 to \$33.3 million in 1972, or by 87 percent. The use of publication gravure inks and printing processes has increased substantially owing to cost benefits of gravure printing in large production runs. Gravure printing is primarily used in advertising supplements, merchandising catalogs, and magazines. From 1967 to 1972, shipments of flexographic inks increased 64 percent, from \$42.0 million to \$68.6 million. The increase in the consumption of flexographic inks is related to the increased use of these inks in cellophane grocery wrapping.

Carbon paper market.--Carbon paper producers accounted for about 20 percent of total shipments of domestically produced and imported iron blue pigments in 1975. Carbon black accounts for about 70 percent of all pigment consumed in this industry. Iron blue and alkali blue pigments are the next most commonly used pigments.

The carbon paper industry is a relatively stable, low-growth industry. Industry sales decreased considerably during the 1975 recession. Within the industry, the production of one-time-use carbon paper has increased more rapidly than that of multiple-use carbon paper. A large amount of iron blue pigment is consumed by the one-time-use carbon paper industry.

Plastics industry.--The plastics industry has been the fastest growing end-use market for iron blue pigment producers. Plastics producers increased their share of total shipments of domestically produced and imported iron blue pigments from approximately 4 percent in 1972 to 9 percent in 1975. In its plastics applications, iron blue pigments are not used as a single pigment but are precipitated with chrome yellow pigment to produce chrome green pigment. Chrome green pigment has good opacity, tinting strength, and brilliance properties, and is often used with extenders to reduce costs of the plastic product. The typical chrome green pigment is a mixture of 70 percent chrome yellow pigment and 30 percent iron blue pigment. Before 1974, chrome green pigment and the plastic were mixed in a 1 to 25 ratio, but, to reduce costs of the final product, the ratio was changed to 1 to 30.

The plastic trash bag market grew rapidly during the late 1960's and early 1970's, but this growth has slowed owing to saturation of the market. For esthetic reasons, green bags account for 80 to 90 percent of the trash bag market, with chrome green pigment being the main colorant. Since the trash bag is a one-time-use product, cost considerations are very important, and there are some indications of a switch from more expensive colorants such as chrome green pigment to less expensive (but less attractive) pigments such as carbon black.

The electrical cable and wire market is a secondary market for iron blue pigments. The lightfastness and heat resistant properties are more stringent in these applications than in the trash bag market.

Coatings industry.--Since the 1950's, the coatings (paint) industry has decreased its consumption of iron blue pigments. From 1972 to 1975, purchases decreased from 15 percent to 8 percent of total shipments of domestically produced and imported iron blue pigments. During the 1940's, iron blue pigments were used extensively in paint formulations for telephone company vehicles. The trend toward dark-colored house paints in the early 1960's increased the demand for iron blue pigment.

During the 1950's, the use of iron blue pigments in auto paints decreased rapidly, since iron blue pigment would fade or "bronze" within 2 years. Iron blue pigments are now primarily used in touchup paints for older vehicles and in some truck and farm-equipment paints. During the 1950's and early 1960's, pigments such as phthalocyanine blues, having superior chemical and lightfastness properties, largely replaced iron blue pigments in the paint industry. Iron blue pigments will continue to be used in paints, but total consumption in this market will probably decrease.

U.S. consumption

Total apparent U.S. consumption of iron blue pigments increased from 12.4 million pounds in 1968 to 13.0 million pounds in 1970, decreased to 12.6 million pounds in 1971, and then increased steadily to 15.8 million pounds in 1974 (table 16). Owing to the downturn in the U.S. economy, annual consumption of iron blue pigments decreased to * * * pounds in 1975, or by * * * .

In terms of quantity, the ratio of U.S. imports to apparent consumption increased steadily from 9 percent in 1968 to 34 percent in 1973, but declined to 33 percent in 1974 and * * * percent in 1975. The largest increase occurred between 1971 and 1972, when the ratio increased from 21 percent to 32 percent.

As shown in the following tables, total purchases 1/ of iron blue pigments increased from 1972 to 1974 in the major end-use markets (ink and carbon paper) but then decreased sharply in 1975. Total purchases of iron blue pigments by ink producers decreased 5 percent from 1972 to 1975. In this period, ink producers' purchases of domestically produced pigment decreased 8 percent, while purchases of imported pigment increased 6 percent. Total purchases of iron blue pigment by the carbon paper industry decreased 24 percent from 1972 to 1975. In this period, purchases of U.S.-produced iron blue pigment decreased 27 percent, while purchases of imported pigment decreased 16 percent. Coatings producers reported purchases of only U.S.-produced iron blue pigment, and plastics producers reported very few purchases of imported iron blue pigments. From 1972 to 1975, purchases of the pigment by coatings producers decreased 52 percent, while purchases by plastics producers increased 253 percent.

1/ According to consumers of iron blue pigments, consumption nearly equals purchases of the pigments owing to small inventories. Total purchases include domestically produced and imported iron blue pigments.

Indexes of U.S. purchases of domestically produced and imported iron blue pigments, 1972-75, and shipments, 1975, by end-use markets

End-use markets	Shipments in 1975	Indexes (1972=100) ^{1/}			
		1972	1973	1974	1975
	<u>1,000 pounds</u>				
Ink-----	* * *	100	110	116	95
Carbon paper-----	* * *	100	129	131	76
Coatings-----	* * *	100	90	77	48
Plastics-----	* * *	100	568	656	253
Other and unknown-----	* * *	2/	2/	2/	2/
Total-----		100	2/	2/	* * *

^{1/} Compiled from major U.S. consumers' responses to questionnaires of the U.S. International Trade Commission. In 1975, these consumers accounted for approximately 60 percent of purchases of domestically produced and imported iron blue pigments.

^{2/} Not available.

Source: Compiled from U.S. producers' and importers' responses to questionnaires of the U.S. International Trade Commission, except as noted.

Indexes of U.S. purchases of domestically produced iron blue pigments, 1972-75, and shipments, 1975, by end-use markets

End-use markets	Shipments in 1975	Indexes (1972=100) ^{1/}			
		1972	1973	1974	1975
	<u>1,000 pounds</u>				
Ink-----	* * *	100	100	110	92
Carbon paper-----	* * *	100	130	129	73
Coatings-----	* * *	100	90	77	48
Plastics-----	* * *	100	558	620	208
Other and unknown-----	* * *	2/	2/	2/	2/
Total-----		100	2/	2/	* * *

^{1/} Compiled from major U.S. consumers' responses to questionnaires of the U.S. International Trade Commission. In 1975, these consumers accounted for approximately 67 percent of purchases of domestically produced iron blue pigments.

^{2/} Not available.

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission, except as noted.

Indexes of U.S. purchases of imported iron blue pigments, 1972-75, and shipments, 1975, by end-use markets

End-use markets	Shipments in 1972 <u>2/</u>	Indexes (1972=100) <u>1/</u>			
		1972	1973	1974	1975
	<u>1,000 pounds</u>				
Ink-----	1,887	100	141	137	106
Carbon paper-----	475	100	124	136	84
Coatings-----	92	<u>3/</u>	<u>3/</u>	<u>3/</u>	<u>3/</u>
Plastics-----	115	<u>4/</u>	<u>4/</u>	<u>4/</u>	<u>4/</u>
Other and unknown-----	715	<u>2/</u> 100	<u>5/</u>	<u>5/</u>	<u>2/</u> 146
Total-----	3,284	<u>2/</u> 100	<u>5/</u>	<u>5/</u>	<u>2/</u> 117

1/ In 1975, the consumers reporting accounted for approximately 46 percent of purchases of imported iron blue pigments.

2/ Compiled from importers' responses to questionnaires of the U.S. International Trade Commission. Nearly all of the "other and unknown" purchases are believed to have been used in the production of ink and carbon paper.

3/ U.S. coatings producers reported no purchases of imported iron blue pigments from 1972 to 1975.

4/ U.S. plastics producers reported no purchases of imported iron blue pigments in 1972 and an average annual purchase of * * * from 1973 to 1975.

5/ Not available

Source: Indexes of purchases compiled from major U.S. consumers' responses to questionnaires of the U.S. International Trade Commission, except as noted in footnote 2.

Statements by former producers

Four companies discontinued production of iron blue pigments during 1969-75. Three of these former producers, which accounted for * * * percent of U.S. production in 1970, submitted written explanations for their actions in response to questionnaires of the U.S. International Trade Commission.

* * * * *

Possible competitive products

A major importer of iron blue pigments alleged that any injury to the iron blue pigment industry was not caused by imported iron blue pigment but was due to replacement by phthalocyanine blue pigment and, to a lesser extent, by alkali blue pigment. 1/ The latter two pigments are organic chemicals, and iron blue pigment is an inorganic chemical.

Major considerations in the choice of a blue pigment are its cost effectiveness and its coloring strength. Prices in February 1976 for phthalocyanine blue pigments, green shade, were approximately \$5.50 per pound, 2/ while iron blue pigments list for about \$1.10 per pound.

Various tests comparing the coloring strength of phthalocyanine blue pigments and iron blue pigments have been conducted. One test indicated that phthalocyanine blue pigments exhibit about 1.7 times the color strength of iron blue pigments in printing ink (see app. D); another showed that phthalocyanine blue pigments have twice the coloring strength of milori iron blue pigments; 3/ and a third test

1/ Brief submitted by Sumitomo Shoji America, Inc., to the U.S. International Trade Commission.

2/ According to the Chemical Marketing Reporter, Feb. 9, 1976, the list price for phthalocyanine blue, green shade, was \$6.30 per pound. List prices for phthalocyanine blue, red shade, ranged from \$5.30 to \$5.85 per pound. According to industry sources, phthalocyanine blue, green shade, prices were being discounted to about \$5.50 per pound.

3/ F. H. Moser and A. L. Thomas, Phthalocyanine Compounds, Reinhold Publishing Corp., New York, 1963, p. 296.

showed that phthalocyanine blue pigments are approximately 2.5 times as strong as iron blue pigments (app. E). Since phthalocyanine blue pigments cost 5 times as much as iron blue pigments, but are only 1.7 to 2.5 times as strong, phthalocyanine blue pigments are nearly twice as expensive as iron blue pigments on a cost-effective basis (table 17 and fig. 3). Iron blue pigments do not disperse as well in plastics (which accounted for 9 percent of the total U.S. iron blue pigment purchases in 1975) as phthalocyanine blue pigments. Nevertheless, industry sources state that in plastics applications (primarily trash bags), phthalocyanine blue pigments are only 1.5 times as expensive as iron blue pigments on an equal color-strength basis.

The three major consumers of iron blue pigments in the printing-ink industry (which accounted for about 49 percent of total U.S. iron blue pigment purchases in 1975) cited no replacement by other blue pigments. * * * * *

milori iron blue pigments have completely replaced phthalocyanine blue pigments in the publication gravure ink business owing to the increased prices of the phthalocyanine blue pigments. Phthalocyanine blue pigments have not replaced iron blue pigments to a significant degree since the markets they serve have different requirements. Consumers of phthalocyanine blue pigments will pay more to acquire their high color qualities and chemical stability, while consumers of iron blue pigments do not require such high quality and will choose the less expensive pigment. The markets for phthalocyanine blue pigments

(e.g., quality automotive paints, inks for pictorial magazine advertisements, and chemically resistant inks for detergent boxes) and for iron blue pigments (e.g., carbon paper and inks for newspaper supplements) indicate this cost/quality distinction. Iron blue pigments have replaced phthalocyanine blue pigments in publication gravure inks to a greater extent than phthalocyanine blue pigments have replaced iron blue pigments in water flexographic inks.

Two large consumers of iron blue pigments in the carbon paper industry (which accounted for about 20 percent of total U.S. iron blue pigments purchases in 1975) cited no commercial replacement for iron blue pigments, while one large company stated that it replaced some iron blue pigments with alkali blue pigments in 1974 owing to high demand and increased prices of iron blue pigments. With the exception of 1974, carbon paper producers report no major replacement of iron blue pigments by either alkali blue or phthalocyanine blue pigments.

Coatings producers (which accounted for about 8 percent of total purchases of iron blue pigments in 1975) reported a large replacement of iron blue pigments by phthalocyanine blue pigments during the 1950's and early 1960's. This replacement continued at a reduced rate in the 1970's. Iron blue pigments are still used in truck, farm equipment, and refinishing paints.

With regard to plastic trash bags, the major end-use for iron blue pigments in the plastics industry (which accounted for about 9 percent of total U.S. iron blue pigments purchases in 1975), there has

been little or no replacement of iron blue pigments by any other pigment. A small amount of iron blue pigments (about 1 percent of total U.S. consumption of iron blue pigments) is used in electrical cables but phthalocyanine blue pigments are used when lightfastness and heat resistance are important.

In conclusion, iron blue pigments are replacing phthalocyanine blue pigments in publication gravure inks. There has been little replacement of iron blue pigments by alkali blue pigments or phthalocyanine blue pigments in the carbon paper and plastic industries. In the paint industry, iron blue pigments were largely replaced by phthalocyanine blue pigments in the early 1960's, but this replacement has decreased in recent years.

Effluent treatment

The waste products of iron blue pigment production must be chemically treated to meet environmental control laws. The solid and liquid effluent, which contains several soluble and insoluble salts, is treated with calcium hydroxide or calcium oxide (lime) to neutralize the solution and to precipitate (solidify) most of the soluble substances (fig. 1). The effluent is pumped to large holding ponds, where most of the solid material settles to the bottom. Depending on federal and local laws, the liquid effluent may be discharged into a sewage system, or river, or evaporated in the holding pond.

During the public hearing, American Cyanamid's representative stated that environmental costs increased by 289 percent during the

1972-75 period. During fieldwork and the public hearing, representatives of three former iron blue pigments producers stated that the cost of pollution controls was not a major factor in their decisions to discontinue production.

YPS production by major iron blue pigments producers

American Cyanamid Co. and Hercules, Inc., produce YPS, the major raw material in the production of iron blue pigments. Three of the former producers purchased YPS from American Cyanamid and foreign sources. 1/ Chemetron Corp. manufactured YPS from 1967 until it terminated iron blue pigment production in 1973. Borden, Inc., and Harshaw Chemical Co. purchase YPS from American Cyanamid.

* * * * *

American Cyanamid currently sells YPS for about * * * cents per pound, and charged * * * cents per pound in 1971.

American Cyanamid and Hercules produce YPS primarily for captive use in making iron blue pigments. Steel producers and photographic processing establishments account for most of American Cyanamid's YPS sales to other firms; however, two of the firms producing iron blue pigments obtain at least part of their YPS requirement from American Cyanamid.

There are no indications that American Cyanamid or Hercules have used their positions as the only manufacturers of YPS to charge inordinately high prices or to force other producers into unprofitable

1/ The sources of YPS for Reichhold Chemical Co. are not available.

situations. Current and former producers of iron blue pigments have stated that Hercules and American Cyanamid have lower costs for YPS.

American Cyanamid's cost savings on YPS production is about * * * cents per pound, as shown in appendix C. An official of Chemetron Corp. stated that his company saved about * * * cents per pound by producing YPS.

YPS is primarily imported from West Germany and the United Kingdom. U.S. imports in 1968-75 are shown in the following table.

Sodium ferrocyanide (YPS): U.S. imports, 1968-75

	: 1968 :	1969 :	: 1970 :	1971 :	: 1972 :	1973 :	: 1974 :	1975 :
Quantity:	:	:	:	:	:	:	:	:
Million	:	:	:	:	:	:	:	:
pounds-----	7.8 :	3.4 :	8.8 :	13.5 :	1.8 :	0.4 :	1.5 :	0.5
Unit value:	:	:	:	:	:	:	:	:
Cents per	:	:	:	:	:	:	:	:
pound-----	10 :	11 :	10 :	11 :	12 :	13 :	20 :	22
	:	:	:	:	:	:	:	:

Source: Compiled from official statistics of the U.S. Department of Commerce.

APPENDIX A
STATISTICAL TABLES

Table 1.--Iron blue pigments: U.S. producers' shipments, 1/ including interplant transfers, by types, 1971-75

* * * * *

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission by current and former U.S. producers of iron blue pigments.

Table 2.--Iron blue pigments: U.S. imports 1/ by types, 1971-75

* * * * *

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

Table 3.--Iron blue pigments: U.S. imports for consumption, by principal sources, 1965-75

Source	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Quantity (1,000 pounds)											
United Kingdom--	600	825	605	739	759	1,090	931	803	1,328	1,958	1,255
Japan-----	-	-	-	29	327	728	1,367	2,226	2,094	1,737	1,285
West Germany----	40	23	28	68	130	10	80	862	1,344	1,273	329
Poland-----	15	11	100	142	209	171	260	309	240	55	44
All other coun- tries-----	173	209	205	179	140	104	43	122	253	110	2
Total-----	829	1,068	937	1,157	1,566	2,102	2,681	4,322	5,260	5,133	2,916
Value (1,000 dollars)											
United Kingdom--	271	381	281	352	368	531	449	400	680	1,074	850
Japan-----	-	-	-	9	99	238	457	843	865	881	686
West Germany----	15	9	11	28	53	5	36	264	512	629	226
Poland-----	4	3	32	44	64	53	79	100	91	37	23
All other coun- tries-----	68	82	80	70	36	45	18	44	63	58	2
Total-----	357	475	404	503	619	871	1,039	1,651	2,210	2,679	1,786
Unit value (per pound)											
United Kingdom--	\$0.45	\$0.46	\$0.46	\$0.48	\$0.48	\$0.49	\$0.48	\$0.50	\$0.51	\$0.55	\$0.68
Japan-----	-	-	-	.31	.31	.33	.33	.38	.41	.51	.53
West Germany----	.38	.39	.39	.41	.41	.50	.45	.31	.38	.49	.69
Poland-----	.27	.27	.32	.31	.31	.31	.30	.32	.38	.67	.52
All other coun- tries-----	.39	.39	.39	.39	.26	.43	.42	.36	.25	.53	1/ .84
Average-----	.43	.44	.43	.43	.40	.41	.39	.38	.42	.52	.61

1/ Based on unrounded data.

Source: Compiled from official statistics of the U.S. Department of Commerce.

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

Table 4.--Iron blue pigments: U.S. importers' shipments, 1/ by types,
1971-75

* * * * *

Source: Compiled from importers' responses to questionnaires of the
U.S. International Trade Commission.

Table 5.--Iron blue pigments: U.S. production, 1960-75

(In thousands of pounds)			
Year	Production	Year	Production
1960-----	9,594	1968-----	12,102
1961-----	9,364	1969-----	11,674
1962-----	9,870	1970-----	10,416
1963-----	10,060	1971-----	10,774
1964-----	10,072	1972-----	10,372
1965-----	10,968	1973-----	10,074
1966-----	11,138	1974-----	10,460
1967-----	11,540	1975-----	<u>1/</u> * * *

1/ Compiled from responses by U.S. producers to questionnaires of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table 6.--U.S. producers' capacity to produce iron blue pigments, 1969-76 1/

* * * * *

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Table 7.--Utilization of U.S. producers' capacity to produce
iron blue pigments, 1969-75 1/

* * * * *

Source: Compiled from U.S. producers' responses to questionnaires of
the U.S. International Trade Commission.

Table 8.--Iron blue pigments: U.S. producers' shipments, including interplant transfers, 1960-75

Year	Quantity	Value	Unit value
	<u>1,000</u>	<u>1,000</u>	
	<u>pounds</u>	<u>pounds</u>	<u>Per pound</u>
1960-----	9,084	4,448	\$0.489
1961-----	8,252	4,287	.519
1962-----	8,804	4,657	.528
1963-----	9,090	4,873	.536
1964-----	9,928	5,208	.524
1965-----	10,390	5,501	.529
1966-----	10,492	5,824	.555
1967-----	10,950	6,052	.552
1968-----	11,262	6,297	.559
1969-----	11,142	6,103	.547
1970-----	10,926	6,229	.570
1971-----	10,088	6,251	.619
1972-----	9,360	6,120	.653
1973-----	10,274	6,929	.674
1974-----	10,784	8,762	.812
1975-----	<u>1/</u> * * *	<u>1/</u> * * *	<u>1/</u> .889

1/ Compiled from responses by U.S. producers to questionnaires of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table 9.--Indexes of the value 1/ of shipments of the U.S. durable and nondurable goods industry, the chemicals and allied products industry, and the iron blue pigments industry, 1971-75

(1971=100)			
Year	: Durable and : Chemicals and : Iron blue		
	: nondurable : allied products: pigments		
	: goods industry: industry : industry 2/		
1971-----	: 100 :	100 :	100
1972-----	: 108 :	111 :	95
1973-----	: 113 :	122 :	103
1974-----	: 108 :	111 :	108
1975-----	: 87 :	86 :	* * *
	: :	:	

1/ Adjusted for inflation. Wholesale price indexes for durable and nondurable manufactures and chemicals and allied products are based on October figures, while those for iron blue pigments include full-year data.

2/ Includes full-year data for American Cyanamid Co., Hercules, Inc., and Borden, Inc., and 11-months' data for Harshaw Chemical Co.

Source: Data on the durable and nondurable goods industry and the Chemicals and allied products industry for 1971-74 are from Survey of Current Business, U.S. Department of Commerce. Data for 1975 are estimated based on official data through November 1975. Data on the iron blue pigments industry for 1971-74 are from official statistics of the U.S. Department of Commerce and include interplant transfers. The 1975 data are based on questionnaires of the U.S. International Trade Commission submitted by producers of iron blue pigments.

Table 10.--Milor iron blue pigments: Net delivered selling prices received by U.S. producers and importers ^{1/} annual and by quarters, 1971-75

Period	U.S. producers' prices		Importers' price		U.S. producers' price minus importers' price		Ratio of importers' price to U.S. producers' price
	Range	Arithmetic	Range	Weighted	importers' price	price to U.S. producers' price	
		average 2/		average 3/			
	Cents per pound	Cents per pound	Cents per pound	Cents per pound	Cents per pound		Percent
971-----	* * *	64	* * *	52	12		81
972-----	* * *	66	* * *	55	11		83
973-----	* * *	69	* * *	59	10		86
974-----	* * *	83	* * *	69	14		83
975-----	* * *	90	* * *	79	11		88
971:							
January-March-----	* * *	64	* * *	52	12		81
April-June-----	* * *	64	* * *	49	15		77
July-September-----	* * *	64	* * *	50	14		78
October-December---	* * *	64	* * *	55	9		86
972:							
January-March-----	* * *	64	* * *	52	12		81
April-June-----	* * *	67	* * *	54	13		81
July-September-----	* * *	67	* * *	56	11		84
October-December---	* * *	67	* * *	57	10		85
973:							
January-March-----	* * *	67	* * *	55	12		82
April-June-----	* * *	67	* * *	59	8		88
July-September-----	* * *	70	* * *	60	10		86
October-December---	* * *	70	* * *	60	10		86
974:							
January-March-----	* * *	72	* * *	63	9		88
April-June-----	* * *	81	* * *	66	15		81
July-September-----	* * *	90	* * *	71	19		79
October-December---	* * *	90	* * *	75	15		83
975:							
January-March-----	* * *	90	* * *	81	9		90
April-June-----	* * *	90	* * *	80	10		89
July-September-----	* * *	90	* * *	78	12		87
October-December---	* * *	90	* * *	77	13		86

^{1/} All prices are reported prices at which U.S. producers or importers each sold the greatest volume of iron blue pigments.

^{2/} Arithmetic average of prices of the 2 major U.S. producers. Data reported on U.S. producers questionnaires were insufficient to provide a weighted average.

^{3/} An arithmetic average of importers' prices did not differ significantly from the weighted average except in 1974, when the arithmetic average of importers' prices was 77 cents per pound, compared with a weighted average of 69 cents per pound.

Source: Compiled from U.S. producers' and importers' responses to questionnaires of the U.S. International Trade Commission.

Table 11.--Alkali-resistant iron blue pigments: Net delivered selling prices received by 2 U.S. producers and 1 importer, 1/ 1971-75

* * * * *

Source: Compiled from U.S. producers' and importers' responses to questionnaires of the U.S. International Trade Commission.

Table 12.--Toning iron blue pigments: Net delivered selling prices received by 2 U.S. producers and 1 importer, 1/ 1971-75

* * * * *

Source: Compiled from U.S. producers' and importers' responses to questionnaires of the U.S. International Trade Commission.

Table 13.--Iron blue pigments: U.S. producers' exports, 1971-75

Year	Quantity	Value 1/	Unit value
	<u>1,000</u>	<u>1,000</u>	
	<u>pounds</u>	<u>dollars</u>	<u>Per pound</u>
1971-----	210	* * *	* * *
1972-----	355	* * *	* * *
1973-----	193	* * *	* * *
1974-----	138	* * *	* * *
1975-----	45	* * *	* * *

1/ Net value f.o.b. establishment.

Source: Compiled from U.S. producers' responses to questionnaires of the U.S. International Trade Commission.

Table 14.--Iron blue pigments: Profit-and-loss experience of 2 U.S. producers 1/ on their overall operations in establishments in which iron blue pigments were produced, 1971-75 2/

* * * * *

Source: Compiled from data submitted to the U.S. International Trade Commission by 2 U.S. producers.

Table 15.--Iron blue pigments: Profit-and-loss experience of 3 U.S. producers on their iron blue pigment operations, 1971-75 1/

* * * * *

Source: Compiled from data submitted to the U.S. International Trade Commission by 3 U.S. producers.

Table 16.--Iron blue pigments: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-75

Year	: U.S. : : producers' : : shipments :	: Imports : : :	: Exports : : :	: Apparent : : consumption :	: Ratio of : : imports to : : consumption
	: <u>1,000</u> : : <u>pounds</u> :	: <u>1,000</u> : : <u>pounds</u> :	: <u>1,000</u> : : <u>pounds</u> :	: <u>1,000</u> : : <u>pounds</u> :	: <u>Percent</u> :
1968-----	: 11,262 :	: 1,157 :	: <u>1/</u> :	: 12,419 :	: 9
1969-----	: 11,142 :	: 1,566 :	: <u>1/</u> :	: 12,708 :	: 12
1970-----	: 10,926 :	: 2,102 :	: <u>1/</u> :	: 13,028 :	: 16
1971-----	: 10,088 :	: 2,681 :	: 210 :	: 12,559 :	: 21
1972-----	: 9,360 :	: 4,322 :	: 355 :	: 13,327 :	: 32
1973-----	: 10,274 :	: 5,260 :	: 193 :	: 15,341 :	: 34
1974-----	: 10,784 :	: 5,133 :	: 138 :	: 15,779 :	: 33
1975-----	: <u>2/</u> * * * :	: 2,916 :	: 45 :	: * * * :	: * * *

1/ Not available. Exports are believed to have been small.

2/ Compiled from responses by U.S. producers to questionnaires of the U.S. International Trade Commission. Data for Harshaw Chemical Co. are based on 11 months.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

Table 17.--U.S. producers' net delivered selling prices of milori iron blue pigments 1/ and unit value of U.S. producers' sales of phthalocyanine blue pigments, 1968-75

Year	: :Selling price of: :milori iron blue: : pigment : (1)	: : sales of :phthalocyanine blue : :pigments, alpha form: : (2)	: : Unit value of : sales of :phthalocyanine blue : :pigments, alpha form: : (2)	: : Ratio of : column : (2) divided : by (1)
	: :Cents per pound	: : Per pound	: :	: :
1968-----	: 2/ 56 :	: \$2.95 :	: 5.3	
1969-----	: 2/ 55 :	: 2.98 :	: 5.4	
1970-----	: 2/ 57 :	: 3.08 :	: 5.4	
1971-----	: 64 :	: 3.08 :	: 4.8	
1972-----	: 66 :	: 3.15 :	: 4.8	
1973-----	: 69 :	: 2.97 :	: 4.3	
1974-----	: 83 :	: 4.04 :	: 4.9	
1975-----	: 90 :	: 4.89 :	: 5.4	

1/ Arithmetic averages of net delivered selling prices of the 2 major U.S. producers of iron blue pigments.

2/ Unit value of shipments compiled from official statistics of the U.S. Department of Commerce. The unit value data for milori iron blue pigment from 1968 to 1970 are approximately 2 percent less than the selling price.

Source: Compiled from statistics of the U.S. International Trade Commission, except as noted. Data for phthalocyanine blue pigment in 1975 are based upon sales data from companies which accounted for 86 percent of sales quantity in 1974.

A-62

APPENDIX B

FIGURES

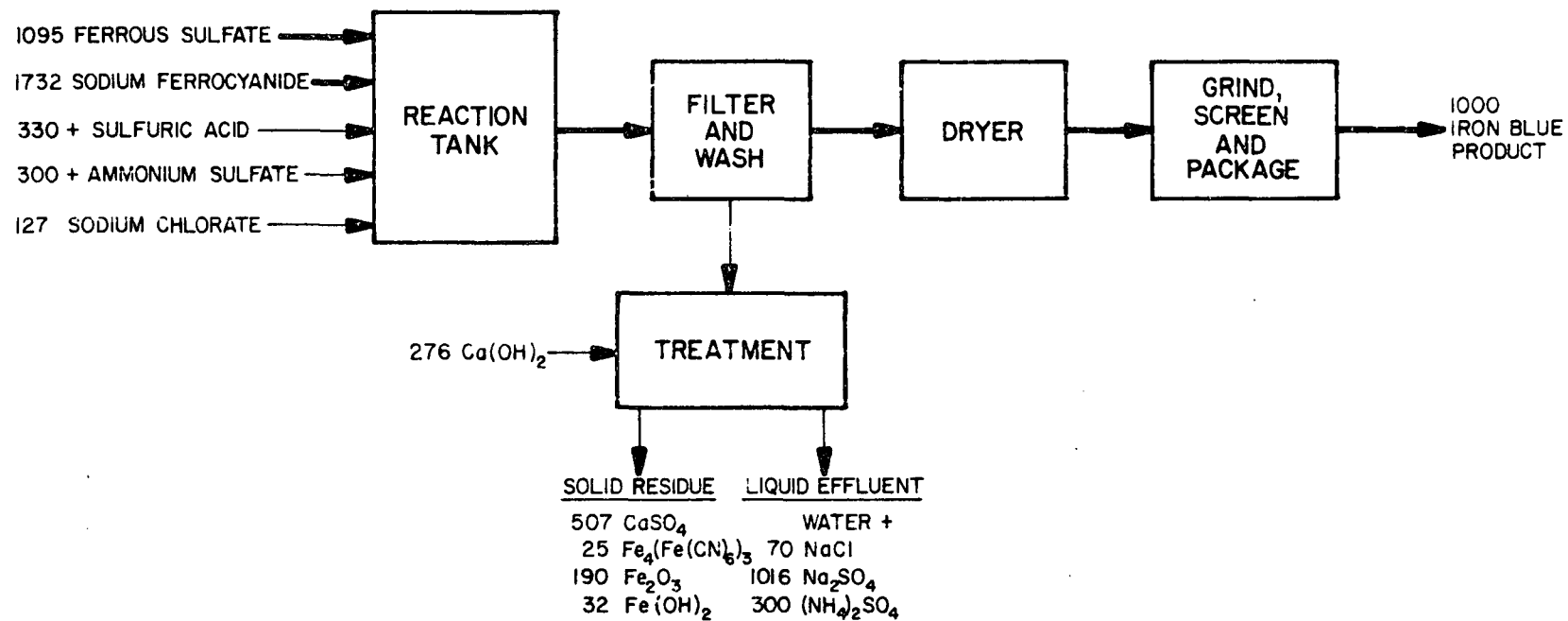
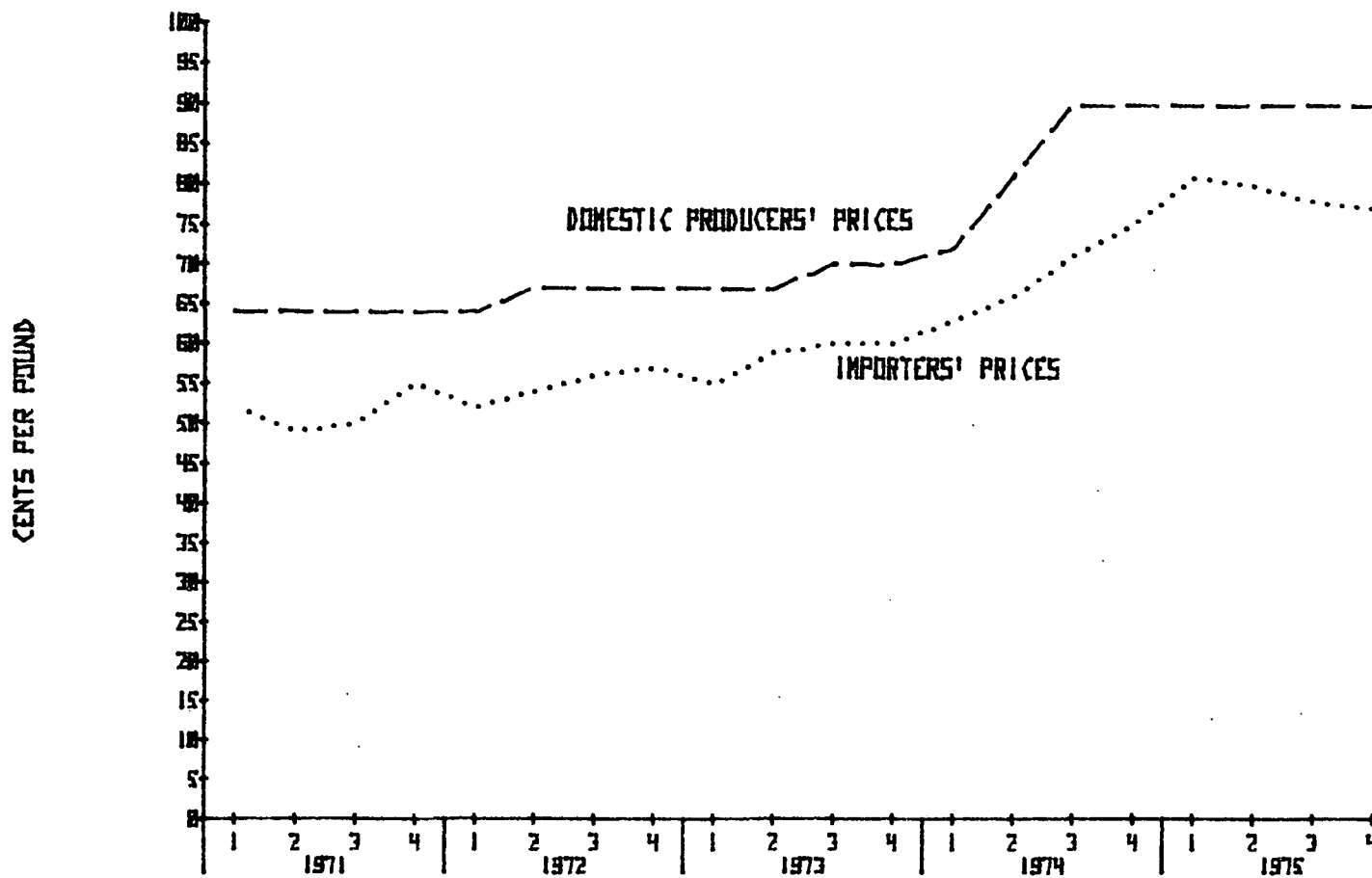


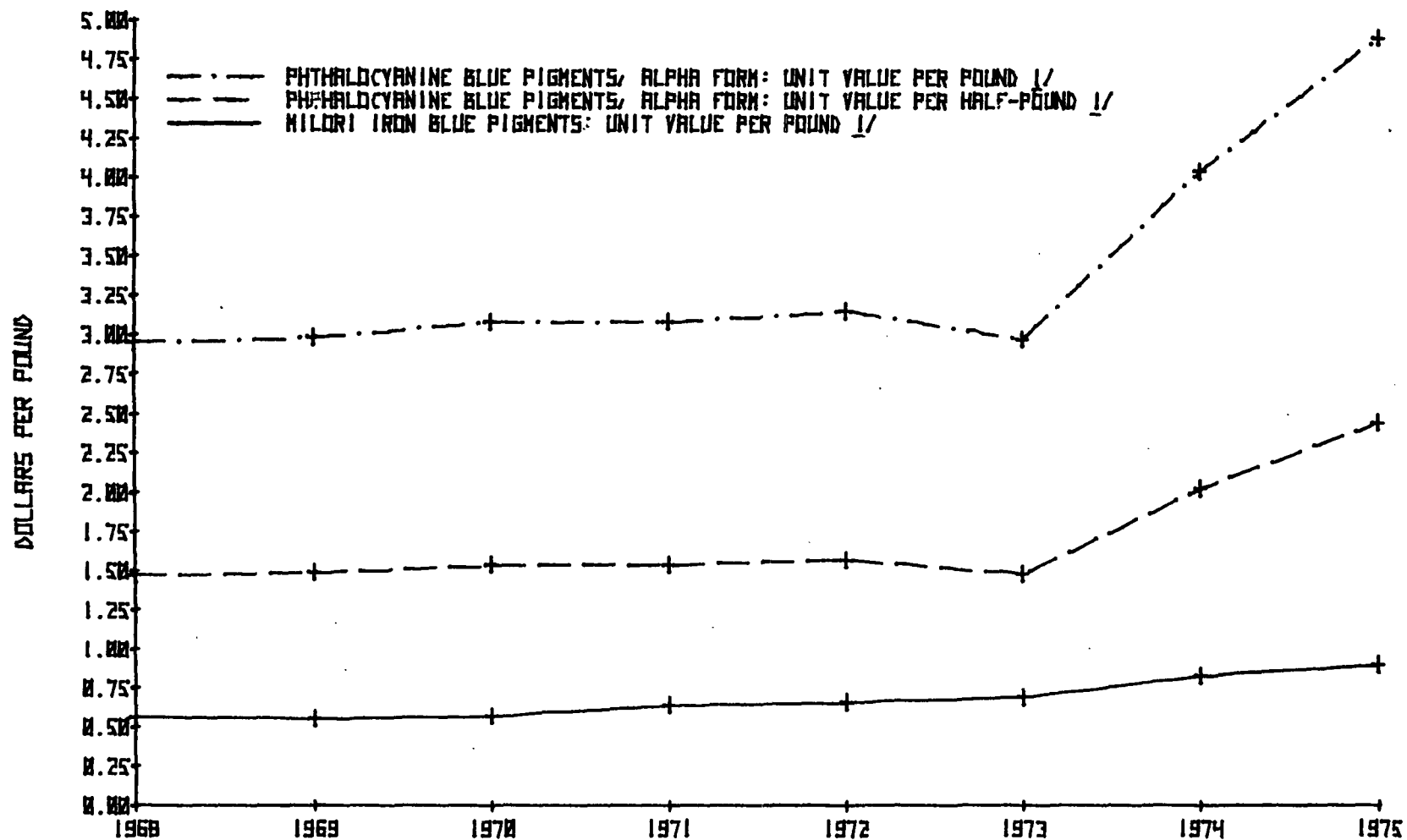
Figure 1.--IRON BLUES MANUFACTURE

Figure 2 .--Milori iron blue pigments: Prices of importers and domestic producers, by quarters, 1971-75



SOURCE: COMPILED FROM RESPONSES TO QUESTIONNAIRES OF THE U.S. INTERNATIONAL TRADE COMMISSION.

FIGURE 3.--U.S. PRODUCERS' NET DELIVERED SELLING PRICES OF MILORI IRON BLUE PIGMENTS AND UNIT VALUE
OF U.S. PRODUCERS' SALES OF PHTHALOCYANINE BLUE PIGMENTS, ALPHA FORM, 1968-75 ^{1/}



A-65

^{1/} SEE FOOTNOTES, TABLE 17.

A-66

APPENDIX C

SAVINGS IN MANUFACTURING COSTS
BY AMERICAN CYANAMID
CO., 1970-75

A-67

*

*

*

*

*

*

*

*

*

*

*

*

*

*

APPENDIX D

LETTER OF JANUARY 30, 1976, AND REPORT FROM MR. MINORU TSUTSUI, PROFESSOR OF
CHEMISTRY, TEXAS A & M UNIVERSITY

TEXAS A&M UNIVERSITY

COLLEGE OF SCIENCE

COLLEGE STATION, TEXAS 77843

Department of
CHEMISTRY

January 30, 1976

Mr. Carl Spellman
Chemical Division
U.S. International Trade Commission
8th and E Streets, N.W.
Washington, D. C. 20436

Dear Mr. Spellman:

This letter is to reply to your question made by phone last week on the color strength of Iron Blue and Phthalo Blue. I have done some measurements in my lab and have put all the information together on the attached report.

If you have any questions, please contact me without hesitation.

Sincerely yours,

M. Tsutsui

Minoru Tsutsui
Professor of Chemistry

MT/sh

cc: Mr. T. Nakamura
Dr. E. Qualey

attachment

A-71

COLOR STRENGTH
ON PHTHALO BLUE AND IRON BLUE

By

Minoru Tsutsui
Professor of Chemistry
Texas A&M University

January 30, 1976

1. Background:

In general, comparison of strength of color of compound is made by intensity (molar extinction coefficient ϵ) of absorption maxima. This provides a conclusive judgment on comparison of color strength of compounds. The absorption maxima are spectroscopically determined in solution. However, most pigments are insoluble in most solvents and it is nearly impossible to make a decisive judgment on comparison of color strength. In the pigment market, there have been so-called color strength of pigments determined by eyes and other conventional methods. The color strength of pigments, however, has to be specific to specific application even though they are not too scientific nor too dependable, because the color strength may be due probably to particle sizes of pigments dispersed into the media. Some pigments may become finer particles than others which may give stronger color. Again, this may depend on technological processes for making fine particles and retaining particles in fine size by avoiding their aggregation.

However, it is fortunate that Phthalo Blue is soluble in α -chloronaphthalene and water soluble Iron Blue is commercially available. The molar extinction coefficient, ϵ , of Phthalo Blue was also reported (Ref. 1).

2. Results:

A. Measurements of absorption spectra of Phthalo Blue - metal free (phthalocyanine) and Phthalo Blue - copper (copper phthalocyanine) in α -chloronaphthalene are shown in Fig. 2-7-A and Fig. 2-7-B, respectively.

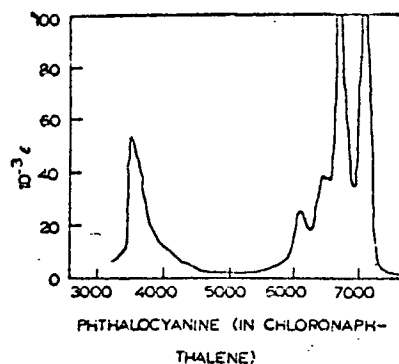


Fig. 2-7-A

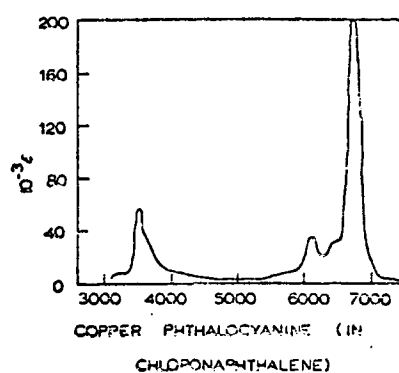
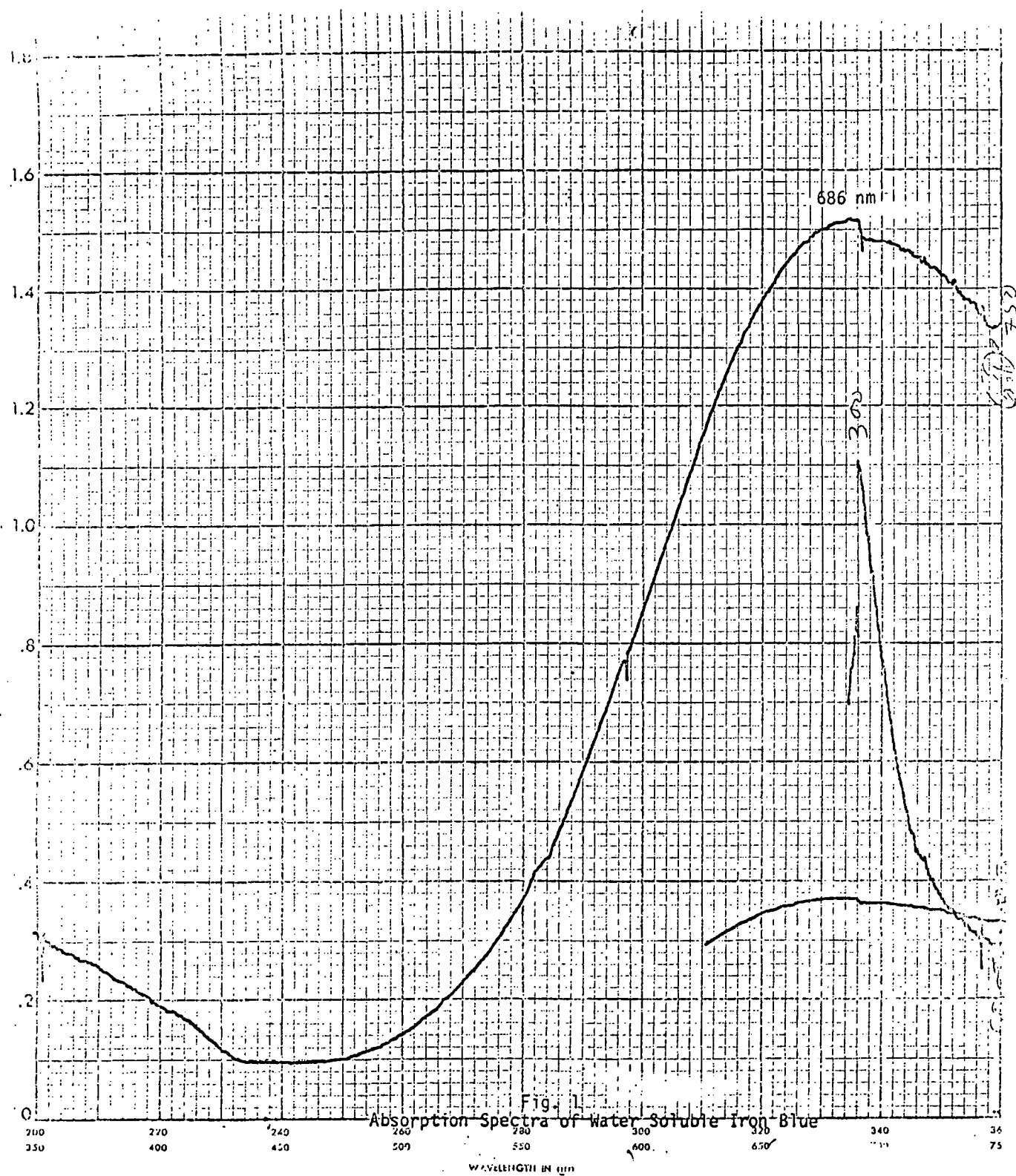


Fig. 2-7-B

Figure 2-7. Absorption spectra of phthalocyanine and copper phthalocyanine in the visible region (85).

ϵ of Phthalo Blue - metal free is $100 \cdot 10^{-3}$ at two maxima and ϵ of Phthalo Blue - copper is $200 \cdot 10^{-3}$.

B. Measurements of absorption spectra of water soluble Iron Blue in water (Fig. 1).



ϵ 's of water soluble Iron Blue are as follows:

ϵ	<u>Mol. Number of Sodium Oxalate as Additive</u>
16×10^{-3}	1
20×10^{-3}	2
30×10^{-3}	4

* Water soluble Iron Blue is treated by sodium oxalate and may contain a few moles of oxalate. (The data was not available and the estimation was made by consultation with a producer).

C. Color Strength of Iron Blue and Phthalo Blue

(1) Printing Ink

Phthalo Blue (Dainichiseika 420- α -form)	Iron Blue (Dainichiseika 690)
100*	60

* Determined by color differential meter.

(2) Plastic

no data is available by this day

(3) Carbon Paper

Phthalo Blue is not used at present.

D. Summary of the Results

(1) Although few points (different solvents for spectroscopic determinations and the amount of sodium oxalate in water soluble Iron Blue) should be scientifically judged, Phthalo Blue - copper (commonly used) seems to exhibit nearly 7 times the intensity than that of Iron Blue.

(2) In the application for printing ink, Phthalo Blue does not exhibit nearly twice the color strength of that of Iron Blue.

3. Evaluation:

In the practical application of Phthalo Blue in printing inks, it has not demonstrated its true color intensity. This probably will be implied to other applications. We should consider the following facts on the comparison of the two pigments:

A. Historical Backgrounds - Iron Blue and Phthalo Blue were discovered about 250 and 40 years ago, respectively. Iron Blue has a much longer history as a practical pigment than that of Phthalo Blue. Iron Blue has been able to develop superior technical processes in application as compared to those in application of Phthalo Blue. This might be one of the reasons why the color strength of Phthalo Blue in printing ink application has been less than twice that of Iron Blue.

B. Quality of Pigment - It has been well known that Phthalo Blue is the much superior pigment than Iron Blue in almost all aspects (Ref. 2).

4. Future Trend in Interplay Between Iron Blue and Phthalo Blue:

Considering the chemical and physical nature (highly resonanced aromatic character) of Phthalo Blue, it seems to me quite apparent that Phthalo Blue will exhibit true color strength (intensity) and superior properties than those of Iron Blue in the near future as the technology of the application of Phthalo Blue progresses.

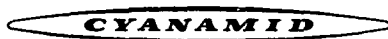
5. References:

- 1) "Pigment Handbook", Ed. T. C. Patton, John Wiley & Sons, N. Y., 1973.
- 2) F. H. Moser and A. L. Thomas, "Phthalocyanine Compounds", Reinhold Publishing Corporation, N. Y., 1963.

A-77

APPENDIX E

LETTER OF JANUARY 28, 1976, AND REPORT FROM MR. D. McGARRITY,
MARKET DEVELOPMENT MANAGER, AMERICAN CYANAMID CO.



AMERICAN CYANAMID COMPANY
ORGANIC CHEMICALS DIVISION
BOUND BROOK, NEW JERSEY 08805
AREA CODE 201 356-2000

January 28, 1976

Mr. Carl Spellman
International Trade Commission
Chemical Division
Washington, D. C. 20436

Dear Mr. Spellman:

During a recent telephone conversation, we discussed the relative economics of Iron Blue vs. Phthalocyanine Blue. I advised that I would obtain and provide information which had been developed in our Technical Service Laboratory.

I have attached a letter from Dr. L. L. Seivard, Manager of our Pigments Technical Service Lab and also color drawdowns comparing Iron Blue and Phthalocyanine Blue. Obviously, direct comparisons of Iron Blue and Phthalocyanine Blue are difficult and somewhat judgemental due to vast shade and hue differences. However, on a color value and strength basis objective ratings indicate that Phthalocyanine Blue is approximately 2.5 times as strong as Iron Blue, but costs approximately 5 times as much.

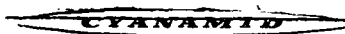
Again, in our experience and in our opinion, Iron Blue on a cost performance basis is more economical than Phthalocyanine Blue in most applications. Almost without exception, we have not seen any replacement of Iron Blue by Phthalocyanine Blue. As further verification, it should again be pointed out that total Iron Blue consumption in the U.S. has continued to increase.

If I can be of further assistance, please just give me a call.

Yours truly,

D. McGarrity
Market Development Manager

DMcG/ls



A-79

INTEROFFICE CORRESPONDENCE

Pigments

1/26/76

OFFICE	BLDG/TUBE	RM#	DATE
--------	-----------	-----	------

TO: Sales Department

ATT'N. OF: Mr. D. McGarrity

COPY TO:

SUBJECT: Iron Blue Versus Phthalocyanine Blue
Relative Cost Performance

REFERENCE:

The Pigments Technical Service Laboratory has compared typical Iron Blue pigments and Phthalocyanine pigments in a variety of printing ink and plastic systems.

Based on current prices, Phthalocyanine Blue is approximately 2.5 times more expensive in printing inks and 1.5 times more expensive in plastics applications than Iron Blue to give application performance equal to Iron Blue.

L. L. Seivard, Manager
Pigments Technical Service Lab

American Cyanamid Company

LLS:tl

A-80



AMERICAN CYANAMID COMPANY
PIGMENTS DIVISION

BOUND BROOK, NEW JERSEY 08805

AREA CODE 201 356-2000

COMPARISON OF IRON BLUE AND
PHTHALOCYANINE BLUE

IMPORTANT NOTICE

The information and statements contained herein are not to be taken as a warranty or representation for which we assume legal responsibility nor as permission, inducement or recommendation to practice any patented invention without a license. The information is offered solely for your consideration, investigation and verification. Users should perform their own testing and verification to determine the applicability and suitability of the information and any products for their own particular purpose.

The green shade Phthalocyanine Blue 55-3297 and the Blacktone Iron Blue 50-4066 are regularly used in the printing ink industry. Therefore, they were compared relative to each other using a lithographic varnish ink system.

The two blue pigments were dispersed at their normal pigment to varnish ratio (Phthalo Blue 55-3297 at 1:2 and Iron Blue 50-4066 at 1:1.4) and then adjusted to equal pigmentation by adding additional varnish to the Iron Blue dispersion.

Tints were then made using Zinc Oxide paste as the white tinting base.

The first comparisons were made at equal pigmentation (designated 100 pts/100 pts.). This juxtaposition drawdown comparison showed the Iron Blue ink to be significantly weaker.

Adjustments were then made to tints only by doubling the Iron Blue paste content in the tint and comparing relative to the initial Phthalo Blue tint (100 pts/200 pts.). The Iron Blue still appeared weak so its concentration in the tint was increased to 2-1/2 times the initial content and then compared to the Phthalo Blue tint still at its initial concentration (100 pts/250 pts.). This comparison showed the Iron Blue to be close in strength but significantly redder and dirtier in hue or tint tone.

Therefore, the Phthalo Blue 55-3297 is approximately 2-1/2 times as strong as the Iron Blue 50-4066 but costs approximately five times as much (based on current selling prices).

Library Cataloging Data

U.S. International Trade Commission.

Ferricyanide and ferrocyanide pigments
(iron blue pigments). Report to the
President on investigation no. TA-201-11
under section 201 of the Trade act of
1974. Washington, 1976.

29, A1-81 p. illus. 27 cm.
(USITC Pub. 767)

1. Iron blue. I. Title.

UNITED STATES
INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C. 20436

OFFICIAL BUSINESS

ADDRESS CORRECTION REQUESTED

PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE, \$300



ADDRESS CHANGE

- ☐ Remove from List
 - ☐ Change as Shown
- Please detach address
label and mail to address
shown above.