UNITED STATES INTERNATIONAL TRADE COMMISSION

LOW-CARBON FERROCHROMIUM

Report to the President
on Investigation No. TA-201-20
Under Section 201 of the Trade Act of 1974

USITC Publication 825
Washington, D.C.
July 1977

UNITED STATES INTERNATIONAL TRADE COMMISSION

COMMISSIONERS

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Joseph O. Parker, Vice Chairman
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LOW-CARBON FERROCHROMIUM IMPORTS NOT CAUSING SERIOUS INJURY

The United States International Trade Commission today reported to the President pursuant to the provisions of section 201 of the Trade Act of 1974 that imports of low-carbon ferrochromium are not causing serious injury or the threat thereof to the relevant U.S. industry.

Commissioners Daniel Minchew, Catherine Bedell, and Italo H. Ablondi formed the majority with their negative findings.

Commissioner George M. Moore found in the affirmative that increased imports of low-carbon ferrochromium were a substantial cause of the threat of serious injury to the domestic industry. Commissioner Joseph O. Parker did not participate in the decision.

There are three U.S. producers of low-carbon ferrochromium: Satralloy, Inc.; Globe Metallurgical Division, Interlake, Inc.; and Union Carbide Corp. These firms' shipments of low-carbon ferrochromium were valued at about $41 million in 1976.

(more)

U.S. imports of low-carbon ferrochromium, most of which come from the Republic of South Africa, Rhodesia, and Japan, amounted to 42,961 short tons, chromium content, having a foreign value of about $55 million in 1976.

Copies of the Commission's report, Low-Carbon Ferrochromium (USITC Publication 825), containing the views of the Commissioners and information developed during the course of the investigation (No. TA-201-20), may be obtained from the Office of the Secretary, United States International Trade Commission, 701 E Street NW., Washington, D.C. 20436.

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REPORT TO THE PRESIDENT

United States International Trade Commission,
July 11, 1977

To the President:

In accordance with section 201(d)(1) of the Trade Act of 1974 (88 Stat. 1978), the U.S. International Trade Commission herein reports the results of an investigation made under section 201(b)(1) of that act, relating to low-carbon ferrochromium.

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

> ferrochromium, not containing over 3 percent by weight of carbon, provided for in item 607.30 of the Tariff Schedules of the United States (TSUS),

is 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 January 21, 1977, upon receipt of a petition filed on January 10, 1977, by the Committee of Producers of Low-Carbon Ferrochrome.

Notice of the institution of the investigation was issued on January 28, 1977; notice was issued on March 8 that the public hearing would be held April 5 in Pittsburgh, Pa.; and on March 21 notice was issued that the public hearing would be held beginning at 10:00 a.m. April 5 in the hearing room of the Federal Building of that city. The

notices were posted at the Commission's offices in Washington, D.C., and New York City, and were published in the Federal Register on February 2, March 11, and March 24, 1977, respectively (42 F.R. 6432, 13609, and 15979). The public hearing was duly held at the time and place announced. All interested parties were afforded an opportunity to be present, to produce evidence, and to be heard.

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

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

DETERMINATION OF THE COMMISSION

On the basis of its investigation, the Commission determines (Commissioner Moore dissenting 2/ and Vice Chairman Parker not participating) that ferrochromium, not containing over 3 percent by weight of carbon, provided for in item 607.30 of the Tariff Schedules of the United States (TSUS), is not being imported into the United States in such

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

2/ Commissioner Moore determines in the affirmative, i.e., that the ferrochromium involved is being imported into the United States in such increased quantities as to be a substantial cause of the threat of serious injury to the domestic industry producing an article like or directly competitive with the imported article.

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.

Views of Chairman Daniel Minchew and Commissioners
Catherine Bedell and Italo H. Ablondi

On January 10, 1977, the United States International Trade Commission received a petition filed by the Committee of Producers of Low Carbon Ferrochrome requesting an investigation under section 201 of the Trade Act of 1974 with respect to imports of low-carbon ferrochromium. On January 21, 1977, the Commission instituted an investigation to determine whether ferrochromium, not containing over 3 percent by weight of carbon, provided for in item 607.30 of the Tariff Schedules of the United States, is 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.

Determination

On the basis of information obtained in the present investigation we have determined that ferrochromium, not containing over 3 percent by weight of carbon, provided for in item 607.30 of the Tariff Schedules of the United States, is 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, we have found that, even though imports have increased, such imports are not a "substantial cause" of any serious injury, or threat thereof, that the industry may experience. Since our negative determination rests on our analysis of the "substantial cause" criterion, we will forgo any further discussion of increased imports and serious injury or threat thereof.

The subject article and the domestic industry

Low-carbon ferrochromium is a ferroalloy which contains not over 3 percent by weight of carbon. Its primary use is in the production of stainless steel. High-carbon and silicon ferrochromium and stainless steel scrap are also used to produce stainless steel.

For the purpose of this investigation, we have considered the relevant domestic industry to consist of the facilities engaged in the production of low-carbon ferrochromium. Low-carbon ferrochromium is currently manufactured by three domestic producers: Interlake, Inc., Satralloy, Inc., and Union Carbide Corp.

Imports not a substantial cause of serious injury, or the threat thereof

Section 201(b)(4) of the Trade Act of 1974 provides a dual test to determine whether imports are a "substantial cause" of serious injury or the threat thereof. First, the imports as a causative factor must be "important"; second, they must be "not less than any other cuase." Taking this into consideration, and after examining all the relevant economic factors presented in the investigation, we find that increased imports, even if an important cause of any injury, or the threat thereof, to the domestic industry, are a less important cause than at least one other factor, i.e. the introduction and use of a stainless steel refining process known as Argon-Oxygen-Decarburization (AOD).

In 1968, Union Carbide Corp. introduced a stainless steel refining process which has significantly altered the volume of high- and low-carbon ferrochromium used in the process. The AOD process allows the stainless steel producer, without prohibitive capital investments, to obtain the chromium input by substituting less costly high-carbon ferrochromium for low-carbon ferrochromium. Over the past 5 years, all major domestic stainless steel producers have installed, or are in the process of installing, AOD capacity. The effect has been a drastic reduction in the consumption of low-carbon ferrochromium. In 1968, 115 pounds of the low-carbon ferroalloy were consumed for each ton of stainless steel produced; by 1976 the figure had plummeted to 38 pounds per ton. In contrast, during the same period the consumption of high-carbon ferrochromium per ton of stainless steel produced doubled.

The shift to AOD technology is still occurring. In 1977, eight new U.S. AOD facilities will begin production of stainless steel. There is evidence that, in 1976, approximately 60 percent of U.S. stainless steel was produced using the AOD process, and it is projected that, by the end of the decade, 95 percent of stainless steel produced in the United States will be produced by the AOD process, with a concomitant decrease in low-carbon ferrochromium consumption.

Conclusion

In view of the evidence discussed above, we determine that the increased imports of low-carbon ferrochromium are not a substantial cause of any serious injury or threat thereof to the domestic industry producing a like or directly competitive article.

Dissenting Views of Commissioner George M. Moore

The basic facts in this proceeding under Section 201 of the Trade Act of 1974 are not in dispute. The nature and content of the petition, the notice of investigation, the Commission's actions, and the evidence developed during the Commission's investigation are outlined in this report.

This investigation was conducted to determine whether imports of so-called low-carbon ferrochromium (hereinafter referred to as LCF) are being imported in such increased quantities as to be a substantial cause of serious injury, or the threat thereof, to the domestic industry producing LCF.

Based upon all the available evidence, I have made an affirmative determination. The domestic LCF industry is being threatened with serious injury, and such threatened injury is caused by imports to a degree equal to, or greater than, that of any other economic factor.

The statutory requirement that there can be an increase in imports is clearly satisfied. During the period 1970-76, imports of LCF rose from 18,353 tons (chromium content) to 42,961 tons, or by 134 percent. In the same period 1970-76, imports as a percentage of domestic production rose nearly ninefold from 25 percent to 218 percent. Imports in 1976 captured almost 87 percent of apparent domestic consumption, compared with 17.5 percent in 1970.

There is no doubt that the domestic LCF industry is threatened with serious injury. In terms of the statutory requirements the evidence of

threatened injury to the domestic industry is as follows:

(1) Declining sales.--U.S. producers' shipments of LCF fell by 60 percent during the period 1972-76--from 56,000 tons (chromium content) to about 22,000 tons. If the period 1973-76 is considered, the decline in U.S. producers' shipments is even greater. The Commission investigation shows that in 1976 the domestic industry lost sales of at least 6,000 tons of domestically produced LCF to imports.

(2) Higher and growing inventories.--The aggregate level of inventories held by producers, consumers, and importers did not change significantly over the period 1972-77. However, importers' inventories increased substantially from 6.2 thousand tons to 19.4 thousand tons during this period. On January 1, 1977, importers' inventories were equal to about 5 months' domestic consumption, and these inventories threaten serious injury to the domestic industry.

(3) Downward trend in production.--U.S. production of LCF declined by about 58 percent during the period 1972-76, from 47.8 thousand tons to 19.7 thousand tons. The decline was particularly sharp from 1975 to 1976 when domestic production was cut by nearly 50 percent.

(4) Downward trend in profitability.--The ratio of net profit to net sales for the operations of U.S. producers' establishments within which LCF was produced fell 38 percent between 1974 and 1976--from 14.1 percent to 8.8 percent. The evidence shows that the profitability of the domestic industry will continue to erode in 1977, since the domestic LCF industry is now operating at or close to a break-even point.

(5) Downward trend in employment.--Employment trends in the domestic LCF industry are clearly downward. The average number of production and related workers engaged in the production of LCF declined from 480 in 1972 to 224 in 1976 as man-hours worked decreased from 784,000 to 468,000 in the same period.

The remaining statutory requirement to be satisfied in this case relates to the "substantial cause" of the threatened serious injury to the domestic LCF industry. The term "substantial cause" in Section 201 of the Trade Act of 1974 means a cause which is important and not less than any other cause.

I believe that there are three economic factors causing the threat of serious injury to the domestic LCF industry. They are (1) the general economic recession in 1974-75, (2) the conversion to the Argon-Oxygen-Decarburization (AOD) technology by the stainless steel industry, and (3) increased LCF imports.

The general economic recession in 1974-75 contributed to a reduction in the domestic consumption of all ferroalloys, which decreased from 349,000 tons in 1974 to 192,000 tons in 1975. However, in 1976 consumption increased to 229,000 tons, with further increases in 1977. During the period of the recession and throughout 1976 and into the first quarter of 1977, imports increased in amount, total value, and as a percentage of domestic consumption and relative to production. Whatever effect the recession had or will have on the domestic LCF industry is less important than the economic effect of rapidly increasing LCF imports.

The conversion to AOD technology by the stainless steel industry significantly reduced the demand for LCF in the United States. The conversion is now virtually completed. The impact of the conversion was largely absorbed by three domestic firms that ceased production of LCF between 1972 and 1974.

The impact of AOD technology on the domestic LCF industry has spent its force. It no longer poses a threat of serious injury to the domestic industry.

Evidence developed during the investigation established that U.S. demand for LCF will level off at nearly 35,000 tons annually in the foreseeable future.

The continued increasing LCF imports were not inhibited by the domestic application of AOD technology. These imports, which have now captured 87 percent of domestic consumption, threaten to completely destroy the domestic industry. It is clear that the domestic producers of LCF would have been able to adjust to the decreased demand for LCF had it not been for the relentless increase in these imports.

There is an ever-increasing amount of excess LCF productive capacity abroad. Much of the LCF produced from such foreign excess capacity can be expected to find its way to the United States. This country is the only export market of consequence for low-carbon ferrochromium by reason of the relatively high tariffs and non-tariff barriers imposed by other industrial nations.

The Congress anticipated a situation involving evidence such as was developed during this investigation. The two Congressional Committees

involved with the Trade Act of 1974 indicated that the Commission should consider that a threat of serious injury exists when serious injury, although not yet existing, is imminent if import trends continue unabated.

There is nothing in the legislative history of the Trade Act of 1974 suggesting that a domestic industry weakened by other economic factors, but threatened with extinction by reason of increased imports should be denied the benefits of the Act. It is not the function of this Commission to decide which domestic industry can be saved or which domestic industry is worth saving.

On the basis of the foregoing considerations, I have concluded that increased imports are a substantial cause of the threat of serious injury to the domestic industry producing an article like or directly competitive with imported low-carbon ferrochromium.

INFORMATION OBTAINED IN THE INVESTIGATION

Introduction

On January 10, 1977, the Committee of Producers of Low Carbon Ferrochromium filed a petition with the United States International Trade Commission for import relief pursuant to section 201 of the Trade Act of 1974.

Following receipt of the petition, the U.S. International Trade Commission instituted an investigation on January 21, 1977, to determine whether ferrochromium, not containing over 3 percent by weight of carbon, provided for in item 607.30 of the Tariff Schedules of the United States (TSUS), is 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 institution of the investigation was issued on January 28, 1977, notice of the date and site of the public hearing was issued on March 8, 1977, and notice of the time and place of the public hearing was issued on March 21, 1977. The notices were posted at the Commission's offices in Washington, D.C., and New York City, and were published in the Federal Register on February 2, 1977 (42 F.R. 6432), March 11, 1977, (42 F.R. 13609), and March 24, 1977 (42 F.R. 15979), respectively. A public hearing in connection with the investigation was held on April 5, 1977, in the Federal Building's hearing room in Pittsburgh, Pa.

The Commission instituted one previous investigation covering low-carbon ferrochromium. On May 21, 1973, following receipt of a petition filed by the Ferroalloys Association, the U.S. Tariff Commission (the former name of the U.S. International Trade Commission) instituted an investigation (No. TEA-I-28) under section 310(b)(1) of the Trade Expansion Act of 1962 to determine whether ferrochromium, ferromanganese, ferrosilicon, ferrochromium silicon, ferrosilicon manganese, chromium metal, manganese metal, and silicon metal were, as a result in major part of concessions granted under trade agreements, being imported into the United States in such increased quantities as to cause, or threaten to cause, serious injury to the domestic industry or industries producing like or directly competitive products. On June 28, 1973, investigation No. TEA-I-28 was discontinued by the Commission at the request of the petitioner without a determination on the merits and without prejudice.

Description and Uses

Chromium is a hard, brittle, corrosion-resistant metal with a high melting point. Domestic deposits of chromite, the ore from which chromium is obtained, are small and of low grade. Thus, the domestic chromite-consuming industry, of which the producers of low-carbon ferrochromium are a part, is dependent primarily upon imports for its source of new supply.

In the metallurgical industry, chromium is used primarily in the production of stainless steel, other high-chromium specialty steels, and high-temperature alloys to provide strength, hardness, and resistance to corrosion, wear, and heat. Chromium is added to these items by means of chromium-containing ferroalloys. A discussion of these ferroalloys follows.

Low-carbon ferrochromium

Low-carbon ferrochromium is defined in the TSUS as ferrochromium 1/ not containing over 3 percent, by weight, of carbon. Commercial grades of this item contain from 0.01 to 0.75 percent carbon, from 60 to 75 percent chromium, and a maximum of 1.0 to 8.0 percent silicon, with the remainder largely iron. 2/

Low-carbon ferrochromium is manufactured by two methods. The first method, which is employed by the petitioners in this investigation, involves a two-step process and the use of two types of electric furnaces. In one furnace, an open-arc tilting type, chrome ore and lime are melted. In the second furnace, a submerged-arc type, chrome ore, quartz, and coke are melted to make ferrosilicon chromium (also known as ferrochromium silicon and chrome silicide). The chrome ore-lime mixture is combined with the ferrosilicon chromium in a reaction vessel, and the resulting product is low-carbon ferrochromium. The low-carbon ferrochromium is then broken, crushed, and sold to consumers.

The second method of manufacturing low-carbon ferrochromium is employed only by Union Carbide Corp. The starting material is standard high-carbon ferrochromium, which is ground to a fine powder, mixed with silica sand, and pressed into briquets. The briquets are placed on a flatcar and rolled into a horizontal, cylindrical, high-vacuum furnace approximately 140 feet long and 15 feet in diameter. The heating of the briquets in the vacuum results in low-carbon ferrochromium known in the trade as Simplex.

1/ Ferrochromium is defined as a ferroalloy which contains, by weight, over 30 percent of chromium but not over 10 percent of silicon.

2/ ASTM Specifications for Ferro-Alloys, March 1975, p. 12.

The basic difference between Simplex and conventional low-carbon ferrochromium is that Simplex contains less carbon (0.01 to 0.05 percent as opposed to 0.025 to 0.75 percent). 1/ Although some consumers prefer Simplex to conventional low-carbon ferrochromium, others do not, and both are generally considered to be competitive for most uses.

High-carbon ferrochromium

High-carbon ferrochromium is defined in the TSUS as ferrochromium containing over 3 percent, by weight, of carbon. Commercial grades of high-carbon ferrochromium contain from 52 to 72 percent chromium, from 4.0 to 9.5 percent carbon, and from 3.0 to 10 percent silicon, with the remainder largely iron. 1/

The method of manufacturing high-carbon ferrochromium is virtually identical to the conventional method of manufacturing low-carbon ferrochromium except that the two-step process is eliminated. The furnace charge is melted in a submerged-arc furnace, the furnace is tapped, and the resulting product is broken, crushed, and shipped to consumers.

Ferrosilicon chromium

Ferrosilicon chromium is defined in the TSUS as a ferroalloy which contains, by weight, over 30 percent of chromium and over 10 percent of silicon. The method used to manufacture ferrosilicon chromium is described above.

Ferrosilicon chromium serves a dual role for the low-carbon ferrochromium producer--it is an intermediate product in the manufacture of low-carbon ferrochromium and, in addition, is sold to consumers as a separate product. The basic difference between the intermediate and commercial products is that the latter contains a higher silicon content as a result of varying the inputs of the charge--i.e., adding relatively greater amounts of quartz.

The bulk of all chromium-containing ferroalloys are used in the manufacture of stainless steel. The objective of the stainless steel producers is to obtain the lowest cost chromium available. Chromium raw materials are available from the previously mentioned ferroalloys and stainless steel scrap. The determining factors in obtaining the lowest cost chromium inputs are the relative prices of the alternative sources and power requirements. Thus, the initial steel melt will include as much stainless steel scrap as possible since it usually contains the lowest cost chromium units of the alternative sources.

1/ ASTM Specifications for Ferro-Alloys, March 1975, p. 12.

The scrap addition will be followed with inputs of high carbon ferrochromium and low-carbon ferrochromium, in that order. Ferrosilicon chromium is added in the final stages of the melting process to return chromium oxide, which has accumulated in the melt slag, back into the melt as chromium metal. In the final stages of melt preparation the mixture is analyzed, and, if necessary, low-carbon ferrochromium will be added to obtain the desired composition of the melt. In the conventional stainless-steel-making process, low-carbon ferrochromium is the principal chromium ferroalloy addition because it is not technologically feasible to remove the excess carbon contained in high-carbon ferrochromium.

After stainless steel production, the largest use of chromium-containing ferroalloys (although it is small in relation to total consumption of these alloys) is in the manufacture of superalloys. 1/ Superalloys, in turn, are used in such applications as jet-engine component parts. Additional smaller quantities of the chromium-containing ferroalloys are used in cast iron, welding and alloy hard-facing rods, and other miscellaneous products.

In 1968, Union Carbide Corp. introduced a stainless-steel-refining process which has significantly altered the use of high- and low-carbon ferrochromium. This process, known as Argon-Oxygen-Decarburization (AOD), allows the stainless steel producer, without prohibitive capital investments, to substitute, almost wholly, lower cost high-carbon ferrochromium for higher cost low-carbon ferrochromium to obtain the chromium input. All major domestic stainless steel producers have installed, or are in the process of installing, AOD capacity.

The following tabulation, which is based upon consumption data from official statistics of the U.S. Bureau of Mines and stainless steel production data from the American Iron and Steel Institute, illustrates the change in the consumption pattern for the chromium-containing ferroalloys which has occurred as a result of stainless

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1/ Superalloys are alloys developed for very high temperature service where relatively high stresses are encountered and oxidation resistance is frequently required.

steel refining by the AOD process (in pounds of ferroalloy consumed per ton of stainless steel produced): 1/

Ferroalloy	1968	1976
Low-carbon ferrochromium	115	38
High-carbon ferrochromium	67	132
Ferrosilicon chromium	34	24
Total	216	194

Although the AOD process does provide greater chromium recovery, the bulk of the decline in total consumption of the chromium-containing ferroalloys per ton of stainless steel produced, as indicated above, is the result of the amount of stainless steel scrap consumed in the melt. The amount of stainless steel scrap consumed is, in turn, determined by its price relative to prices of the chromium-containing ferroalloys.

Substitutability of the chromium-containing ferroalloys

The chromium-containing ferroalloys, although produced from essentially the same raw materials, are different in two principal respects--chemical composition and price.

With regard to chemical composition, the high carbon content of high-carbon ferrochromium limits the amount of the ferroalloy which may be added to the melt in the conventional stainless-steel-refining process. If high-carbon ferrochromium were substituted for low-carbon ferrochromium, it would not be feasible to remove all of the excess carbon. The resulting stainless steel product would be unsuitable for use.

The ability to remove excess carbon feasibly was achieved with the introduction of the AOD stainless-steel-refining process. As a result, high-carbon ferrochromium became the principal chromium-containing ferroalloy addition to the stainless steel melt. Low-carbon ferrochromium can be substituted for high-carbon ferrochromium in both the AOD and the conventional processes; however, it would not be in the economic interest of the stainless steel producer to effect such a substitution because of the difference in price--i.e., high-carbon ferrochromium is substantially less expensive.

1/ The index of stainless steel production is provided on page A-60. It shows a peak year of production in 1974, a decrease in 1975, and an increase in 1976.

Ferrosilicon chromium differs from low-carbon and high-carbon ferrochromium in use as well as in chemical composition and price. This alloy is added to the stainless steel melt principally as a vehicle to return chromium oxide which has accumulated in the melt slag to the melt as chromium metal. Neither low-carbon nor high-carbon ferrochromium is capable of satisfactorily performing this function.

U.S. Tariff Treatment

Low-carbon ferrochromium is classified under TSUS item 607.30 with a column 1 rate of duty of 4 percent ad valorem. The current rate represents a reduction, pursuant to the Kennedy round negotiations, from 8.5 percent ad valorem applicable on December 31, 1967.

High-carbon ferrochromium and ferrosilicon chromium are classified under TSUS items 607.31 and 607.55, respectively. These items were not subject to Kennedy round reductions. The column 1 rate on high-carbon ferrochromium--0.625 cent per pound on chromium content--has been in effect since January 1, 1948. The column 1 rate of duty on ferrosilicon chromium--10 percent ad valorem--reflects the final stage of concessions negotiated under the General Agreement on Tariffs and Trade (GATT) in 1960-62.

Status of General Services Administration programs

As a result of the stockpile study announced on October 1, 1976, the stockpile goals for metallurgical-grade chromite and low-carbon ferrochromium were increased from 444,710 short dry tons (SDT) to 2,550,000 SDT and from no objective to 124,000 tons, respectively.

At the end of 1976 the stockpile contained slightly less than 3 million tons of metallurgical-grade chromite, with some 22 percent composed of nonstockpile-grade material. At the same time, the stockpile contained about 319,000 tons of low-carbon ferrochromium--123,000 tons in excess of the stockpile goal. There is currently no authorization to dispose of the excess low-carbon ferrochromium contained in the stockpile, and no such authorization is anticipated.

History of the Rhodesian Chrome Embargo

On December 16, 1966, the United Nations Security Council, with the affirmative vote of the United States, adopted Resolution 232, which called upon all U.N. members to prevent the--

> importation] into their territories of . . . chrome . . . originating in Southern Rhodesia and exported therefrom after [December 16, 1966].

In compliance with Resolution 232, on December 19, 1966, the President, issued Executive Order 11322 1/ prohibiting the importation into the United States of, among other products, Rhodesian chrome or products made therefrom in Rhodesia or elsewhere.

The embargo on Rhodesian chrome remained in effect until January 1, 1972, the effective date of the so-called Byrd amendment to section 10 of the Strategic and Critical Materials Stock Piling Act. The Byrd amendment 2/ provides in pertinent part that--

> Notwithstanding any other provision of law . . . the President may not prohibit or regulate the importation into the United States of any material determined to be strategic and critical pursuant to the provisions of this Act, if such material is the product of any foreign country or area not listed as a Communist-dominated country or area in general headnote 3(d) of the Tariff Schedules of the United States . . . for so long as the importation into the United States of material of that kind which is the product of such Communist-dominated countries or areas is not prohibited by any provision of law.

Since Rhodesia is not a Communist-dominated country, and inasmuch as the United States imported substantial quantities of strategic and critical chromium-bearing materials from Communist countries (notably the U.S.S.R.), the Byrd amendment implied the resumption of Rhodesian chromium exports to the United States.

The Byrd amendment was in effect with respect to Rhodesian chrome until the passage, on March 18, 1977, of Public Law 95-12, 3/ an amendment to section 5 of the United Nations Participation Act of 1945. 4/ That amendment provides in part that--

> Any Executive order . . . which applies measures against Southern Rhodesia pursuant to any United Nations Security Council Resolution may be enforced, notwithstanding the provisions of any other law.

Public Law 95-12 further provides that so long as the U.N. economic sanctions with regard to Rhodesia remain in effect, shipments of chromium-containing steel mill products may not be released from customs custody for entry into the United States unless a certificate

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1/ 3 CFR 606.
2/ 50 U.S.C. 98h-1.
3/ 91 Stat. 22
4/ 22 U.S.C. 287c.

of origin with respect to each such shipment has been filed with the Secretary of the Treasury and such certificate establishes that the chromium contained in the shipment is not of Rhodesian origin.

Public Law 95-12 and the Department of the Treasury regulations implementing that statute are set out in appendix A. Also included in appendix A is the text of a statement presented before the Senate Subcommittee on African Affairs on February 10, 1977, by Julius L. Katz, Assistant Secretary of State for Economic and Business Affairs, regarding the economic implications of repealing the Byrd amendment.

The Question of Increased Imports

U.S. imports of ferrochromium not containing over 3 percent, by weight, of carbon (low-carbon ferrochromium) enter the United States under TSUS item 607.30. Such imports are limited to a narrow range of grades and sizes, all of which are like or directly competitive with domestic production. In recent years, U.S. imports of low-carbon ferrochromium have been sourced principally from Japan, the Republic of South Africa, and Rhodesia.

This section will examine the facts relating to the question of increased imports. Initially, the discussion will focus on the increase or decrease in imports for various time periods. The factors which caused imports to fluctuate over the period will be enumerated. Finally, the ratio of U.S. imports to consumption and production will be reviewed.

U.S. imports

During the period 1968-76 the level of imports of low-carbon ferrochromium frequently varied. Imports were at their highest levels in 1968, 1972, and 1976 and at their lowest levels in 1970 and 1973 (see the following table and fig. 1). 1/ For the period 1968-76 the import trend line is slightly upward; for the period 1971-76, the import trend line is more steeply upward.

Factors affecting U.S. imports

The frequent variations in total U.S. low-carbon ferrochromium imports and the change in the 1971-76 import trend line were influenced by several factors, including the level of worldwide demand for stainless steel, the adoption of AOD technology, and the passage of the Byrd amendment.

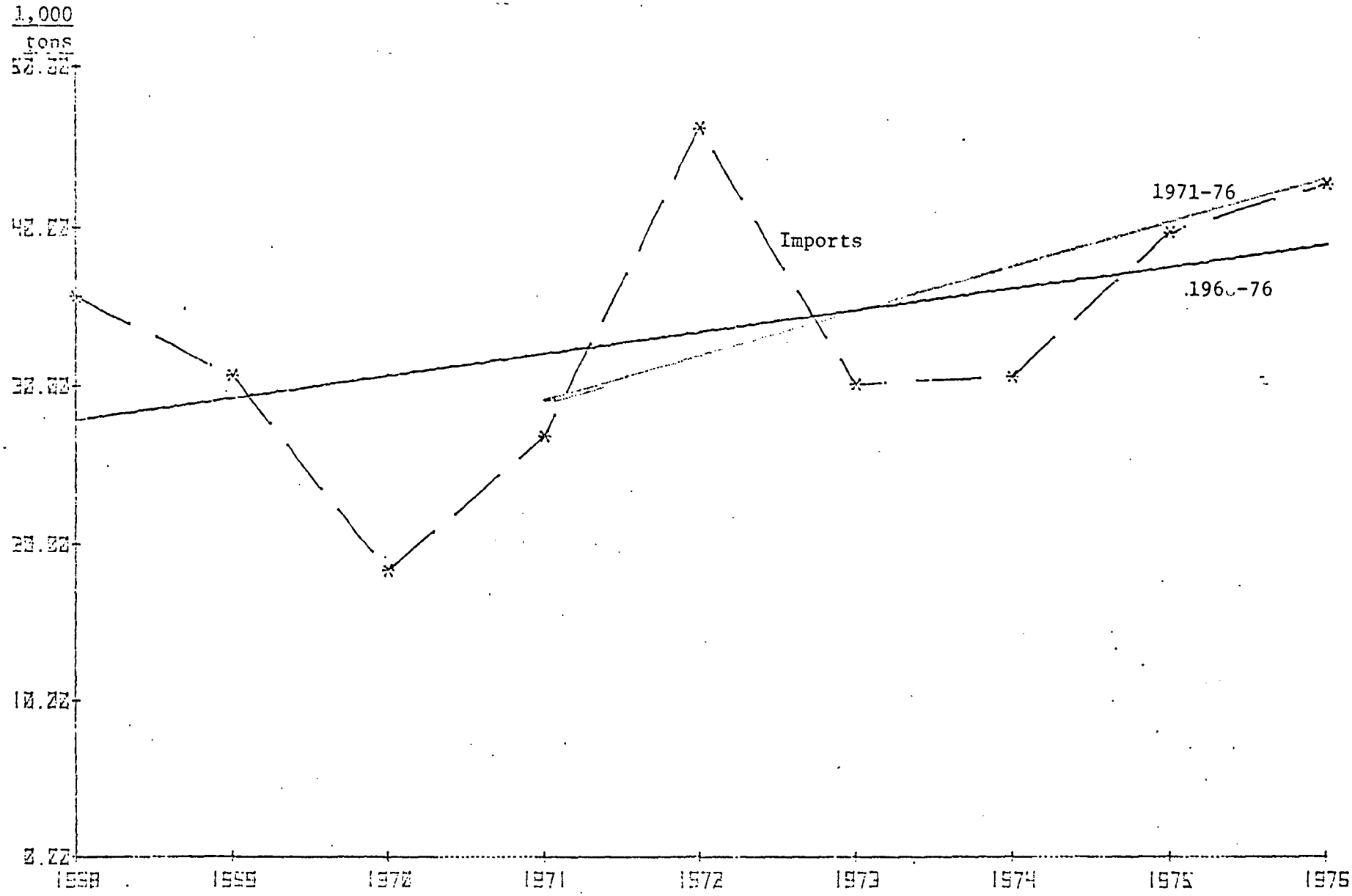
1/ Annual U.S. imports of high-carbon ferrochromium and ferrochromium silicon are shown in table 1 in appendix B, and unit values are shown in table 20.

Low-carbon ferrochromium: U.S. imports, by sources, 1968-76

Source	1968	1969	1970	1971	1972	1973	1974	1975	1976
	Quantity (tons, chromium content)								
Japan	314	445	210	4,882	9,598	7,577	4,602	11,816	19,360
Republic of South Africa	16,430	12,192	11,658	8,661	14,406	8,745	12,429	14,511	6,829
Rhodesia	0	0	0	0	2,181	3,329	3,514	3,714	5,785
West Germany	4,857	7,061	1,910	3,728	2,163	1,506	3,444	3,205	2,667
France	1,714	348	21	773	336	0	0	671	2,459
Sweden	4,846	2,865	2,192	4,036	7,125	4,542	2,653	2,114	2,217
Norway	4,489	2,118	2,362	2,490	4,505	2,163	2,037	1,585	1,974
Turkey	2,351	3,456	0	750	4,703	1,180	1,565	1,297	777
Brazil	0	0	0	0	0	0	0	214	530
All other	779	2,260	0	1,734	1,232	1,182	519	806	363
Total	35,780	30,745	18,353	26,973	46,249	30,224	30,763	39,933	42,961
	Value (1,000 dollars)								
Japan	127	164	71	2,943	5,434	4,263	4,162	23,410	23,582
Republic of South Africa	5,903	4,973	4,517	3,459	5,955	4,385	7,531	11,002	8,168
Rhodesia	-	-	-	-	1,114	1,871	2,258	5,369	8,098
West Germany	1,827	1,474	922	2,342	1,211	1,117	2,875	5,076	3,899
France	634	134	9	425	177	-	-	1,083	3,335
Sweden	1,802	1,098	1,146	2,492	3,958	2,786	2,437	4,039	3,470
Norway	1,611	789	1,081	1,460	2,422	1,260	1,710	2,459	2,414
Turkey	796	1,214	-	357	2,311	598	745	1,735	989
Brazil	-	-	-	-	-	-	-	479	721
All other	258	794		844	740	642	409	937	108
Total	12,958	10,640	7,746	14,322	23,322	16,922	22,127	55,589	54,784
	Percent of total quantity								
Japan	0.9	1.4	1.1	18.1	20.8	25.1	15.0	29.8	45.1
Republic of South Africa	45.9	39.7	63.5	32.1	31.1	28.9	40.4	36.3	15.9
Rhodesia	0	0	0	0	4.7	11.0	11.4	9.3	13.5
West Germany	13.6	23.0	10.4	13.8	4.7	5	11.2	8	6.2
France	4.8	1.1	0.1	2.9	.8	0	0	1.7	5.7
Sweden	13.5	9.3	11.9	15.0	15.4	15.0	8.6	5.3	5.2
Norway	12.5	6.9	13.0	8.9	9.7	7.2	6.6	3.7	4.6
Turkey	6.6	11.2	0	2.8	10.2	3.9	5.1	3.2	1.8
Brazil	0	0	0	0	0	0	0	.5	1.2
All other	2.2	7.4		6.4	2.6	3.9	1.7	2.2	.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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

Figure 1.--Low-carbon ferrochromium: U.S. imports with trend lines, 1968-76 and 1971-76



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

The steep 1971-76 import trend line reflects the large jump in U.S. imports from Japan and Rhodesia. Prior to 1971, Japan was a minor supplier of U.S. low-carbon ferrochromium imports. However, as the Japanese stainless steel industry converted to AOD type technology, a large amount of Japanese low-carbon ferrochromium capacity became excess to the Japanese stainless steel industry and available for export. In addition, the slope of the 1971-76 trend line was raised by the steadily increasing imports from Rhodesia after the 1972 passage of the Byrd amendment.

The changing level of worldwide demand for stainless steel and its resulting effects on foreign low-carbon ferrochromium capacity-utilization rates strongly affected the yearly variations in U.S. import levels. In the industrialized nations, the foreign ferrochromium producing industry first meets the needs of the indigenous stainless steel industry and exports any excess. Thus, during periods of high demand by the indigenous stainless steel industry, exports have tended to be small. Conversely, during periods of low indigenous demand, low-carbon ferrochromium exports have tended to increase in order for the foreign ferrochromium producer to maintain optimal production levels. The United States, as the world's largest consumer of ferrochromium, is a principal export market for any foreign ferrochromium producer.

Ratios of U.S. imports to production and consumption 1/

The changes in the ratios of U.S. low-carbon ferrochromium imports to U.S. production and consumption have been dramatic (see the following table and figs. 2 and 3).

Low-carbon ferrochromium: Ratios of imports to U.S. production and consumption, 1968-76

(In percent)

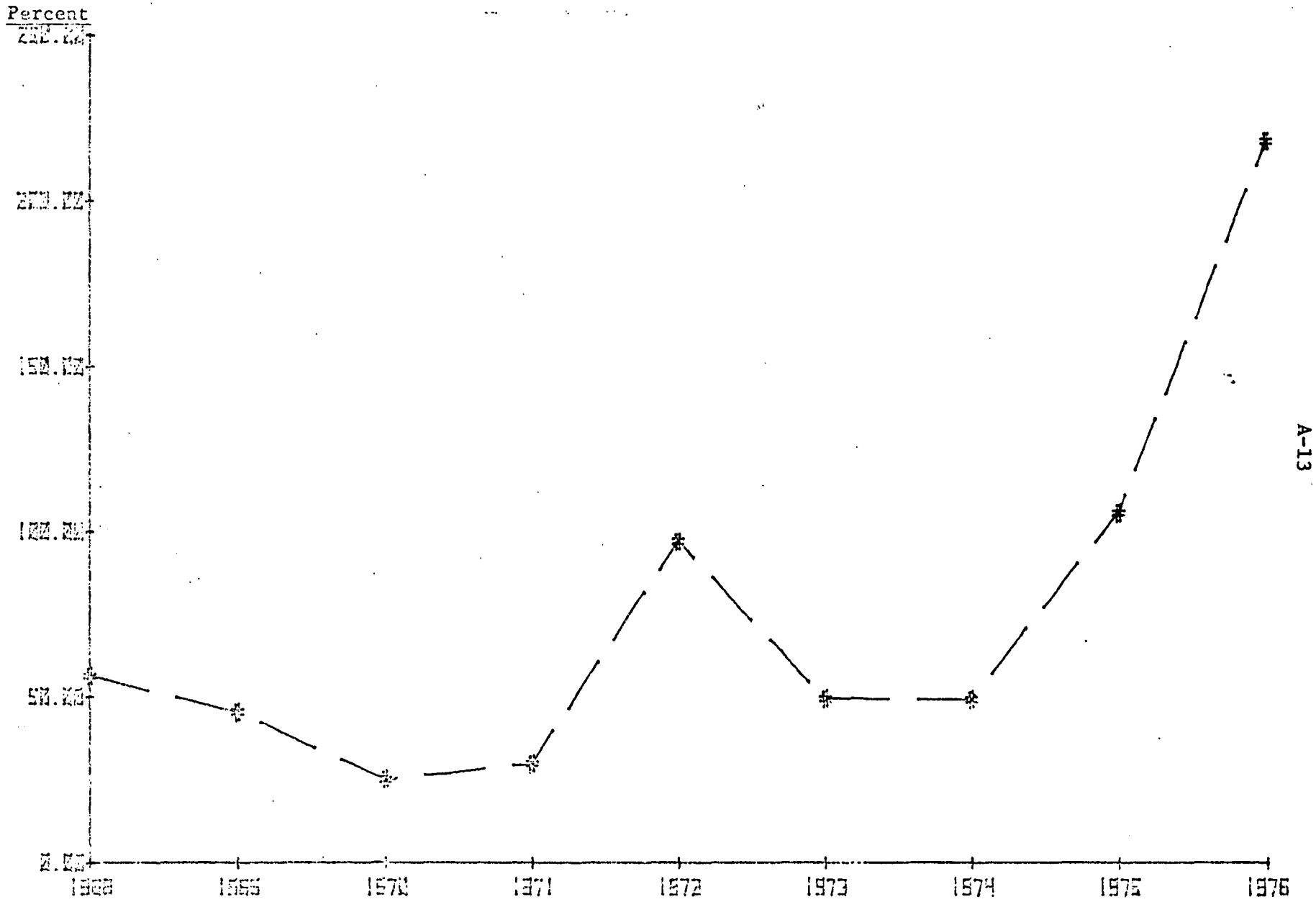
Ratio of low carbon ferrochromium imports to--	1968	1969	1970	1971	1972	1973	1974	1975	1976
U.S. low-carbon ferrochromium--									
Production	56.2	45.4	25.1	29.8	97.0	49.4	49.0	105.7	218.2
Consumption	34.1	28.1	17.5	31.0	55.4	29.5	24.9	78.8	86.6

The unusual combination of frequency and magnitude of change in these ratios is a reflection of the peak-valley import effect--i.e., imports at peak, U.S. production and consumption in valley. The dramatic increases in the 1975 and 1976 ratios were caused not only by this peak-valley relationship but also by the cumulative effect of the shift to A.O.D. technology in the United States and throughout the world.

1/ Ratios of U.S. imports of low-carbon ferrochromium to total U.S. ferrochromium production and consumption were as follows (in percent):

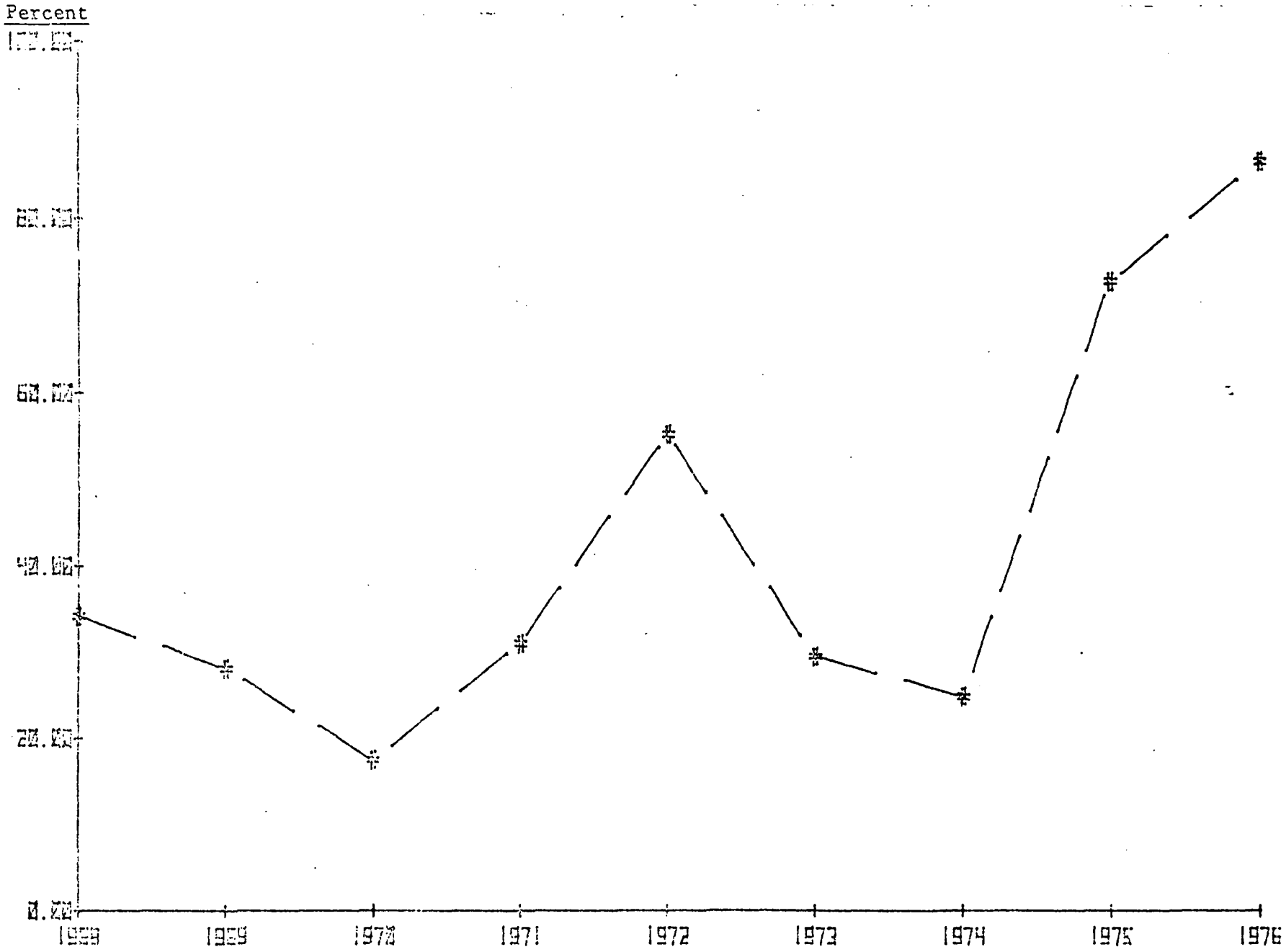
Ratio of low-carbon ferrochromium imports to--	1972	1973	1974	1975	1976
Total U.S. ferrochromium--					
Production	23.4	12.2	12.8	29.5	29.1
Consumption	20.0	10.0	8.8	20.7	18.8

Figure 2.--Low-carbon ferrochromium: Ratio of imports to production, 1968-76



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

Figure 3.--Low-carbon ferrochromium: Ratio of imports to consumption, 1968-76



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

The Question of Serious Injury to the Domestic Industry

This section examines the facts relating to the question of serious injury to the domestic industry. The discussion will initially focus on U.S. producers' capacity, production, and capacity utilization. Discussion will then follow on U.S. producers' shipments and inventories. The presentation will then shift to U.S. exports, employment, and man-hours. Finally, there will be a discussion on low-carbon ferrochromium pricing trends and a financial analysis of U.S. producers.

U.S. producers

Low-carbon ferrochromium is produced by the petitioners--Satralloy, Inc., at Steubenville, Ohio, and Globe Metallurgical Division, Interlake, Inc., at Beverly, Ohio, and by Union Carbide Corp., which is not a petitioner in this case, at Marietta, Ohio.

Satralloy, Inc., is a subsidiary of Satra Corp., a trading firm which is the principal domestic supplier of chrome ore from the U.S.S.R. In 1973, Satra Corp. purchased a ferroalloy plant formerly owned by Foote Mineral Co. and established Satralloy, Inc., as an operating subsidiary. Satralloy, Inc., specializes in the production of low-carbon ferrochromium and ferrosilicon chromium. In 1976 the firm also produced high-carbon ferrochromium. The plant was constructed in 1958 and was the last complete ferroalloy plant built in the United States.

Interlake, Inc., manufactures low-carbon ferrochromium through its Globe Metallurgical Division. In addition to low-carbon ferrochromium, Globe also produces high-carbon ferrochromium, ferrosilicon chromium, ferrosilicon, and silicon metal. The firm's output is marketed by Pickands Mather & Co., a leading sales agent for industrial raw materials.

Globe operates production facilities at two locations, Selma, Ala., and Beverly, Ohio. At Selma, production is confined to silicon metal; at Beverly, the firm produces low-carbon ferrochromium, high-carbon ferrochromium, ferrosilicon chromium, ferrosilicon, and silicon metal. The Beverly facility was constructed in the mid-1950's.

Union Carbide Corp. is by far the largest domestic firm engaged in the manufacture of low-carbon ferrochromium. The firm also manufactures a wide variety of other ferroalloys at six domestic locations. Union Carbide produces low-carbon ferrochromium only at its Marietta, Ohio, plant, which was constructed in the mid-1950's.

Capacity

Domestic capacity to produce low-carbon ferrochromium and the utilization of such capacity are provided in the following tabulation:

Year	Capacity	Utilization of capacity
	Short tons, chromium content	Percent
1972	84,636	56
1973	79,400	77
1974	70,128	86
1975	59,508	64
1976	59,508	33

* * * * * * *

Although the overall industry trend in production capacity was sharply down after 1972, firms in the low-carbon ferrochromium industry showed considerable fluctuation in their utilization of production capacity. * * *.

Furnace convertibility

In general, the open-arc tilting furnaces and submerged-arc stationary furnaces used in the manufacture of low-carbon ferrochromium can be converted to the manufacture of other ferroalloys. Market conditions and the downward trend in consumption of low-carbon ferrochromium induced producers to effect a limited number of such conversions during the 1972-76 period.

* * * * * * *

The submerged-arc stationary furnaces are more versatile than the open-arc tilting types. During the 1972-76 period, four conversions of the submerged-arc furnaces were reported by the domestic industry. These conversions involved changes in production from ferrosilicon to high-carbon ferrochromium, from ferrosilicon chromium to high-manganese blocking chrome, from high-manganese blocking chrome to high-carbon ferromanganese, and from high-carbon ferrochromium to ferromanganese. The costs of these conversions ranged from negligible for the first change to * * * for the last change.

Although the convertibility of furnaces used in the manufacture of low-carbon ferrochromium is technologically feasible, the economic feasibility of making extensive conversions is questionable for the petitioning firms. Under highly competitive market conditions, these firms would be competing against other firms in the industry manufacturing these ferroalloys in larger and more efficient furnaces. Thus, it is unlikely that the petitioning firms would be cost competitive with other firms in the ferroalloy industry.

Domestic production

During the period 1972-76, domestic production of low-carbon ferrochromium was as follows (in short tons, chromium content): 1/

Year	Quantity
1972	47,766
1973	60,917
1974	60,706
1975	37,875
1976	19,686

1/ Domestic production of the individual chromium ferroalloys and total production are provided in table 3.

In 1973 and 1974, low-carbon ferrochromium producers operated at their highest levels of the 1972-76 period to meet demand (see fig. 4). In 1975, however, purchases from the stainless steel sector declined, and the low-carbon ferrochromium producers, faced with increasing inventories, reduced output. Output continued to be reduced through 1976, and, by yearend, production had reached its lowest level since the U.S. Bureau of Mines began reporting the chromium ferroalloys separately in official statistics.

The trend in production of low-carbon ferrochromium has been downward since the introduction of the AOD stainless-steel-refining process in 1968. This technological change has placed the low-carbon ferrochromium industry in a position of being dependent not only upon the level of stainless steel production but also upon the method utilized by the stainless steel industry to effect such production. Thus, during periods in which stainless steel production is high, such as 1973 and 1974, both AOD and conventional capacity will be utilized in order to meet demand. As the utilization rate of conventional capacity rises, the demand for low-carbon ferrochromium also rises, and production is increased. During periods in which the stainless steel industry is operating at less than capacity levels, such as 1975 and 1976, conventional capacity utilization will be reduced and AOD capacity retained, causing the demand for low-carbon ferrochromium to decline.

U.S. producers' shipments

During the period 1972-76, producers' shipments of low-carbon ferrochromium were as follows: 1/

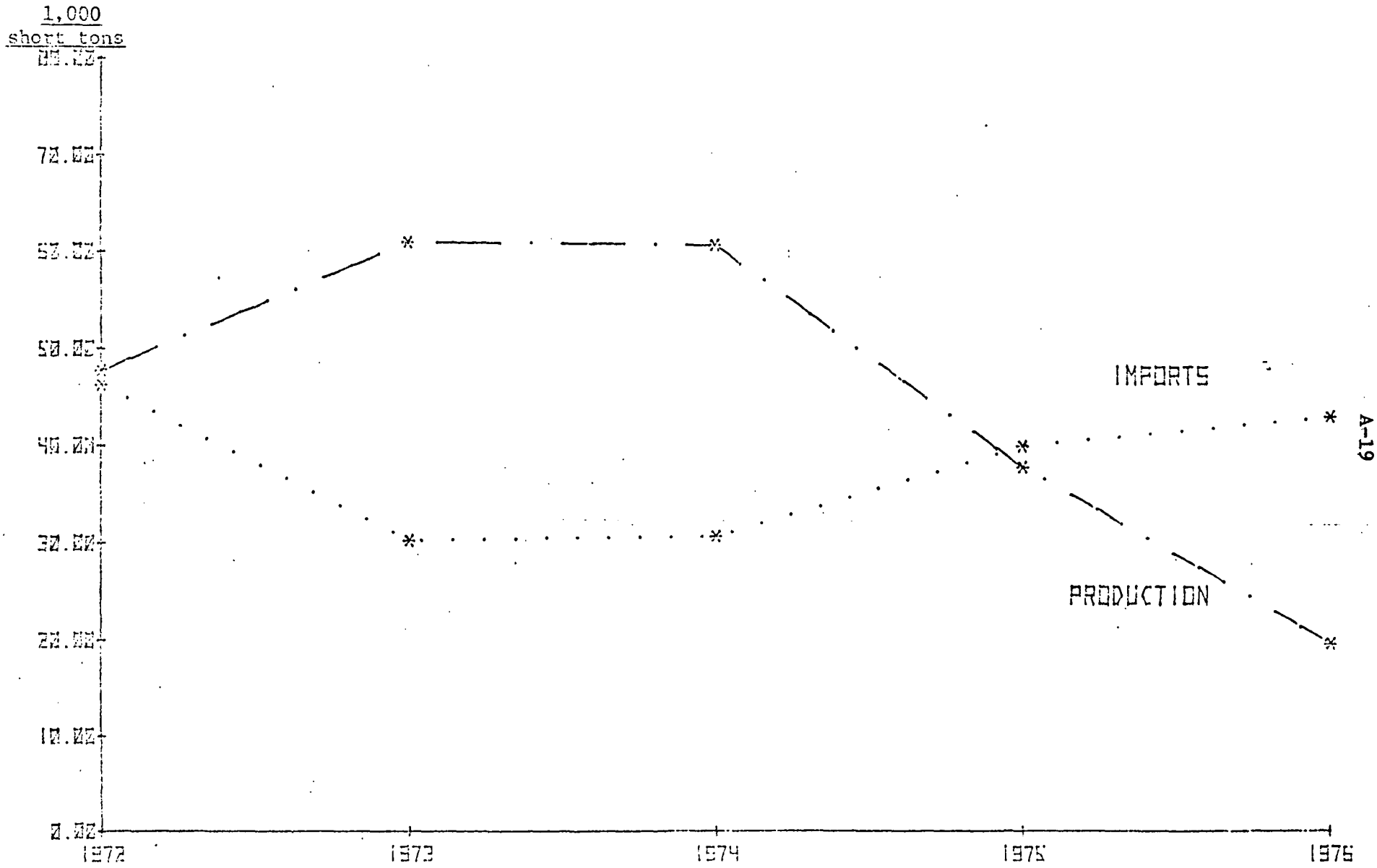
	Quantity (short tons chromium content)	Value (1,000 dollars)
1972	56,001	38,581
1973	72,404	45,988
1974	67,040	71,096
1975	30,328	56,489
1976	22,168	1/ 41,000

1/ Estimated

The increased stainless steel production which occurred in 1973 resulted in increased orders for low-carbon ferrochromium, not only to meet current demand but also to increase low-carbon ferrochromium inventories in anticipation of future increases in stainless steel production. As a result, low-carbon ferrochromium shipments substantially increased in 1973 (see fig. 5).

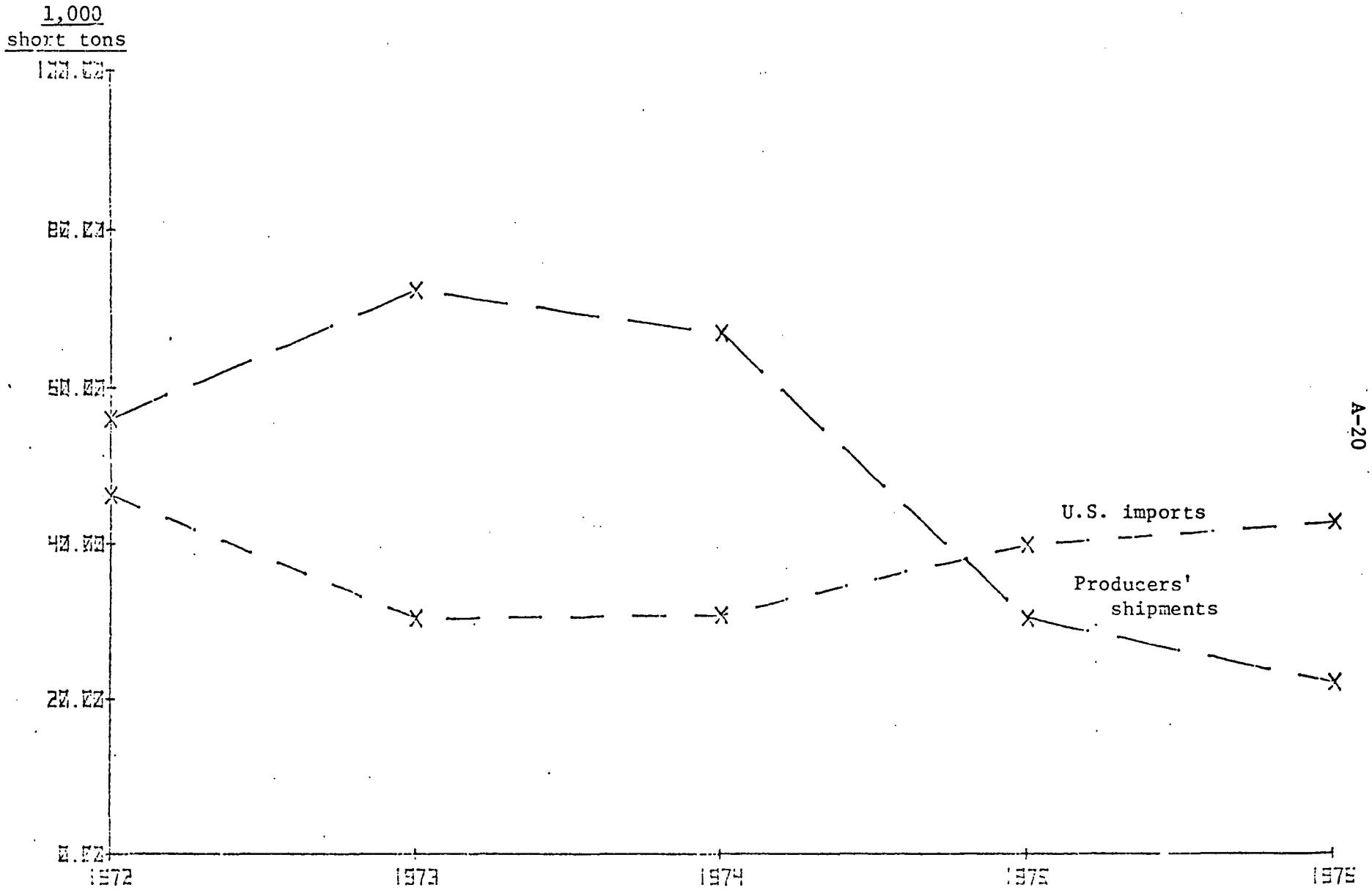
1/ Producers' shipments of the andividual chromium ferroalloys and total producers' shipments are provided in table 4

Figure 4.--Low-carbon ferrochromium: U.S. imports and production, 1972-76



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

Figure 5.--Low-carbon ferrochromium: U.S. imports and producers' shipments, 1972-76



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

The decline in stainless steel production which began late in the second half of 1974 was a major factor causing the quantity of low-carbon ferrochromium shipments to decline in that year. However, as a result of the shortages which prevailed earlier in the year, low-carbon ferrochromium prices substantially increased and the value of shipments markedly improved over the 1973 level.

The weakness in stainless steel demand continued throughout 1975 and the first quarter of 1976, further reducing consumers' orders of low-carbon ferrochromium and, in turn, shipments of low-carbon ferrochromium. Despite the 1975 weakness in stainless steel demand, low-carbon ferrochromium prices increased, and the value of shipments, although below the 1974 level, showed a much smaller decline than the quantity of shipments. According to the domestic producers, these high 1975 price levels were the result of increasing costs of operations, primarily for chrome ore, power, and labor.

Inventories

Producers' inventories.--U.S. producers' inventories of low-carbon ferrochromium began the 1972-76 period at a relatively high level (see the following table, figs. 6 and 7, and table 5). Despite a reduced rate of low-carbon ferrochromium production in 1972, the level of inventories remained high until the third quarter of 1973. At that time, increased demand from the stainless steel industry permitted significant inventory reductions.

Demand for stainless steel continued to be high throughout much of 1974, and, by yearend, low-carbon ferrochromium inventories had been reduced to abnormally low levels. In 1975, despite major production cutbacks, low-carbon ferrochromium inventories steadily increased, reaching their peak at the beginning of the third quarter. Production continued at reduced levels throughout 1976, and, by yearend, producers' inventories were considerably below the level in late 1975.

Consumers' inventories .--The level of consumers' inventories of low-carbon ferrochromium did not change significantly from the beginning of 1972 until late 1973. At that time, and continuing throughout 1974, consumers increased inventories in order to meet the then current and anticipated high level of stainless steel production. This anticipated level of stainless steel production did not materialize. As a result, consumers' inventories remained high throughout 1975 despite a significant reduction in purchases from low-carbon ferrochromium producers. Purchases were further reduced in 1976, and, at the beginning of 1977, consumers' inventories of low-carbon ferrochromium had returned to 1972 levels.

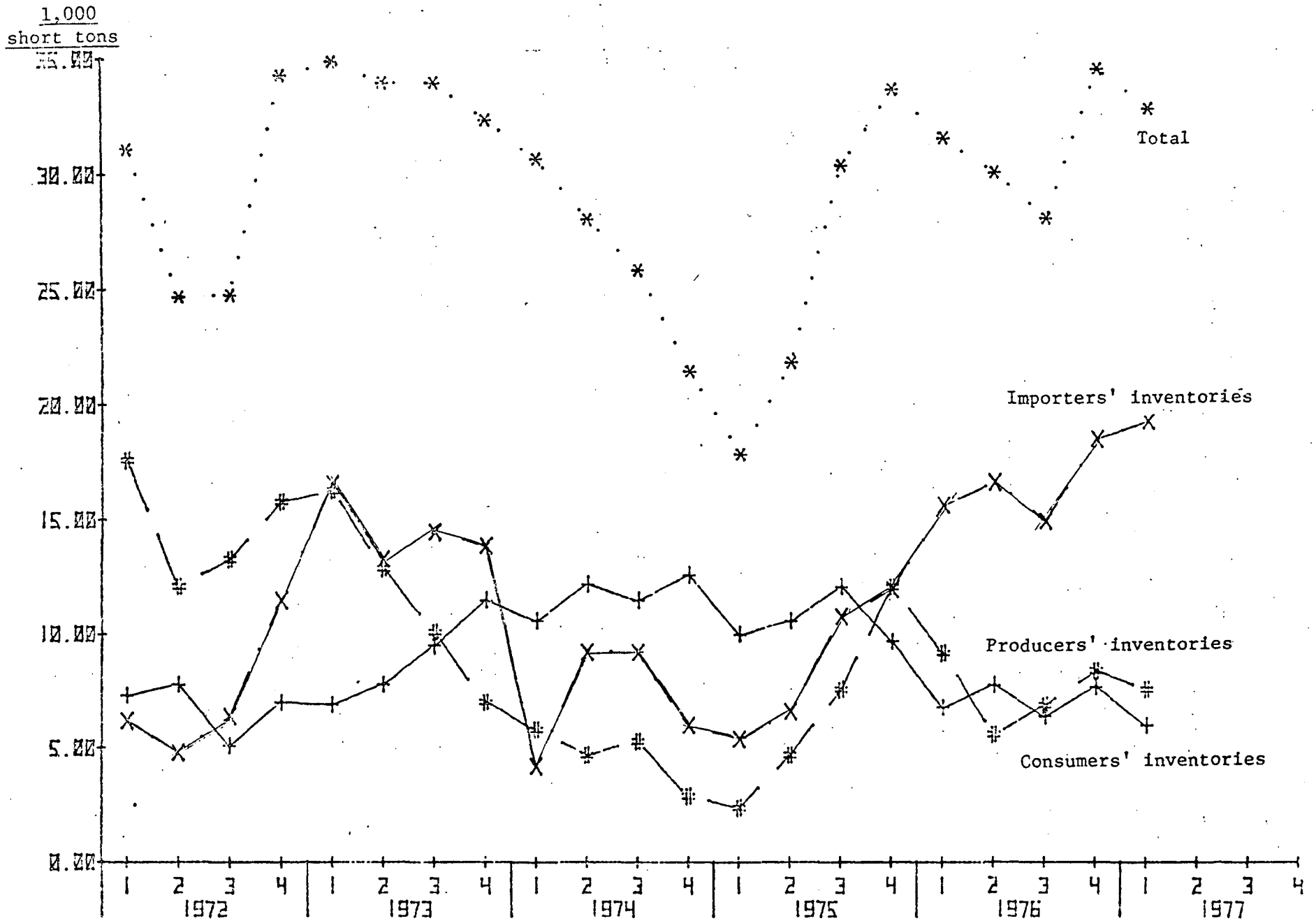
Low-carbon ferrochromium: U.S. producers', consumers', and importers' inventories, by quarters, Jan. 1, 1972-Jan. 1, 1977

(Short tons, chromium content)

Date	Producers'	Consumers'	Importers'	Total
1972:				
Jan. 1	17,594	7,342	6,207	31,143
Apr. 1	12,139	7,782	4,782	24,703
July 1	13,341	5,120	6,363	24,824
Oct. 1	15,847	6,975	11,472	34,294
1973:				
Jan. 1	16,290	6,869	16,590	39,749
Apr. 1	12,942	7,767	13,329	34,038
July 1	10,087	9,459	14,483	34,029
Oct. 1	6,966	11,524	13,906	32,396
1974:				
Jan. 1	5,809	10,608	14,232	30,649
Apr. 1	4,677	14,244	9,150	28,071
July 1	5,297	11,486	9,123	25,906
Oct. 1	2,962	12,564	5,950	21,476
1975:				
Jan. 1	2,441	9,995	5,447	17,883
Apr. 1	4,727	10,590	6,563	21,880
July 1	7,569	12,111	10,837	30,517
Oct. 1	12,137	9,722	11,972	33,831
1976:				
Jan. 1	9,187	6,845	15,645	31,677
Apr. 1	5,624	7,846	16,715	30,185
July 1	6,930	6,357	14,939	28,226
Oct. 1	8,434	7,677	18,591	34,702
Jan. 1, 1977	7,634	5,967	19,431	33,032

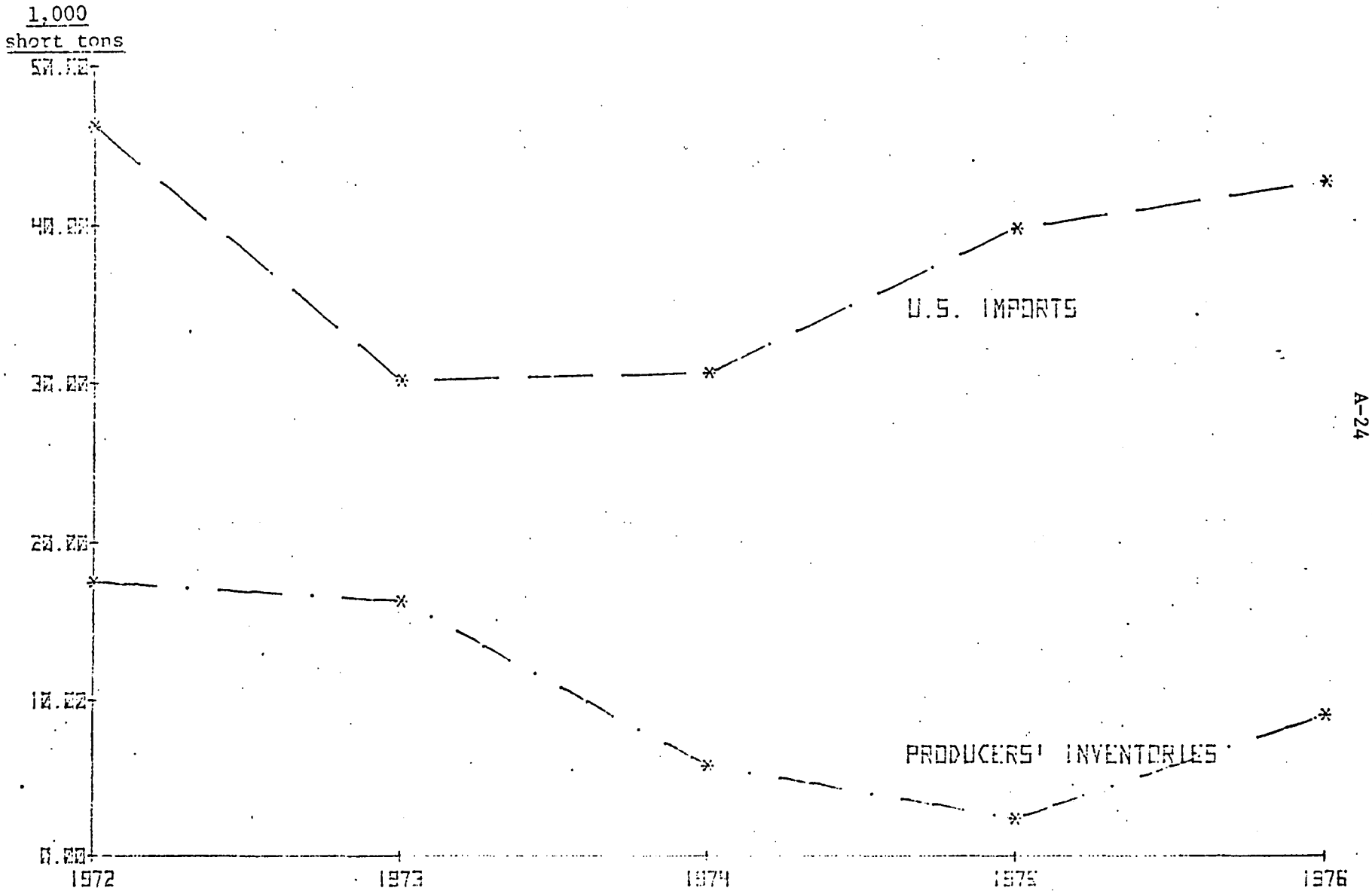
Source: Producers' and consumers' inventories were estimated from gross weight based upon average content of production as reported by the U.S. Bureau of Mines; importers' inventories were obtained from data submitted in response to questionnaires of the U.S. International Trade Commission.

Figure 6.--Low-carbon ferrochromium: U.S. importers', producers', and consumers' inventories by quarters, 1972-76



Source: Compiled from official statistics of the Bureau of Mines; importers' inventories from data submitted in response to questionnaires of the U.S. International Trade Commission.

Figure 7.--Low-carbon ferrochromium: U.S. imports and producers' inventories 1972-76



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

Importers' inventories.--Importers' inventories of low-carbon ferrochromium increased substantially in late 1972 as a result of the high level of importation which occurred in that year. By the end of 1974, declining low-carbon ferrochromium imports, coupled with increasing purchases by the stainless steel industry, had reduced importers' inventories to their lowest level of the 1972-76 period.

In 1975 and 1976, increased low-carbon ferrochromium imports and reduced purchases of low-carbon ferrochromium by the domestic stainless steel industry resulted in steadily increasing importers' inventories. On October 1, 1976, importers' inventories reached their highest level of the 1972-76 period. As of January 1, 1977, importers' inventories exceeded aggregate inventories held by U.S. producers and consumers and were equivalent to about 5 months' consumption (on the basis of the 1976 level of consumption).

U.S. exports

As shown in table 6, U.S. ferrochromium exports ranged between a low of 7,245 tons in 1974 and a high of 15,164 tons in 1973. Low-carbon ferrochromium exports are insignificant.

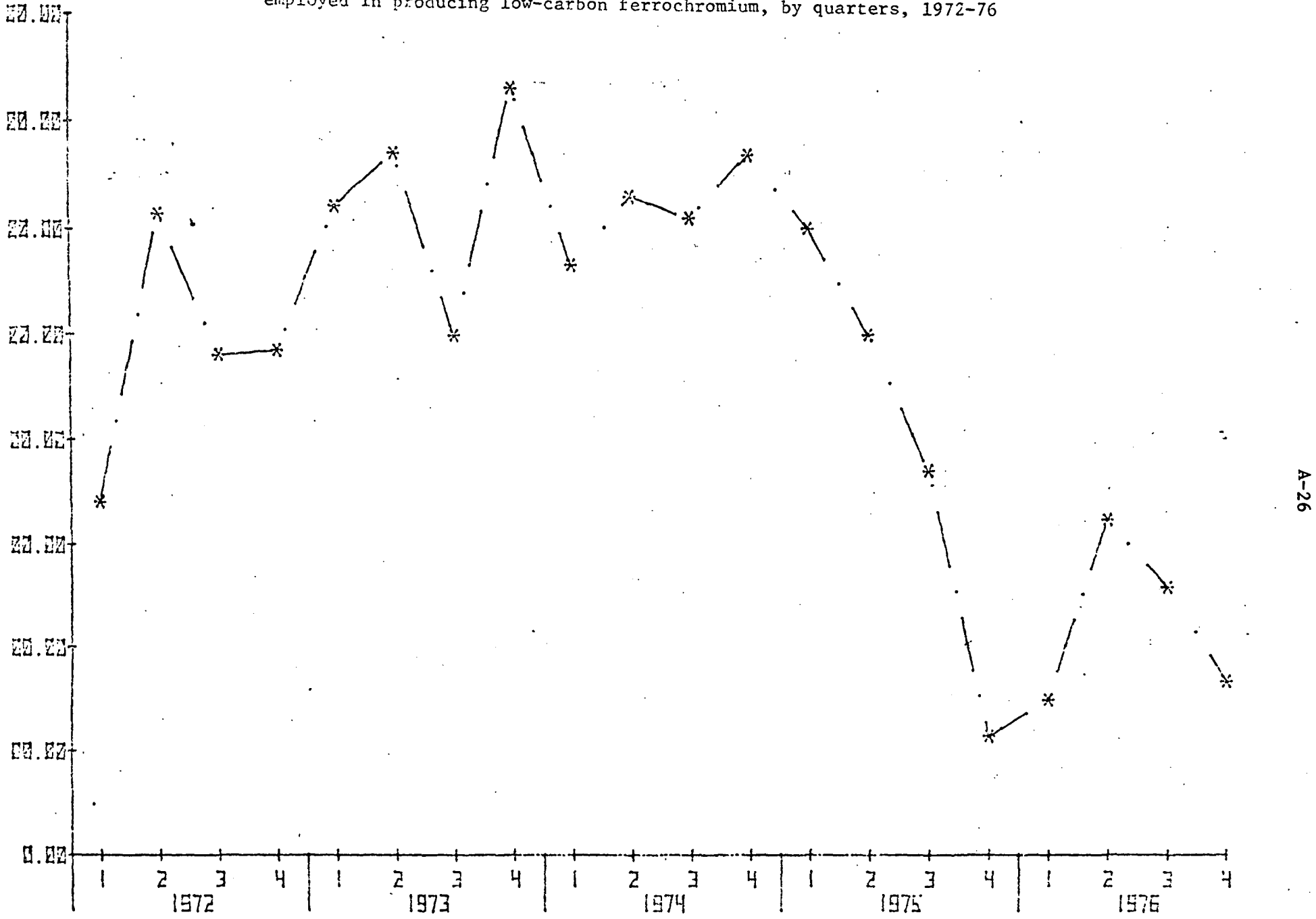
Employment

The average number of all employees and of production and related workers engaged in the manufacture of low-carbon ferrochromium are as follows and detailed in figure 8 and table 7:

	All employees	Production and related workers
1972	565	480
1973	724	630
1974	747	618
1975	495	396
1976	290	224

The average number of all employees and of production and related workers engaged in the manufacture of low-carbon ferrochromium substantially increased in 1973 as firms in the industry geared up to increase production to meet heavy demand in the stainless steel industry. The bulk of increased employment during this period was accounted for by * * *.

Figure 8.--Low-carbon ferrochromium: Average number of production and related workers employed in producing low-carbon ferrochromium, by quarters, 1972-76



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

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Man-hours.--Man-hours worked by production and related workers engaged in the manufacture of low-carbon ferrochromium are provided as follows and detailed in figure 9.

	Man-hours (thousands)
1972	784
1973	1,124
1974	1,164
1975	792
1976	468

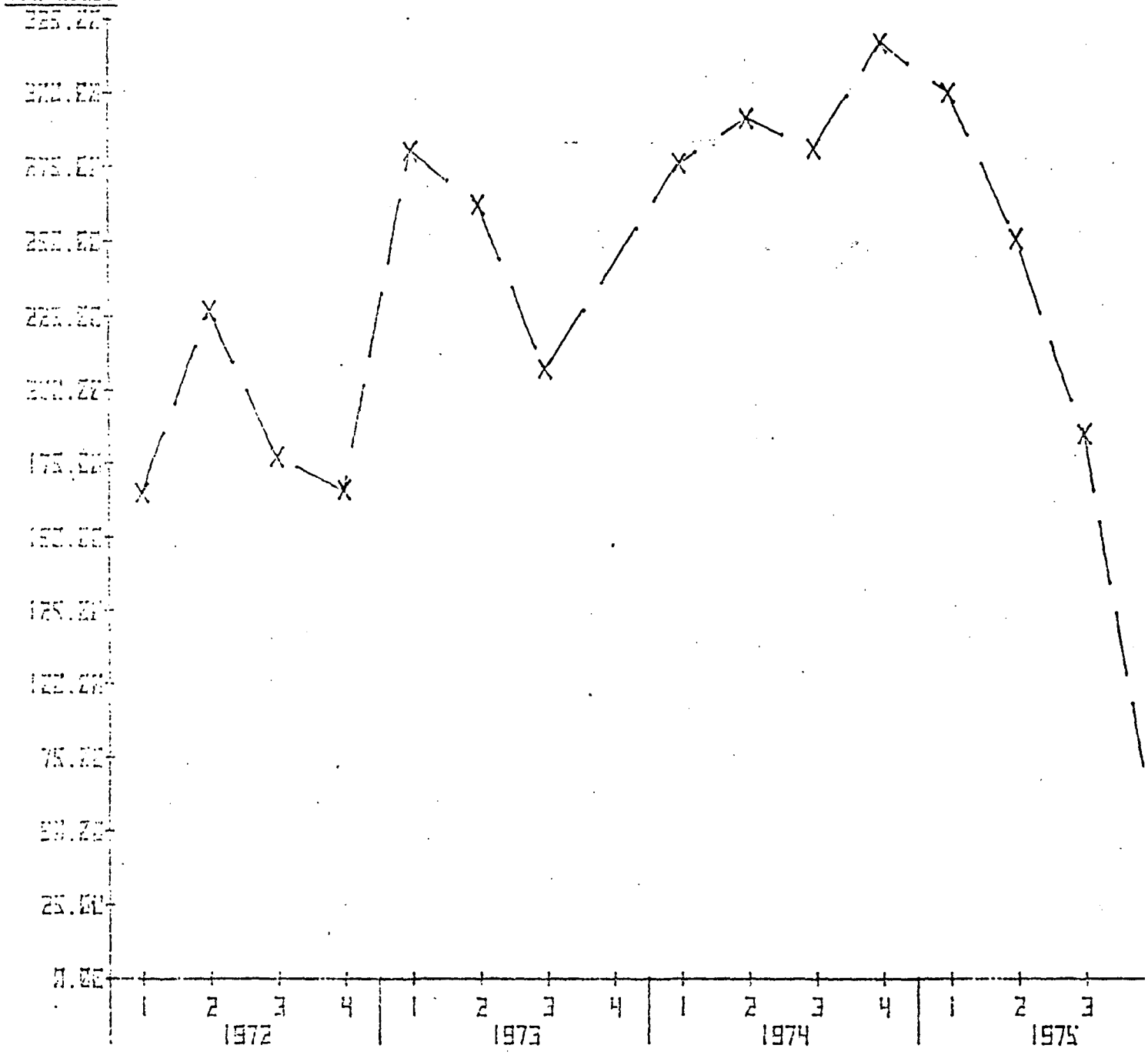
Man-hours worked followed the same general trend as employment except that in 1974 man-hours increased while the number of production and related workers declined. * * *. However, total man-hours worked declined by 41 percent in 1976 compared with those in 1975.

Productivity.--The average annual output of low-carbon ferrochromium (short tons, chromium content) per man-hour is provided in the following tabulation:

	Output per man-hour
1972	.06
1973	.05
1974	.05
1975	.05
1976	.04

Employee earnings.--Earnings received by workers producing low-carbon ferrochromium and other ferrochromium alloys are similar to earnings received by workers in the steel industry since workers in both industries belong to the United Steel Workers of America. Average hourly and weekly earnings for U.S. production workers producing durable

Figure 9.--Low-carbon ferrochromium: Man-hours worked by production and relate
producing low-carbon ferrochromium, by quarters, 1972-76



Source: Compiled from data submitted in response to questionnaires of the U.S. Internat

goods, primary metals (SIC 33), and basic steel products (SIC 331) are shown in table 9. 1/ Average hourly earnings of U.S. production workers producing basic steel products increased 85 percent from 1970 to 1976, while earnings of production workers producing primary metals and durable goods increased 73 percent and 56 percent, respectively. Earnings in establishments producing basic steel products have been historically higher than those in the production of all durable goods and primary metals. Average weekly earnings increased at the same rate as average hourly earnings.

Earnings of production workers in basic steel products rose more than 9 percent annually during 1970-1976, compared with 8 percent annually for primary metals and 6.5 percent annually for durable goods. By contrast, earnings of production workers producing basic steel products increased 5 percent on an hourly basis and 6 percent on a weekly basis between 1975 and 1976.

Real hourly and weekly earnings of U.S. production workers were derived from the figures in table 10 by using the Consumer Price Index as a price deflator. Real hourly earnings increased from 1970 to 1977, but at a lower rate than average earnings. For basic steel products, real hourly earnings increased 25 percent from 1970 to 1976, while earnings for production workers producing durable goods and primary metal increased 7 percent and 17 percent, respectively. Real weekly earnings for production workers producing basic steel products increased from 1970 to 1976 with one decline in 1975. Real earnings on an hourly and weekly basis for workers producing basic steel products were higher than real earnings received in the production of all durable goods.

Price relationship between domestic and imported low-carbon ferrochromium 2/

As indicated in the following table and figures 10 and 11, from 1970 to 1973 the lowest price of the imported product (68 to 73 percent chromium content) averaged 2.3 cents per pound (6.6 percent) below that of the comparable domestic product. During 1974 and the first half of 1975 the price of the imported product averaged 10.5 cents per pound (15.8 percent) higher than that of domestically produced low-carbon ferrochromium. From the middle of 1975 through yearend 1976 the lowest price for imported low-carbon ferrochromium averaged 8.5 cents per pound (8.2 percent) below the price for the domestic product. A similar trend is shown for .025-percent low-carbon ferrochromium.

1/ Earnings of U.S. production workers producing low-carbon ferrochromium and other ferroalloys are included in SIC 331.

2/ Prices of other chromium ferroalloys are showned in tables 11, 12, and 13.

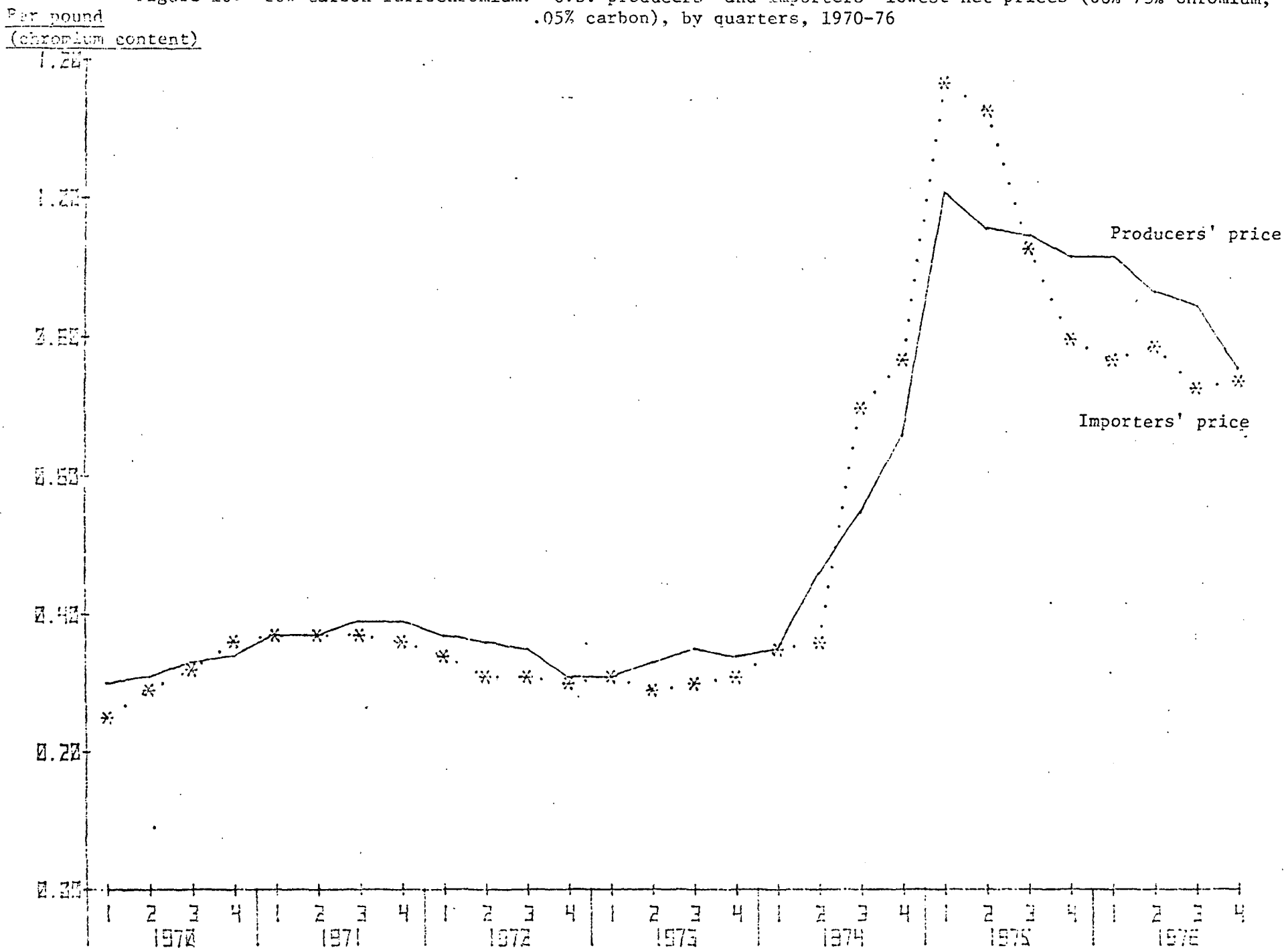
Low-carbon ferrochromium: Import and U.S. prices, by specified types and by quarters, 1970-76

(Per pound)

Period	68-73% chromium, .05% carbon maximum				No chromium specification .025% carbon maximum			
	Lowest net price		Net price at greatest volume		Lowest net price		Net price at greatest volume	
	Import	U.S.	Import	U.S.	Import	U.S.	Import	U.S.
1970:								
January-March	$0.25	$0.30	$0.30	$0.31	$0.23	$0.31	$0.30	$0.31
April-June	.29	.31	.32	.31	.28	.31	.29	.31
July-September	.32	.33	.34	.34	.29	.33	.33	.33
October-December	.36	.34	.38	.34	.28	.35	.35	.35
1971:								
January-March	.37	.37	.41	.36	.31	.38	.37	.38
April-June	.37	.37	.40	.37	.33	.38	.37	.38
July-September	.37	.39	.40	.39	.36	.38	.38	.38
October-December	.36	.39	.39	.39	.35	.38	.38	.38
1972:								
January-March	.34	.37	.36	.37	.35	.38	.37	.38
April-June	.31	.36	.35	.36	.34	.38	.36	.38
July-September	.31	.35	.34	.35	.38	.38	.36	.38
October-December	.30	.31	.33	.31	.31	.33	.33	.32
1973:								
January-March	.31	.31	.33	.31	.30	.33	.32	.32
April-June	.29	.33	.34	.34	.31	.34	.35	.35
July-September	.30	.35	.35	.34	.35	.35	.37	.35
October-December	.31	.34	.36	.34	.37	.35	.38	.35
1974:								
January-March	.35	.35	.40	.37	.37	.35	.42	.35
April-June	.36	.46	.43	.49	.47	.47	.49	.47
July-September	.70	.55	.72	.73	.88	.53	.80	.60
October-December	.77	.66	.90	.95	.99	.62	.91	.70
1975:								
January-March	1.17	1.01	1.16	1.19	1.18	.85	1.03	1.00
April-June	1.13	.96	1.14	1.00	1.17	1.00	.99	1.00
July-September	.93	.95	1.03	1.00	1.19	1.00	.94	1.00
October-December	.80	.92	.88	.92	1.11	.96	.87	1.00
1976:								
January-March	.77	.92	.82	.92	.81	.92	.85	.92
April-June	.79	.87	.89	.92	.81	.92	.86	.92
July-September	.73	.85	.79	.85	.82	.85	.87	.85
October-December	.74	.76	.81	.71	.82	.85	.83	.85

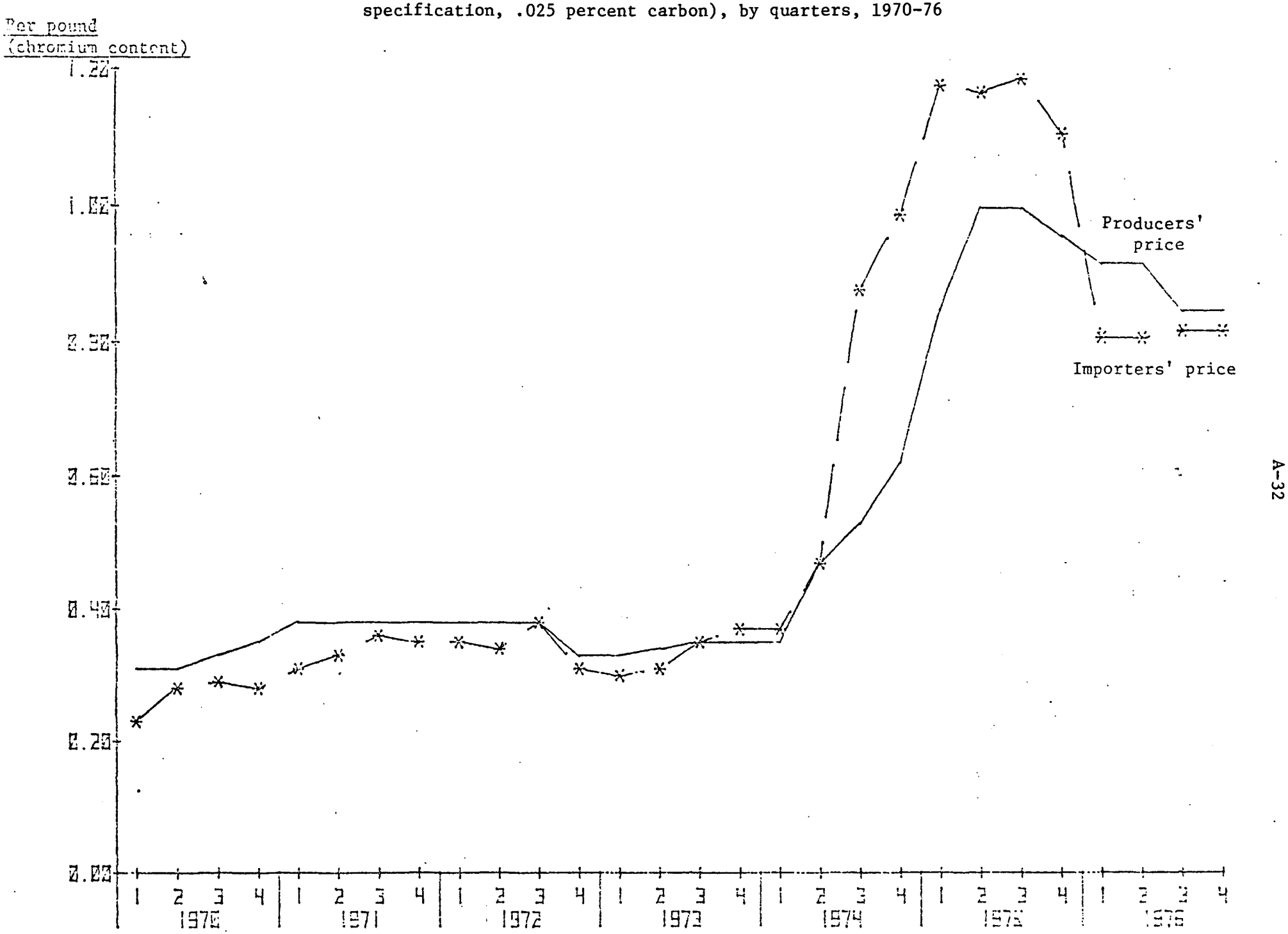
Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission by producers and importers of low-carbon ferrochromium.

Figure 10.--Low-carbon ferrochromium: U.S. producers' and importers' lowest net prices (68%-73% Chromium, .05% carbon), by quarters, 1970-76



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

Figure 11. Low carbon ferrochromium: U.S. producers' and importers' lowest net prices (no chromium specification, .025 percent carbon), by quarters, 1970-76



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

Price trends

Indexes of U.S. wholesale prices for low-carbon ferrochromium and related commodities were obtained from statistics provided by the U.S. Bureau of Labor Statistics, as shown in the following table. Wholesale prices of low-carbon ferrochromium have trended upward (fig. 12) since 1970, but at an average annual growth rate less than that for pig iron and ferroalloys. From 1970 to 1976 the low-carbon ferrochromium average annual growth rate (10.8 percent) was greater than the rates for all commodities (7.5 percent) and for intermediate goods (8.1 percent); however, the low-carbon ferrochromium rate was below those for the other two indexes between 1975 and 1976.

Indexes of U.S. wholesale prices for low-carbon ferrochromium and other selected commodities, average annual growth rates, 1970-76, 7-year average, 1970-76, and 5-year average, 1972-76

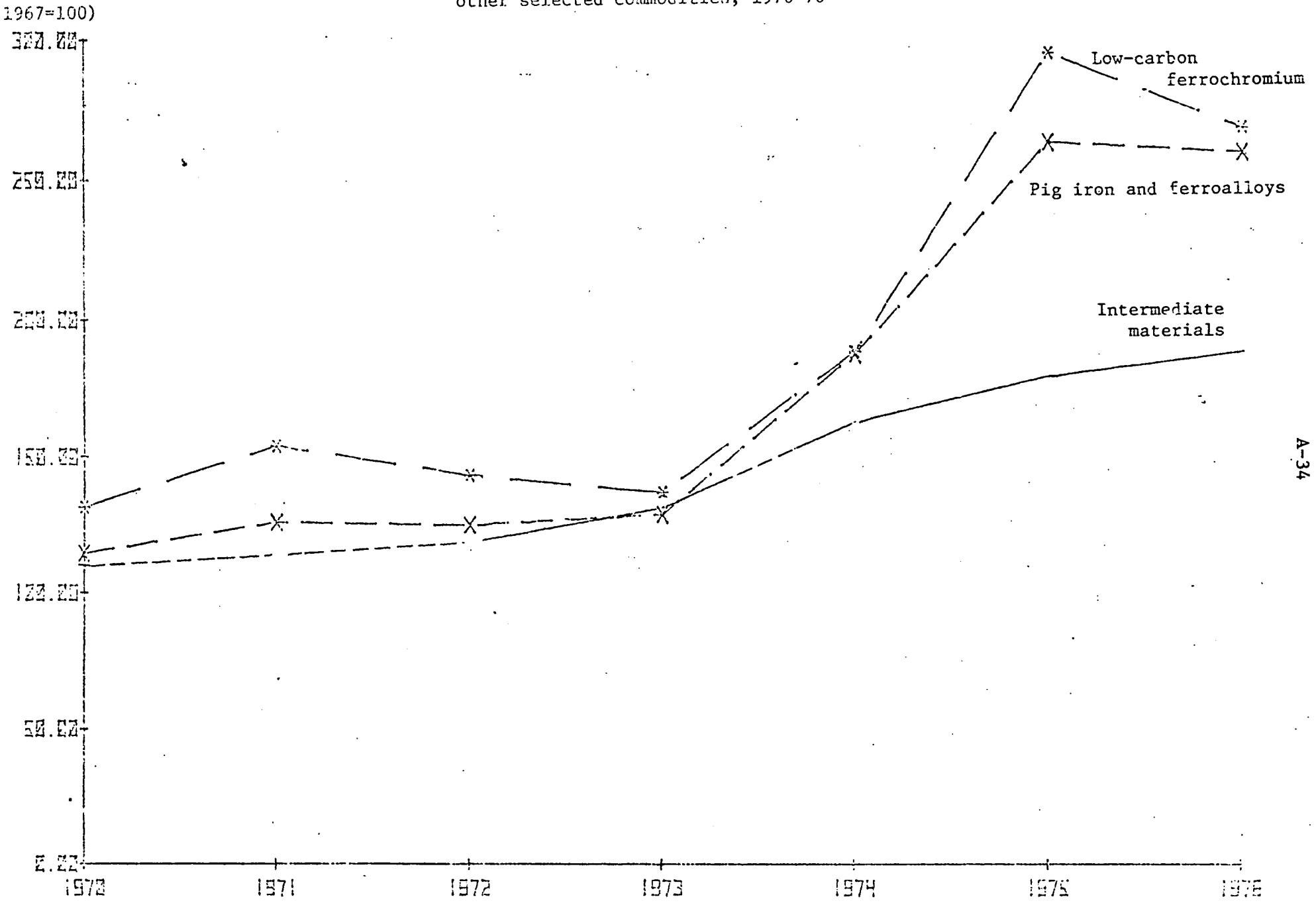
(1967=100)

Period	All commodities	Intermediate materials	Pig iron and ferroalloys	Low-carbon ferrochromium
1970	110.4	109.9	114.7	131.6
1971	113.9	114.0	126.3	154.0
1972	119.1	118.7	125.4	143.6
1973	134.7	131.6	129.4	137.4
1974	160.1	162.9	188.1	188.9
1975	174.9	180.0	264.7	1/ 296.8
1976	182.9	189.2	261.4	1/ 270.2
7-year average, 1970-76	142.3	143.8	172.9	188.9
5-year average, 1972-76	154.3	156.5	193.8	207.4
Average annual growth rate:				
1976 from 1970	7.5	8.1	12.5	10.8
1976 from 1972	9.0	9.8	15.8	13.4
1976 from 1975	2.3	2.5	-0.6	-4.6

1/ Estimated.

Source: Compiled from official statistics of the U.S. Bureau of Labor Statistics.

Figure 12.--Wholesale price indexes for low-carbon ferrochromium and other selected commodities, 1970-76



Source: U.S. Bureau of Labor Statistics.

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

The data reported in this section represent the profit-and-loss experience of three U.S. producers on their overall establishment operations, their low-carbon ferrochromium operations; and their operations on other products--mainly chromium ferroalloys and other alloys--produced within the same establishments (see table 14).

All three of the producers manufacture other products in their establishments in which low-carbon ferrochromium is produced. Each of the three producers employs a standard cost system as a means of segregating costs of their various product lines. Variances from standard costs and various other factory-period costs not included in their standard costs were allocated by the producers to their low-carbon ferrochromium operations. Also, all general, administrative, and selling expenses presented in this section for low-carbon ferrochromium are based on allocations.

The basis used for allocating each of the costs and expenses to low-carbon ferrochromium varied considerably from producer to producer. Moreover, because of declining production, variances from the standard were rather sizable in some years.

The use of standard costs and allocations in developing product profit-and-loss statements is not an exact science. However, if each of the three producers was consistent (there is no evidence to the contrary) from year to year in its use of its respective allocation base, the data presented in this section should give a reasonable profit trend for each producer's low-carbon ferrochromium operations.

The accounting year for each of the three producers ended on or about December 31.

Overall operations of the establishments.--The following table reveals that total net sales of all products manufactured within the establishments producing low-carbon ferrochromium 1/ during 1972-76 increased in each of the years 1973 and 1974, declined in 1975, and then increased in 1976 to a level slightly below that of 1974. Net operating profit increased 754 percent during 1972-74 and declined 38 percent during 1974-76. Net profit before income taxes followed a similar trend. Net operating profit as a share of net sales increased from 3.1 percent in 1972 to 14.1 percent in 1974 and declined thereafter to 8.8 percentwin 1976.

1/ The establishment operation of one producer includes the operations of two plants. Low-carbon ferrochromium is produced at one plant, and high-carbon ferrochromium is produced at the other.

Low-carbon ferrochromium: Profit-and-loss experience of 3 U.S. producers on the overall operations of their establishments within which low-carbon ferrochromium is produced, their operations on low-carbon ferrochromium, and their operations on other products manufactured within the same establishments, 1972-76 1/

(Money figures in thousands of dollars)

Item and year	Net sales	Cost of sales	Gross profit	General, administrative, and selling expenses	Net operating profit	Other income or (expense), net	Net profit before income taxes	Ratio of net operating profit to net sales	Ratio of net profit before income taxes to net sales
								Percent	Percent
Total establishment operations:									
1972	125,869	113,531	12,338	8,453	3,885	1,146	2,739	3.1	2.2
1973	163,506	146,865	16,641	9,190	7,451	1,123	6,328	4.6	3.9
1974	235,788	191,730	44,058	10,859	33,199	(687	32,512	14.1	13.8
1975	205,716	164,555	41,161	12,975	28,186	2,353	25,833	13.7	12.6
1976	234,807	198,937	35,870	15,270	20,600	5,998	14,602	8.8	6.2
Operations on low-carbon ferrochromium:									
1972	26,648	23,852	2,796	1,581	1,215	258	957	4.6	3.6
1973	36,313	34,002	2,311	1,782	529	319	210	1.5	.6
1974	68,747	54,623	14,124	2,314	11,810	235	11,575	17.2	16.8
1975	53,493	37,456	16,037	2,168	13,869	502	13,367	25.9	25.0
1976	36,203	27,024	9,179	1,703	7,476	709	6,767	20.7	18.7
Operations on other products produced within the same establishments: 2/									
1972	99,221	89,679	9,542	6,872	2,670	888	1,782	2.7	1.8
1973	127,193	112,863	14,330	7,408	6,922	804	6,118	5.4	4.8
1974	167,041	137,107	29,934	8,545	21,389	452	20,937	12.8	12.5
1975	152,223	127,099	25,124	10,807	14,317	1,851	12,466	9.4	8.2
1976	198,604	171,913	26,691	13,567	13,124	5,289	7,835	6.6	3.9

1/ The accounting year for each of the 3 producers ended on or about Dec. 31.
2/ Other products include other chromium ferroalloys, other alloys, and nonferrous metals.

Source: Compiled from data submitted to the U.S. International Trade Commission by U.S. producers of low-carbon ferrochromium.

* * * * * * *

Operations on low-carbon ferrochromium.--In the aggregate, the low-carbon ferrochromium operations of the three producers were profitable in each of the years 1972-76. Profit margins were, however, rather meager in 1972 and 1973.

Net sales of low-carbon ferrochromium for the three producers increased from $26.6 million in 1972 to $68.7 million in 1974--amounting to an increase of 158 percent--and then declined 47 percent during the next 2 years to $36.2 million in 1976.

Net sales of low-carbon ferrochromium peaked in 1974. On the other hand, profit peaked in 1975, a year in which low-carbon ferrochromium prices were substantially higher than in 1974. Net operating profit declined from $1.2 million in 1972 to $529,000 in 1973, increased sharply to $11.8 million in 1974, peaked at $13.9 million in 1975, and then declined by about 46 percent to $7.5 million in 1976. Net profit before income taxes followed a similar pattern.

As a share of net sales, net operating profit averaged 4.6 percent in 1972, 1.5 percent in 1973, 17.2 percent in 1974, 25.9 percent in 1975, and 20.7 percent in 1976.

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Operations on other products produced within the same establishments.--With the exception of 1973, the other product operations of the three producers were less profitable than their low-carbon ferrochromium operations during 1972-76. Other product profit margins were substantially lower than those of low-carbon ferrochromium in 1975 and 1976.

As a share of total establishment sales, net sales of other products ranged from 71 percent in 1974 to 85 percent in 1976. On the other hand, the other product operations accounted for about 64 percent of the aggregate operating profit in each of those years. * * *.

Comparison of net operating profit margins for low-carbon ferrochromium with those of other product lines or industries.--The following table presents a comparison of operating profit margins for low-carbon ferrochromium with those for all U.S. manufacturers and those for certain other product lines or industries. The table reveals that the operating profit margins for low-carbon ferrochromium were substantially higher than those for all U.S. manufacturing and certain other product lines or industries in each of the years 1974-76.

The table does not, however, reveal profit trends in absolute dollars. For example, the relative profit margin for low-carbon ferrochromium declined only 20 percent in 1976 when compared with 1975. The absolute dollar decline in profit was, however, 46 percent.

Low-carbon ferrochromium: Net operating profit margins for 3 U.S. producers' low-carbon ferrochromium operations and those for other product lines or industries, 1972-76

(In percent)

Item	1972	1973	1974	1975	1976
Low-carbon ferrochromium	4.6	1.5	17.2	25.9	20.7
Other products produced in the same establishments along with low-carbon ferrochromium	2.7	5.4	12.8	9.4	6.6
All U.S. manufacturing	7.8	8.5	7.7	7.2	1/ 8.3
Primary metal industries	6.3	8.3	10.4	6.5	1/ 6.1
Stainless steel metal industry 2/	4.0	9.6	13.4	1.6	3.4
Stainless steel round wire	.9	5.8	12.0	8.2	3/

1/ Computed on data for January-September.

2/ Excludes data on stainless steel round wire and stainless steel pipe and tube.

3/ Not available.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission by U.S. producers of low-carbon ferrochromium from data of the Commission's investigation Nos. TA-201-5 and TA-201-13 and from data obtained from the Federal Trade Commission's Quarterly Financial Reports.

Investment in productive facilities.--The following table presents the three producers' investment in productive facilities both for the establishments in which low-carbon ferrochromium is produced and for low-carbon ferrochromium alone for the 1972-76 period. The table also shows ratios of operating profit to investment in such facilities. The three producers were requested to submit the replacement value for their productive facilities for each of the years 1972-76. However, such data were received by all three producers for 1976 only.

The table reveals that the three producers' total investment in productive facilities--both in actual cost and book value--for the establishment in which low-carbon ferrochromium was produced trended upward during 1972-76, while investments in such facilities for low-carbon ferrochromium production trended downward. The ratio of operating profit to investment in productive facilities--both in actual cost and book value--was much higher for low-carbon ferrochromium than for the total establishments in each of the years 1974-76.

The decline in investment in productive facilities for low-carbon ferrochromium in 1974 resulted from the conversion of a low-carbon ferrochromium furnace by one producer for use with another product group and from the revaluation of productive facilities when one low-carbon ferrochromium operation changed ownership between 1973 and 1974. The decline after 1974 resulted from the reassignment or reallocation of facilities because of declining low-carbon ferrochromium production.

The purpose in requesting this data from the low-carbon ferrochromium producers was to determine if their profits were keeping pace with their investments in productive facilities and if low-carbon ferrochromium production is sufficiently profitable to warrant future investment. The ratio of profit to investment in productive facilities should not be construed as a return on total investment. Total investment includes, in addition to investment in productive facilities, investment in working capital, nonproductive facilities, and other fixed assets.

The Question of Imports as a Substantial Cause of Serious Injury

This section examines facts which bear on the relationship between imports and alleged injury or threat of injury to the domestic producers of low-carbon ferrochromium. U.S. consumption and the factors which strongly influence aggregate demand for low-carbon ferrochromium and of chromium ferroalloys are discussed, after which some possible causes of serious injury or threat of injury are outlined and examined.

Low-carbon ferrochromium: Investments in productive facilities and net operating profits of 3 U.S. producers of low-carbon ferrochromium, 1972-76

Item and year	Investment in productive facilities at yearend			Net operating profit	Ratio of net operating profit to investment in productive facilities in terms of--		
	Actual cost	Net book value	Replacement value		Actual cost	Net book value	Replacement value
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	Percent	Percent	Percent
Total establishment operations:							
1972	***	***	1/	3,885	***	***	1/
1973	***	***	1/	7,451	***	***	1/
1974	***	***	1/	33,199	***	***	1/
1975	***	99,591	1/	28,186	***	28.3	1/
1976	***	107,323	***	20,600	***	19.2	2.5
Operations on low-carbon ferrochromium:							
1972	***	***	1/	1,215	***	***	1/
1973	***	***	1/	529	***	***	1/
1974	***	9,869	1/	11,810	***	119.7	1/
1975	***	8,104	1/	13,869	***	171.1	1/
1976	***	8,968	103,482	7,476	***	83.4	7.2

1/ Data are not available for all producers for each of the years 1972-75.

* * * * * * *

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

U.S. consumption

U.S. consumption of low-carbon ferrochromium is determined primarily by the demand for stainless steel, the availability and price of chromium-bearing scrap, and the availability and price of high-carbon ferrochromium. It is further influenced by the availability and price of imported low-carbon ferrochromium.

U.S. consumption of low-carbon ferrochromium and other chromium ferroalloys is shown below and in figure 13.

Chromium ferroalloys: U.S. consumption, total, and by types, 1972-76

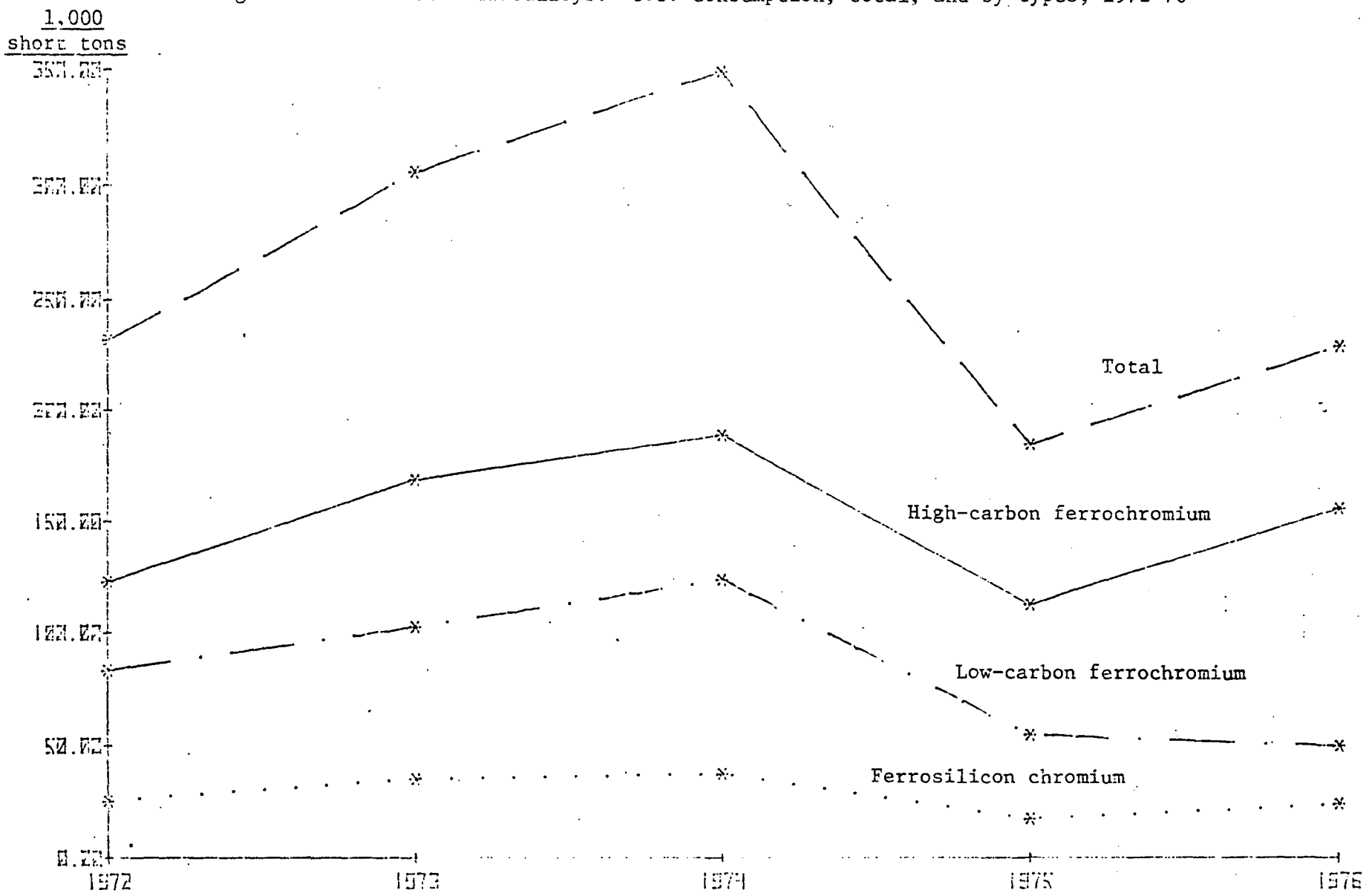
(In short tons, chromium content)

Item	1972	1973	1974	1975	1976 1/
Chromium ferroalloys, total	231,368	305,738	349,185	192,932	228,995
Low-carbon ferrochromium	83,460	102,444	123,424	50,732	49,594
High-carbon ferrochromium	122,521	168,539	188,728	123,700	155,800
Ferrosilicon chromium	25,387	34,755	37,033	18,500	23,601

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Figure 13.--Chromium ferroalloys: U.S. consumption, total, and by types, 1972-76



Source: Compiled from official statistics of the U.S. Bureau of Mines.

Causes of injury

In order to simplify analysis of the factors affecting the low-carbon ferrochromium industry, indexes were constructed as shown in the following table.

Low-carbon ferrochromium: Indexes of the ratio of imports to consumption, pounds of chromium consumed per ton of stainless steel produced, by types of input, and stainless steel production, 1968-76

(1968=100)

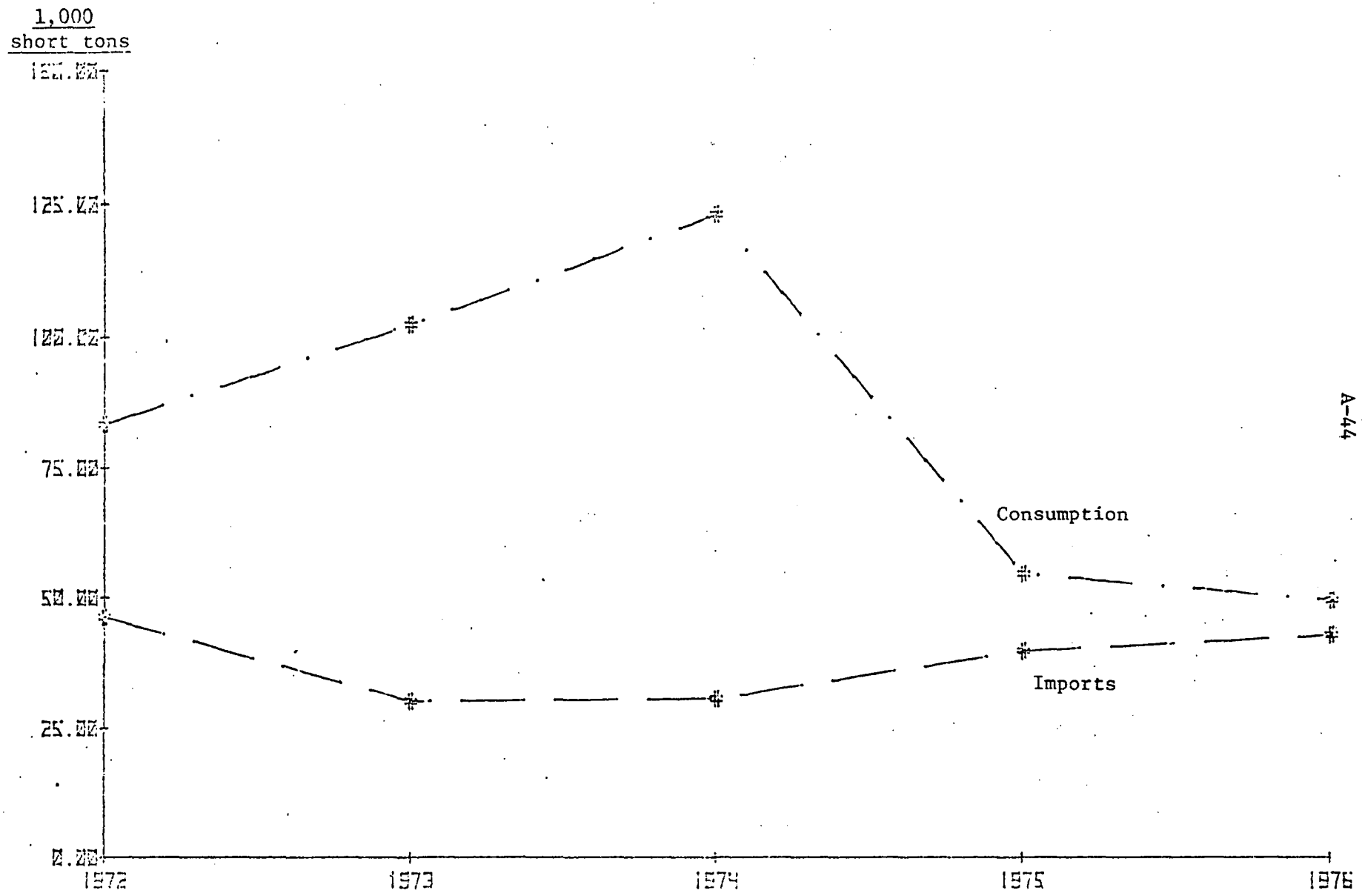
Year	Ratio of imports to consumption	Pounds of chromium consumed per ton of stainless steel produced using: Low-carbon ferrochromium	High-carbon ferrochromium	Ferrosilicon chromium	Total chromium ferroalloys	Chromium-bearing scrap	Total	Stainless steel production
1968	100	100	100	100	100	100	100	100
1969	82	94	93	100	94	108	105	110
1970	53	110	99	91	104	103	104	89
1971	91	91	110	88	97	107	106	88
1972	162	73	155	79	100	104	104	109
1973	88	76	191	88	113	96	101	132
1974	74	81	197	85	118	98	104	150
1975	231	47	199	79	99	109	109	76
1976	256	33	197	71	90	108	106	116

Source: Compiled from the official statistics of the U.S. Bureau of Mines.

The years 1969 and 1976 will be used for analyzing the various factors affecting the U.S. low-carbon ferrochromium industry. They were chosen because the amount of stainless steel scrap used per ton of stainless steel produced was the same in both years, and the amount of stainless steel produced in 1976 was only slightly higher than the amount produced in 1969. Therefore, the recession and consumption of stainless steel scrap are removed as major factors affecting the industry in those years so that the effects of increased imports and technological change as possible causes of injury to the U.S. low-carbon ferrochromium industry can be more readily quantified.

The effect of increased imports on the domestic industry is illustrated by the index of the ratio of imports to consumption in figure 14. As can be seen, the index rose from 82 in 1969 to 256 in 1976.

Figure 14.--Low-carbon ferrochromium: U.S. consumption and imports, 1972-76



Source: Compiled from official statistics of the U.S. Bureau of Mines.

The calculated increase in imports using 1969 as the base year is 29,000 tons; using 1970 as the base year, it is 35,000 tons. Thus, assuming the import-to-consumption ratios had remained the same, the calculated level of imports in 1976 using 1969 and 1970 as base years would have totaled 14,000 tons and 8,000 tons, respectively, instead of the actual 43,000 tons. All other calculations of increased imports would yield results of less magnitude than the 2 years reported above.

The effects of imports and technological change can be seen by comparing the index for low-carbon ferrochromium and the index for high-carbon ferrochromium. Although the first domestic AOD unit came on stream in 1968, major conversions to AOD technology did not occur until 1971. The decline in consumption of low-carbon ferrochromium per ton of stainless steel produced and the accompanying increase in high-carbon ferrochromium consumption, which began in 1971 and continued in 1972, are shown in the index. In 1973 and 1974 the extraordinarily large stainless steel demand and the high cost of chromium-bearing scrap caused a dramatic rise in the amount of low-carbon ferrochromium consumed. In 1975 and 1976, consumption of low-carbon relative to high-carbon ferrochromium returned to the trend established in 1971 and 1972.

Quantification of the effect of technological change on U.S. production of low-carbon ferrochromium is calculated, as follows:

	Short tons, chromium content
Calculated consumption in 1976 assuming no change in technology------	103,000
Less actual U.S. production----------	20,000
Less actual U.S. imports----------	43,000
Calculated loss in U.S. production as a result of technological change in 1976----------	40,000

It should be noted that a direct ton-for-ton comparison between the calculated loss of 40,000 tons due to technological change and the calculated loss of 35,000 tons resulting from increased imports (or 29,000 tons if 1969 is used) would not be advisable. The technological change occurred more gradually than the increased imports, thereby providing the industry more time to adjust to changing consumer demand. Further, if the calculated increased imports had not been available to consumers of low-carbon ferrochromium, domestic prgduction would be calculated to be in the range of 55,000 tons in 1976. In 1973 and 1974, production was about 10 percent more than this calculated 55,000-ton production level, and the low-carbon ferrochromium producers

indicated that they were operating at capacity, and presumably profitable levels for much of those 2 years.

The following table summarizes estimates of lost U.S. production due to AOD and increased imports by all interested parties and the Commission's staff for the period 1971-76.

Estimates by the USITC, the petitioner, the South African Ferroalloys Association, and Union Carbide of lost U.S. production due to AOD and increased imports, 1971-76

(In thousands of tons, chromium content)

Year	Estimate by--							
	U.S.I.T.C. staff		Petitioner		South African Ferroalloys Association		Union Carbide	
	AOD	Imports	AOD	Imports	AOD	Imports	AOD	Imports
1971	0	11.6	1.8	0.2	4.3	8.6	6.4	8.6
1972	15.4	31.6	11.0	12.7	25.9	27.9	24.7	27.9
1973	37.8	12.3	0	0	43.0	11.9	26.7	11.9
1974	52.0	9.1	0	0	48.7	12.4	24.1	12.4
1975	8.4	31.0	1.3	24.4	35.5	21.6	33.0	21.6
1976	40.0	35.0	10.9	27.9	57.2	24.6	62.7	24.6
Total	153.6	130.6	25.0	65.2	214.6	107.0	177.6	107.0

Lost sales

The petitioners submitted confidential evidence of lost sales involving 13 domestic purchasers. The Commission's staff verified the information submitted through questionnaires and direct contact with the subject firms.

In 1976, lost sales of domestically produced low-carbon ferrochromium were evident at seven of these firms. The percentage of lost sales ranged from 11 percent to 50 percent of each firm's total purchases of low-carbon ferrochromium. The aggregate percentages of lost sales for the seven firms, and the tonnages involved, were 18 percent and 6,000 tons (chromium content), respectively.

Two of the remaining six companies slightly increased their purchases of domestically produced low-carbon ferrochromium. Another two firms neither increased nor decreased purchases of domestic low-carbon ferrochromium in relation to purchases of the similar imported product. Finally, no definitive data could be obtained for the remaining two firms.

Foreign industry

In 1976, Japan, the Republic of South Africa, and Rhodesia supplied 45 percent, 16 percent, and 14 percent, respectively, of total U.S. imports of low-carbon ferrochromium, in terms of quantity. A discussion of the industries in these countries follows.

The Japanese industry.--Data obtained from the Yearbook of Iron and Steel Statistics, on production and consumption of low-carbon and high-carbon ferrochromium in Japan during the period 1971-75 are provided in the following tabulation (in short tons):

Year 1/	Production		Consumption	
	High-carbon ferrochromium	Low-carbon ferrochromium	High-carbon ferrochromium	Low-carbon ferrochromium
1971	299,529	144,846	241,553	97,804
1972	247,248	86,343	266,933	76,237
1973	393,977	94,388	437,828	91,146
1974	497,103	100,273	415,695	91,151
1975	426,653	109,139	328,164	52,293

1/ Data for 1976 are not available.

It is noteworthy that, in contrast to U.S. production of low-carbon ferrochromium, Japanese production increased in 1975. This increase occurred despite a decline in Japanese consumption of low-carbon ferrochromium. At the same time Japanese exports of ferrochromium (low-carbon and high-carbon ferrochromium are not separately reported in official statistics) substantially increased over 1974 levels.

The South African industry.--As a principal world supplier of chromium ore, the South African ferrochromium industry is benefiting from the growing trend to locate chromium-processing facilities at the source of the ore rather than near the major consuming areas. These facilities are being built for the production of high-carbon, rather than low-carbon, ferrochromium. Shipments from the newest such facility, in which Union Carbide has a minority interest, began in early 1977. All production from the facility is scheduled to be exported.

The Rhodesian industry.--External statistics for Rhodesia have not been published since the mid-1960's, and information regarding ferrochromium production is not available.

On March 18, 1977, the President signed into law a bill repealing the Byrd amendment, thereby banning the importation of all chromium-bearing materials, including low-carbon ferrochromium, from Rhodesia. Most industry sources feel that this action is primarily symbolic and that Rhodesian chromium will continue to reach the U.S. market through circuitous routes.

Effect of technological change on U.S. and world low-carbon ferrochromium consumption.--The economic advantages of utilizing AOD-type technology in the production of stainless steel have resulted in its rapid implementation, particularly after 1970. According to information supplied by Union Carbide Corp., the percentages of world stainless steel production accounted for by AOD-type technology in the major steel-producing locations are estimated as follows (in percent):

Location	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
United States--	3	3	3	14	37	43	49	57	62	85.5	92.0
Japan 1/	10	19	25	41	67	72	86	2/	2/	2/	2/
Europe 1/	2	2	4	15	27	39	46	2/	2/	2/	2/

1/ Primarily VOD, a vacuum process developed by a West German firm which is similar to Union Carbide's AOD process.
2/ Not available.

As indicated in the tabulation above, the Japanese industry has led the United States and Europe in the implementation of AOD-type technology. The percentage of stainless steel produced in Japan by such equipment in 1974 and the additional AOD capacity added in 1975 and 1976 indicate that the Japanese industry has essentially completed its conversion. As this AOD conversion process proceeded, the export market became an increasingly important factor for the Japanese low-carbon ferrochromium producers.

In 1971, Japan's home-market consumption of low-carbon ferrochromium accounted for 68 percent of total production as opposed to 98 percent in the preceding year. Despite reduced production of stainless steel and the increasing utilization of AOD-type technology in 1971, Japan's production of low-carbon ferrochromium increased. As a result, there was a substantial increase in Japanese exports of low-carbon ferrochromium in 1971. These exports continued at high levels through 1976. By 1975, Japan's home-market consumption of low-carbon ferrochromium had declined to only 48 percent of Japanese low-carbon ferrochromium production.

It is estimated that the United States will not equal the 1974 percentage of total Japanese stainless steel production using AOD-type technology until the end of 1977. Assuming stainless steel production remains at the 1976 level in 1977, it is calculated that total U.S. demand for low-carbon ferrochromium will approximate 32,000 tons, chromium content, as opposed to 50,000 tons in 1976. Another factor which may depress the domestic low-carbon ferrochromium industry in 1977 is the large volume of inventory principally held by importers. These inventories, along with those held by producers and consumers at the beginning of 1977, are sufficient to meet all of the projected 1977 demand for low-carbon ferrochromium.

The inclusion of 1977 low-carbon ferrochromium imports further reduces the domestic market available to domestic producers. As a consequence, it is probable that the market for low-carbon ferrochromium available to the domestic industry and to imports will be insufficient to support the industry as it now exists.

APPENDIX A

PUBLIC LAW 95-12 AND RELATED INFORMATION

RHODESIAN CHROME

Public Law 95-12
95th Congress

An Act

Mar. 18, 1977
[H.R. 1746]

To amend the United Nations Participation Act of 1945 to halt the importation of Rhodesian chrome.

Rhodesian chrome. Importation prohibition.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 5 of the United Nations Participation Act of 1945 (22 U.S.C. 287c) is amended—

(1) by adding at the end of subsection (a) the following new sentences: "Any Executive order which is issued under this subsection and which applies measures against Southern Rhodesia pursuant to any United Nations Security Council Resolution may be enforced, notwithstanding the provisions of any other law. The President may exempt from such Executive order any shipment of chromium in any form which is in transit to the United States on the date of enactment of this sentence."; and

(2) by adding at the end thereof the following new subsection:

Steel mill products, certificate of origin.

"(c)(1) During the period in which measures are applied against Southern Rhodesia under subsection (a) pursuant to any United Nations Security Council Resolution, a shipment of any steel mill product (as such product may be defined by the Secretary) containing chromium in any form may not be released from customs custody for entry into the United States if—

"(A) a certificate of origin with respect to such shipment has not been filed with the Secretary; or

"(B) in the case of a shipment with respect to which a certificate of origin has been filed with the Secretary, the Secretary determines that the information contained in such certificate does not adequately establish that the steel mill product in such shipment does not contain chromium in any form which is of Southern Rhodesian origin;

unless such release is authorized by the Secretary under paragraph (3) (B) or (C).

Infra.

Regulations.

"(2) The Secretary shall prescribe regulations for carrying out this subsection.

Subpenas.

"(3)(A) In carrying out this subsection, the Secretary may issue subpenas requiring the attendance and testimony of witnesses and the production of evidence. Any such subpena may, upon application by the Secretary, be enforced in a civil action in an appropriate United States district court.

Certification requirement, exemption.

"(B) The Secretary may exempt from the certification requirements of this subsection any shipment of a steel mill product containing chromium in any form which is in transit to the United States on the date of enactment of this subsection.

Release from customs custody.

"(C) Under such circumstances as he deems appropriate, the Secretary may release from customs custody for entry into the United States, under such bond as he may require, any shipment of a steel mill product containing chromium in any form.

"(4) As used in this subsection: Definitions.

"(A) the term 'certificate of origin' means such certificate as the Secretary may require, with respect to a shipment of any steel mill product containing chromium in any form, issued by the government (or by a designee of such government if the Secretary is satisfied that such designee is the highest available certifying authority) of the country in which such steel mill product was produced certifying that the steel mill product in such shipment contains no chromium in any form which is of Southern Rhodesian origin; and

"(B) the term 'Secretary' means the Secretary of the Treasury.".

SEC. 2. (a) Upon the enactment of this Act, the President may suspend the operation of the amendments contained in this Act if he determines that such suspension would encourage meaningful negotiations and further the peaceful transfer of governing power from minority rule to majority rule in Southern Rhodesia. Such suspension shall remain in effect for such duration as deemed necessary by the President. Operation of amendments, suspension. 22 USC 287c note.

(b) If the President suspends the operation of the amendments contained in this Act, he shall so report to the Congress. In addition, the President shall report to the Congress when he terminates such suspension. Report to Congress.

(c) If the President suspends the operation of the amendments contained in this Act, any reference in those amendments to date of enactment shall be deemed to be a reference to the date on which such suspension is terminated by the President.

Approved March 18, 1977.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 95-59 (Comm. on International Relations).
SENATE REPORT No. 95-37 accompanying S. 174 (Comm. on Foreign Relations).
CONGRESSIONAL RECORD, Vol. 123 (1977):
Mar. 11, S. 174 considered in Senate.
Mar. 14, considered and passed House; S. 174 considered in Senate.
Mar. 15, considered and passed Senate, in lieu of S. 174.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 13, No. 12:
Mar. 18, Presidential statement.

O

Title 31 - Money and Finance: Treasury
Chapter V - Office of Foreign Assets Control
Department of the Treasury
Part 530 - Rhodesian Sanctions Regulations

Prohibitions Against Imports of Strategic and Critical Materials of Southern Rhodesian Origin and of Ferrochromium and Chromium Steel Products from any Country, Except as Authorized

The Rhodesian Sanctions Regulations are being amended in connection with the enactment of Public Law 95-12.

The amendments are:

(1) A revocation of §530.518 which has permitted the importation of strategic and critical materials of Southern Rhodesian origin. The effect of this revocation is to again restrict the importation of a list of Rhodesian strategic commodities such as chromium ore, ferrochromium, nickel, asbestos, beryllium, and other strategic materials. It also again restricts the importation of ferrochromium produced in any other country from Rhodesian ores or concentrates.

(2) A new prohibition (§530.202) against the importation of chromium ore from any country except when imported directly or on a through bill of lading. Also, a new prohibition against the importation from any country of ferrochromium and steel mill products containing more than 3% chromium, except as authorized.

(3) A new section (§530.313) defining "steel mill products" and identifying those products affected by the import restrictions.

(4) An amendment of §530.503 to authorize the importation of ferrochromium and steel mill products whenever they have been specially certified by the Government of the producing country not to contain any chromium of Southern Rhodesian origin. These special certificates may be issued only pursuant to special certification procedures to be agreed upon between the certifying country and the Treasury Department. Notices of the availability of special certificates will be published from time to time in the Federal Register.

(5) A new section explaining that in-transit shipments of strategic and critical materials of Southern Rhodesian origin may be authorized to be imported, but in such cases a specific license will have to be obtained from the Office of Foreign Assets Control. The application should be supported by satisfactory documentary proof of exportation from Southern Rhodesia before March 18, 1977.

(6) A General License (§530.520) authorizing the importation, without application to Treasury, of ferrochromium and steel mill products from third countries when the materials were in-transit as of March 18, 1977. The ocean bill of

lading must have been issued before March 18, 1977. Other in-transit shipments may be authorized to be imported, but in such cases a specific license will have to be obtained from the Office of Foreign Assets Control. The application should be supported by satisfactory documentary proof of exportation from the producing country before March 18, 1977.

(7) A new section (§530.521) explaining that imports of merchandise subject to the Regulations may be refused when there is reason to believe the merchandise contains Rhodesian materials. Refusal of these imports may occur although a special certificate of origin or license may have been obtained.

(8) A new section (§530.522) describing special certificates of origin and explaining that other certificates of origin are not acceptable for purposes of these Regulations.

(9) A technical amendment to §530.808, authorizing certain Customs transactions in connection with these new controls.

In addition to these controls, the Office of Foreign Assets Control is also instructing Customs to sample all imports of chromium ore and ferrochromium from South Africa. The samples are to be forwarded for Customs' laboratory testing. This testing will ensure that Rhodesian chromium ore and ferrochromium does not enter the United States misdescribed as being of South African origin.

As the material contained herein involves a foreign affairs function, the provisions of the Administrative Procedure Act (5 U.S.C. 533) requiring notice of proposed rule making, opportunity for public participation, and delay in effective date, are inapplicable.

For further information, contact George F. Hazard, Chief of Licensing, Office of Foreign Assets Control, Treasury Department, Washington, D. C. 20220, telephone (202) 376-0428. The principal author of this amendment is Stanley L. Sommerfield.

31 CFR Part 530, is amended to revoke Section 530.518; to revise Sections 530.503 and 530.808; and to add Sections 530.202, 530.313, 530.519, 530.520, 530.521, and 530.522. The revised and added sections read as follows:

Section 530.202 Imports of chromium ore, ferrochromium, and steel mill products containing chromium

(a) All of the following direct or indirect transactions by any person subject to the jurisdiction of the United States are prohibited, except as authorized by the Secretary of the Treasury (or any person, agency, or instrumentality designated by him) by means of regulations, rulings, instructions, general or specific licenses or otherwise:

(1) Importation from any country of non-Rhodesian chromium ore except when imported directly or on a through bill of lading.

(2) Importation from any country of ferrochromium.

(3) Importation from any country of steel mill products in their basic shapes and forms which contain more than 3% chromium. Steel mill products subject to this prohibition are specified in §530.313.

Section 530.313 Chromium ore, ferrochromium, and steel mill products

The terms "chromium ore", "ferrochromium", and "steel mill products" as used in Section 530.202 mean:

(1) Chromium ore provided for in item 601.15 of the Tariff Schedules of the United States (BTN ch. 26.01).

(2) Ferrochromium provided for in items 607.30 and 607.31 of the Tariff Schedules of the United States (BTN ch. 73, ch. note 1.(c)).

(3) Stainless steel and other alloy steels in their basic shapes and forms containing more than 3% chromium provided for in Schedule 6, Part 2, Subpart B, of the Tariff Schedules of the United States (BTN ch. 73, ch. note 1.(d)).

Section 530.503 Certain transactions with respect to merchandise affected by §530.201 and §530.202

(a) With respect to materials the unauthorized importation of which is prohibited by §530.201 or §530.202, all Customs transactions are authorized except the following:

(1) Entry for consumption (including any appraisement entry, and entry of goods imported in the mails, regardless of value, and any other informal entries);

(2) Entry for immediate exportation;

(3) Entry for transportation and exportation;

(4) Withdrawal from warehouse;

(5) Transfer or withdrawal from a foreign-trade zone; or

(6) Manipulation or manufacture in a warehouse or in a foreign-trade zone.

This paragraph is intended solely to allow certain restricted disposition of merchandise which is imported without proper authorization. This paragraph does not authorize the purchase or importation of any merchandise.

(b) With respect to materials the unauthorized importation of which is prohibited by §530.202(a), (2), and (3), importation is authorized if there is presented to the District Director of Customs in connection with such importation the original of a special certificate of origin as defined in section 530.522. The materials must have been shipped to the United States directly, or on a through bill of lading, from the country issuing the special certificate of origin.

Section 530.519 In-Transit Materials of Southern Rhodesian Origin

Specific licenses may be issued authorizing the importation into the U.S. of strategic and critical materials of Southern Rhodesian origin which were in transit on March 18, 1977. Applications will be decided on a case-by-case basis in the discretion of the Office of Foreign Assets Control. In such cases, importations will not be authorized unless the Office is satisfied that undue hardship would result from denial. Applications must be supported by documentary proof establishing the goods were in-transit on March 18, 1977, and establishing the claim of undue hardship.

Section 530.520 In-Transit Steel Mill Products

(a) All transactions incidental to the importation into the United States of ferrochromium and steel mill products subject to the prohibitions of Section 530.202 are authorized, provided the pertinent ocean bill of lading was issued before March 18, 1977.

(b) Such materials may also be licensed to be imported if the Office of Foreign Assets Control is satisfied the materials were exported from the producing country before March 18, 1977. The application must be supported by documentary proof establishing exportation before March 18, 1977.

(c) The authorization contained in paragraph (a) shall expire at the close of business on May 18, 1977.

Section 530.521 Rejection of Imports

Imports of merchandise subject to Section 530.202 will be refused, although a special certificate of origin or a special license has been obtained, if there is reason to believe the merchandise is of Southern Rhodesian origin or contains chromium materials of Southern Rhodesian origin.

Section 530.522 Special Certificates of Origin

There are many types of certificates of origin issued by governmental and commercial agencies abroad. However, the only certificates of origin which will be accepted by Customs for Foreign Assets Control purposes in connection with imports of commodities subject to Section 530.202 are certificates issued pursuant to special agreements between the country of issue and the Treasury Department. The availability of special certificates of origin which are acceptable for Office of Foreign Assets Control purposes is announced in the Federal Register. The

special certificate must bear a statement by the issuing foreign government agency referring to the Rhodesian Sanctions Regulations, stating that the special certificate has been issued under procedures agreed upon with the United States Government. The name of the issuing agency in each country will be published in the Federal Register.

The Office of Foreign Assets Control reserves the right to refuse importations when the special certificate of origin presented to Customs in connection with an importation under §530.202 has been improperly issued. Certificates must be requested from the certifying country prior to exportation. Certificates may be improperly issued if the goods were not produced in the certifying country or were produced in the certifying country by a non-registered producer. Further, if the certificate does not fully and specifically describe the merchandise to which it refers, the importation may likewise be rejected.

§530.808 Customs procedures; merchandise specified in §530.201 and 530.202.

(a) With respect to merchandise specified in §530.201 and §530.202, whether or not such merchandise has been imported into the United States, District Directors of Customs shall not accept or allow any:

(1) Entry for consumption (including any appraisement entry, any entry of goods imported in the mails, regardless of value, and any other informal entries);

(2) Entry for immediate exportation;

(3) Entry for transportation and exportation;

(4) Withdrawal from warehouse;

(5) Transfer or withdrawal from a foreign-trade zone; or

(6) Manipulation or manufacture in a warehouse or in a foreign-trade zone,

unless either:

(i) The merchandise was imported prior to March 18, 1977, in the case of merchandise subject to Section 530.202; or

(ii) An applicable general license appears in subpart E hereof; or

(iii) A specific license issued pursuant to this part is presented; or

(iv) Instructions from the Office of Foreign Assets Control, either directly or through the Federal Reserve Bank of New York, authorizing the transactions are received; or

(v) The original of a special certificate of origin as defined in Section 530.522 is presented; or

(vi) The merchandise is chromium ore of non-Rhodesian origin and is imported directly or on a through bill of lading from the country of origin.

(b) Whenever a specific license is presented to a District Director of Customs in accordance with this section, one additional legible copy of the entry, withdrawal or other appropriate document with respect to the merchandise involved shall be submitted to the District Director of Customs at the port where the transaction is to take place. Each copy of any such entry, withdrawal, or other appropriate document, including the additional copy, shall bear plainly on its face the number of the license pursuant to which it is submitted. The original copy of the specific license shall be presented to the District Director in respect to each such transaction. It shall bear a notation in ink by the licensee or person presenting the license showing the description, quantity, and value of the merchandise to be entered, withdrawn, or otherwise dealt with. This notation should be so placed and so written that there will exist no possibility of confusing it with anything placed on the license at the time of its issuance. If the license in fact authorizes the entry, withdrawal or other transaction with regard to the merchandise, the District Director or other authorized Customs employee shall verify the notation by signing or initialing it. He shall first assure himself that it accurately describes the merchandise it purports to represent. The license shall thereafter be returned to the person presenting it.

The additional copy of the entry, withdrawal, or other appropriate document shall be forwarded by the District Director to the Office of Foreign Assets Control.

(c)(1) The original of a special certificate of origin as defined in §530.522 must be presented to a District Director of Customs in accordance with the provisions of this section. An additional legible copy of the entry, withdrawal or other appropriate document with respect to the merchandise involved shall be submitted to the District Director of Customs at the port where the transaction is to take place. Each copy of the entry, withdrawal or other appropriate document, including the additional copy, shall bear plainly on its fact the following statement: "This document is presented under the provisions of §530.503(b) of the Rhodesian Sanctions Regulations." The original of the certificate of origin shall not be returned to the person presenting it, but shall be securely attached to the additional copy required by this subparagraph. It shall be forwarded by the District Director to the Office of Foreign Assets Control, Treasury Department, Washington, D.C. 20220. District Directors may forward such documents weekly, or more often if the volume warrants.

(2) The original of a special certificate of origin must be submitted to a District Director of Customs with respect to a transaction which is the first of a series of transactions allowed under subdivision (v) of paragraph (a) of this section. (For example, merchandise has been entered in a bonded warehouse and a specific certificate of origin is submitted. The certificate relates to all of the merchandise entered. However, the importer desires to withdraw only part of the merchandise in the first transaction). The District Director shall so note on the original of the specific certificate of origin and return it to the importer. In addition, the District Director shall endorse his pertinent records so as to record what merchandise is covered by the specific certificate of origin submitted. The District Director may thereafter allow subsequent authorized transactions on presentation of the certificate of origin. The District Director shall, with respect to each such transaction, demand an additional copy of each withdrawal or other appropriate document. The additional copy shall be promptly forwarded by the District Director to the Director of the Office of Foreign Assets Control, Treasury Department, Washington, D.C. 20220. It shall bear an endorsement reading: "This document has been accepted

pursuant to §500.808(c)(2) of the Foreign Assets Control Regulations. Special certificate of origin No. _____ from (country)." When the final transaction has been effected under the certificate of origin, the original shall be taken up and attached to the entry. It shall then be forwarded as in paragraph (c)(1).

(d) A person presenting an entry, withdrawal, or other appropriate document affected by this section may assert that no specific Foreign Assets Control license or special certificate of origin as defined in §530.522 is required. The District Director of Customs shall then withhold action. He shall advise the person to communicate directly with the Federal Reserve Bank of New York, Foreign Assets Control Division. The person should request the Division to issue appropriate instructions to the District Director.

Authority: 22 U.S.C. 287(c); Public Law 95-12, March 18, 1977, 91 Stat.22; Executive Order 11322; Executive Order 11419; Executive Order 11978.

Effective Date: These amendments take effect on March 18, 1977.

Stanley L. Sommerfield

Stanley L. Sommerfield
Acting Director

File: March 31, 1977
Published: April 5, 1977

APPENDIX B

STATISTICAL TABLES

Table 1.--Ferrochromium: U.S. imports of high-carbon ferrochromium and ferrochromium silicon, 1968-76

Year	High-carbon ferrochromium		Ferrochromium silicon	
	Quantity	Value	Quantity	Value
	Tons	1,000 dollars	Tons	1,000 dollars
1968	5,229	1,239	1,932	339
1969	10,741	2,318	795	49
1970	7,592	1,874	0	0
1971	26,965	8,375	772	207
1972	44,017	11,266	8,427	1,846
1973	69,534	18,253	13,037	3,127
1974	71,319	33,134	7,553	2,045
1975	158,055	135,041	4,136	2,041
1976	107,307	70,035	15,725	7,593

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

Table 2.--Low-carbon ferrochromium: Average unit value of U.S. imports, by sources, 1968-76

(In cents per pound)

Source	1968	1969	1970	1971	1972	1973	1974	1975	1976
Japan	20.3	18.5	17.0	30.1	28.3	28.1	45.2	99.1	60.9
Republic of South Africa	18.0	20.4	19.4	20.0	20.7	25.1	30.3	37.9	59.6
Rhodesia	-	-	-	-	25.5	23.1	32.1	72.3	70.0
West Germany	18.8	10.4	24.1	31.4	28.0	37.1	41.7	79.2	73.1
France	18.5	19.2	21.6	27.5	26.4	-	-	80.7	67.8
Sweden	18.6	19.2	26.1	30.9	27.8	30.7	45.9	93.1	78.1
Norway	17.9	18.6	22.9	30.3	26.9	29.1	42.0	77.6	61.1
Turkey	16.9	17.6	-	23.8	24.6	25.3	23.8	66.9	63.7
Brazil	-	-	-	-	-	-	-	112.1	68.0
All other	16.6	17.6	-	24.3	30.0	27.2	39.4	58.1	47.0
Total	18.1	17.3	21.1	26.5	25.2	28.0	36.0	69.6	63.8

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

Table 3.--Chromium ferroalloys: U.S. production, total, and by types, 1972-1976

(In short tons, chromium content)

Item	1972	1973	1974	1975	1976 1/
Chromium ferroalloys, total	197,457	248,538	240,712	135,413	147,406
Low-carbon ferrochromium	47,766	60,917	60,706	37,875	19,686
High-carbon ferrochromium	112,805	158,550	144,910	78,071	106,563
Ferrosilicon chromium	36,886	29,071	35,096	19,467	21,157

1/ Preliminary.

Source: Compiled from official statistics of the U.S. Bureau of Mines.

Table 4.--Chromium ferroalloys: U.S. producers' shipments, 1/ by types, 1972-76

Item	1972	1973	1974	1975	1976 2/
	Quantity (Short tons, chromium content)				
Chromium ferroalloys, total	200,346	280,215	255,183	123,570	154,753
Low-carbon ferrochromium	56,001	72,404	67,040	30,328	22,168
High-carbon ferrochromium	105,767	174,765	151,908	77,959	112,664
Ferrosilicon chromium	38,578	33,046	36,235	15,283	19,921
	Value (1,000 dollars)				
Chromium ferroalloys, total	104,243	145,786	214,315	162,499	168,000
Low-carbon ferrochromium	38,581	45,988	71,096	56,489	41,000
High-carbon ferrochromium	39,688	73,055	92,284	78,483	101,000
Ferrosilicon chromium	25,974	26,743	50,935	27,527	26,000
	Unit value (per pound, chromium content)				
Chromium ferroalloys,	$0.26	$0.26	$0.42	$0.66	$0.54
Low-carbon ferrochromium	.34	.32	.53	.93	.92
High-carbon ferrochromium	.19	.21	.30	.50	.45
Ferrosilicon chromium	.34	.40	.70	.90	.65

1/ Estimated from gross weight and average percent alloy content.
2/ Preliminary. Values estimated by the staff of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Bureau of Mines, except as noted.

Table 5.--Chromium ferroalloys: Producers', consumers', and importers' inventories, by types and by quarters, Jan 1, 1972-Jan. 1, 1977

(Short tons, chromium content) 1/

Date	Low-carbon ferrochromium				High-carbon ferrochromium				Ferrosilicon chromium			
	Producer	Consumer	Importer	Total	Producer	Consumer	Importer	Total	Producer	Consumer	Importer	Total
1972:												
Jan. 1	17,594	7,342	6,207	31,143	18,441	6,581	6,343	31,365	8,405	1,510	0	9,915
Apr. 1	12,139	7,782	4,782	24,703	19,139	5,233	6,483	30,455	9,172	1,165	0	10,337
July 1	13,341	5,120	6,363	24,824	20,755	5,876	10,603	37,234	7,540	1,390	672	9,602
Oct. 1	15,847	6,975	11,472	34,294	23,747	6,835	7,138	37,720	10,100	1,593	3,028	14,721
1973:												
Jan. 1	16,290	6,869	16,590	39,749	24,627	7,231	11,049	42,907	9,369	1,381	6,024	16,774
Apr. 1	12,942	7,767	13,329	34,038	24,977	8,306	6,412	39,695	6,007	1,506	4,854	12,367
July 1	10,087	9,459	14,483	34,029	17,884	12,099	5,819	35,802	4,335	2,130	2,337	8,802
Oct. 1	6,966	11,524	13,906	32,396	15,903	12,796	7,601	36,300	3,709	2,365	3,648	9,722
1974:												
Jan. 1	5,809	10,608	14,232	30,649	13,518	15,642	5,764	34,924	2,565	2,387	1,751	6,703
Apr. 1	4,677	14,244	9,150	28,071	11,095	14,454	7,432	32,981	2,077	2,446	1,074	5,597
July 1	5,297	11,486	9,123	25,906	5,460	13,743	5,952	25,155	1,740	1,885	299	3,924
Oct. 1	2,962	12,564	5,950	21,476	6,794	15,190	5,922	27,906	1,769	2,354	323	4,446
1975:												
Jan. 1	2,441	9,995	5,447	17,883	8,957	16,225	9,972	35,154	970	3,850	600	5,420
Apr. 1	4,727	10,590	6,563	21,880	13,339	28,429	19,167	60,935	5,453	3,397	1,131	9,981
July 1	7,569	12,111	10,837	30,517	22,374	31,473	29,950	83,797	5,436	2,347	1,641	9,424
Oct. 1	12,137	9,722	11,972	33,831	30,001	27,262	38,109	95,372	3,541	2,221	1,525	7,287
1976:												
Jan. 1	9,187	6,845	15,645	31,677	31,022	32,967	46,089	110,038	4,571	1,488	829	6,888
Apr. 1	5,624	7,846	16,715	30,185	37,336	30,888	45,588	113,812	4,927	2,099	832	7,858
July 1	6,930	6,357	14,939	28,226	39,817	31,399	41,980	113,196	5,041	1,867	267	7,175
Oct. 1	8,434	7,677	18,591	34,702	51,078	32,436	47,601	131,115	4,900	1,694	2,026	8,620
Jan. 1, 1977	7,634	5,967	19,431	33,032	40,964	33,459	43,416	117,839	5,999	1,380	1,313	8,692

1/ Producers' and consumers' inventories were estimated from gross weight based upon average chromium content of production as reported by the U.S. Bureau of Mines; importers' inventories were obtained from data submitted in response to questionnaires of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Bureau of Mines, except as noted.

Table 6.--Ferrochromium: 1/ U.S. exports, 1972-75, January-October 1975, and January-October 1976

Period	Quantity	Value
	Short tons, gross weight	1,000 dollars
1972	12,861	4,342
1973	15,164	5,091
1974	7,245	3,765
1975	13,218	9,075
January-October--		
1975	12,367	8,323
1976	9,945	6,624

1/ Chromium ferroalloys are not separately reported in official statistics. The bulk of exports are known to be high-carbon ferrochromium.

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

Table 7.--Average number of persons and the average number of production and related workers employed in producing low-carbon and high-carbon ferrochromium and ferrosilicon chromium, by quarters, 1972-76 1/

Period	All employees producing--				Production and related workers producing--			
	All products	Low-carbon ferro-chromium	High-carbon ferro-chromium	Ferrosilicon chromium	All products	Low-carbon ferro-chromium	High-carbon ferro-chromium	Ferrosilicon chromium
1972:								
Jan.-Mar---	4,445	414	602	300	3,696	341	506	259
Apr.-June--	4,636	724	659	425	3,878	614	561	375
July-Sept--	4,595	557	665	326	3,929	481	574	272
Oct.-Dec---	4,672	564	607	309	3,911	485	515	278
1973:								
Jan.-Mar---	4,622	713	749	370	3,865	621	644	320
Apr.-June--	4,671	775	788	421	3,919	670	680	369
July-Sept--	4,854	561	772	435	4,102	499	680	382
Oct.-Dec---	4,807	847	789	413	4,060	730	693	361
1974:								
Jan.-Mar---	4,741	680	771	458	3,982	565	745	404
Apr.-June--	4,878	766	788	511	4,102	629	686	448
July-Sept--	4,969	734	731	452	4,191	609	643	396
Oct.-Dec---	4,933	806	788	410	4,158	667	692	336
1975:								
Jan.-Mar---	4,854	729	841	454	4,049	599	735	384
Apr.-June--	4,545	619	615	369	3,730	499	525	306
July-Sept--	3,909	474	338	173	3,092	370	281	139
Oct.-Dec---	3,545	158	357	301	2,743	114	297	221
1976:								
Jan.-Mar---	3,831	203	564	377	3,021	149	464	292
Apr.-June--	4,213	415	585	394	3,396	323	484	314
July-Sept--	4,331	322	722	217	3,535	258	608	179
Oct.-Dec---	3,996	220	530	417	3,201	167	454	325

1/ Employment figures for high-carbon ferrochromium and ferrosilicon chromium reflect employment by low-carbon ferrochromium producers surveyed.

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

Table 8.--Chromium ferroalloys: Man-hours worked by production and related workers producing all products, low-carbon and high-carbon ferrochromium, and ferrosilicon chromium, by quarters, 1972-76

(In thousands of man-hours)

Period	Production and related workers producing--			
	All products	Low-carbon ferrochromium	High-carbon ferrochromium	Ferrosilicon chromium
1972:				
Jan.-Mar	1,438	165	163	89
Apr.-June	1,350	227	177	112
July-Sept	1,378	177	188	124
Oct.-Dec	1,486	166	159	83
1973:				
Jan.-Mar	1,460	280	245	96
Apr.-June	1,442	262	258	101
July-Sept	1,544	207	260	116
Oct.-Dec	1,560	330	274	103
1974:				
Jan.-Mar	1,525	276	248	138
Apr.-June	1,520	291	236	152
July-Sept	1,519	281	217	125
Oct.-Dec	1,560	317	247	107
1975:				
Jan.-Mar	1,597	300	275	134
Apr.June	1,456	251	163	102
July-Sept	1,209	185	74	29
Oct.-Dec	1,124	54	77	87
1976:				
Jan.-Mar	1,145	68	158	132
Apr.-June	1,329	193	165	142
July-Sept	1,318	132	225	69
Oct.-Dec	1,157	74	143	134

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

Table 9.--Average hourly and weekly earnings of U.S. production workers engaged in the production of durable goods, primary metals (SIC 33), and blast furnace and basic steel products (SIC 331), annual 1970-77, 7-year average, 5-year average, and average annual growth

Period	Average hourly earnings			Average weekly earnings		
	Durable goods	Primary metals	Basic steel products	Durable goods	Primary metals	Basis steel products
Annual:						
1970	$3.56	$3.94	$4.16	$143.47	$159.18	$166.40
1971	3.80	4.23	4.49	153.52	170.89	179.15
1972	4.05	4.66	5.04	167.27	193.86	207.14
1973	4.32	5.03	5.44	179.28	213.27	227.39
1974	4.68	5.60	6.25	190.48	233.52	258.75
1975	5.14	6.17	6.95	205.09	246.80	273.14
1976	5.55	6.80	7.68	225.33	276.08	307.20
1977 1/	5.80	6.98	7.85	230.26	279.90	308.51
7-year average, 1970-1976	4.44	5.20	5.72	180.63	213.37	231.31
5-year average, 1972-1976	4.74	5.65	6.27	193.49	232.70	254.72
Average annual growth:						
1976 from 1970--percent	6.5	8.1	9.2	6.7	8.2	9.2
1976 from 1972--do	4.6	7.8	8.8	6.1	7.3	8.2
1976 from 1975--do	3.9	5.0	5.1	4.8	5.8	6.0

1/ January 1977.

Source: Compiled from official statistics of the U.S. Bureau of Labor Statistics.

Table 10.--Real hourly and weekly earnings of U.S. production workers engaged in the production of durable goods, primary metals (SIC 33), and blast furnace and basic steel products (SIC 331), annual 1970-77, 1/ 7-year average, 5-year average, and average annual growth

(1967=100)

Period	Real hourly earnings			Real weekly earnings		
	Durable goods	Primary metals	Basic steel products	Durable goods	Primary metals	Basic steel products
Annual:						
1970	$3.56	$3.94	$4.16	$143.47	$159.18	$166.40
1971	3.64	4.05	4.30	147.19	163.84	171.77
1972	3.76	4.32	4.68	155.26	179.94	192.26
1973	3.77	4.40	4.75	156.65	186.35	198.69
1974	3.68	4.40	4.92	150.00	183.88	203.74
1975	3.70	4.45	5.01	147.87	179.38	196.94
1976	3.80	4.64	5.34	153.70	188.32	209.55
1977 2/	3.84	4.63	5.21	152.76	185.70	204.67
7-year average, 1970-1976	3.70	4.31	4.72	150.60	177.27	191.31
5-year average, 1972-1976	3.74	4.44	4.92	152.70	183.57	200.25
Average annual growth:						
1976 from 1970--percent	0.93	2.36	3.35	0.99	2.43	3.34
1976 from 1972--do	.21	1.43	2.30	.20	.91	1.23
1976 from 1975--do	1.34	2.11	2.30	1.95	2.50	3.15

1/ Earnings are deflated by the Consumer Price Index after 1970 to show effect of price changes.
2/ January 1977.

Source: Compiled from official statistics of the U.S. Bureau of Labor Statistics.

Table 11.--High-carbon ferrochromium: Lowest net prices for the imported and the U.S. products, by chromium specifications and by quarters, 1970-76

(Per pound)

Period	Over 65 percent chromium		58 percent-64 percent chromium		52 percent-55 percent chromium	
	Imported	U.S.	Imported	U.S.	Imported	U.S.
1970:						
Jan.-Mar	$0.19	$0.20	1/	$0.22	1/	1/
Apr.-June	.21	.20	1/	.22	1/	1/
July-Sept	.20	.21	1/	.24	1/	1/
Oct.-Dec	.21	.23	.20	.26	1/	1/
1971:						
Jan.-Mar	.23	.25	1/	.28	$0.22	1/
Apr.-June	.23	.23	.22	.28	.22	1/
July-Sept	.20	.23	.23	.26	1/	1/
Oct.-Dec	.20	.23	1/	.26	.22	1/
1972:						
Jan.-Mar	.20	.21	1/	.25	.17	1/
Apr.-June	.20	.17	.22	.26	.16	1/
July-Sept	.19	.19	1/	.24	.14	$0.18
Oct.-Dec	.19	.17	1/	.24	.15	.17
1973:						
Jan.-Mar	.20	.17	.15	.24	.15	.16
Apr.-June	.20	.19	.19	.24	.15	.19
July-Sept	.22	.19	1/	.26	.15	.20
Oct.-Dec	.21	.20	.21	.25	.18	.20
1974:						
Jan.-Mar	.22	.21	1/	.25	.16	.20
Apr.-June	.26	.24	1/	.41	.19	.27
July-Sept	.55	.30	.80	.43	.24	.31
Oct.-Dec	.64	.34	.76	.46	.25	.36
1975:						
Jan.-Mar	.55	.51	.65	.58	.33	.45
Apr.-June	.56	.50	.61	.57	.41	.47
July-Sept	.56	.53	.52	.55	.48	.49
Oct.-Dec	.41	.53	.54	.56	.41	.48
1976:						
Jan.-Mar	.37	.31	.38	.57	.36	.44
Apr.-June	.39	.45	.47	.59	.35	.44
July-Sept	.41	.33	.46	.59	.37	.42
Oct.-Dec	.36	.34	.34	.56	.35	.44

1/ No sales prices reported.

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

Table 12.--High-carbon ferrochromium: Prices of greatest volume sold for the imported and the U.S. products, by chromium specifications and by quarters, 1970-76

(Per pound)

Period	Over 65 percent chromium		58 percent-64 percent chromium		52 percent-55 percent chromium	
	Imported	U.S.	Imported	U.S.	Imported	U.S.
1970:						
Jan.-Mar.	$0.21	$0.20	1/	$0.22	1/	1/
Apr.-June	.22	.20	1/	.22	1/	1/
July-Sept.	.22	.21	1/	.24	1/	1/
Oct.-Dec.	.24	.23	$0.20	.26	1/	1/
1971:						
Jan.-Mar.	.25	.25	1/	.28	$0.22	1/
Apr.-June	.25	.23	.24	.26	.22	1/
July-Sept.	.22	.23	.24	.26	1/	1/
Oct.-Dec.	.21	.23	.23	.26	.22	1/
1972:						
Jan.-Mar.	.21	.22	.21	.25	.17	1/
Apr.-June	.21	.22	.23	.26	.16	1/
July-Sept.	.20	.20	.20	.24	.15	$0.18
Oct.-Dec.	.19	.19	1/	.23	.15	.17
1973:						
Jan.-Mar.	.21	.19	.15	.24	.15	.16
Apr.-June	.20	.21	.19	.24	.16	.20
July-Sept.	.23	.22	1/	.26	.18	.20
Oct.-Dec.	.23	.23	.21	.25	.19	.21
1974:						
Jan.-Mar.	.27	.24	1/	.25	.20	.20
Apr.-June	.35	.29	1/	.41	.21	.27
July-Sept.	.49	.37	.79	.46	.30	.36
Oct.-Dec.	.78	.46	.77	.51	.30	.41
1975:						
Jan.-Mar.	.77	.56	.80	.58	.42	.45
Apr.-June	.76	.57	.64	.57	.38	.47
July-Sept.	.61	.55	.66	.55	.50	.49
Oct.-Dec.	.47	.51	.64	.54	.42	.48
1976:						
Jan.-Mar.	.42	.45	.45	.59	.40	.44
Apr.-June	.46	.42	.44	.56	.39	.44
July-Sept.	.44	.43	.46	.57	.39	.42
Oct.-Dec.	.43	.42	.39	.56	.40	.42

1/ No sales prices reported.

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

Table 13.--Ferrochromium silicon: Import and U.S. prices, by quarters, 1970-76

(Per pound)

Period	Lowest net price		Net price	
	Import	U.S.	Import	U.S.
1971:				
January-March	1/	$0.22	1/	$0.27
April-June	1/	.23	1/	.23
July-September	1/	.21	1/	.21
October-December	1/	.22	1/	.22
1972:				
January-March	1/	.40	1/	.41
April-June	1/	.37	1/	.37
July-September	1/	.37	1/	.37
October-December	1/	.36	1/	.36
1973:				
January-March	1/	.39	1/	.39
April-June	1/	.39	1/	.39
July-September	1/	.41	1/	.41
October-December	1/	.41	1/	.41
1974:				
January-March	$0.25	.43	$0.28	.43
April-June	.25	.52	.27	.53
July-September	.41	.74	.62	.75
October-December	.85	.92	.85	.92
1975:				
January-March	1/	.91	1/	.91
April-June	1/	.87	1/	.87
July-September	1/	.87	1/	.87
October-December	1/	.84	1/	.84
1976:				
January-March	1/	.84	1/	.84
April-June	1.30	.85	1.30	.85
July-September	.81	.83	.81	.83
October-December	.81	.83	.81	.83

1/ No sales prices reported.

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

Table 14.--Chromium ferroalloys: Profit-and-loss experience of 5 U.S. producers on their chromium ferroalloy operations, by type, and their operations on other products manufactured within the same establishments, 1972-76 1/

(Money figures in thousands of dollars)

Item and year	Net sales	Cost of sales	Gross profit	General, administrative, and selling expenses	Net operating profit	Other income or (expense), net	Net profit before income taxes	Ratio of net operating profit to net sales	Ratio of net profit before income taxes to net sales
								Percent	Percent
Operations on low-carbon ferrochromium:									
1972 2/	26,648	23,852	2,796	1,581	1,215	(258)	957	4.6	3.6
1973	44,448	43,235	1,213	2,040	(827)	(276)	(1,103)	(1.9)	(2.5)
1974	70,109	55,824	14,285	2,363	11,922	(242)	11,680	17.0	16.7
1975	53,493	37,456	16,037	2,168	13,869	(502)	13,367	25.9	25.0
1976	36,203	27,024	9,179	1,703	7,476	(709)	6,767	20.7	18.7
Operations on high-carbon ferrochromium: 3/									
1972 2/	29,658	29,139	519	1,938	(1,419)	(838)	(2,257)	(4.8)	(7.6)
1973	80,589	71,669	8,920	3,077	5,843	(793)	5,050	7.3	6.3
1974	113,473	85,551	27,922	4,587	23,335	(1,477)	21,858	20.6	19.3
1975	88,743	69,599	19,144	4,849	14,295	(666)	13,629	16.1	15.4
1976	96,731	83,197	13,534	5,334	8,200	1,382	6,818	8.5	7.0
Operations on ferrosilicon chromium:									
1972 2/	10,224	8,846	1,378	502	876	(56)	820	8.6	8.0
1973	26,258	22,484	3,774	1,002	2,772	36	2,808	10.6	10.7
1974	48,513	35,624	12,889	1,749	11,140	(307)	10,833	23.0	22.3
1975	28,081	20,463	7,618	1,909	5,709	(45)	5,664	20.3	20.2
1976	32,894	24,734	8,160	1,893	6,267	(912)	5,355	19.1	16.3
Operations on other products produced within the same establishments:									
1972 2/	75,248	67,642	7,606	5,456	2,150	(726)	1,424	2.9	1.9
1973	134,637	118,776	15,861	7,316	8,545	(380)	8,165	6.3	6.1
1974	198,549	158,719	39,830	9,581	30,249	(744)	29,505	15.2	14.9
1975	175,318	143,434	31,884	13,289	18,595	(1,108)	17,487	10.6	10.0
1976	232,986	193,653	39,333	15,090	24,243	(3,873)	20,370	10.4	8.7

1/ The accounting year of each of the 5 producers ended on or about Dec. 31.

2/ One producer was unable to supply data for 1972.

3/ Includes the overall establishment operation of one producer. This producer's net sales of high-carbon ferrochromium ranged from 71 percent to 83 percent of its total establishment sales in each of the years 1974-76.

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

APPENDIX C

STUDY BY UNION CARBIDE CORP.

UNION CARBIDE CORPORATION
METALS DIVISION
270 PARK AVENUE, NEW YORK, N.Y. 10017

April 6, 1977

Mr. Nicholas C. Tolerico
Mr. J. Kennedy
U. S. International Trade Commission
Metals Division
8th and E Streets, N. W.
Washington, D. C. 20436

Gentlemen:

During my last visit with you in Washington I agreed to furnish two pieces of information. The delay in sending this information was due to the necessity of determining the AOD figures for Europe and Japan and also the question of confidentiality. This information is not confidential. It is based upon our best knowledge of what the stainless steel producers are doing. I hope it will be of value to you.

I have also included an evaluation we made of the low carbon ferrochrome petition. This is not confidential material nor is it a position paper. It is one of the bases for our decision not to participate in the low carbon ferrochrome petition.

Very truly yours,

G. G. Borden

GGB:hk
Enc.

Low Carbon Ferrochrome Import Injury

Union Carbide Corporation has been, and is today, one of the major suppliers of domestically produced low carbon ferrochrome for the U.S. market. Although Union Carbide has a major interest in this subject and possibly could derive some benefit from a restriction of low carbon ferrochrome imports, it could not join in as a party to the submission of the import restriction petition nor could it agree that the petition is justified. Union Carbide does not think that imports of low carbon ferrochrome are a "substantial" cause or threat of injury, as defined by the 1974 Trade Act, to the domestic industry. A technological change has occurred during recent years which is the major cause, more than imports, of the decrease in market for low carbon ferrochrome in the U.S. This technological change, the AOD stainless steel process, which started in the U.S. in 1968, has resulted in an increasing usage of high carbon ferrochrome in place of low carbon ferrochrome due to significant economic reasons. In 1975 this technological change had grown to the position whereby it became the most substantial cause of loss of market for low carbon ferrochrome and this trend is increasing and will continue to increase during future years. In 1976 approximately 62% of U.S. stainless steel was produced using the AOD process. It is estimated that this percentage will increase during the next few years to the extent that in 1979, 95% of stainless steel will be produced by the AOD process. The consumption of low carbon ferrochrome has decreased and will decrease due to this change in technology.

Although the AOD stainless steel process and a few other similar processes have been very widely publicized and are well known in the ferroalloy and steel industry, Union Carbide is possibly better informed in this regard than others. Union Carbide developed the process, holds the patents, and is marketing the AOD process.

Attached is a study by Union Carbide, using Bureau of Mines data, which details the relative significance of the factors of technology change and import.

U.S. Low Carbon Ferrochrome - Relative Impact of Imports and of the AOD Process

Introduction

This study will quantitatively assess the relative importance of imports versus the AOD process on the size of the U.S. market served by domestically produced low carbon ferrochrome.

The period examined is the decade 1967 through 1976 in order to include four years, 1967-1970, in which the impact of the AOD process on low carbon ferrochrome demand was small or negligible. The first AOD vessel was placed into service in 1968. Data for 1967 through 1974 were drawn from the U. S. Department of the Interior, Bureau of Mines Minerals Yearbooks. 1975 annual data and 1976 monthly data were taken from Mineral Industry Surveys also published by the Bureau of Mines. The effect of stainless steel scrap recycle on virgin Cr addition practices is not covered below.

Summary

(1) Stainless Steel typically consumed about 68% of the U. S. chromium contained in all chromium ferroalloys in 1967-1976.

(2) From 1967 to 1974, stainless steel typically accounted for 77% of U. S. low carbon ferrochrome consumption. In 1975-1976 this value dropped to an average of 61%. (Chart 1, "D")

(3) The virgin chromium consumption per short ton of stainless steel produced in the past decade averaged 217 pounds Cr per ton and ranged from 196 to 247 pounds Cr per ton primarily due to variations in the proportion of stainless scrap charged by the stainless steel melters. The introduction of the AOD process does not appear to have caused a significant change in the total virgin chrome consumed in stainless steel production.

(4) Low carbon ferrochrome consumption averaged 113 pounds Cr per ton stainless steel produced in 1967-1970 and fell through the 1971 to 1976 period to 38 pounds Cr per ton as a result of the penetration of the AOD process which is able to utilize high carbon ferrochrome instead of the more expensive low carbon ferrochrome. (Chart I, "B" and Chart IV)

(5) If the AOD process had not been introduced, and if the 1967-1970 average low carbon ferrochrome level of 113 pounds Cr per ton of stainless steel produced had continued, an additional 125 million pounds of Cr contained in low carbon ferrochrome would have been consumed in 1976. This represents a 56% reduction in the total 1976 U. S. low carbon ferrochrome market caused by the AOD process. Assuming an analysis of 67% Cr, this is equivalent to a displacement of 93,000 short tons of low carbon ferrochrome. (Table II)

(6) In 1967-1976, low carbon ferrochrome imports for consumption in the U. S. averaged 67 million pounds per year of contained chromium and ranged from 38 to 93 million pounds of chromium per year. In 1976, low carbon ferrochrome imports for consumption were 86 million pounds of chromium contained in 64,000 short tons of alloy. This represents 38% of the consumption had the AOD process not been introduced. (Table II)

(7) Through 1975, imported low carbon ferrochrome had a greater impact on the domestic LCFeCr market than displacement by the AOD process. By 1976, however, the penetration by the AOD process had become a more important factor (Chart II). Chart III directly compares the displacement by the AOD process with low carbon ferrochrome imports.

Data

Table I attached displays chromium ferroalloy consumption data drawn from the Bureau of Mines. (Consumption data are all expressed in terms of contained chromium in order to place the various ferroalloys on a common basis).

Chart I shows U. S. stainless steel production from 1967 to 1976 displaying a high degree of cyclicality during recent years (Segment A), the substantial decrease in average LCFeCr additions to stainless steel since the AOD melting practice first became significant in 1971 (Segment B), the corresponding reduction in the proportion of virgin Cr additions obtained from LCFeCr alloys (Segment C), and the very marked and recent drop in the relative importance of the stainless steel industry to the LCFeCr market (Segment D).

Calculation of Relative Impact of AOD Process and Imports

Table II contains for the years 1971-1976, an estimate of the level of low carbon ferrochrome total U. S. consumption based on a use level of 213 pounds Cr per short ton of stainless steel produced, the average level of 1967-1970. The difference between this estimated consumption and the actual reported consumption is attributed to the AOD process (shown on Chart III attached). The historical levels of low carbon ferrochrome imports are also tabulated. The impact of both the AOD process and imports are expressed as percent of the estimated consumption had the AOD process not been introduced.

TABLE 1

U.S. CONSUMPTION OF CHROMIUM FERROALLOYS (U.S. BUREAU OF MINES)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*
Low Carbon Ferrochrome, Millions of Pounds Cr										
Stainless Steel	154.8	165.2	169.6	158.2	129.9	127.3	160.2	194.8	60.2	62.3
All Other Uses	45.1	44.7	49.7	52.0	44.4	39.7	44.7	52.0	41.2	36.9
Total	199.9	209.9	219.3	210.2	174.3	167.0	204.9	246.8	101.4	99.2
High Carbon Ferrochrome, Millions of Pounds Cr										
Stainless Steel	97.8	95.6	96.6	82.6	90.3	157.6	231.5	269.9	148.3	218.8
All Other Uses	80.0	84.4	90.4	70.9	73.0	87.4	105.6	107.6	99.2	92.0
Total	177.8	180.0	187.0	153.5	163.3	245.0	337.1	377.5	247.5	310.8
Ferrochrome Silicon, Millions of Pounds Cr										
Stainless Steel	53.1	48.1	53.6	40.6	37.8	44.0	62.2	67.1	29.9	41.4
All Other Uses	11.9	12.8	9.0	7.1	6.7	6.8	7.3	7.0	7.2	5.8
Total	65.0	60.9	62.6	47.7	44.5	50.8	69.5	74.1	37.1	47.2
Other Chromium, Millions of Pounds Cr										
Stainless Steel	2.4	0.4	1.3	4.3	0.2	0.2	0.3	0.3	0.3	3.4
All Other Uses	16.8	8.0	10.5	12.7	14.3	15.8	19.5	21.2	16.5	15.8
Total	19.2	8.4	11.8	17.0	14.5	16.0	19.8	21.5	16.8	19.2
Total Virgin Chrome, Millions of Pounds Cr										
Stainless Steel	308.1	309.3	321.1	285.7	258.2	329.1	454.2	532.1	238.7	325.9
All Other Uses	153.8	149.9	159.6	142.7	138.4	149.7	177.1	187.8	164.1	150.5
Total	461.9	459.2	480.7	428.4	396.6	478.8	631.3	719.9	402.8	476.4
Total Virgin Chrome, Percent by Use										
Stainless Steel	66.7	67.4	66.8	66.7	65.1	68.7	71.9	73.9	59.3	68.4
All Other Uses	33.3	32.6	33.2	33.3	34.9	31.3	28.1	26.1	40.7	31.6
Stainless Steel Virgin Chrome, Percent by Source										
Low Carbon Ferrochrome	50.3	53.4	52.8	55.4	50.3	38.7	35.2	36.6	25.2	19.1
High Carbon Ferrochrome	31.7	30.9	30.1	28.9	35.0	47.9	51.0	50.7	62.1	67.1
Ferrochrome Silicon	17.2	15.6	16.7	14.2	14.6	13.3	13.7	12.6	12.6	12.7
Other	0.8	0.1	0.4	1.5	0.1	0.1	0.1	0.1	0.1	1.1
All Other Uses Virgin Chrome, Percent by Source										
Low Carbon Ferrochrome	29.3	29.8	31.1	36.4	32.1	26.5	25.3	27.7	25.1	24.5
High Carbon Ferrochrome	52.0	56.3	56.6	49.7	52.8	58.4	59.6	57.3	60.5	61.1
Ferrochrome Silicon	7.8	8.6	5.7	5.0	4.8	4.5	4.1	3.7	4.4	3.9
Other	10.9	5.3	6.6	8.9	10.3	10.6	11.0	11.3	10.0	10.5
Low Carbon Ferrochrome										
Percent of Virgin Chrome	43.3	45.7	45.6	49.1	43.9	34.9	32.5	34.3	25.2	20.8
Percent to Stainless Steel	77.4	78.7	77.3	75.3	74.5	76.2	78.2	78.9	59.4	62.8
Stainless Steel										
Production, Thousands of Short Tons	1451	1432	1569	1279	1263	1564	1889	2150	1116	1661
Low Carbon Ferrochrome, Pounds Cr Per Ton	107	115	108	124	103	81	85	91	54	38
Total Virgin Chrome, Pounds Cr Per Ton	212	216	205	223	204	210	240	247	214	196

* Preliminary values compiled from monthly data

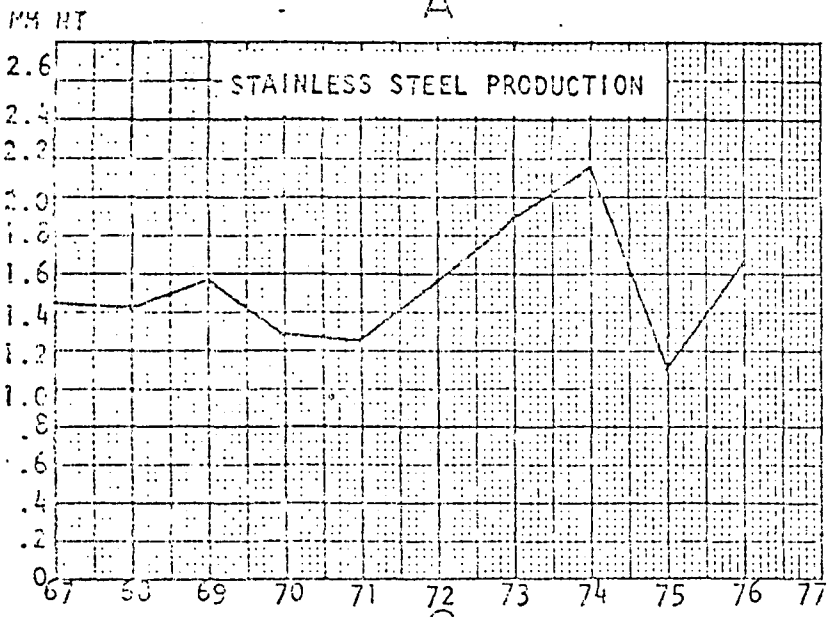
TABLE II

U.S. LOW CARBON FERROCHROME, MILLIONS OF POUNDS CONTAINED CR

Year	Estimated Consumption No AOD Process *		Actual Total Consumption	Displaced by AOD		Imports	
				Millions lbs Cr	% of Cons. No AOD	Millions lbs Cr	% of Cons. No AOD
1967	-		199.9	-	-	65.7	32.9
1968	-		209.9	-	-	71.5	34.1
1969	-		219.3	-	-	52.1	23.8
1970	-		210.2	-	-	37.7	17.9
1971	187.1	93.55	174.3	12.8	6.8	53.9	28.8
1972	216.4	108.2	167.0	49.4	22.8	92.5	42.7
1973	258.2	129.1	204.9	53.3	20.6	65.5	25.4
1974	295.0	145.5	246.8	48.2	16.3	63.0	21.4
1975	167.3	93.1	101.4	65.9	39.4	79.9	47.8
1976	224.6	[illegible]	99.2	125.4	55.8	85.9	38.2

* Based on 1967-1970 four year average of 113 pounds Cr derived from L.C. FeCr per short ton stainless steel produced.

A



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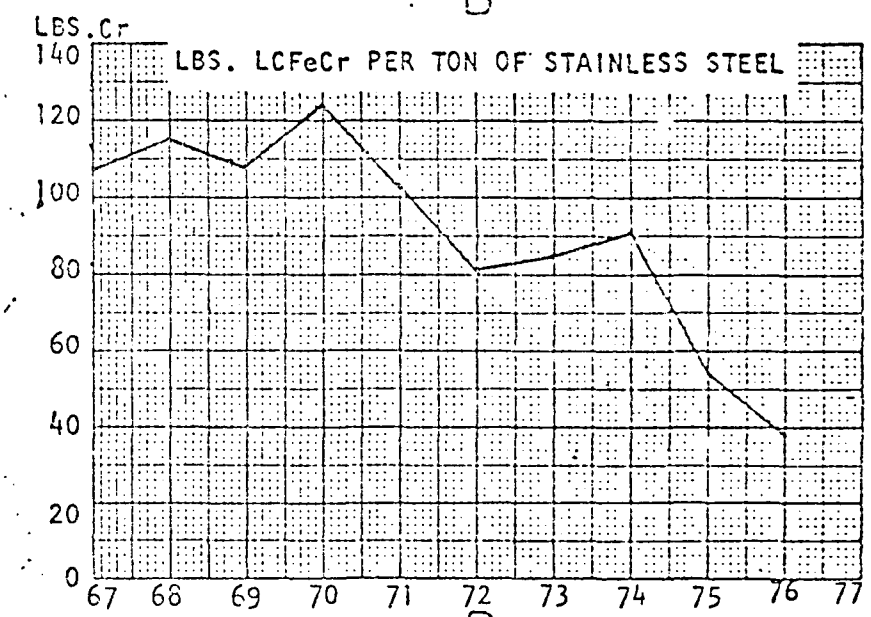

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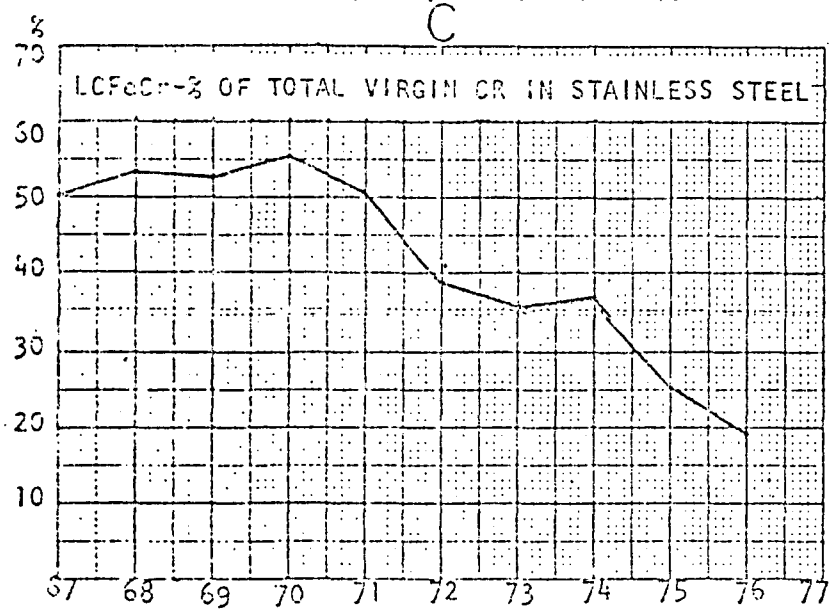

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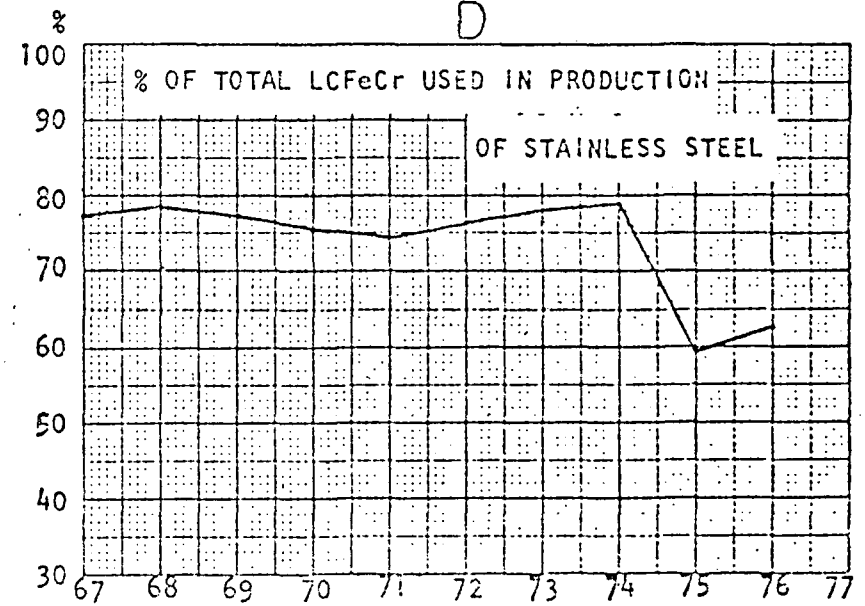


A-92

LOW CARBON FERROCHROME IN STAINLESS STEEL

METALS DIVISION

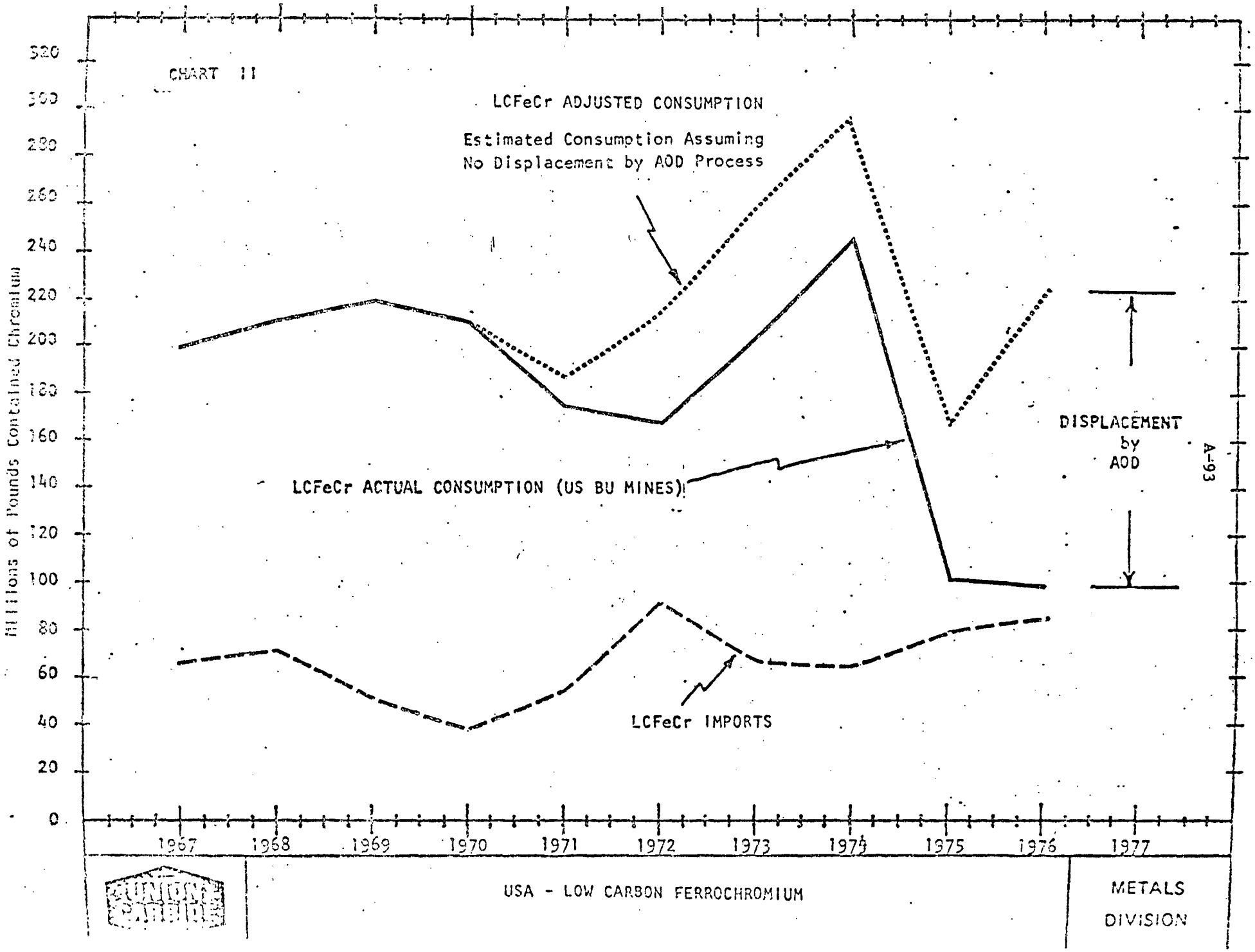


CHART II
LCFeCr ADJUSTED CONSUMPTION
Estimated Consumption Assuming
No Displacement by AOD Process
LCFeCr ACTUAL CONSUMPTION (US BU MINES)
LCFeCr IMPORTS
DISPLACEMENT
by
AOD
A-93
Millions of Pounds Contained Chromium
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
USA - LOW CARBON FERROCHROMIUM
METALS
DIVISION

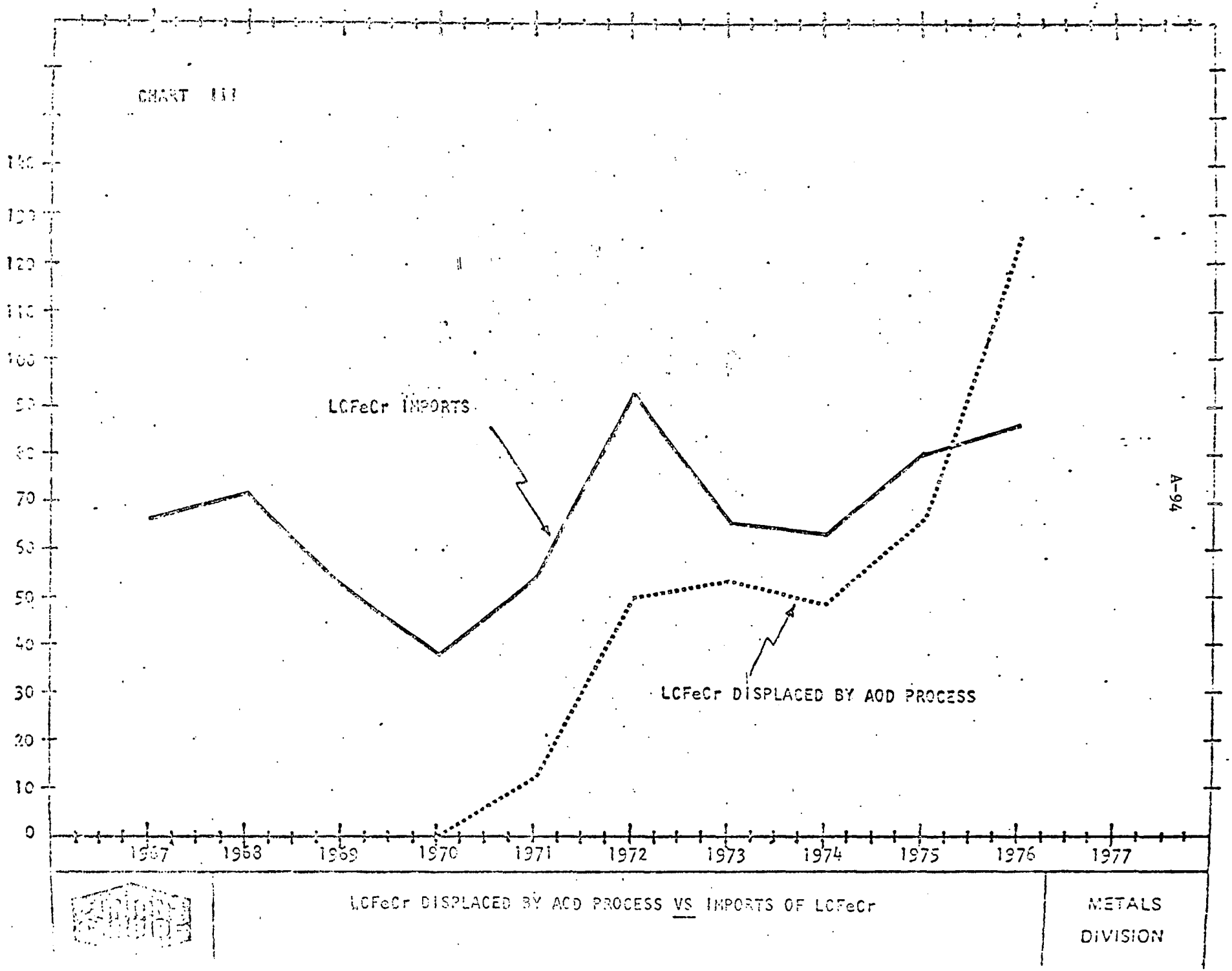


CHART III
LCFeCr IMPORTS
LCFeCr DISPLACED BY AOD PROCESS
70
60
50
40
30
20
10
0
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
LCFeCr DISPLACED BY AOD PROCESS VS IMPORTS OF LCFeCr
METALS
DIVISION

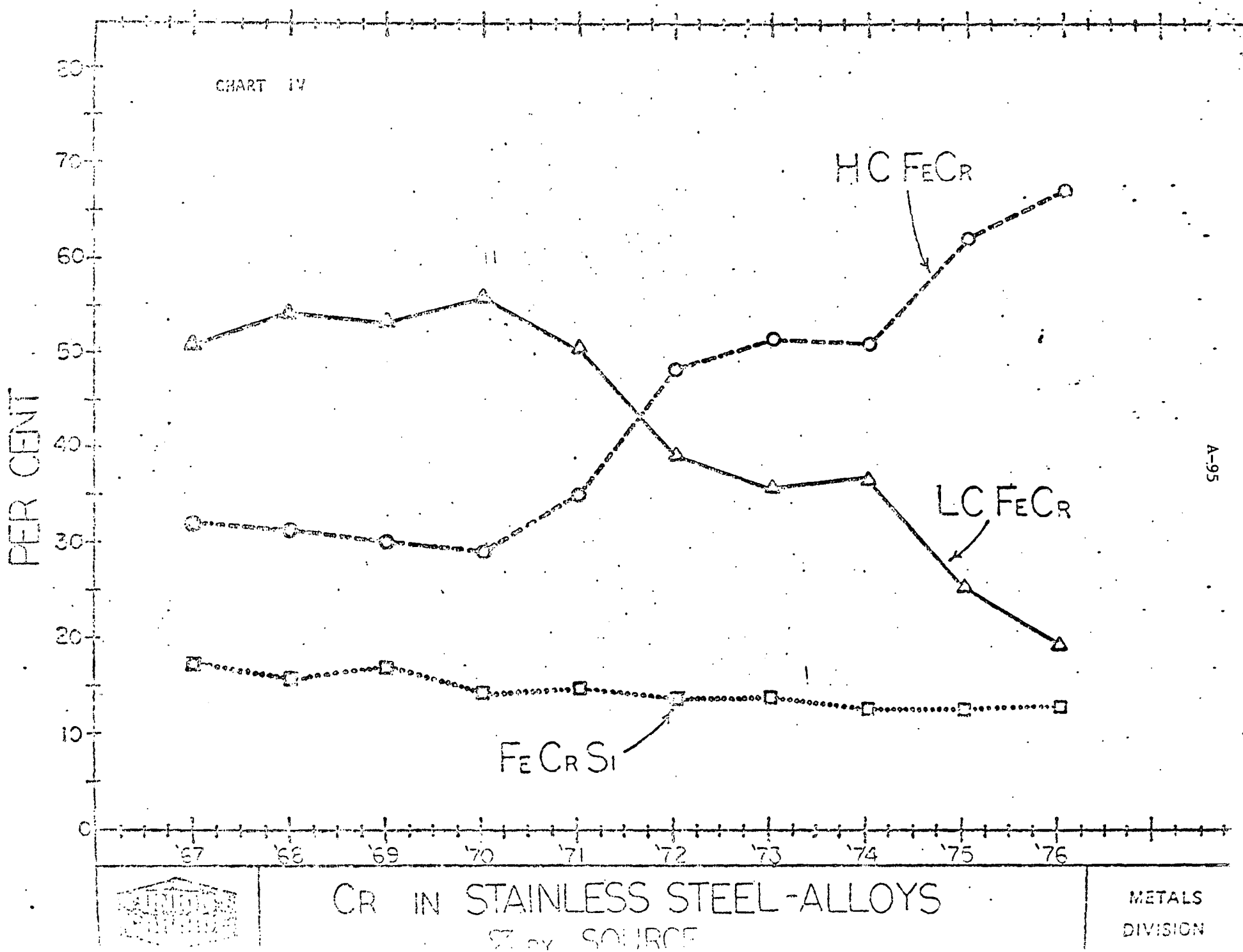


CHART IV
PER CENT
80
70
60
50
40
30
20
10
0
'67
'68
'69
'70
'71
'72
'73
'74
'75
'76
HC FeCr
LC FeCr
Fe Cr Si
A-95
CR IN STAINLESS STEEL-ALLOYS
METALS
DIVISION

Estimated Adoption of AOD and VOD Practices for the Production of Stainless Steel

(% of Total Stainless Steel Production)

Practice	1968	1969	1970	1971	1972	1973	1974
United States							
AOD	3.0	3.0	3.0	10.7	33.5	39.3	45.6
VOD	-	-	-	3.6	3.6	3.6	3.6
Total	3.0	3.0	3.0	14.3	37.1	42.9	49.2
Europe							
AOD	0	0	0.6	2.6	6.2	17.0	23.9
VOD	1.8	1.8	3.3	12.4	21.1	22.2	22.2
Total	1.8	1.8	3.9	15.0	27.3	39.2	46.1
Japan							
AOD	0	0	0	0	14.4	18.8	30.7
VOD	9.7	19.4	25.0	40.6	52.1	53.4	54.8
Total	9.7	19.4	25.0	40.6	66.5	72.2	85.5

Projection of Stainless Steel Production by AOD and VOD in the United States

(% of Total)

	% AOD and VOD
1975	57.4
1976	61.6
1977	85.5
1978	92.0
1979	95.5
1980	95.5

E S T I M A T E D

USAGE OF CHROMIUM - BY SOURCE - IN STAINLESS STEEL

(Pounds of Chromium per Net Ton)

Scrap Quantity - 45% of charge

Scrap Analysis - 16.75% chromium

Lbs. Cr/NT	AOD Partial Pressure Practice	Conventional Practice
Scrap	151	151
Charge Chrome	198	80
Ferrochrome Silicon	10	46
Low Carbon Ferrochrome	6	110
Total	365 *	387

*Reflects recovery improvement of AOD practice.

APPENDIX D

RESPONSES OF IMPORTS TO CHANGES IN THE PRICES OF IMPORTED LOW-CARBON FERROCHROMIUM AND DOMESTIC LOW-CARBON FERROCHROMIUM AND TO CHANGES IN U.S. ECONOMIC INDICATORS

In order to determine the relationship between the demand for imported low-carbon ferrochromium and various economic factors, several elasticity measures were calculated. Economic factors used in the determination of elasticities were the price of imported and domestically produced low-carbon ferrochromium and several measures of U.S. economic activity. The demand for imported low-carbon ferrochromium varies directly with the price of domestic products and U.S. economic activity and varies inversely with the price of the imported product. If the import price increases, the level of imports should decline; if the price of the domestic product increases, the level of imports should also increase; finally, if U.S. economic activity increases, the level of imports should increase as more purchasing power is available for both the domestic and imported product.

The price elasticity of demand is used as an estimate of price sensitivity of imports. Specifically, this elasticity measures the percentage change in the quantity demanded corresponding to a given percentage change in price, all other things being equal. Two models were used to estimate this elasticity--one utilizing the actual prices of imports and of their principal domestic substitutes and the other using relative prices.

Three indicators of U.S. economic activity were used to calculate elasticities based on income. Since low-carbon ferrochromium is an intermediate good used in the production of stainless and other types of steel, the Federal Reserve Board Index of Quantity Output for iron and steel was used as one economic index of income. The Federal Reserve

Board Index of Quantity Output for the U.S. economy and the gross national product were used as other income measures.

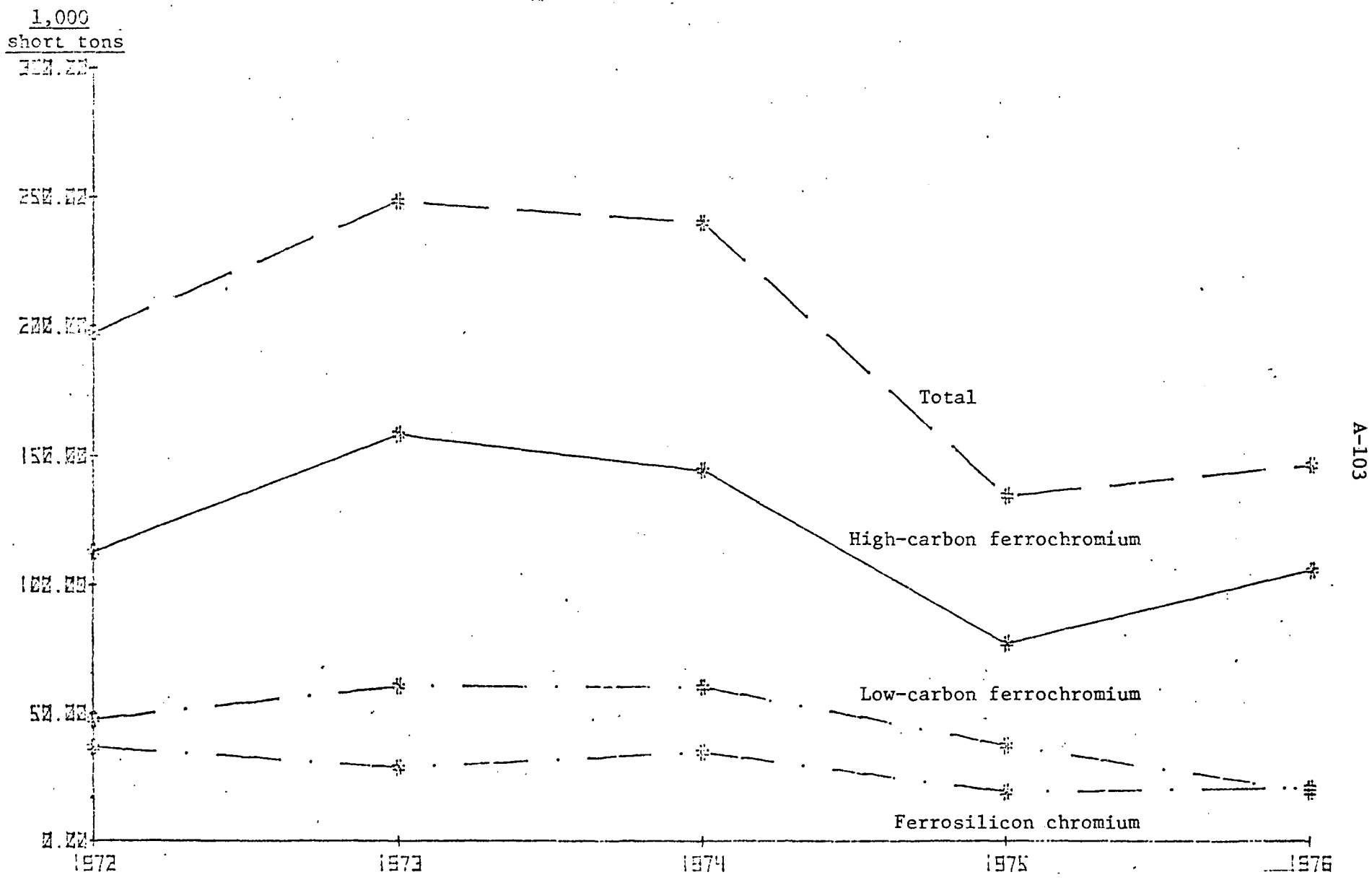
The results of the elasticity calculations indicated the relationships between variables were as expected, that is, the quantity of imports demanded varied directly with the price of the domestic product and U.S. economic activity and inversely with the price of the imported product. The calculations, however, possessed a low statistical significance level. Changes in the variables used in the specification of the equasion--prices of U.S. and imported low-carbon ferrochromium and U.S. economic activity measure--did not to any great extent explain changes in the quantity of imported low-carbon ferrochromium demanded. 1/ One explanation for such results may be that since the demand for low-carbon ferrochromium is related primarily to the production of stainless and other steels and accounts for only a small percentage of the total cost of steel production, the demand for low-carbon ferrochromium may depend primarily on its availability from foreign and domestic sources.

1/ Substituting price data deflated by the U.S. Composite Wholesale Price Index for actual price data did not increase significance of the results.

APPENDIX E

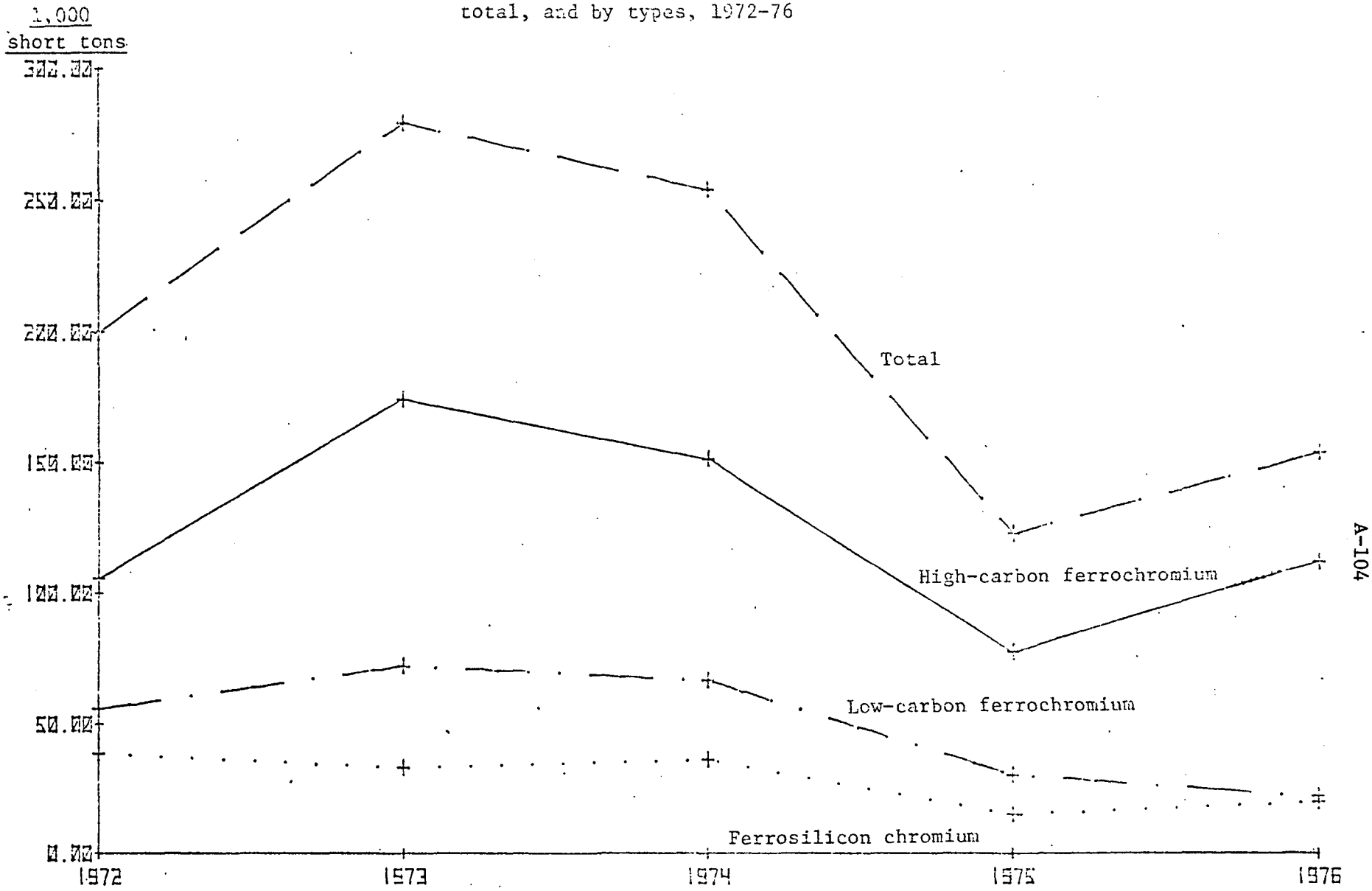
FIGURES

Figure 15.--Chromium ferroalloys: U.S. production, total, and by types, 1972-76



Source: Compiled from official statistics of the U.S. Bureau of Mines.

Figure 16.--Chromium ferroalloys: U.S. producers' shipments, total, and by types, 1972-76



Source: Compiled from official statistics of the U.S. Bureau of Mines.

Library Cataloging Data

U.S. International Trade Commission.
Low-carbon ferrochromium. Report to the President on investigation no. TA-201-20 under section 201 of the Trade act of 1974, Washington, 1977.

"USITC Publication 825"

1. Chromium-iron alloys, I. Title

UNITED STATES
INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C 20436

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☐ Change as Shown
Please detach address label and mail to address shown above.