HIGH-CARBON FERROCHROMIUM

Report to the President on Investigation No. TA-203-8 Under Section 203 of the Trade Act of 1974

USITC PUBLICATION 1185

SEPTEMBER 1981

United States International Trade Commission / Washington, D.C. 20436

UNITED STATES INTERNATIONAL TRADE COMMISSION

COMMISSIONERS

Bill Alberger, Chairman

Michael J. Calhoun, Vice Chairman

Catherine Bedell

Paula Stern

Kenneth R. Mason, Secretary to the Commission

This report was prepared by:

Woodley Timberlake, Investigator
Clark Workman, Office of Economics
Genevieve Kenney, Office of Economics
James Kennedy, Office of Industries
Henry McFarland, Office of Economics
Chandrakant Mehta, Office of Investigations
William Perry, Office of the General Counsel

Lynn Featherstone, Supervisory Investigator

Address all communications to
Office of the Secretary
United States International Trade Commission
Washington, D.C. 20436

CONTENTS

CONTENTS

Figures

Tables

CONTENTS

CONTENTS

Note.--Information that would disclose confidential operations of individual concerns may not be published and therefore has been deleted from this report. Deletions are indicated by asterisks.

REPORT TO THE PRESIDENT

U.S. International Trade Commission
September 16, 1981

To the President:

In accordance with section 203(i)(2) and 203(i)(3) of the Trade Act of 1974 (19 U.S.C. 2253(i)(2) and 2253(i)(3)), the United States International Trade Commission herein reports the results of an investigation concerning high-carbon ferrochromium.

The Commission advises, on the basis of information obtained in the investigation, that termination of import relief with respect to imports of certain high-carbon ferrochromium 1/ would have a significant adverse economic effect on the domestic high-carbon ferrochromium industry, and therefore, relief should be extended. The Commission is of the view that inflation has rendered the present relief largely ineffective and, therefore, believes that the relief should be modified if it is extended. The Commission has discussed several alternative forms of extended relief. These alternative forms of extended relief are set forth in the Statement of the Commission, which follows.

The Commission instituted this investigation on May 27, 1981, following receipt, on May 15, 1981, of a petition filed by the Committee of Producers of High-Carbon Ferrochromium requesting an extension of the relief being provided. Public notice of the investigation and hearing was given by posting

---

1/ High-carbon ferrochromium is defined in item 606.24 of the Tariff Schedules of the United States (TSUS) as ferrochromium containing over 3 percent by weight of carbon. Relief is provided in the form of a temporary increase in duty, described in item 923.18 of the TSUS, of 4 cents per pound on chromium content, on imports of high-carbon ferrochromium valued less than 38 cents per pound entered on or before Nov. 15, 1981.

copies of the notice in the Office of the Secretary, U.S. International Trade Commission, Washington, D.C., and by publishing the notice in the Federal Register of June 3, 1981 (46 F.R. 29794). A public hearing was held in connection with the investigation on July 22, 1981, in Washington, D.C. All interested persons were afforded an opportunity to be present, to present evidence, and to be heard.

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

STATEMENT OF THE COMMISSION

On the basis of the information before the Commission in this investigation, it is our judgment that termination of import relief with respect to high-carbon ferrochromium would have a significant adverse economic effect on the domestic industry. We therefore advise that relief be extended in modified form 1/ for an additional 3-year period to provide the domestic industry with more time in which to complete the process of adjusting to import competition. Because we believe the present relief is ineffective, we have discussed in this statement several alternative forms of extended relief for the President's consideration. It is also our view that the present relief, although no longer very effective, would be better than no relief after November 15, 1981, in view of information indicating a large buildup of inventories of imported high-carbon ferrochromium which could cause a significant decline in prices. 2/

The above advice is based on our assessment of several factors, including the present state of the industry's health, levels and trends of imports during the relief period (especially from South Africa), efforts made by the industry to adjust during the relief period, and the factors set forth in section 202(c) of the Trade Act of 1974.

The product

High-carbon ferrochromium is one of several ferroalloys that is used as a source of chromium. 3/ The bulk of all high-carbon ferrochromium is used in

---

1/ Vice Chairman Calhoun, while supporting Chairman Alberger's conclusion in footnote 2, nevertheless recommends that relief be extended whether it is the current relief or relief in modified form.

2/ Chairman Alberger believes that an extension of the present relief would be only marginally better than termination of relief, and that it certainly would not allow for completion of the process of adjustment.

3/ Report at A-3.

production of stainless steel, which by definition contains a significant amount of chromium (usually 10.5 percent or more). 1/ High-carbon ferrochromium is also used in the production of superalloys, cast iron, alloy hard-facing rods, and in welding. 2/

State of health of the industry and industry efforts to adjust to import competition

Despite the domestic industry's efforts to adjust, the health of the domestic industry has not improved much during the relief period. Except for a brief period of relative improvement during 1979, the first year of the relief period, industry capacity utilization, production, sales, and employment have continued to decline. Further, the number of companies producing high-carbon ferrochromium on a sustained basis has dwindled from five in 1978 to only two in 1981. One domestic producer has permanently discontinued domestic production, and two others have suspended production but have retained the capability of resuming production if economic circumstances so permit. Thus, the domestic industry today is far from healthy, and, in fact, is confronted with adverse forces similar to those which existed prior to the imposition of relief.

The industry enjoyed a certain level of prosperity in 1979, the first year of relief. Production was up by 30 percent, shipments increased by 9 percent, sales were up by 41 percent, and individual producers' profit margins averaged 1.6 percent during that year. 3/ However, in the second and third years of the relief period, inflation contributed to the reduced effectiveness of the relief, and most imports exceeded the breakpoint price. Market

1/ The only economically feasible substitute for high-carbon ferrochromium is stainless steel scrap. See Report at A-7 and A-8.
2/ Id.
3/ Report at A-19 through A-21 and A-35.

conditions of higher import penetration and a decline in apparent domestic consumption cut short the possibility of continued improvement. 1/

Thus, in 1980, the domestic industry again found its performance declining. The industry's capacity utilization rate fell from 65 percent in 1979 to 50 percent in 1980. 2/ Production declined from 131,222 short tons (chromium content) of high-carbon ferrochromium in 1979 to 99,500 short tons in 1980, or by 24 percent. 3/ Further, the number of production employees involved in producing high-carbon ferrochromium declined from 639 in 1979 to 453 in 1980, or by 29 percent. 4/ One factor which contributed to the reduced number of production employees was the decision made by two producers in mid-1980 to shut down their high-carbon ferrochromium furnaces for an indefinite time due to adverse market conditions. All of these factors forced the domestic industry into an economic and financial situation similar to that experienced prior to the imposition of relief.

Nonetheless, the domestic industry has made a considerable effort to adjust to import competition and improve its competitive position. Even though there have been no major technological innovations in the industry, domestic producers increased their capital expenditures significantly between 1978 and 1980. Capital expenditures, excluding expenditures for pollution control equipment, increased from * * * million in 1978 to * * * million in 1980, or by * * * percent. These capital expenditures were used for such projects as upgrading plants and equipment beyond normal replacement, building reconstruction, a new chemical laboratory, upgraded dock facilities, furnace

---

1/ We recognize that the decline in overall economic activity has also contributed to a decline in domestic consumption.
2/ Report at A-19 and A-20.
3/ *Id.*
4/ *Id.* at A-24 and A-25.

modification, and for new concentrators used to recapture chrome from the molten slag. 1/

The domestic industry made other specific efforts to adjust to import competition, including diversifying its product lines, making better use of raw materials (e.g., improving the premix process), adopting labor saving equipment and/or processes, and developing new marketing strategies. In addition, Macalloy has started a cogeneration project which, if implemented, will result in the capture of heat loss from the smelting furnace and the heat's conversion into steam for use on the nearby Charleston Naval Base and as electric power for use by the local utility. This project will potentially increase ferroalloy productivity 35 percent and result in a reduction of $4 million per year in alloy cost. 2/

Imports during the relief period

In the first year of relief, total imports declined by 29 percent, from 171,113 short tons in 1978 to 121,839 short tons in 1979. Imports from South Africa, the largest source country, declined by 33 percent, from 136,858 short tons in 1978 to 91,780 short tons in 1979. During the same period, U.S. production rose from 101,190 short tons to 131,222 short tons, or by 30 percent. However, in 1980, total imports and imports from South Africa rose by 21 and 22 percent, respectively. At the same time, domestic production fell 24 percent to 99,500 short tons. Furthermore, total imports during January-March 1981 were 67 percent higher than were imports in the corresponding period of 1980. Likewise, imports from South Africa for the same period grew by 99 percent, from 12,766 short tons in January-March 1980

1/ Id. at A-37 and A-38.
2/ Id. at A-42 and A-44.

to 25,468 short tons in January-March 1981. 1/ The aggregate share of total imports from countries other than South Africa remained relatively unchanged between 1978 and 1980, accounting for less than 30 percent of total imports. 2/

The ratio of U.S. shipments of imports to domestic consumption declined from 68 percent in 1978 to 54 percent in 1979. In 1980, the ratio rose to the high rate of 72 percent. 3/

Extension of relief

Import relief for the domestic high-carbon ferrochromium industry should be continued for several reasons.

First, despite cost disadvantages, we believe the domestic industry is presently viable and can adjust to import competition. The domestic industry can continue to remain competitive as a stable secondary source of supply both to domestic and foreign high-carbon ferrochromium consumers. One advantage the domestic industry has over its foreign competitors is that it is located closer to U.S. customers and, therefore, can be more responsive to such customers, such as the U.S. stainless steel producers. Statements made by representatives of the stainless steel industry in their brief and at the hearing suggest that U.S. stainless steel producers will continue to buy high-carbon ferrochromium from the domestic industry in order to ensure a stable domestic source of supply. 4/ They may not view the present primary foreign suppliers of high-carbon ferrochromium as stable enough to be their sole source of supply. Thus, to be competitive, the domestic industry does not necessarily have to have the same costs as or match the prices of foreign

---

1/ Part of this increase in imports is the result of * * *.
2/ Report at A-16 through A-18.
3/ Id.
4/ See transcript at 234 and posthearing brief of Tool and Stainless Steel Industry Committee at 7.

producers. However, it can enhance its competitive position vis-a-vis foreign producers if it can narrow any cost or price gaps. 1/

Second, the industry has not had sufficient time to adjust to import competition because unusually high inflation rates quickly eroded the effectiveness of the 38-cent breakpoint price. As a practical matter, the domestic industry has had only 1 year of effective relief, during which the industry began to recover somewhat as imports declined and domestic production increased. High inflation rates, however, soon eroded the domestic industry's protection. We do not believe there has been sufficient time to adjust to import competition, especially in such a capital-intensive industry.

Third, although the industry is viable, it is vulnerable at this time to import competition. Presently, only two out of five domestic producers actually produce high-carbon ferrochromium. In addition, the domestic industry has raised its prices only moderately since the beginning of relief, by less than 10 percent annually. Import penetration rose to 72 percent in 1980, which means that the domestic industry accounts for an ever decreasing share of the domestic market. Unless the industry is given additional time to adjust to import competition, it will continue to decline in size and market share.

An importer has informed the Commission that in anticipation of a possible rise in the breakpoint price as a result of the President's decision in this case, importers have built up large inventories of high-carbon ferrochromium. Termination of relief at this time might result in the importers selling their inventories of high-carbon ferrochromium at cut-rate

1/ Vice Chairman Calhoun believes that this is the strongest premise upon which extension of relief can be based and that it is also the most reasonable standard by which to assess the domestic industry's success in adjusting to import competition.

prices, thereby causing a sharp drop in prices, even below the breakpoint price of 38 cents.

Section 202(c) considerations.

In deciding what advice we would give, we reviewed the various considerations set forth in section 202(c) of the Trade Act and would like to comment briefly on several of them. 1/ First, we believe that prior to the time that the effectiveness of the breakpoint price was eroded because of inflation, import relief was effective in promoting adjustment by the domestic industry to import competition. Second, it is our view that even if the import relief now in effect, i.e., the present breakpoint price and 4-cent duty, were extended it would provide some protection to the domestic industry from extreme cuts in prices. 2/ Third, we do not believe that relief has had, or that the extension of relief will have, a significant adverse impact on U.S. consumers, primarily because high-carbon ferrochromium accounts for less than 10 percent of the cost of producing a pound of stainless steel. 3/ Failure to extend relief could have an adverse effect on stainless steel producers because of the possible demise of a stable secondary source of supply of high-carbon ferrochromium. The possible loss of a stable secondary source of high-carbon ferrochromium for the stainless steel industry could result in significant economic and social costs for taxpayers, communities, and workers.

For all the reasons discussed above, it is our view that relief to the high-carbon ferrochromium industry ought to be extended.

1/ See the Report at A-47 through A-51 for further discussion of the section 202(c) considerations.
2/ See footnotes 1 and 2 on page 3.
3/ See Report at A-49.

Form of extended import relief

Set forth below for the President's consideration is a discussion of alternative forms of extended relief. 1/

Chairman Alberger, Vice Chairman Calhoun, and Commissioner Stern believe that an orderly marketing agreement (OMA) would provide the most economically effective and least disruptive form of modified relief. 2/ It is clear that section 203(e)(2) gives the President authority to negotiate an OMA on or before November 15, 1981, the date import relief is scheduled to end. This authority to negotiate would also clearly exist prior to the termination of any extended period of relief, if the present relief is extended. The President may also decide that section 203(h)(3) permits him to negotiate an OMA after November 15, 1981.

Since most imports come from South Africa, the President may in particular wish to consider negotiating an OMA with this country. Yearly data for 1978-80 show that imports of high-carbon ferrochromium from South Africa have consistently maintained at least a 75 percent share of the total import market. After declining dramatically during the first year of relief, the ratio of imports from South Africa to total U.S. consumption has already returned to a level near that prior to relief.

Should the President decide that it is within the scope of his authority under section 203, 3/ there is the possibility of providing effective relief

---

1/ Commissioner Bedell believes it is appropriate for the Commission to advise the President regarding alternative forms of extended relief but makes no recommendation on which form of modified relief would be the most effective.

2/ Chairman Alberger continues to believe, as he advised in 1978, that some form of quantitative restrictions is the best way to provide effective relief for this industry. Since imports from South Africa account for three-quarters of all imports, restrictions on imports from that country may be the most practicable, as well as the most effective form of relief.

3/ Chairman Alberger has some concern about the legal authority for such a modification and suggests that the record before us, particularly briefs submitted by the parties and the parties' oral arguments, contains a thorough analysis of the issues.

by upwardly adjusting the breakpoint price. Importers and some foreign producers contended in their briefs and during the Commission hearing that such an upward adjustment of the breakpoint price would constitute an increase in the "level of relief" and would be proscribed by section 203(h)(3) of the Trade Act, which provides that relief during an extension period may not be at a level greater than that in effect immediately prior to the extension. The domestic producers, on the other hand, argued that the level of relief is the increased tariff and not the breakpoint price and that the breakpoint price can therefore be adjusted upward to compensate for inflation without contravening section 203(h)(3).

It may be possible to adjust the breakpoint price in order to provide the domestic industry with the same benefits it received in 1979. The original breakpoint price was intended to allow the most efficient U.S. producer (* * *) to obtain an adequate financial return on its high-carbon ferrochromium operations. 1/ Following imposition of relief, * * * net operating return rose dramatically from * * * percent in 1978 (prior to relief) to * * * percent in 1979. It rose further to * * * percent in 1980. By January-March 1981, however, * * * net operating return had fallen to * * * percent. In order for * * * to have achieved the same return in 1981 as it did in 1979, the average unit value of its high-carbon ferrochromium shipments would have to have been * * * cent higher per pound. 2/ It is possible that a similar increase in the breakpoint price (i.e., to * * * cents per pound in 1981, which equals an annual increase of slightly less than * * * percent)

1/ See Communication from the President of the United States, Import Relief Action High-Carbon Ferrochrome, H. Doc. No. 96-28, 96th Cong., 1st Sess., at 3; Presidential Memorandum of Nov. 2, 1978 for the Special Representative for Trade Negotiations, 43 F.R. 51599 (1978).

2/ Assuming that all of the additional revenue received from this increase would go into operating profits.

might have resulted in an increase in prices sufficient to allow * * * to improve its net operating return to * * * percent. Thus, adjusting the breakpoint price upward at an annual rate of * * * percent (i.e., to * * * cents in 1982, * * * cents in 1983, and * * * cents in 1984) may be appropriate.

A net operating return of * * * percent is not the only level which might be deemed to be "an adequate return" (although it is roughly in line with the return achieved by the steel industry as a whole in 1980). Using the methodology and assumptions discussed above, achieving an * * * percent net operating return would call for breakpoint prices of * * * cents in 1982, * * * cents in 1983, and * * * cents in 1984. Achieving a * * * percent net operating return would call for breakpoint prices of * * * cents in 1982, * * * cents in 1983, and * * * cents in 1984.

Alternatively, it is possible to adjust the breakpoint price to reflect some measure of inflation. Between 1979 (the first year of relief) and 1980, the Producer Price Index for all metal and metal products rose by 10 percent, U.S. selling prices of imported high-carbon ferrochromium (50 to 55 percent chromium content) rose by 9 percent, U.S. selling prices of domestic high-carbon ferrochromium (50 to 55 percent chromium content) rose by 6 percent, and the Producer Price Index for pig iron and ferroalloys rose by 4 percent. On the other hand, * * * unit cost of goods sold for high-carbon ferrochromium operations fell by about * * * percent. Adjusted breakpoint prices using these annual rates of change are shown in the following tabulation (in cents):

	Rates of Change (Percent)				
	10	9	6	4	* * *
1982---	50.5	49.0	45.5	43.0	* * *
1983---	55.5	53.5	48.0	44.5	* * *
1984---	61.0	58.5	51.0	46.0	* * *

Of course, it is possible to adjust the rate of increase in the breakpoint price. We point out that the above tabulation reflects historical rates of increase for the indicators chosen and that these rates are dynamic and subject to change. 1/

Finally, it is possible to attempt to control the quantity of imports by setting an appropriate breakpoint price. As discussed on pp. A-44 through A-46 of the accompanying report, imports could be expected to remain at approximately the 1980 level (147,000 short tons, chromium content) by imposing an adjusted breakpoint price of 46 cents. Continuing the 38-cent breakpoint price, or terminating relief, would be expected to result in annual increases in imports of about 5 percent.

Related to any adjustment of the breakpoint price may be a consideration of the desired effect on foreign producers. For example, the current U.S. selling price for imported high-carbon ferrochromium (50 to 55 percent chromium content) is about 47.5 cents per pound. Projections for 1982 call for a price of possibly as much as 50 cents. A breakpoint price of 44 cents correlates roughly with a U.S. price of 50 cents. Therefore, establishing a new breakpoint price at 44 cents or above would likely result in a general

1/ Since the Commission has suggested several alternative forms of relief to the President, it is difficult to advise whether it is feasible to phase down relief, and to what extent, under section 203(h)(2) during the extension period without knowing the specific alternative that may be chosen by the President.

upward movement of prices (much as happened in 1979 after the 38-cent breakpoint price was established), so that significantly higher returns would be achieved by foreign producers and few, if any, additional duties would be collected. It is unlikely, however, that this would happen with a breakpoint price above 44 cents, indicating that imports probably would be subject to the additional 4-cent-per-pound duty, and foreign suppliers may have to hold steady, or even lower, their prices. 1/

Conclusion

The domestic industry has made a considerable effort to adjust to import competition, but has not yet had a sufficient period of effective relief. Termination of import relief would have a significant adverse economic effect on the domestic industry. The import relief presently in effect is ineffective and the President should therefore extend import relief for the high-carbon ferrochromium industry in a modified form 2/ for a 3-year period.

1/ Commissioner Stern and Commissioner Bedell note that another possible option open to the President may be to impose quantitative restrictions on U.S. imports of high-carbon ferrochromium.

2/ Chairman Alberger believes that an extension of the present relief would be only marginally better than termination of relief, and that it certainly would not allow for completion of the process of adjustment. Vice Chairman Calhoun, while supporting Chairman Alberger's conclusion, nevertheless recommends that relief be extended whether it is the current relief or relief in modified form.

INFORMATION OBTAINED IN THE INVESTIGATION

Introduction

On May 27, 1981, the United States International Trade Commission instituted investigation No. TA-203-8, High-Carbon Ferrochromium, under sections 203(i)(2) and 203(i)(3) of the Trade Act of 1974 (19 U.S.C. 2253(i)(2) and 2253(i)(3)) for the purpose of gathering information in order that it might advise the President of its judgment as to the probable economic effect on the industry concerned of the extension, reduction, or termination of import relief presently in effect with respect to certain high-carbon ferrochromium, provided for in item 606.24 of the Tariff Schedules of the United States (TSUS). Import relief presently in effect with respect to high-carbon ferrochromium is scheduled to terminate on November 15, 1981, unless extended by the President. The relief, in the form of a temporary duty increase described in TSUS item 923.18, is provided for in Presidential Proclamation 4608, issued November 15, 1978. 1/

The investigation was instituted following receipt on May 15, 1981, of a petition filed by the Committee of Producers of High-Carbon Ferrochromium (HCF Committee). The petition solicits the extension of the import relief provided the U.S. high-carbon ferrochromium industry in Presidental Proclamation 4608. 2/ The HCF Committee alleges in the petition that the probable economic effect on the U.S. industry should the relief be terminated would be to cause the industry to suffer serious injury.

Notice of the institution of the investigation and of the public hearing to be held in connection therewith was published in the Federal Register of June 3, 1981 (46 F.R. 29794) and was posted in the Office of the Secretary, U.S. International Trade Commission Building, Washington, D.C. A copy of the notice is presented in appendix B. The hearing was held in the Commission's Hearing Room on Wednesday, July 22, 1981. A list of witnesses appearing at the hearing is presented in appendix C. The Commission made its determination in the investigation on September 1, 1981, and reported its advice to the President on September 16, 1981.

The information in this report was obtained from questionnaires sent to domestic producers, importers, and consumers of high-carbon ferrochromium; fieldwork and interviews; the Commission's files; briefs submitted by interested parties; and other Government agencies.

Previous Commission Investigations

The Commission has instituted four prior investigations with respect to ferrochromium products. On May 21, 1973, following receipt of a petition

1/ A copy of Presidential Proclamation 4608 is presented in app. A.
2/ The petition further requests that the breakpoint price established in Presidential Proclamation 4608 " . . . be adjusted to reflect cost of production increases since late 1978 in order to permit the relief to continue to have the effect for which it was intended."

filed by the Ferroalloys Association, the U.S. Tariff Commission (the former name of the U.S. International Trade Commission) instituted investigation No. TEA-I-28 under section 301(b)(1) of the Trade Expansion Act of 1962 to determine whether ferrochromium, ferromanganese, ferrosilicon, ferrosilicon chromium, ferrosilicon manganese, chromium metal, managanese 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, this investigation was discontinued by the Commission at the request of the petitioner without a determination on its merits and without prejudice.

A second Commission investigation (No. TA-201-20) was instituted under section 201(b)(1) of The Trade Act of 1974 on January 21, 1977, following receipt of a petition filed by the Committee of Producers of Low-Carbon Ferrochrome. On July 11, 1977, the Commission determined 1/ that low-carbon ferrochromium was 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 (42 F.R. 36896).

With respect to high-carbon ferrochromium specifically, the Commission has conducted two prior investigations. On December 1, 1977, the Commission determined by a vote of 3 to 1 2/ in investigation No. TA-201-28 that high-carbon ferrochromium was 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 (42 F.R. 62050). As a consequence of its affirmative finding, the Commission recommended to the President the imposition of increased rates of duty on imported high-carbon ferrochromium. On January 27, 1978, the President determined that the relief recommended by the Commission was not in the national economic interest and so notified Congress (43 F.R. 4245).

On June 21, 1978, the Commission instituted investigation No. TA-201-35 after determining that good cause exists, within the meaning of section 201(e) of the Trade Act of 1974, for a reinvestigation of high-carbon ferrochromium in less than 1 year from the date the Commission reported to the President the results of its previous investigation (No. TA-201-28) of the same subject matter (43 F.R. 27907). The investigation was instituted following receipt, on June 9, 1978, of a letter from the HCF Committee and receipt, on June 13, 1978, of a resolution of the Committee on Ways and Means of the House of Representatives requesting such a reinvestigation. On September 5, 1978, the Commission determined 3/ that high-carbon ferrochromium was being imported into the United States in such increased quantities as to be a subtantial cause of serious injury to the domestic industry producing an article like or

1/ Commissioner Moore dissenting and Vice Chairman Parker not participating.
2/ Chairman Minchew dissenting and Vice Chairman Parker and Commissioner Alberger not participating.
3/ Chairman Parker and Commissioner Minchew not participating.

directly competitive with the imported article and recommended to the President the imposition of tariff increases on the column 1 rate of duty on all imports of high-carbon ferrochromium to remedy the injury (43 F.R. 40555). 1/ In response to the Commission's finding, the President proclaimed the relief specified in Proclamation 4608.

Description and Uses

High-carbon ferrochromium is one of several ferroalloys that are used as sources of chromium. 2/ It is defined in the TSUS as ferrochromium 3/ containing over 3 percent, by weight, of carbon. Commercial grades of high-carbon ferrochromium contain 50 to 72 percent chromium, 4.0 to 9.5 percent carbon, and 3.0 to 10.0 percent silicon, with the remainder largely iron. 4/

Method of production

High-carbon ferrochromium is produced in submerged-arc electric furnaces (fig. 1), which are rated in terms of the power used in their operation. A small furnace would be rated at about 10 megawatts and could produce about 60 tons, gross weight, of high-carbon ferrochromium a day; a large furnace would be rated at about 60 megawatts and have a daily production capacity of about 360 tons. Heat is generated by passing an electric current through carbon electrodes that extend downward into the "charge mix" (thus the name "submerged-arc"). Electrodes range from about 25 inches in diameter in the small furnaces to 65 inches in diameter in the larger ones. The brick furnace is constructed above the floor of the foundry so that the molten high-carbon ferrochromium can be tapped from the bottom. It is "charged," or loaded, from the top through a system of conveyor belts and chutes, and may or may not be stoked by attendants (open-top furnaces are stoked, while covered furnaces are not). The charge consists basically of chromium ore and coke, although other additives such as wood chips and quartz gravel may be used in specific applications (wood chips are added to give the charge porosity, and quartz is used as a slag conditioner). As the ore and coke mixture is heated, the component metals melt and sink to the bottom of the furnace. Molten iron and chromium mix together in the lowest portion of the furnace to form high-carbon ferrochromium and the slag floats on top. The molten high-carbon ferrochromium is tapped about every 1-1/2 to 2 hours and poured into molds,

---

1/ A copy of the determination, findings, and recommendations of the Commission in investigation No. TA-201-35 is presented in app. D.

2/ Chromium is a hard, grayish-white, corrosion-resistant metal with a very high-melting point (3,434 degrees Fahrenheit). In the metallurgical industry it 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 or chromium-containing scrap.

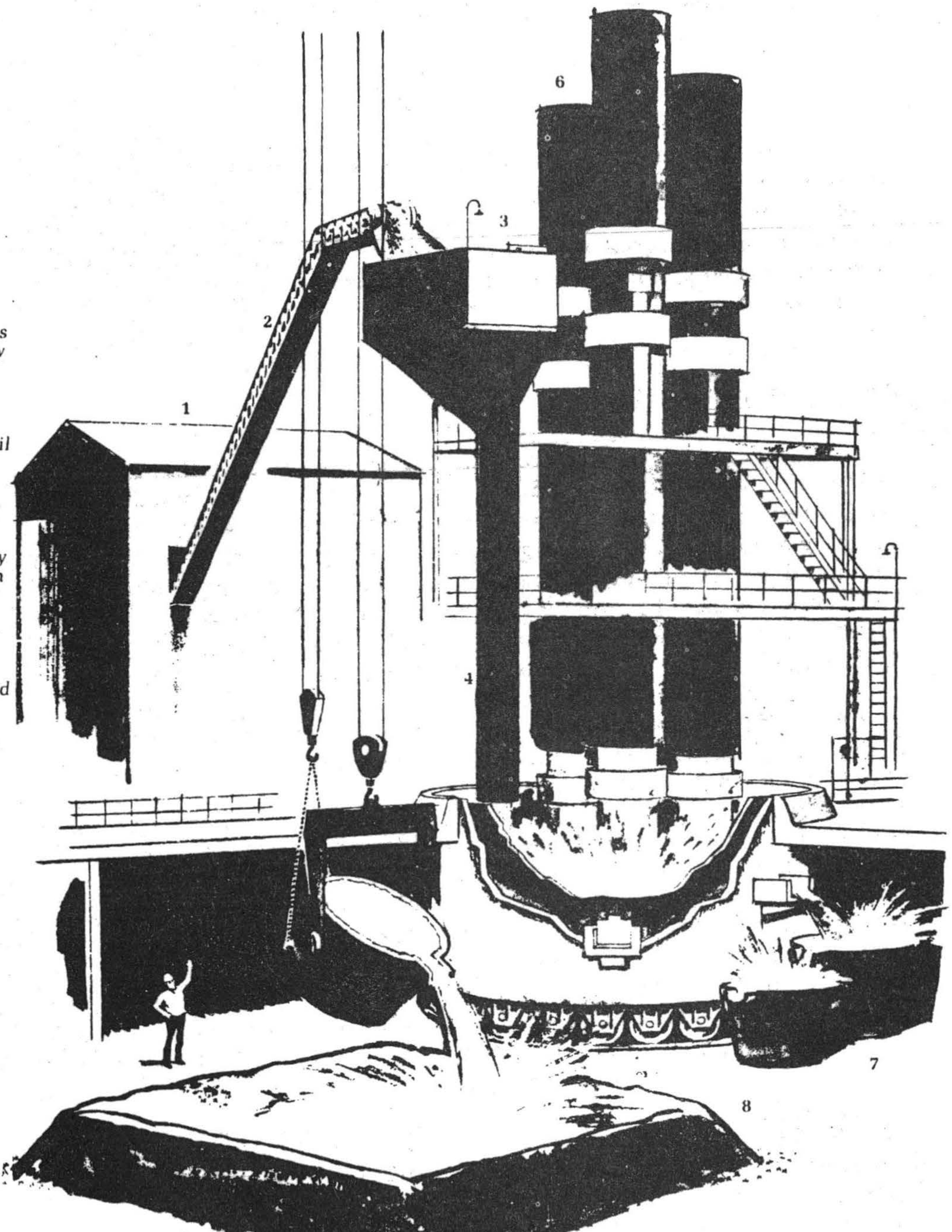
3/ Ferrochromium is defined in the TSUS as a ferroalloy which contains, by weight, over 30 percent of chromium but not over 10 percent of silicon.

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

Figure 1.--High-carbon ferrochromium furnace.

The Making of Ferroalloys

The ferroalloy manufacturing process begins in the mix house **(1)** *where raw materials – ore, coke and other process ingredients – are precisely weighed and mixed. A conveyor* **(2)** *carries this mixture to mix bins* **(3)** *which store the raw materials until the furnace operator releases them through chutes* **(4)** *to the furnace* **(5)**. *Carbon electrodes* **(6)**, *which extend into the furnace, carry the electricity required to produce the extremely high temperatures (6000°F) necessary to carry out the ferroalloy production process. Finished ferroalloy, in the molten state, is tapped into a ladle* **(7)** *and poured into molds* **(8)** *for cooling. After solidifying, the ferroalloy is crushed, screened according to desired size and shipped to the customer.*



Source: Ferroalloys . . . adding character to steel, Airco, Inc., p.2.

where it is cooled for several hours until it solidifies. It is then removed and broken or ground according to customer specification.

The tap hole (about 6 inches in diameter) is made by drilling through the refractory into the lower part of the furnace and is closed with a clay mixture when all the high-carbon ferrochromium and slag have been drained. As the electrodes are consumed with use (about 12 inches a day), it is important that the depth to which they penetrate the charge be carefully controlled. Should the distance from the bottom of the electrodes to the bottom of the furnace become too great, the ferrochromium will cool and solidify, thus making a tap extremely difficult. Electrode depth is monitored continuously and adjusted by attendants as necessary.

There are two types of electrodes in use in domestic foundries: the amorphous carbon electrode, which is purchased whole (about 5 to 6 feet in length) and the self-baking electrode, which is made in position from a carbon mix. All domestically produced amorphous carbon electrodes are made by a subsidiary of Union Carbide Corp.

Production control

High-carbon ferrochromium is manufactured to very stringent specifications, with some customers (such as those making aircraft parts) requiring that impurities be controlled to the "parts per million" level. To achieve this level of control, most firms have installed sophisticated equipment that instantaneously analyzes high-carbon ferrochromium samples. Such samples may be taken with each tap or even more often, depending on customer order.

Plant managers frequently measure the efficiency of their operations in terms of the amount of chromium recovered from the chromium ore. Recovery rates are improved by reprocessing slag to remove chromium that did not sink to the bottom of the furnace. This becomes progressively more and more costly, however, and economic considerations usually dictate a maximum recovery rate of about 92 percent. Beyond this point, the costs of reprocessing the slag exceed the value of the chromium recovered. Two other factors that affect recovery rates are the grade of ore used and its cost. The unit value of imported chromium ore 1/ held fairly constant between 1977 and 1980, increasing from $128.03 per short ton in 1977 to $137.39 in 1980, as shown in table 1. However, although the unit value rose only slightly during this period, the quantity of imported ore fell from 541,000 short tons in 1977 to 411,000 in 1980, representing a 19 percent drop. This drop coincided with lower domestic production and higher imports of high-carbon ferrochromium.

1/ Domestic deposits of chromium ore (or "chromite") are small and of low grade, thus making the U.S. chromite-consuming industry dependent almost exclusively upon imports for its source of new supply.

Table 1.--Chromium ore: U.S. imports for consumption, 1977-80, January-March 1980, and January-March 1981

Period	Quantity	Value	Unit value
	1,000 short tons, chromium content	1,000 dollars	Per short ton, chromium content
1977	541	$69,242	$128.03
1978	415	51,435	123.94
1979	411	53,607	130.41
1980	411	56,467	137.39
January-March--			
1980	162	20,392	125.88
1981	92	12,030	130.76

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

Pollution control

Ferrochromium furnaces generate a substantial amount of air pollution (primarily dust), and domestic producers have invested millions of dollars in pollution abatement. U.S. producers reported that expenditures for pollution-control equipment represent about 15 to 20 percent of the cost of constructing a new furnace. Three of the most common types of pollution-control equipment are described below:

1. The baghouse filter cleans the furnace smoke by passing it through a series of filter bags, which collect impurities in much the same manner as a vacuum cleaner;

2. The electrostatic precipitator controls emissions by negatively charging dust particles and then attracting them to a positively charged plate. This type of system is not suitable for other than ferrochromium furnaces and thus limits furnace convertibility in plants where it is employed; and

3. The wet scrubber removes particles by spraying the furnace exhaust with water. The wet dust falls to the bottom of the unit, where it is collected and removed.

The dust that is removed from the furnace smoke is frequently packaged and sold as a filler material; current research projects are aimed at developing this "packaged smoke" into a fertilizer. Future pollution-control efforts are expected to center on solid waste disposal and capturing "fugitive" dust (i.e., that dust produced separately from the furnace by handling the ores, driving trucks through the yards, and so forth).

Uses of high-carbon ferrochromium

The bulk of all high-carbon ferrochromium is used in manufacturing stainless steel, as shown in the following tabulation:

	Share of U.S. high-carbon ferrochromium consumption used in making stainless steel (Percent)
1978	77.7
1979	78.9
1980	77.6
January-March--	
1980	70.7
1981	81.7

Chromium raw materials are available from various ferroalloys and from stainless steel scrap. The objective of stainless steel producers is to obtain the lowest cost chromium available, and the determining factors in obtaining the lowest cost chromium input 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 alternative sources. The scrap addition will be followed with inputs of high-carbon ferrochromium and low-carbon ferrochromium, 1/ in that order. 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. A third chromium-containing ferroalloy, ferrosilicon chromium, 2/ is also added to the the stainless steel melt, principally to facilitate the return of chromium oxide which has accumulated in the melt slag to the melt as chromium metal.

Other uses of high-carbon ferrochromium (although small in relation to total consumption) are in the manufacture of superalloys, 3/ cast iron, welding and alloy hard-facing rods, and other miscellaneous products. High-carbon ferrochromium is also used as a raw material in the production of chromium metal. It is ground and dissolved in an acid solution, and then the chromium is plated onto sheets of stainless steel through electrolysis.

1/ Low-carbon ferrochromium is defined in the TSUS as ferrochromium not containing over 3 percent, by weight, of carbon.

2/ 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.

3/ Superalloys are alloys developed for very high temperature service where relatively high stresses are encountered and oxidation resistance is frequently required. They are used in such applications as jet-engine component parts.

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 it which may be added to the melt in stainless-steel-refining processes other than that known as the Argon Oxygen Decarburization (AOD) process. 1/ If high-carbon ferrochromium were substituted entirely for low-carbon ferrochromium in a non-AOD process, it would not be feasible to remove all the excess carbon, and the resulting stainless steel product would be unsuitable for use.

As a result of the introduction of the AOD stainless-steel-refining process, the ability to remove excess carbon feasibly was achieved and 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 any process, but it would not be in the economic interest of stainless steel producers to effect such a substitution because high-carbon ferrochromium is substantially less expensive.

Ferrosilicon chromium differs from high-carbon and low-carbon ferrochromium in use, as mentioned earlier, as well as in chemical composition and price, and neither high-carbon nor low-carbon ferrochromium is a satisfactory substitute for it.

U.S. Government stockpile programs

Stockpiles of various "critical" materials are maintained by the U.S. Government (General Services Administration) in order to insure availability should normal international trade be interrupted. At the end of 1980, 403,000 short dry tons (SDT) of high-carbon ferrochromium and 2 million SDT of metallurgical-grade chromite were held in stockpile. These stockpiles are generally located close to ferrochromium plants, and, in fact, land for storage is sometimes leased from producers.

The suggestion has been put forward (see transcript of the hearing, pp. 238 and 258) that if relief were terminated, domestic producers could, utilizing total combined capacity, convert the ore stockpile into high-carbon ferrochromium. It is estimated that such a conversion could be accomplished in a matter of three to four years.

1/ The AOD process was introduced by Union Carbide Corp. in 1968 and is now the predominant stainless-steel-making process used by producers.

U.S. Tariff Treatment

Prior to January 1, 1980, high-carbon ferrochromium was dutiable under TSUS item 607.31, 1/ at a column 1 2/ rate of duty of 0.625 cents per pound on chromium content (ad valorem equivalent of 1.6 percent in 1979) and a column 2 3/ rate of 2.5 cents per pound, chromium content. These rates had been in effect since January 1, 1948. Effective on January 1, 1980, the column 1 rate of duty was changed to 1.9 percent ad valorem and the column 2 rate of duty was changed to 7.5 percent ad valorem. 4/ These rates reflect implementation of the Geneva protocol to the General Agreement on Tariffs and Trade (Tokyo round). High-carbon ferrochromium is not designated as an eligible article for purposes of the Generalized System of Preferences (GSP). 5/

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 6/ prohibiting the importation into the United States of, among other products, Rhodesian chrome or products made therefrom in Rhodesia or elsewhere.

1/ Effective January 1, 1980, high-carbon ferrochromium was reclassified under TSUS item 606.24.

2/ The rates of duty in rate of duty column numbered 1 are Most-Favored-Nation (MFN) rates, and are applicable to imported products from all countries except those Communist countries and areas enumerated in general headnote 3(f) of the TSUS.

3/ The rates of duty in rate of duty column numbered 2 apply to imported products from those Communist countries and areas enumerated in general headnote 3(f) of the TSUS.

4/ Effective on or before Nov. 15, 1981, the rate of duty on high-carbon ferrochromium valued at less than 38 cents per pound in both column 1 and 2 is 4.625 cents per pound, as provided for in TSUS item 923.18 pursuant to Presidential Proclamation 4608.

5/ The GSP under title V of the Trade Act of 1974, provides duty-free treatment of specified eligible articles imported directly from designated beneficiary developing countries. GSP, implemented by Executive Order 11888 of Nov. 24, 1975, applies to merchandise imported on or after Jan. 1, 1976, and is scheduled to remain in effect until Jan. 4, 1985, unless modified by the President or terminated.

6/ 3 CFR 606.

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 1/ provided 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 this 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, in effect, permitted 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, 2/ an amendment to section 5 of the United Nations Participation Act of 1945. 3/ That amendment provided 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 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.

On August 15, 1979, the Congress passed the Department of State Authorization Act, Fiscal Years 1980 and 1981. Section 498 of the Act, Sanctions Against Zimbabwe-Rhodesia, 4/ provided that since elections were held transferring power to a black majority government and in order to encourage the development of a multiracial democracy in Zimbabwe-Rhodesia, the

---

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

President should terminate sanctions against Zimbabwe-Rhodesia by November 15, 1979, unless the President determined that it was not in our national interest to do so. This was followed on November 9, 1979, by section 818 of the Department of Defense Authorization Act, 1/ which stated:

> It is the sense of the Congress that the United States should have unlimited access to strategic and critical materials which are vital to the defense and security of the United States and that every effort should be made to remove artificial impediments against the importation of such materials into the United States from Zimbabwe-Rhodesia.

On December 16, 1979, in response to these legislative directives, in Executive Order 12183 (44 F.R. 7487), President Carter revoked Executive Order 11322 and ended sanctions against Zimbabwe-Rhodesia.

U.S. Producers

In 1978 there were five principal U.S. producers of high-carbon ferrochromium. Today, there remain only two domestic producers that are producing the material in any significant amount. The five producers existing in 1978 were Airco, Inc., production facilities in Charleston, S.C.; Chromium Mining & Smelting Corp., production facilities in Woodstock, Tenn.; Globe Metallurgical Division of Interlake, Inc., production facilities in Beverly, Ohio; Satralloy, Inc., production facilities in Steubenville, Ohio; and, Union Carbide Corp., production facilities in Marietta, Ohio. Today, Macalloy Corp. 2/ and Globe Metallurgical are the only two domestic producers that continue to produce high-carbon ferrochromium in significant quantities.

Macalloy Corp., by far the largest domestic producer of high-carbon ferrochromium, is owned by Macmetal Corp. (* * * percent) and Satra Corp. (* * * percent), the parent firm to Satralloy, Inc. Having an annual U.S. capacity of * * * short tons, chromium content, 3/ Macalloy's 1980 production totaled * * * short tons, or * * * percent of total U.S. production. Macalloy's sales of high-carbon ferrochromium represented * * * percent of the company's total sales in 1980.

Chromium Mining & Smelting Corp. is a wholly owned subsidiary of Chromasco, Ltd., a Canadian firm. As a result of * * *, in July 1980 the company ceased producing high-carbon ferrochromium. Still, sales of high-carbon ferrochromium accounted for * * * percent of all sales of ferroalloy products produced at the Woodstock, Tenn., plant in 1980. In that year, the company produced * * * short tons, chromium content, of high-carbon ferrochromium, and had an annual rated capacity of * * * short tons. Although

---

1/ 22 U.S.C. 287c Note.

2/ Macalloy Corp. was established in January 1979 for the sole purpose of acquiring the Alloys Division of Airco, Inc. The acquisition was completed in July 1979.

3/ Macalloy also produces high-carbon ferrochromium in a plant located in Vargon, Sweden.

not presently producing high-carbon ferrochromium, in late 1980 the company began reclaiming and selling high-carbon ferrochromium from existing chrome slag stockpiles.

In 1980, Globe Metallurgical Division of Interlake, Inc., had an annual rated capacity to produce high-carbon ferrochromium of * * * short tons, chromium content. Its 1980 production of * * * short tons, chromium content, represented * * * percent of domestic high-carbon ferrochromium production. In contrast, Globe's 1980 production of low-carbon ferrochromium totaled * * * short tons, exceeding high-carbon ferrochromium production by a margin of * * *. Globe produces a high-chromium high-carbon ferrochromium (65-70 percent chromium content) which is more suited for use in making specialty steel products (e.g., aircraft steel, bearings, superalloys, engineering steel, and so forth) than in making stainless steel.

Satralloy, Inc., is a subsidiary of Satra Corp., a U.S. trading firm. Its annual production capacity for high-carbon ferrochromium in 1980 totaled * * * short tons, but as of June 1, 1980, the company shut down all of its furnaces due to * * *. It has been reported 1/ that the company plans to bring back on line all three of its furnaces starting in mid-1981 to satisfy an earlier commitment with Phibro Corp.

On June 30, 1981, Union Carbide Corp. sold its chromium production facilities at Marietta, Ohio to a group of investors headed by Elkem a/s, a Norwegian firm. It is uncertain at this time whether or not the new owners will continue to operate the Marietta plant as a ferroalloy producing facility. Prior to June 30, 1981, the Marietta facility, operated by the Metals Division of Union Carbide, had annual high-carbon ferrochromium capacity of * * * short tons. Much of its actual production, however, was consumed internally for the production of low-carbon ferrochromium. Union Carbide will continue to act as the U.S. marketing arm for its two offshore subsidiaries which produce and export high-carbon ferrochromium. From these two subsidiaries-- Tubatse Ferrochrome Pty., Ltd. (Republic of South Africa, 49 percent ownership) and Zimbabwe Mining & Smelting Co., (Pty.), Ltd. (Zimbabwe, 100 percent ownership)--Union Carbide imported just over * * * short tons of high-carbon ferrochromium in 1980.

Channels of Distribution

Domestically produced high-carbon ferrochromium is marketed either directly by the producer or through sales agents. Freight is normally equalized with the nearest competitive producer, and prices are generally quoted on an f.o.b. point-of-shipment basis. Rarely are prices quoted on a delivered basis. Shipments are made by water, rail, or truck depending on available facilities.

Imported high-carbon ferrochromium is marketed through brokers or importers. Nearly all such firms maintain inventories in warehouses that are

---

1/ See, " Satralloy to Renew Output of Charge Chrome Plant after 1-year Shut-down," American Metal Market, June 15, 1981, p. 31.

strategically located near end-users' productive facilities. Principal warehouses are in East Liverpool, Ohio, Baltimore, Md., Houston, Tex., and Carson, Calif. Most imported high-carbon ferrochromium is entered through one of four ports: New Orleans, La.; Burnside, La.; Baltimore, Md.; or Los Angeles, Calif. From these ports of entry, the material is shipped directly to either an end-user customer or a warehouse facility.

Foreign Producers

There are a number of foreign producers of high-carbon ferrochromium, most of which export to the United States. Brazil, West Germany, Sweden, Yugoslavia, Zimbabwe, and the Republic of South Africa are the principal sources of U.S. imports of high-carbon ferrochromium. In terms of volume of production and exports, however, the Republic of South Africa is unquestionably the leader.

There are a total of seven high-carbon ferrochromium producers in the Republic of South Africa. These seven producers operate a combined total of 24 furnaces ranging in size from a high of 43 megawatts (3 furnaces) to a low of 4 megawatts (1 furnace). Industry sources estimate world demand for high-carbon ferrochromium to be between 1.2 and 1.6 million tons per year, and it is generally agreed that South Africa alone has the capacity to supply this demand.

There are three important advantages South African ferrochomium producers enjoy over other world producers. First, the Republic of South Africa has an abundant reserve of chromium ore, which is the major raw material used in producing high-carbon ferrochromium. As shown in table 2, from 1978 through 1980, South Africa consistently produced 35 percent of the world's supply of chromium ore, averaging 3.6 million short tons per year. In contrast, the United States has no known reserves of chromium ore suitable for use in producing high-carbon ferrochromium, thus making domestic producers totally dependent on foreign sources. Two other significant advantages South African producers have over domestic producers in particular and other world producers in general are lower cost and readily available supplies of labor and energy (see report section on Producer Cost Estimates).

Effects of Imports on the Domestic Industry

Before imposition of relief

Import levels.--As shown in table 3, imports of high-carbon ferrochromium remained fairly constant between 1973 and 1974, but then increased dramatically in 1975, reaching 158,055 short tons. Conversely, domestic production in 1975 fell to 78,071 short tons, down from 144,910 short tons in 1974. Two factors contributed to the opposite movements of imports and domestic production in 1975: (1) an overestimation of U.S. demand by importers, and (2) a 48-percent decline in U.S. stainless steel production. While not falling back to pre-1975 levels, imports of high-carbon ferrochromium did drop substantially in 1976. The ratio of imports to domestic production fluctuated dramatically from less than 50 percent in 1973 and 1974 to more than 200

Table 2.--Chromium ore: World production, by countries, 1978-80

Country	1978	1/ 1979	1/ 1980
	Quantity (1,000 short tons, gross weight)		
Republic of South Africa,	3,466	3,634	3,764
Union of Soviet Socialist Republics	2,500	2,600	2,700
Albania	1,100	1,220	1,190
Philippines	592	620	631
Zimbabwe	527	597	611
Turkey	410	500	440
Other	1,325	1,327	1,389
Total	9,920	10,498	10,725
	Percent of total		
Republic of South Africa	34.9	34.6	35.1
Union of Soviet Socialists Republics	25.2	24.8	25.2
Albania	11.1	11.6	11.1
Philippines	6.0	5.9	5.9
Zimbabwe	5.3	5.7	5.7
Turkey	4.1	4.8	4.1
Other	13.4	12.6	12.9
Total	100.0	100.0	100.0

1/ Preliminary.

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

Table 3.--High-carbon ferrochromium: U.S. imports for consumption and production, 1973-78

Year	Imports	Production	Ratio of imports to production
	Short tons, chromium content	Short tons, chromium content	Percent
1973	71,916	158,550	45
1974	71,319	144,910	49
1975	158,055	78,071	202
1976	107,307	105,237	102
1977	109,847	112,803	97
1978	171,113	101,190	169

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

percent in 1975. After falling to about 100 percent in 1976 and 1977, the ratio again rose sharply, to 169 percent, in 1978.

Import market share.--Historically, the two major sources of imported high-carbon ferrochromium have been the Republic of South Africa and Zimbabwe (formerly Rhodesia). Combined, the two countries have, from 1973 to 1977, accounted for 78, 62, 59, 64, and 77 percent, respectively, of total imports (table 4). This co-dominance of the U.S. import market, however, was terminated in 1977 when the United States embargoed imports of chromium products from Zimbabwe. As a consequence of this action, Zimbabwe's market share fell to 0 in 1978 and South Africa's share increased sharply to 80 percent, capturing all of the market share lost by Zimbabwe.

Table 4.--High-carbon ferrochromium: U.S. imports for consumption, by principal sources, 1973-78

Year	Total	Republic of South Africa	Zimbabwe	Yugoslavia	Other
	Quantity (short tons, chromium content)				
1973	71,916	23,732	32,362	2,157	13,665
1974	71,319	24,248	19,969	14,264	12,838
1975	158,055	41,094	52,158	7,903	56,900
1976	107,307	41,850	26,827	13,950	24,680
1977	109,847	57,120	27,462	15,379	9,886
1978	171,113	136,858	-	25,709	8,545
	Percent of total				
1973	100	33	45	3	19
1974	100	34	28	20	18
1975	100	26	33	5	36
1976	100	39	25	13	23
1977	100	52	25	14	9
1978	100	80	-	15	5

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

The ratio of imports to domestic consumption rose dramatically in 1975 (to 97 percent) as consumption fell in the same year by 34 percent (table 5). This unrealistically high import-to-consumption ratio is believed to be the result of incomplete data on the buildup of importers' inventories. In 1976, the level of imports fell substantially, causing the ratio to drop to 67 percent. After falling further to 58 percent in 1977, the ratio of imports to consumption rose to 68 percent in 1978.

Table 5.--High-carbon ferrochromium: U.S. shipments of imports for consumption and consumption, 1973-78

Year	Shipments of imports 1/	Consumption	Ratio of imports to consumption
	Short tons, chromium content	Short tons, chromium content	Percent
1973	77,201	168,539	46
1974	67,111	188,728	36
1975	119,509	123,772	97
1976	106,231	159,480	67
1977	110,560	190,218	58
1978	159,752	233,297	68

1/ U.S. imports for consumption adjusted for changes in U.S. importers' inventories.

Source: Compiled from official statistics of the U.S. Department of Commerce and the U.S. Bureau of Mines and from data submitted in response to questionnaires of the U.S. International Trade Commission.

After imposition of relief

Import levels.-- In the first full year following the imposition of import relief for the U.S. high-carbon ferrochromium industry, 1/ imports of high-carbon ferrochromium decreased by 29 percent, from 171,113 short tons in 1978 to 121,839 short tons in 1979 (table 6). During the same period, U.S. production of high-carbon ferrochromium rose from 101,190 short tons to 131,222 short tons, representing an increase of 30 percent. Accordingly, the ratio of imports to production declined from 169 percent in 1978 to 93 percent in 1979.

In 1980, imports and U.S. production of high-carbon ferrochromium reversed their relative trends as imports increased 21 percent to 147,149 short tons and domestic production fell 24 percent to 99,500 short tons. Much of the increase in imports occurred in the second quarter when imports amounted to 73,040 short tons, representing an increase of 183 percent above imports during the January-March period. Contributing to the second quarter increase were unusally large shipments in April to a major U.S. importer (* * *) from an affiliated plant in South Africa.

Imports rose 67 percent in January-March 1981 compared with the corresponding period in 1980. Domestic production, on the other hand, decreased by 16 percent over the same period and the ratio of imports to production rose from 77 percent to 153 percent.

1/ The effective date of the relief was Nov. 17, 1978.

Table 6.--High-carbon ferrochromium: U.S. imports for consumption and production, 1977-80, January-March 1980, and January-March 1981

Period	Imports	Production	Ratio of imports to production
	Short tons, chromium content	Short tons, chromium content	Percent
1977	109,847	112,803	97
1978	171,113	101,190	169
1979	121,839	131,222	93
1980	147,149	1/ 99,500	148
January-March--			
1980	21,471	1/ 27,874	77
1981	35,943	1/ 23,525	153

1/ Preliminary.

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

Import market share.--During 1978-80, South Africa continued to be the single largest source of imported high-carbon ferrochromium, with imports from Yugoslavia a distant second (table 7). South Africa's share of total imports reached its highest level in 1978 (80 percent) and fell only slightly to 76 percent in 1980. In January-March 1981, South Africa captured 71 percent of the U.S. import market, followed by Yugoslavia with 21 percent. Imports from Zimbabwe have failed to reach pre-embargo levels despite the lifting of the sanctions in late 1979.

In 1979, the first full year after the date of Presidential Proclamation 4608, the ratio of imports to consumption decreased to 54 percent, down from 68 percent in 1978. However, the declining ratio was shortlived since, in 1980, the ratio again rose, to 72 percent (table 8).

Table 7.--High-carbon ferrochromium: U.S. imports for consumption, by principal sources, 1977-80, January-March 1980, and January-March 1981

Period	Total	Republic of South Africa	Zimbabwe	Yugoslavia	Other
	Quantity (short tons, chromium content)				
1977	109,847	57,120	27,462	15,379	9,886
1978	171,113	136,858	-	25,709	8,545
1979	121,839	91,780	-	21,260	8,799
1980	147,149	111,816	12,589	13,157	9,586
January-March--					
1980	21,471	12,766	3,425	4,550	731
1981	35,943	25,468	-	7,517	2,957
	Percent of total				
1977	100	52	25	14	9
1978	100	80	-	15	5
1979	100	75	-	17	7
1980	100	76	9	9	7
January-March--					
1980	100	59	16	21	3
1981	100	71	-	21	8

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

Table 8.--High-carbon ferrochromium: U.S. shipments of imports for consumption and U.S. consumption, 1978-80, January-March 1980, and January-March 1981

Period	Shipments of imports 1/	Consumption	Ratio of imports to consumption
	Short tons, chromium content	Short tons, chromium content	Percent
1978	159,752	233,297	68
1979	141,262	259,676	54
1980	145,187	2/ 201,184	72
January-March--			
1980	33,537	2/ 57,657	58
1981	37,545	2/ 60,108	62

1/ U.S. imports for consumption adjusted for changes in U.S. importers' inventories.

2/ Preliminary.

Source: Compiled from official statistics of the U.S. Department of Commerce and the U.S. Bureau of Mines and from data submitted in response to questionnaires of the U.S. International Trade Commission.

Recent Trends in the U.S. Market

Reported U.S. consumption

Reported U.S. consumption of high-carbon ferrochromium, as compiled by the U.S. Bureau of Mines, increased steadily from 1977 to 1979 but then fell abruptly in 1980, as shown in the following tabulation:

	Quantity (short tons, chromium content)
1977	190,218
1978	233,297
1979	259,676
1980	201,184
January-March--	
1980	57,657
1981	60,108

U.S. consumption rose from 190,218 short tons, chromium content, in 1977 to 259,676 short tons in 1979, representing an increase of 36 percent. Consumption in 1980 fell by 23 percent to 201,184 short tons, corresponding with a similar decline in U.S. stainless steel production. Consumption was up slightly (4 percent) in January-March 1981 compared with the corresponding period in 1980.

Capacity and capacity utilization

Capacity.--U.S. capacity to produce high-carbon ferrochromium, defined as maximum potential output based on a product mix which permits a facility to operate under optimum conditions, increased a modest 3.9 percent in 1978 but then declined slightly each year thereafter (table 9).

Capacity utilization.--Domestic producers operated at 50 percent of capacity in 1980 as production fell to 99,500 short tons, chromium content. The capacity utilization rate for January-March 1981 fell further to 48 percent, representing a 14 percent drop from the January-March period a year earlier.

U.S. production

U.S. production of high-carbon ferrochromium during 1977-80 fluctuated from year to year with no apparent long-term trend. Production declined in 1978 to 101,190 short tons, or by 10 percent below the 1977 level; rebounded in 1979 to 131,222 short tons, representing a sharp 30-percent rise; and then fell in 1980 by 24 percent to 99,500 short tons (table 10). Two events occurred in 1980 that may explain, in part, the decline in the 1980 production figure. As mentioned earlier, in mid-1980, two domestic producers (Chromium Mining & Smelting Corp., and Satralloy, Inc.) closed down their high-carbon

Table 9.--High-carbon ferrochromium: U.S. capacity, production, and capacity utilization, 1977-80, January-March 1980, and January-March 1981

Period	Capacity	Production	Capacity utilization
	Short tons, chromium content	Short tons, chromium content	Percent
1977	196,339	112,803	58
1978	203,939	101,190	50
1979	201,439	131,222	65
1980	199,339	99,500	50
January-March--			
1980	49,885	27,874	56
1981	48,985	23,525	48

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

Table 10.--High-carbon ferrochromium: U.S. production, by quarters, January 1977-March 1981

(In short tons, chromium content)

Year	Total	January-March	April-June	July-September	October-December
1977	112,803	22,869	34,905	26,860	28,169
1978	101,190	23,542	24,224	29,301	25,526
1979	131,222	38,099	31,444	36,385	41,396
1980	99,500	27,874	28,330	18,278	25,018
1981	1/	23,525	1/	1/	1/

1/ Not available.

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

Note.--Because of revisions in annual data, quarterly figures may not add to the totals shown.

ferrochromium furnaces due to "deteriorated market conditions." The second event which may have contributed to low production figures in 1980 was a strike at the Globe Metallurgical plant at Beverly, Ohio. The strike lasted for 55 days, ending on October 1, 1980.

U.S. producers' shipments

Domestic shipments.--U.S. producers' domestic shipments were down almost 17 percent in 1980 from the 119,351 short tons shipped in 1979 and have generally followed the same up and down pattern as production. January-March 1981 shipments were 26 percent lower than shipments in January-March 1980 (table 11).

Table 11.--High-carbon ferrochromium: U.S. producers' domestic shipments, by quarters, January 1977-March 1981

(In Short tons, chromium content) 1/

Year	Total	January-March	April-June	July-September	October-December
1977	122,994	30,852	37,048	28,342	26,752
1978	109,686	23,248	29,172	29,332	40,021
1979	119,351	42,318	32,921	39,525	35,736
1980	99,244	31,903	22,304	22,792	21,595
1981	2/	23,635	2/	2/	2/

1/ Chromium content estimated from gross weight on the basis of average chromium content of production, as reported by the U.S. Bureau of Mines.
2/ Not available.

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

Note.--Because of revisions in annual data, quarterly figures may not add to the totals shown.

U.S. exports.--U.S. exports of high-carbon ferrochromium are relatively small but increased sharply in 1980, as shown in the following tabulation:

	Quantity (short tons, chromium, content)	Ratio of exports to production (percent)
1978	12,220	12
1979	9,097	7
1980	18,908	19
January-March--		
1980	5,147	18
1981	825	4

Much of the increase in 1980 can be accounted for by a single U.S. producer which reported significant exports to Japan.

U.S. inventories

Producers' inventories.--U.S. producers' yearend inventories of high-carbon ferrochromium increased from 16,599 short tons, chromium content, in 1978 to 22,146 short tons in 1979, and then fell to 18,701 short tons in 1980. The ratio of inventories to producers' shipments rose from 15 percent in 1978 to 19 percent in 1979 and 1980. Inventories in January-March 1981 were down by 2,480 short tons compared with January-March 1980, but the ratio of inventories to shipments was up by 2 percentage points to 18 percent (table 12).

Table 12.--High-carbon ferrochromium: U.S. producers' shipments and end-of-period inventories, 1978-80, January-March 1980, and January-March 1981

Period	Producers' shipments 1/	Producers' end-of-period inventories 1/	Ratio of inventories to shipments
	Short tons, chromium content	Short tons, chromium content	Percent
1978	109,686	16,599	15
1979	119,351	22,146	19
1980	99,244	18,701	19
January-March--			
1980	31,903	15,796	2/ 16
1981	23,635	13,316	3/ 18

1/ Estimated from gross weight on the basis of average chromium content of production, as reported by the U.S. Bureau of Mines.
2/ Based on full-year shipments.
3/ Based on annualized shipments.

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

Consumers' inventories.--Yearend inventories of high-carbon ferrochromium held by consumers fell from 41,884 short tons, chromium content, in 1978 to 27,251 short tons in 1979, but then rose to 30,004 short tons in 1980. The ratio of inventories to consumption stood at 12 percent in January-March 1981, compared with a ratio of 16 percent in January-March 1980 (table 13).

Table 13 .--High-carbon ferrochromium: U.S. consumption and consumers' end-of-period inventories, 1978-80, January-March 1980, and January-March 1981

Period	Consumption	Consumers' end-of-period inventories	Ratio of inventories to consumption
	Short tons, chromium content	Short tons, chromium content 1/	Percent
1978	233,297	41,884	18
1979	259,676	27,251	10
1980	201,184	30,004	15
January-March--			
1980	57,657	32,102	2/ 16
1981	60,108	24,919	3/ 12

1/ Estimated from gross weight on the basis of average chromium content of consumption, as reported by the U.S. Bureau of Mines.
2/ Based on full-year consumption.
3/ Based on annualized consumption.

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

Importers' inventories.--The ratio of inventories to shipments for U.S. importers of high-carbon ferrochromium fell from 38 percent in 1978 to 29 percent in 1980; inventories in absolute terms fell from 60,242 short tons to 42,781 short tons (table 14).

Table 14 .--High-carbon ferrochromium: U.S. importers' shipments and end-of-period inventories, 1978-80, January-March 1980, and January-March 1981

Period	Importers' shipments 1/	Importers' end-of-period inventories	Ratio of inventories to shipments
	Short tons, chromium content	Short tons, chromium content	Percent
1978	159,752	60,242	38
1979	141,262	40,819	29
1980	145,187	42,781	29
January-March--			
1980	33,537	28,753	2/ 20
1981	37,545	41,179	3/ 25

1/ U.S. imports for consumption adjusted for changes in U.S. importers' inventories.
2/ Based on full-year shipments.
3/ Based on annualized shipments.

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

U.S. employment

Average number employed.--The average number of production and related workers employed in the production of high-carbon ferrochromium increased by 46 percent from 1978 to 1979 (438 to 639), but fell sharply thereafter to 453 in 1980 and to 350 in January-March 1981 (table 15).

Man-hours worked.--The total number of man-hours worked by production and related workers producing high-carbon ferrochromium decreased to 933,000 hours in 1980 after reaching 1.3 million hours in 1979. The number of man-hours worked in the first quarter of 1981 (177,000) was less than half the number of hours worked (349,000) in the corresponding period of 1980.

Productivity.--The productivity of production and related workers producing high-carbon ferrochromium, as measured by physical output per man-hour worked by such employees, is shown in the following tabulation:

	Quantity (short tons per man-hour)
1978	0.115
1979	.101
1980	.107
January-March--	
1980	.080
1981	.133

The growth in productivity in January-March 1981 occurred at a time when the domestic industry was left virtually with two producers, one being largely an exlusive producer of high-carbon ferrochromium.

Wages.--Wages paid to production and related workers fell to $9.4 million in 1980, after rising to $11.6 million in 1979. Wages paid in January-March 1981 amounted to $1.7 million, representing a 48-percent drop from those paid in January-March 1980. The average hourly earnings of production and related workers producing high-carbon ferrochromium increased by 31 percent between 1978 and 1980, rising from $7.72 per hour in 1978 to $10.11 per hour in 1980. Production and related workers are members of the United Steel Workers of America union.

Table 15.--Average number of persons employed in U.S. establishments in which high-carbon ferrochromium was produced, total and production and related workers, and man-hours worked and wages paid to production and related workers producing high-carbon ferrochromium, 1978-80, January-March 1980, and January-March 1981

Item	1978	1979	1980	January-March-- 1980	January-March-- 1981
Average number of all employees	2,136	2,509	2,063	2,197	1,879
Production and related workers:					
Producing all products	1,800	2,141	1,719	1,841	1,572
Producing high-carbon ferrochromium	438	639	453	582	350
Man-hours worked by production and related workers producing high-carbon ferrochromium 1,000 hours	883	1,299	933	349	177
Wages paid to production and related workers producing high-carbon ferrochromium 1,000 dollars	6,816	11,628	9,430	3,331	1,725

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

Prices

Weighted-average domestic and import prices (f.o.b. U.S. point of shipment, freight-equalized to the nearest competitor) and price ranges for high-carbon ferrochromium developed from producers' and importers' questionnaires are presented in tables 16 and 17 for 1978 through 1980 and for January-June 1981. Price differences among the three grades of high-carbon ferrochromium depend importantly upon the chromium content of the product. Thus, as is apparent from table 16, prices of high-carbon ferrochromium with a chromium content of 64 percent or more are generally higher than those of high-carbon ferrochromium containing 56 to 64 percent chromium or 50 to 55 percent chromium. In this discussion, the high-chromium product (64 percent or over) will be referred to as grade A, the medium-chromium product as grade B, and that with the lower chromium content (50 to 55 percent), as grade C.

As shown in table 17, the domestic and import price ranges for grades A and C were relatively narrow during most quarters of the 3-1/2 year period. Therefore, the weighted-average prices shown in table 16 for these grades are probably representative of transaction prices during the period. However, because of the consistently wide range of producer's prices shown for grade B, less significance can be placed in the weighted-average prices for this category. During the April-June of 1981, the U.S. producer's price for grade B ranged from 42 to 70 cents per pound.

Table 16.--High-carbon ferrochromium: Weighted-average net prices received by domestic producers and importers for their single largest sale in a particular quarter, by chromium specifications and by quarters, January 1978-June 1981

(Cents per pound, chromium content)

Period	Over 64 percent chromium (grade A)		56-64 percent chromium (grade B)		50-55 percent chromium (grade C)	
	Imported	U.S.-produced	Imported	U.S.-produced	Imported	U.S.-produced
1978:						
January-March	37.0	38.5	32.2	37.6	32.0	32.8
April-June	37.0	36.0	32.2	38.6	31.1	33.1
July-September	35.1	37.9	1/	38.4	32.9	31.0
October-December	34.7	37.9	1/	40.3	32.2	31.9
1979:						
January-March	40.5	40.4	40.0	45.4	34.1	39.6
April-June	41.7	43.5	47.0	46.4	43.1	39.3
July-September	47.0	46.6	1/	43.2	43.5	41.9
October-December	45.9	45.8	1/	46.3	43.2	43.6
1980:						
January-March	50.4	46.3	1/	45.0	44.1	44.0
April-June	50.0	49.3	1/	44.9	45.0	43.5
July-September	48.9	46.5	48.9	45.3	44.7	43.4
October-December	47.5	49.1	49.6	44.2	44.7	43.2
1981:						
January-March	47.7	52.0	46.6	45.1	45.0	41.8
April-June	48.2	52.0	48.3	50.2	44.9	43.1

1/ Not available.

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

Table 17.--High-carbon ferrochromium: Ranges of prices received by domestic producers and importers for their single largest sale in a particular quarter, by chromium specifications and by quarters, January 1978-June 1981

(Cents per pound, chromium content)

Period	Over 64 percent chromium (grade A)		56-64 percent chromium (grade B)		50-55 percent chromium (grade C)	
	Imported	U.S.-produced	Imported	U.S.-produced	Imported	U.S.-produced
1978:						
January-March	36.8-39.0	35.4-41.0	32.2	35.5-58.1	31.5-36.0	32.5-34.0
April-June	32.9-41.0	34.5-43.0	32.2	34.5-58.1	29.5-36.0	33.0-33.2
July-September	31.0-39.0	35.0-43.0	1/	34.5-58.1	32.5-33.5	30.7-40.0
October-December	31.0-39.0	34.6-43.0	1/	35.5-58.1	31.3-34.0	31.7-36.5
1979:						
January-March	36.5-45.0	37.9-45.0	42.0	42.0-64.4	31.5-42.5	39.5-43.5
April-June	38.5-45.0	42.5-48.0	47.0	45.0-67.9	42.5-43.5	39.3-44.0
July-September	41.0-48.0	44.8-50.0	1/	42.5-67.9	42.7-43.6	41.9-44.0
October-December	41.0-49.0	44.6-52.0	1/	45.0-67.9	42.8-44.2	42.8-43.6
1980:						
January-March	47.0-51.4	44.0-52.0	1/	44.0-67.9	42.7-46.2	42.8-46.8
April-June	48.0-53.1	44.0-52.0	1/	44.0-67.9	43.1-47.5	43.4-47.0
July-September	46.8-53.3	44.0-52.0	48.9	44.0-70.0	43.5-46.2	43.3-46.8
October-December	44.5-49.5	46.4-52.0	49.6	43.5-70.0	43.8-46.2	43.0-46.8
1981:						
January-March	46.0-49.5	49.0-52.0	46.6	42.0-70.0	44.4-45.5	41.7-46.8
April-June	45.5-53.0	52.0	46.7-48.5	42.0-70.0	44.5-45.5	43.0-46.8

1/ Not available.

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

During 1978-80, the index of producers's prices for high-carbon ferrochromium increased less rapidly than the Bureau of Labor Statistics' (BLS) indexes of intermediate materials and metal products as a group, but more rapidly than some classes of related products. As shown in table 18, the index of producer's prices for grade C high carbon ferrochromium increased by only 27.4 percent between January-March 1978 and January-March 1981. By comparison, the BLS indexes for intermediate materials and for metals and metal products rose by 42.9 percent and 34.9 percent, respectively, during this period. On the other hand, the index for pig iron and ferroalloys increased by only 22.4 percent.

Although domestic and import prices of all three grades of high-carbon ferrochromium have moved upward during the 3 year period, the pattern of movement among the different grades has been varied. In the case of grade C ferrochromium, the domestic price remained relatively stable throughout 1978 and then climbed sharply during the next year, reaching a peak level of 44.0 cents per pound in January-March 1980, before declining slightly to 43.5 cents per pound in April-June 1980. During the next year, it remained fairly constant. It is evident from table 16 that movements in import prices for grade C ferrochromium closely paralleled movements in domestic prices for this grade. Domestic prices of grade B rose almost steadily from 37.6 cents per pound in January-March 1978 to 46.4 cents per pound in April-June 1979 and then showed little change during the next seven quarters. However, in April-June 1981 prices jumped by 5 cents to 50.2 cents per pound. Despite gaps in the data, it appears that import prices for grade B ferrochromium have also moved fairly closely with grade B domestic prices during the period being considered. After showing little change during 1978, domestic prices of grade A ferrochromium edged steadily upward during the next 2 years, reaching a peak level of 52.0 cents per pound during January-June 1981. Import prices for grade A roughly paralleled movements in domestic prices during most of the 3-1/2 year period. However, unlike domestic prices, they reached a peak level of 50.4 cents per pound during January-March 1980 and then declined moderately during the next four quarters, before recovering slightly to 48.2 cents per pound in April-June 1981.

Domestic and imported prices for all three grades of ferrochromium are presented in figures 2, 3, and 4 for the 1976-80 period and for January-June 1981. Data for 1976 and 1977 were developed during the earlier high-carbon ferrochromium industry investigation (No. TA-201-35). It is evident from figure 2 that the import price for grade C was generally below the domestic price throughout 1976-78. However, shortly after the introduction of the breakpoint price in November 1978, this pattern reversed. From April-June 1979 through April-June 1981, the price of imported grade C was almost consistently higher than the domestic price. Similarly, the import price for grade B was often substantially less than the domestic price throughout 1976-77 and April-June 1978 (fig. 3). However, incomplete data show that from April-June 1979 onward, neither the domestic nor the imported price of grade B has been consistently lower. During much of the 1976-81 period, the price of imported grade A high-carbon ferrochromium has been lower than the domestic price, although the margin has generally been narrow (fig. 4).

Table 18.--Indexes of domestic prices for high-carbon ferrochromium and other selected commodities, by quarters, January 1978-March 1981

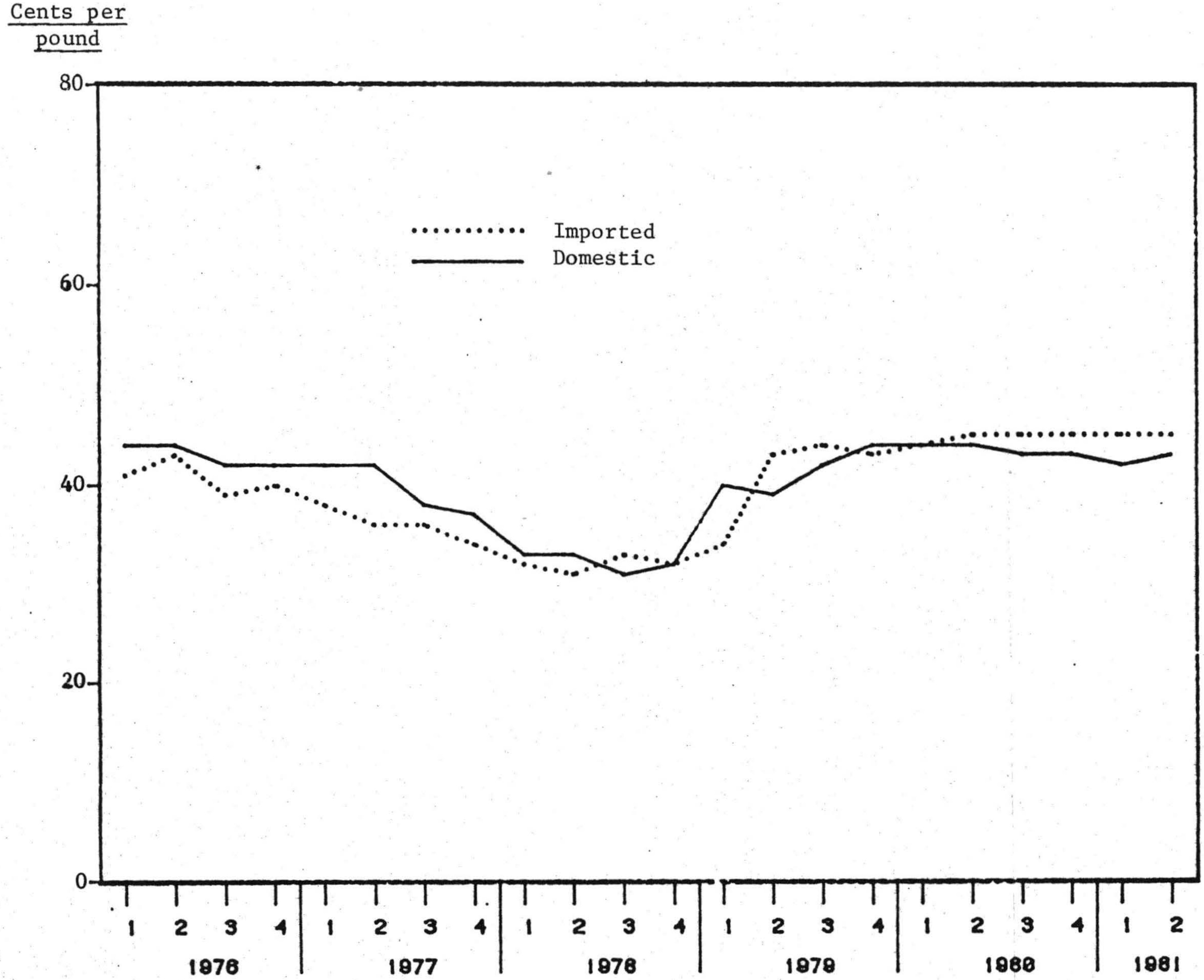
(January-March 1978=100)

Period	Intermediate materials	Metals and metal products	Pig iron and ferroalloys	High-carbon 1/ ferrochromium
1978:				
January-March------	100.0	100.0	100.0	100.0
April-June---------	102.0	102.9	100.7	105.0
July-September-----	103.8	105.2	104.0	94.6
October-December---	106.6	107.8	105.2	102.7
1979:				
January-March------	109.6	113.0	110.6	120.7
April-June---------	113.7	117.5	115.7	120.0
July-September-----	118.5	120.0	120.4	127.7
October-December---	123.3	124.2	120.9	133.0
1980:				
January-March------	129.6	131.3	121.5	131.0
April-June---------	132.2	129.4	122.0	132.6
July-September-----	135.4	130.4	120.6	132.3
October-December---	138.9	133.3	120.6	131.7
1981:				
January-March------	142.9	134.9	122.4	127.4

1/ Calculated from price data in table 16 for high-carbon ferrochromium containing 50-55 percent chromium.

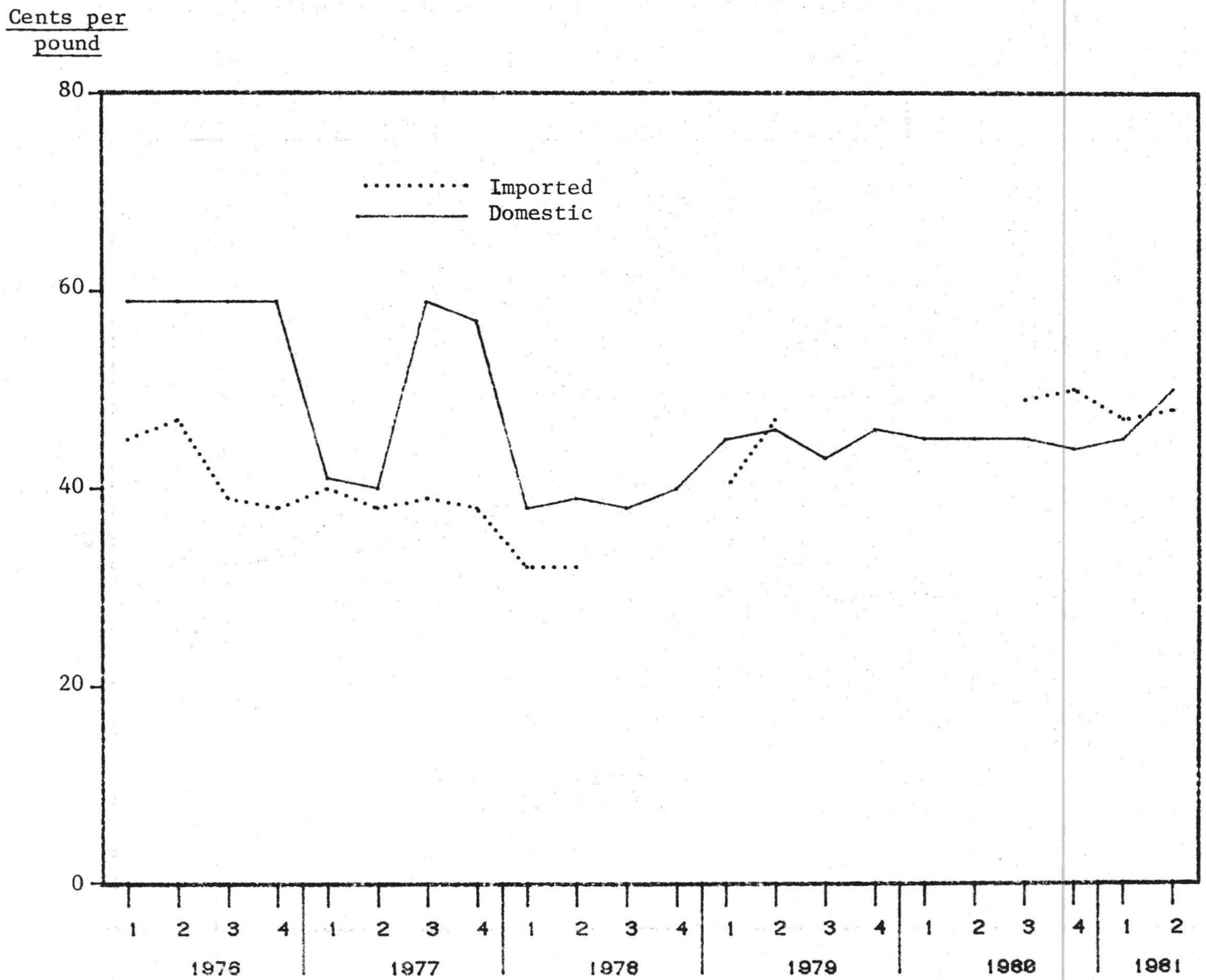
Source: Compiled from official statistics of the U.S. Bureau of Labor Statistics, except as noted.

Figure 2.--High-carbon ferrochromium, 50-55 percent chromium content: Weighted-average prices of domestic and imported metal, by quarters, January 1976-June 1981



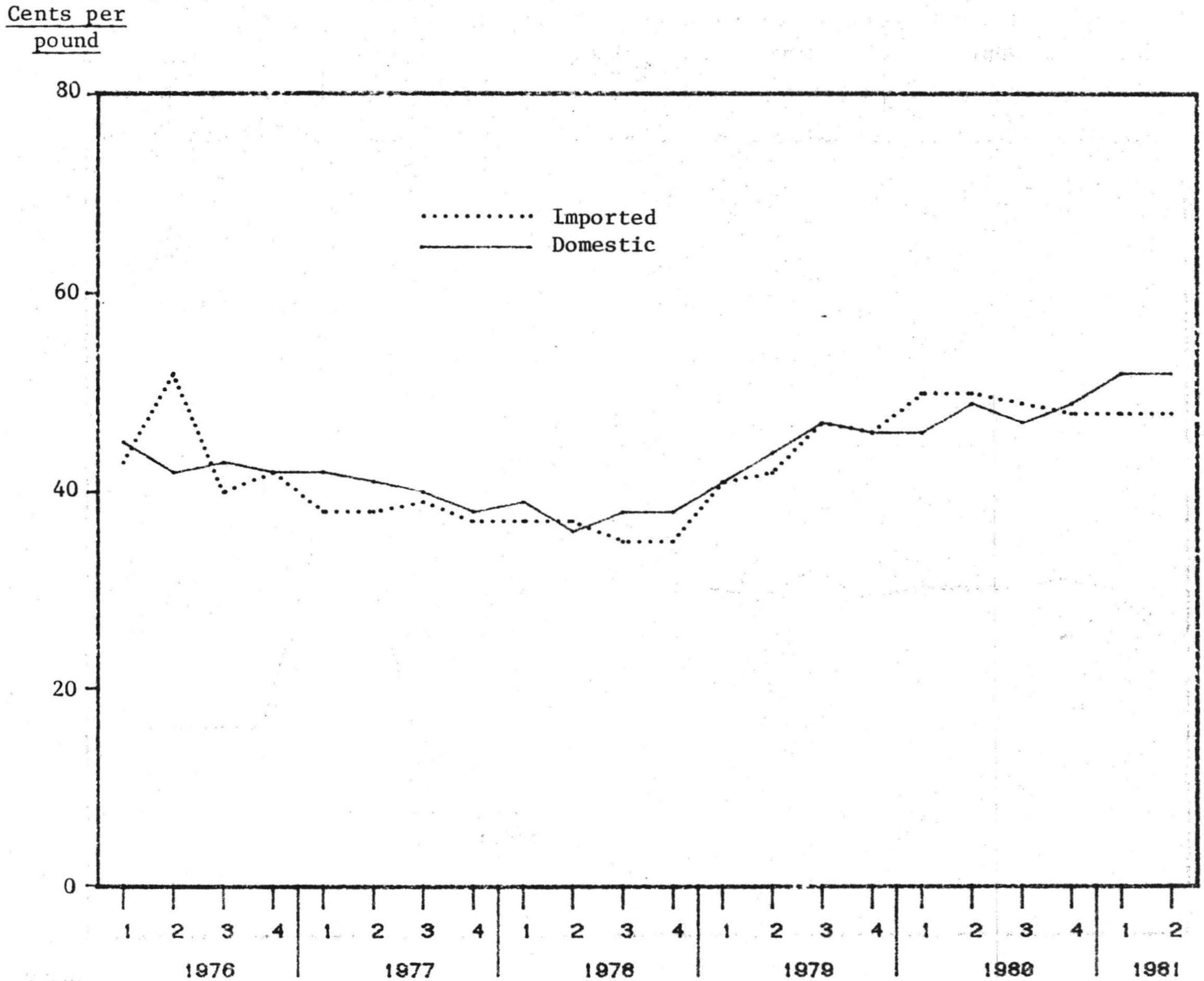
Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Figure 3.--High-carbon ferrochromium, 56-64 percent chromium content: Weighted-average prices of domestic and imported metal, by quarters, January 1976-June 1981



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

Figure 4.--High-carbon ferrochromium, over 64 percent chromium content: Weighted-average prices of domestic and imported metal, by quarters, January 1976-June 1981



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

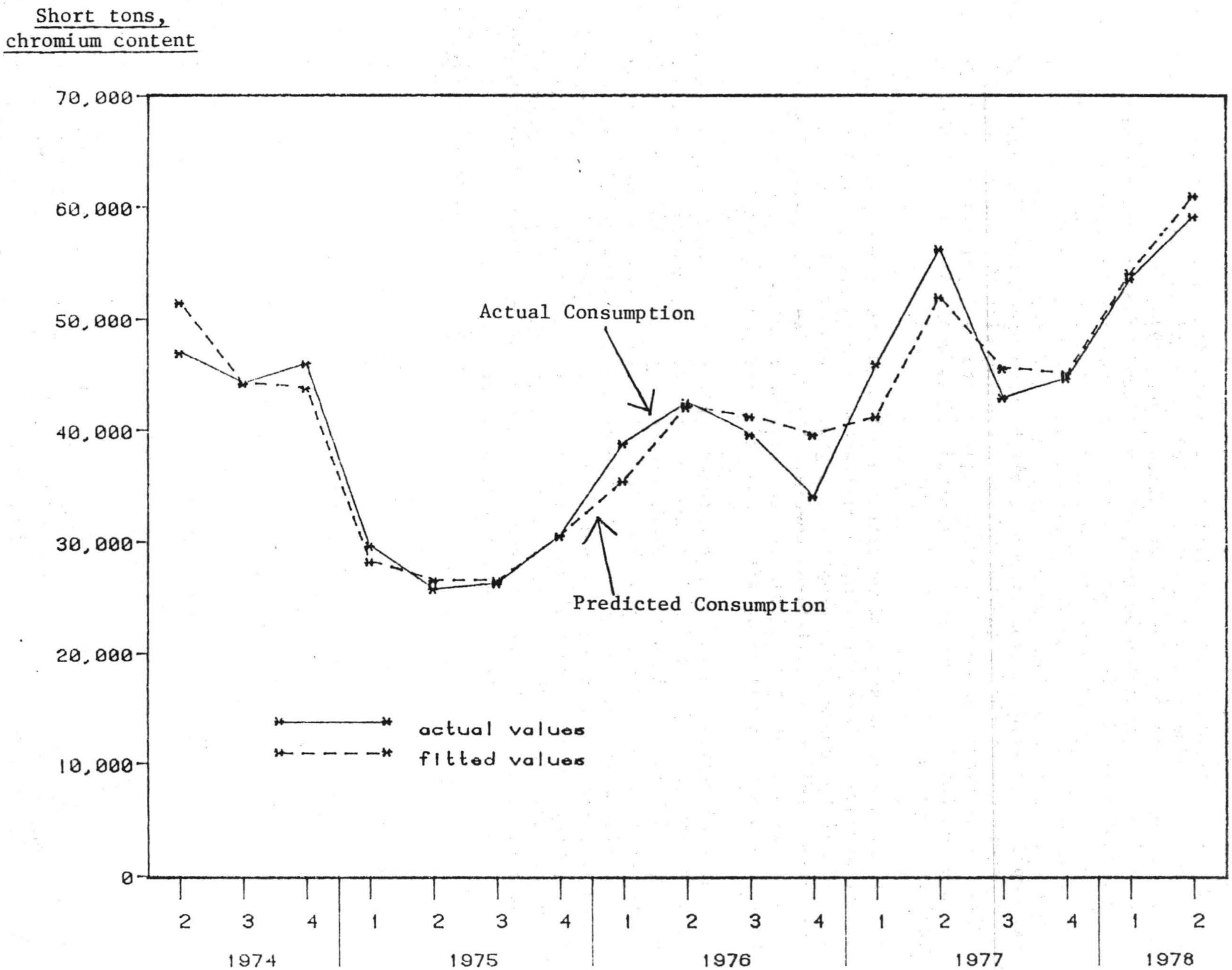
Price/demand relationships

Regressions were performed in an effort to assess the influence of prices and domestic production of stainless steel on the demand for high-carbon ferrochromium. The analysis, which is described in detail in appendix E, relied upon quarterly data for 1974-77, and January-June 1978. Total U.S. consumption of high-carbon ferrochromium was found to be negatively and significantly related to the average level of domestic and imported high-carbon ferrochromium prices and positively and significantly related to the level of U.S. stainless steel output. The close fit of the regression equation, which "explained" 93 percent of the variation in apparent consumption, is evident from figure 5, which shows predicted and actual levels of consumption for the 17 quarter period beginning with the second quarter of 1974. The estimated price coefficient suggests that a 1-percent increase in the average level of domestic and imported prices would lead to a 0.9 percent decline in consumption.

Since stainless steel scrap prices are thought to be positively related to the demand for ferrochromium, several attempts were made to include this variable in the consumption equation along with the ferrochromium price and stainless steel output variables. However, the results were unsatisfactory--possibly because of statistical problems arising from the high correlation between stainless steel scrap prices and stainless steel output.

Several regressions which attempted to relate levels of U.S. shipments to separate levels of domestic prices and imported prices, stainless steel scrap. prices, and U.S. stainless steel production were performed. These regressions consistently accounted for about 70 percent or more of the quarterly variation in U.S. shipments, and suggested that shipments are negatively related to domestic prices and are positively related to the other variables as expected, although the estimated coefficients were often insignificant. Again, the high degree of correlation between scrap prices and stainless steel output, and between domestic and imported high-carbon ferrochromium prices, offers an explanation for the lack of significance of these variables.

Figure 5.--High-carbon ferrochromium: Actual and predicted levels of U.S. consumption, by quarters, April 1974-June 1978



Source: Compiled from official statistics of the U.S. Bureau of Mines, and from data developed during investigations Nos. TA-201-35 and TA-203-5.

Financial experience of U.S. producers

Profit-and-loss.--The financial performance of the five U.S. producers of high-carbon ferrochromium on their overall establishment operations improved significantly from a $9.7 million net operating loss in 1978 to a $24.9 million net operating profit in 1979, and then declined to a $16.6 million net operating profit in 1980 (table 19). Net operating profit further declined to $6.7 million in January-March 1981, compared with $10.4 million in the corresponding period of 1980. The ratio of net operating profit or loss to net sales followed the same trend.

Net sales of high-carbon ferrochromium increased by 41 percent from $79.1 million in 1978 to $111.4 million in 1979, and then dropped to $102.3 million in 1980. In January-March 1981, net sales decreased by 38 percent compared with sales in the corresponding period of 1980 ($38.3 million to $23.6 million), primarily as a result of a 36-percent drop in the quantity of shipments. The majority of the decline in shipments resulted from * * *. The aggregate net operating profit picture improved from a net operating loss of $10.8 million in 1978 to a net operating profit of $1.8 million in 1979, and then fell back to a net operating loss of $1.2 million in 1980. The aggregate operating profit or (loss) margins amounted to (13.6) percent in 1978, 1.6 percent in 1979, and (1.1) percent in 1980. The improved financial picture in 1979 and 1980 compared with 1978 is generally the result of increasing selling prices rather than reductions in costs. In January-March 1981, net operating profit declined by 36 percent, compared with that in the corresponding period of 1980 ($1.5 million to $926,000), mainly due to the low volume of sales. In the same period, however, the ratio of net operating profit to net sales increased slightly (3.8 percent to 3.9 percent), because * * *.

The following tabulation shows the profit or (loss) margins by individual firms on their high-carbon ferrochromium operations during the specified periods (in percent):

Firm	1978	1979	1980	January-March--	
				1980	1981
Chromium Mining	***	***	***	***	1/ ***
Globe	***	***	***	***	***
Macalloy	***	***	***	***	***
Satralloy	***	***	***	***	2/
Union Carbide	***	***	***	***	***
Average	(13.6)	1.6	(1.1)	3.8	3.9

1/ * * *.
2/ * * *.

Table 19.--Profit-and-loss experience of 5 U.S. producers 1/ on their overall and high-carbon ferrochromium operations, 1978-80, January-March 1980, and January-March 1981

Item and period	Net sales	Cost of goods sold	Gross profit or (loss)	General, selling, and administrative expenses	Net operating profit or (loss)	Ratio of net operating profit or (loss) to net sales	Ratio of cost of goods sold to net sales
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	Percent	Percent
Overall establishment operations:							
1978	214,682	210,271	4,411	14,110	(9,699)	(4.5)	97.9
1979	310,370	272,591	37,779	12,860	24,919	8.0	87.8
1980	276,582	246,962	29,620	13,038	16,582	6.0	89.3
January-March--							
1980	92,459	78,639	13,820	3,464	10,356	11.2	85.1
1981	77,218	67,404	9,814	3,138	6,676	8.6	87.3
Operations on high-carbon ferrochromium:							
1978	79,154	84,776	(5,622)	5,149	(10,771)	(13.6)	107.1
1979	111,405	105,297	6,108	4,290	1,818	1.6	94.5
1980	102,348	98,363	3,985	5,142	(1,157)	(1.1)	96.1
January-March--							
1980	38,258	35,488	2,770	1,318	1,452	3.8	92.8
1981	23,645	21,707	1,938	1,012	926	3.9	91.8

1/ On July 19, 1979, Macalloy Corp. purchased the Charleston, S.C., plant from Airco Alloys Division of Airco, Inc. Data presented prior to that time were reported by Airco and data subsequent to July 19, 1979, by Macalloy.

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

Macalloy Corp. produces only high-carbon ferrochromium at their Charleston plant and accounts for over * * * percent of aggregate net sales. Hence, their data have a significant impact on the industry averages.

Cash flow from operations.--U.S. producers' cash flow from high-carbon ferrochromium operations improved greatly in 1979 ($5.2 million compared with a $7.4 million deficit recorded in 1978), but fell sharply in 1980 and January-March 1981, as shown in the following tabulation:

	Value (1,000 dollars)
1978	($7,381)
1979	5,181
1980	2,244
January-March--	
1980	2,358
1981	1,803

Investment in productive facilities.--To provide an additional measure of profitability, the ratios of net operating profit or (loss) to original cost and book value of fixed assets employed in production of high-carbon ferrochromium are presented in table 20. These ratios followed the same trend as did the ratios of net operating profit or (loss) to net sales, except for January-March 1981, when a downward trend is shown.

Research and development and capital expenditures

Only two domestic producers (* * * and * * *) reported research and development expenditures for their high-carbon ferrochromium operations. The majority of such expenditures in 1979 and 1980 were reported by * * * and were associated with the improvement of production techniques and attempts to achieve a higher recovery of chromium from ore. * * * reported that its research and development expenditures were for product development (* * * percent), improvement in production processes (* * * percent), and pollution control (* * * percent). Total reported expenditures increased from * * * in 1978 to * * * in 1980.

Domestic producers' capital expenditures fell from * * * million in 1978 to * * * million in 1979, but then rose to * * * million in 1980. However, when expenditures for pollution control equipment and/or devices are netted out of these totals (i.e., leaving only outlays for assets employed directly in the manufacturing process), capital expenditures amounted to * * * million in 1978, * * * million in 1979, and * * * million in 1980, as shown in the tabulation following table 20.

Table 20.--Investment in productive facilities and net operating profit of 4 U.S. producers of high-carbon ferrochromium, 1978-80, January-March 1980, and January-March 1981

Item and year	Investment in productive facilities at yearend: Original cost	Investment in productive facilities at yearend: Book value	Net operating profit or (loss)	Ratio of net operating profit or (loss) to investment in productive facilities in terms of--: Original cost	Ratio of net operating profit or (loss) to investment in productive facilities in terms of--: Book value
	1,000 dollars			Percent	
Overall establishment operations:					
1978	86,892	50,446	***	***	***
1979	89,380	50,080	***	***	***
1980	62,787	38,462	***	***	***
January-March--					
1980	71,974	41,997	***	***	***
1981	61,840	36,818	***	***	***
Operations on high-carbon ferrochromium:					
1978	51,965	30,272	***	***	***
1979	57,118	34,078	***	***	***
1980	36,068	26,400	***	***	***
January-March--					
1980	42,798	27,816	***	***	***
1981	36,138	25,333	***	***	***

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

Year	Research and development expenditures	Capital Expenditures: Total	Capital Expenditures: Net of pollution control equipment
	1,000 dollars	Million dollars	Million dollars
1978	***	***	***
1979	***	***	***
1980	***	***	***

Regarding specific expenditures in 1978, 1/ officials at Satralloy reported spending * * *; Globe reported spending * * *; Macalloy reported spending * * *. Chromium Mining incurred expenses of * * *.

In 1979, Satralloy reported spending * * *; Globe made improvements in * * *; Macalloy * * *; Chromium Mining reported spending * * *.

In 1980, Satralloy spent * * *; Globe purchased * * *; Macalloy spent * * *. Chromium Mining incurred an expense * * *.

Producer cost estimates 2/

Present costs.--Four domestic producers, three South African producers, and one Zimbabwe producer provided estimates of their costs of manufacturing high-carbon ferrochromium and delivering it to Pittsburgh, Penn. The estimates for 1978 are presented in table 21 and the estimates for 1981 are in table 22. Adjustments were required for data submitted by Macalloy for 1981 and the data presented in table 22 reflect these corrections. Adjustments were not made in 1978 or 1984 data, and such data should accordingly not be compared with those of 1981.

For the sake of comparability, cost comparsions were made between those producers producing high-carbon ferrochromium containing equal or near equal units of chromium. Therefore, these tables compare Macalloy's costs to those of the South African producers (each producing a product with a 52-59 percent chromium content) and the Zimbabwe producer's costs with those of Globe, Satralloy, and Chromium Mining (each producing a product with a chromium content of 63-68 percent). The estimate of the South African producers' cost advantage is the difference between Macalloy's costs and the average costs of the South African producers. The estimate of the Zimbabwe producers' cost advantage is the difference between the average costs of Globe, Satralloy, and Chromium Mining and the Zimbabwe producer's costs.

Both the 1978 and 1981 data indicate that the South African producers and the Zimbabwe producer have cost advantages in a number of areas. Their greatest cost advantage is in * * *, where South African costs were * * * and where the Zimbabwe producer's * * * costs were * * *. This advantage for the South African producers is the result of * * *, whereas the Zimbabwe producer enjoys the advantages of * * *.

The data also indicate that the South African producers have advantages in * * * in 1981; the Zimbabwe producer has similar cost advantages in * * *.

The South African producers and the Zimbabwe producer have an apparent * * * advantage, but it is small in comparison with these other differences. The * * *.

1/ Union Carbide Corp. did not provide the Commission with detailed expenditure data.

2/ Data in this section are based on information provided by U.S. and foreign producers in response to requests made by Commissioners at the hearing.

Table 21.--High-carbon ferrochromium: Producers' costs, by companies, 1978

Item	Macalloy's costs	South African producers' costs 1/	South African advantage	South African advantage as a share of total cost	Other U.S. producers' costs average 2/ 3/	Zimbabwe producer costs	Zimbabwe advantage	Zimbabwe advantage as a percent of total costs
	Cents per pounds, chromium content			Percent	Cents per pound, chromium content			Percent
Ore:								
Transportation-------	***	***	***	***	***	***	***	***
Other----------------	***	***	***	***	***	***	***	***
Total ore-------------	***	***	***	***	***	***	***	***
Transportation to Pittsburgh 4/ 5/-----	***	***	***	***	***	***	***	***
Labor-----------------	***	***	***	***	***	***	***	***
Energy----------------	***	***	***	***	***	***	***	***
Depreciation----------	***	***	***	***	***	***	***	***
Other factory costs----	***	***	***	***	***	***	***	***
Total--------------	***	***	***	***	***	***	***	***

1/ Includes Samancor, Middleburg Steel & Alloy, Tubatse Ferrochrome.
2/ Includes data for Globe Metallurgical, Satralloy, Inc., and Chromium Mining.
3/ Satralloy data for 1979.
4/ Generally, U.S. producers' prices are quoted on an f.o.b. producer's warehouse basis, thus freight costs are usually absorbed by the buyer.
5/ Includes U.S. duty.

Source: Compiled from data submitted to the Commission by the specified companies.

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

Table 22.--High-carbon ferrochromium: Producers' costs, by companies, 1981

Item	Macalloy's cost	South African producers' costs 1/	South African advantage	South African advantage as a share of total cost	Other U.S. producers' costs 2/	Zimbabwe producer costs	Zimbabwe advantage	Zimbabwe advantage as a share of total costs
	Cents per pound, chromium content			Percent	Cents per pound, chromium content			Percent
Ore:								
Transportation	***	***	***	***	***	***	***	***
Other	***	***	***	***	***	***	***	***
Total ore	***	***	***	***	***	***	***	***
Transportation to Pittsburgh 3/	***	***	***	***	***	***	***	***
Labor	***	***	***	***	***	***	***	***
Energy	***	***	***	***	***	***	***	***
Depreciation	***	***	***	***	***	***	***	***
Other factory costs	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***

1/ Includes Samancor, Middleburg Steel & Alloy, and Tubatse Ferrochrome.
2/ Includes Globe Metallurgical, Satralloy, Inc., and Chromium Mining.
3/ Generally, U.S. producers' prices are quoted on an f.o.b. producer's warehouse basis, thus freight costs are usually absorbed by the buyer.

Source: Compiled from data submitted to the Commission by the specified companies.

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

These data indicate that the South African producers and the Zimbabwe producer have only one major cost disadvantage--the cost of * * *. This disadvantage to the South African producers is * * *, and to the Zimbabwe producer, the disadvantage is * * *. In neither instance, however, is the extra cost * * * large enough to outweigh the savings they realize in other areas. Therefore, in 1981, South African producers have a net advantage of * * *, * * * while the Zimbabwe producer has a net advantage of * * *.

The Commission's staff also analyzed ore- and transportation-cost data compiled by the U.S. Department of Commerce to examine the effects of location on producers' costs. A discussion of the results of this analysis is presented in appendix F. Care should be exercised in evaluating these data because of some apparent inconsistencies with data submitted by U.S. producers and some illogical unit value data in the official statistics (the lowest grade ore has the highest unit value, for example).

Projected future costs.--Producers' Cost projections for 1984 are presented in table 23. A comparison of the projected costs for 1984 with the costs reported for 1981 indicates that U.S. and foreign producers have different expectations concerning the future behavior of their costs. Both the South African producers and the Zimbabwe producer expect * * *. Macalloy expects * * *, other U.S. producers expect * * *, while the Zimbabwe producer expects * * *.

Because of these differences in expectations, these forecasts indicate that in 1984 the South African producers will have a net * * *. By comparison, the Zimbabwe producer is expected to * * *.

U.S. Producers' Efforts to Compete with Imports

In response to questions in the Commission's questionnaire regarding specific actions taken to more effectively compete with imports, U.S. producers cited, among others, the following initiatives: (1) improved sales force operations; (2) change in upper management personnel; (3) branching out into nonferrochromium products; (4) increased investment in new plant and machinery; (5) improvements in material usage; (6) adoption of labor-saving equipment and/or processes; and, (7) divestiture of unprofitable operations.

Two or more U.S. producers reported taking each of the above actions to compete more effectively. Other measures cited by only one producer were (1) development of new marketing strategies, (2) better cash-flow management, (3) increased exports, (4) better customer service, (5) improved management techniques, and (6) shifts in product mix.

In the area of improvements in material usage, Macalloy Corp. reported that it had developed * * *. Finally, Macalloy is embarked on a co-generation project which ultimately is expected to provide a 35-percent increase in ferroalloy productivity and approximately a $4 million per year reduction in alloy cost. The theory behind the co-generation project is capturing heat loss from the smelting furnace and converting it into steam for use on the nearby Charleston Naval Base and electric power for use by the local utility. The project is expected to cost in the neighborhood of $68 million, $15 million of which is to be provided by the Navy and $20 million by the utility.

Table 23.--High-carbon ferrochromium: Projected producers' costs, by companies, 1984

Item	Macalloy's costs	South African producers' costs 1/	South African advantage	South African advantage as a share of total cost	Other U.S. producers' costs 2/	Zimbabwe producer costs	Zimbabwe advantage	Zimbabwe advantage as a share of total costs
	Cents per pounds, chromium content			Percent	Cents per pound, chromium content			Percent
Ore:								
Transportation	***	***	***	***	***	***	***	***
Other	***	***	***	***	***	***	***	***
Total ore	***	***	***	***	***	***	***	***
Transportation to Pittsburgh 3/4/	***	***	***	***	5/	***	5/	5/
Labor	***	***	***	***	***	***	***	***
Energy	***	***	***	***	***	***	***	***
Depreciation	***	***	***	***	***	***	***	***
Other factory costs	***	***	***	***	***	***	***	***
Total	***	***	***	***	***	***	***	***

1/ Includes Samancor, Middleburg Steel and Alloy, and Tubatse Ferrochrome .
2/ Includes Globe Metallurgical, Satralloy, Inc., and Chromium Mining.
3/ Generally, U.S. producers' prices are quoted on an f.o.b. producer's warehouse basis, thus freight costs are usually absorbed by the buyer.
4/ Includes U.S. duty.
5/ Data not available.

Source: Compiled from data submitted to the Commission by the specified companies.

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

The other principal U.S. producer (Globe Metallurgical Division) reported that it is * * *.

Finally, in an attempt to improve efficiency in the industry through increased recovery rates of chromium from existing slag (waste) stockpiles, three of the four remaining U.S. producers have each installed concentrating equipment that permits such additional chromium recovery. The chromium that is recovered is sold to high-carbon ferrochromium end users as "concentrates" or "fines" at a price typically 10 percent below prevailing high-carbon ferrochromium prices.

U.S. producers, in their efforts to compete with imports more effectively, have invested considerable amounts in upgrading and modifying their present plant facilities (discussed on pp. A-37 through A-39).

Probable Economic Effects of Import Relief

In assessing the probable economic effects of extended import relief on the high-carbon ferrochromium industry, it is important to consider the effects on the total demand for high-carbon ferrochromium and on how this demand would be allocated between domestic shipments and imports. The likely future capacity and supply capabilities of domestic and foreign producers should also enter into the analysis.

As discussed earlier, regression results developed from 1974-78 data indicated that the total U.S. demand for high-carbon ferrochromium is positively related to the level of U.S. stainless steel output, but negatively related to the average level of high-carbon ferrochromium prices. On the basis of these results, the overall decline in consumption of high-carbon ferrochromium during 1980 can be largely attributed to the sharp decline in stainless steel output during this period. Thus, a recovery in the total demand for high-carbon ferrochromium will depend importantly upon an expansion in stainless steel output. The results also suggest that a significant increase in the price of high-carbon ferrochromium resulting from additional import relief measures could impede a recovery in ferrochromium consumption.

Although the regression results also provided evidence that an increase in the price of imported ferrochromium would lead to a decline in imports and a rise in domestic shipments, information developed from this analysis was not sufficient for assessing the likely extent of the shift for a given increase in the import price. However, past evidence suggests that this shift could be substantial. Following the implementation of the breakpoint price of 38 cents per pound late in 1978, imports of high-carbon ferrochromium in 1979 declined by nearly 30 percent from their 1978 level, while domestic shipments in 1979 rose by nearly 9 percent from the level in the previous year.

In attempting to gage the probable effect of import relief, it is also important to compare the strengths and weaknesses of the U.S. industry with those of its leading foreign competitors. As noted elsewhere in the report, high-carbon ferrochromium production capacity in the United States has been gradually declining since 1978, while capacity has been expanding in South Africa, Zimbabwe, and other countries where chromium ore reserves are plentiful. Evidence suggests that the ready access to this ore may offer these foreign suppliers a significant transportation cost advantage over U.S. producers (app. F).

Projections of future levels of consumption, domestic shipments, and imports were made under three sets of assumptions (table 24). In the first case, it was assumed that import relief would not be extended. In the second case it was assumed that a new 43-cents-per-pound breakpoint price would be established, and that it would be adjusted upward during each year of the relief period to allow for inflation. As a third possibility, the effects of imposing a 46-cents-per-pound breakpoint price, again with adjustments for inflation, was considered. Since the current 38-cent breakpoint price is below the prevailing market price, and thus is believed to have little if any effect in restricting imports, an analysis of the effects of continuing with a 38-cent breakpoint price was not provided. 1/

The projection of future consumption if import relief is not extended is based on a 3 percent annual rate of growth during 1982-84, a projection that is roughly in line with industry forecasts for growth in stainless steel output during this period. If relief is not extended, it is also likely that imports would increase, both in absolute terms and as a share of total consumption. Between 1977 and 1980, imports increased irregularly at an average annual rate of about 10 percent. Between 1979 and 1980, they increased by 21 percent as inflation eroded the tariff protection afforded by the 38-cents-per-pound breakpoint price. Since it is unlikely that these rapid rates of increases would be sustained, the projections in table 24 assume that imports will rise by only 5 percent annually during 1981 and the relief period, reaching a level of 179,000 tons by 1984. If imports increase by only 5 percent annually, domestic shipments are projected to decline moderately to about 90,000 tons throughout the relief period.

If the 46-cents-per-pound breakpoint price is put into effect, the price of high-carbon ferrochromium imported from South Africa could be expected to increase by 10 percent or more from its current level. Similarly, it is likely that the price charged by U.S. producers would also increase, though probably by a smaller percentage than the South African price. Although the full extent of the price rise resulting from the increased breakpoint cannot be readily measured, the price elasticity estimates described earlier suggest that it would lead to a reduction in the overall demand for ferrochromium. The projection of consumption assumes that in the initial period, 1982, the reduction in demand as a result of the increase in price offsets the increase in demand for ferrochromium resulting from expanded stainless steel output. Thus, total consumption in 1982 will remain at its 1980 level of 246,000 tons, but it is projected to increase by 3 percent during each of the next 2 years as a result of continuing expansion of stainless steel output.

With the protection afforded by the breakpoint tariff, domestic shipments could increase significantly. The estimates in table 24 assume that these shipments would rise by 8.8 percent in 1982 and 1983, the same percentage

1/ Counsel for producers of high-carbon ferrochromium in Yugoslavia has suggested that a 41-cents-per-pound breakpoint price be established. Projections based on this price have not been prepared.

Table 24.--High carbon ferrochromium: Projections of U.S. consumption, shipments, and imports under alternative assumptions, 1982-84

(In thousands of short tons, chromium content)

Item	1982	1983	1984
	Assuming no extension of import relief		
Imports	162	170	179
Domestic shipments	92	91	90
Domestic consumption 1/	254	261	269
	Assuming new breakpoint price of 43 cents per pound is established		
Imports	154	157	160
Domestic shipments	96	100	105
Domestic consumption 1/	250	267	265
	Assuming new breakpoint price of 46 cents per pound is established		
Imports	147	146	148
Domestic shipments	99	108	113
Domestic consumption 1/	246	254	261

1/ Sum of imports and domestic shipments; will not correspond with data on reported consumption presented earlier in this report.

Source: Estimated by the Office of Economics, U.S. International Trade Commission.

increase in shipments that occurred in 1979 following the imposition of the original breakpoint price in late 1978. However, it is unlikely that this rate of increase would be sustained for more than 2 years. Therefore, it is assumed that shipments would increase by only 5 percent in 1984, reaching a level of 113,000 tons. In turn, imports are assumed to remain at a fairly constant level throughout the relief period.

If the breakpoint price were adjusted upward from its present level to 43 cents per pound, it is likely that total consumption would increase more rapidly than if the 46-cents-per-pound price were imposed, but domestic shipments would increase less rapidly. Thus, with a 43-cents-per-pound price it is assumed that consumption would increase by 1.5 percent in 1982, and by 3 percent during each of the next two years, reaching 265,000 tons in 1984. Domestic shipments are assumed to rise at a 5 percent rate each year, reaching 105,000 tons in 1984.

Section 202(c) Considerations

Section 203(i)(4) of the Trade Act of 1974 (19 U.S.C. 2253(i)(4)) directs the Commission to take into account the considerations set forth in section 202(c) of the Act in advising the President of the probable economic effects on the United States industry of the extension, reduction, or termination of import relief being provided. A discussion of these considerations is presented in this section.

Section 202(c)(1)

Section 202(c)(1) directs that consideration be given to--

> information and advice from the Secretary of Labor on the extent to which workers in the industry have applied for, are receiving, or are likely to receive adjustment assistance under chapter 2 or benefits from other manpower programs.

In order for a petiton to be certified for worker adjustment assistance, sales and production within an industry must decline and imports must rise at the expense of domestic sales. Furthermore, the workers, in order to qualify for assistance, must either be unemployed or threatened with the prospect of unemployment.

Since 1975, six adjustment assistance petitions have been certified for workers in the domestic high-carbon ferrochromium industry. One petition was certified in 1975, three in 1976, one in 1978, and the most recent in 1981. The six petitions had been filed on behalf of workers employed at three plants in Ohio, one plant in Tennessee, and one plant in South Carolina (2 petitions).

The benefits which have been accorded to workers between 1975 and 1980 in the high-carbon ferrochromium industry are as follows:

> 644 workers received $2,016,343 in trade adjustment allowances;
> 4 workers received $5,404 in relocation benefits; and
> 3 workers received $655 in job-search allowances.

These figures understate the total benefits which have been granted to workers in the high-carbon ferrochromium industry because they do not include assistance which has been provided to workers in South Carolina as a result of a petition which was certified in 1981.

Section 202(c)(2)

Section 202(c)(2) directs that consideration be given to--

> information and advice from the Secretary of Commerce on the extent to which firms in the industry have applied for, are receiving, or are likely to receive adjustment assistance under chapters 3 and 4.

For a petition to be certified under the program for firms, it must be demonstrated that the firm is confronted with declining output or sales and has had to, or intends to, let workers go, and that imports are in part responsible for the ailments of the firm. Only one producer of high-carbon ferrochromium, Satralloy, Inc., has had a petition for trade adjustment assistance certified by the Department of Commerce. That petition was certified in January 1978, and initial technical assistance of $9,708 for funding a study by a consultant was approved. However, the request was withdrawn shortly after the project was initiated.

Section 202(c)(3)

Section 202(c)(3) directs that consideration be given to--

> the probable effectiveness of import relief as a means to promote adjustment, the efforts being made or to be implemented by the industry concerned to adjust to import competition and other considerations relative to the position of the industry in the Nation's economy.

The evidence suggests that some efforts have been made by the industry to adjust to import competition during the relief period. Questionnaire responses from individual firms show that various approaches were employed, including efforts to upgrade sales forces, to diversify into new products to improve material usage, and to adopt labor-saving equipment and/or processes while divesting unprofitable operations. Macalloy's focus on * * *, and Globe's * * * are described elsewhere in the report. Moreover, the industry increased its expenditures on research and development during the relief period, even though the actual outlays remained small. Between 1978 and 1980 these outlays increased from * * * to * * *.

Although total capital outlays for machinery and equipment increased only minimally between 1978 and 1980 (from * * * to * * * million), these numbers understate the extent of the increase in productive investment during the relief period since they include large expenditures for pollution control equipment in 1978. If pollution control expenditures are subtracted from the totals, outlays for machinery and equipment rose from * * * million in 1978 to * * * million in 1980--or by more than * * * percent.

Section 202(c)(4)

Section 202(c)(4) directs that consideration be given to--

> the effect of import relief on consumers (including the price and availability of the imported articles and the like or directly competitive article produced in the United States) and on competition in the domestic markets for such articles.

If a higher breakpoint price is put into effect, it is likely that this would result in an increase in the price of imported high-carbon ferrochromium followed by an increase in the domestic price of high-carbon ferrochromium. In turn, some industrial consumers would probably shift to increased purchases of stainless steel scrap, a substitute input in the production of stainless steel. This could lead to an increase in the price of stainless steel scrap.

Although prices are likely to increase if import relief is extended, an ample supply of high-carbon ferrochromium for stainless steel producers and other industrial consumers appears to be virtually assured since the domestic industry is currently operating at only about 50 percent of capacity.

Since high-carbon ferrochromium is an intermediate material that is used mainly in the production of stainless steel, which in turn is used in a wide range of consumer and industrial products, the final costs to consumers of the import relief are not readily calculable. Assuming that the breakpoint price (and corresponding U.S. selling price) is raised to 46 cents per pound, industrial consumers could be expected to pay an additional $20 million for high-carbon ferrochromium in 1982 if United States consumption remains roughly at levels that have prevailed during 1980 and 1981. Although it is possible that total costs to final consumers would be greater than this amount, price increases on individual consumer goods resulting from the import relief are likely to be small since high-carbon ferrochromium accounts for less than 10 percent of the cost of producing a pound of stainless steel.

Sections 202(c)(5) and (6)

Sections 202(c)(5) and (6) direct that consideration be given to--

> the effect of import relief on the international economic interests of the United States; the impact on United States industries and firms as a consequence of any possible modification of duties or other import restrictions which may result from international obligations with respect to compensation.

As contracting parties to the General Agreement on Tariffs and Trade (GATT), the major foreign suppliers to the U.S. market (South Africa, Zimbabwe, and Yugoslavia) are all entitled to compensation under Article XIX of the GATT. At this point it is not known whether any country will request compensation in the event that import relief is extended, although none did after the relief was originally put into effect. However, in 1979, the South Africans did initiate proceedings to ensure that they would be eligible for compensation had they wished to request it. Zimbabwe was not a legal supplier to the U.S. market at that time and it could not have qualified for compensation.

Of these three countries, South Africa is the largest U.S. supplier of high-carbon ferrochromium. The volume of trade between the United States and South Africa is substantially higher than that between the United States and either Yugoslavia or Zimbabwe. The United States imports mainly mineral products, especially diamonds, gold, and platinum-group products, from South Africa.

In 1980, metal coins represented the single-largest-value import from South Africa ($941 million), followed by diamonds in their natural state at $662 million, unwrought platinum (in sponge form) at $407 million, and palladium, valued at $129 million. Of the 15 highest value items imported from South Africa, only high-carbon ferrochromium, high-carbon ferromanganese, and cane or beet sugar syrups are assessed a duty when they enter the United States.

The chief U.S. exports to South Africa are transport and related equipment and data and digital-processing machines and parts. The leading exports in 1980 were nonmilitary airplanes, valued at $129 million, followed by aircraft parts, valued at $60 million, and gold sweepings and waste, valued at $51 million.

Section 202(c)(7)

Section 202(c)(7) directs that consideration be given to--

> the geographic concentration of imported products marketed in the United States.

As high-carbon ferrochromium is used primarily as a source of chromium in the production of stainless and other specialty steels, the largest share of imports of high-carbon ferrochromium go to the stainless-steel-producing areas of the northeast and midwest. However, since some purchasers of imported high-carbon ferrochromium have plants which are located elsewhere, consumers are not confined to these areas. Since stainless steel is an input in the production of numerous products (including transport, industrial, food-processing, and electrical equipment; machinery; and various durable goods), many industries are indirectly consuming high-carbon ferrochromium. Thus, import relief measures may affect consumers of a wide range of products, nationwide.

Section 202(c)(8)

Section 202(c)(8) directs that consideration be given to--

> the extent to which the United States market is the focal point for exports of such article by reason of restraints on exports of such article to, or on imports of such article into third country markets.

It is doubtful that significant amounts of high-carbon ferrochromium exports are diverted to the United States due to the trade barriers elsewhere. Paralleling the recent experience of the United States, imported high-carbon ferrochromium has made dramatic inroads into the European Community (EC) and Japan, the other major high-carbon ferrochromium users. Although tariff rates are higher in the EC and Japan than in the United States, significant quantities of high-carbon ferrochromium enter those markets duty free, whereas the United States has no duty-free allowances. The United States imposes a 1.9 percent ad valorem duty on most imports of high-carbon ferrochromium, the EC has an 8 percent ad valorem duty and Japan has a 10 percent ad valorem duty which is currently being reduced to 8 percent.

Other less significant high-carbon ferrochromium consumers in the developed world have lower tariff levels and some, such as Canada, Sweden, Finland, Norway, and Austria, grant duty-free entry. In some of the larger developing countries, the tariff rates are higher than the tariff rate in the United States: Mexico has a 5 percent (plus surcharge) ad valorem duty and Brazil and India, which both have domestic high-carbon ferrochromium industries, have rates of 20 percent (plus 4 percent surcharge) and 40 percent, respectively.

The U.S. market may attract exports from the other major consuming regions which have erected the higher tariff barriers, but other factors make the tariff differences less important. Since the EC has been unable to meet its internal high-carbon ferrochromium needs, it has relied on foreign material more heavily, allowing substantial amounts of duty-free imports. Furthermore, it has been asserted that while a certain level of Japanese high-carbon ferrochromium production is maintained through government market intervention, some of the imported product enters duty free.

Section 202(c)(9)

Section 202(c)(9) directs that consideration be given to--

> the economic and social costs which would be incurred by taxpayers, communities, and workers, if import relief were or were not provided.

Since average employment in the industry amounted to only 350 persons during the first half of 1980, the overall effects on taxpayers, communities, and workers of failing to provide import relief would be relatively small. These effects would be felt predominately in the areas of Beverly, Ohio and Charleston, S.C., the only two locations where high-carbon ferrochromium is currently produced on a continuing basis.

It is possible that extended import relief in the form of a higher breakpoint price would reduce unemployment compensation and adjustment assistance payments and thus lessen the tax load on consumers in general while reducing the economic and social costs to the communities where high-carbon ferrochromium is produced. On the other hand, the higher costs to consumers of end products which embody high-carbon ferrochromium would tend to offset the benefits of import relief. At the same time, evidence suggests that the industry's recent problems are at least partly a result of the recent weakness in demand for stainless steel. Therefore, it is by no means certain that extended relief by itself would ensure continued employment for workers in the industry.

APPENDIX A

PRESIDENTIAL PROCLAMATION 4608

presidential documents

[3195-01-M]

Title 3—The President

Proclamation 4608 **November 15, 1978**

Temporary Duty Increase on the Importation Into the United States of Certain High-Carbon Ferrochromium

By the President of the United States of America

A Proclamation

1. Pursuant to section 201(d)(1) of the Trade Act of 1974 (the Trade Act) (19 U.S.C. 2251(d)(1)), the United States International Trade Commission (USITC) on September 5, 1978, reported to the President (USITC Report 201-35) the results of its investigation under section 201(b)(1) of the Trade Act (19 U.S.C. 2251(b)(1)). The USITC determined that ferrochromium, containing over 3 percent by weight of carbon, provided for in item 607.31 of the Tariff Schedules of the United States (TSUS) (19 U.S.C. 1202) is being imported into the United States in such increased quantities as to be a substantial cause of serious injury to the domestic industry producing an article like or directly competitive with the imported article. The USITC recommended the imposition of tariff increases on the column 1 rate of 30 percent ad valorem in the first year declining to 20 percent ad valorem in the fifth year of relief.

2. On November 2, 1978, pursuant to section 202(b)(1) of the Trade Act (19 U.S.C. 2252(b)(1)), and after taking into account the considerations specified in section 202(c) of the Trade Act (19 U.S.C. 2252(c)), I determined to remedy the injury found to exist by the USITC through the proclamation of a temporary duty increase different from that recommended by the USITC. In accordance with section 203(b)(1) of the Trade Act (19 U.S.C. 2253(b)(1)), I transmitted a report to the Congress setting forth my determination and intention to proclaim a temporary duty increase and stating the reasons why my decision differed from the action recommended by the USITC.

3. Section 203(e)(1) of the Trade Act (19 U.S.C. 2253(e)(1)) requires that import relief be proclaimed and take effect within 15 days after the import relief determination date.

4. Pursuant to section 203(a)(1) of the Trade Act (19 U.S.C. 2253(a)(1)), I am providing import relief through the temporary increase of import duty on ferrochromium, containing over 3 percent by weight of carbon, valued less than 38 cents per pound, as hereinafter proclaimed.

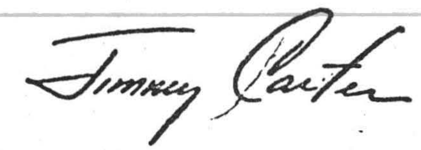
NOW, THEREFORE, I, JIMMY CARTER, President of the United States of America, acting under the authority vested in me by the Constitution and the statutes of the United States, including General Headnote 4 of the TSUS (19 U.S.C. 1202), sections 203 and 604 of the Trade Act (19 U.S.C. 2253 and 2483), and in accordance with Articles I and XIX of the General Agreement on Tariffs and Trade (GATT) (61 Stat. (pt. 5) A 12 and 61 Stat. (pt. 5) A 58: 8 UST (pt. 2) 1786), do proclaim that—

(1) Part I of Schedule XX to the GATT is modified to conform to the actions taken in the Annex to this proclamation.

(2) Subpart A, part 2 of the Appendix to the TSUS is modified as set forth in the Annex to this proclamation.

(3) This proclamation shall be effective as to those articles entered, or withdrawn from warehouse, for consumption on or after November 17, 1978, and before the close of November 16, 1981, unless the period of its effectiveness is earlier expressly modified or terminated.

IN WITNESS WHEREOF, I have hereunto set my hand this fifteenth day of November, in the year of our Lord nineteen hundred seventy-eight, and of the Independence of the United States of America the two hundred and third.



ANNEX

Subpart A, part 2 of the Appendix to the TSUS is modified by inserting in numerical sequence the following new provision:

Item	Articles	Rates of Duty 1	Rates of Duty 2	Effective Period
923.18	Ferrochromium, containing over 3 percent by weight of carbon, valued less than 38 cents per pound, provided for in item 607.31	4.625¢ per lb. on chromium content	4.625¢ per lb. on chromium content	On or before 11/15/81

[FR Doc. 78-32619 Filed 11-16-78; 10:25 am]

APPENDIX B

UNITED STATES INTERNATIONAL TRADE COMMISSION
NOTICE OF INVESTIGATION AND HEARING

[Investigation No. TA-203-8]

High-Carbon Ferrochromium; Investigation and Hearing

AGENCY: United States International Trade Commission.

ACTION: Upon its own motion and on the basis of a petition filed on May 15, 1981, on behalf of the Committee of Producers of High-Carbon Ferrochromium (CPHCF), the Commission on May 27, 1981, instituted investigation No. TA-203-8 under sections 203(i)(2) and 203(i)(3) of the Trade Act of 1974 (19 U.S.C. 2253 (i)(2) and (i)(3)) for the purpose of gathering information in order that it might advise the President of its judgment as to the probable economic effect on the industry concerned of the extension, reduction, or termination of import relief presently in effect with respect to ferrochromium, containing over 3 percent by weight of carbon, valued less than 38 cents per pound, provided for in item 606.24 (formerly item 607.31) of the Tariff Schedules of the United States (TSUS). Relief in the form of a temporary duty increase described in item 923.18 of the Appendix to the TSUS is provided against imports in Presidential Proclamation 4608 (issued November 15, 1978, 43 FR 53701). Import relief presently in effect with respect to such merchandise is scheduled to terminate at the close of business on November 15, 1981, unless extended by the President.

EFFECTIVE DATE: May 27, 1981.

FOR FURTHER INFORMATION CONTACT: Woodley Timberlake, Investigator, telephone (202-523-4618), U.S. International Trade Commission, Room 349, 701 E Street, NW., Washington, D.C. 20436.

SUPPLEMENTARY INFORMATION: *Public hearing ordered.* A public hearing in connection with this investigation will be held in Washington, D.C., at 10 a.m., e.d.t., on Wednesday, July 22, 1981, in the Hearing Room, U.S. International Trade Commission Building, 701 E Street, NW. Requests for appearances at the hearing should be received in writing by the Secretary to the Commission at his office in Washington no later than the close of business on Wednesday, July 1, 1981.

Prehearing procedures. To facilitate the hearing process, it is requested that persons wishing to appear at the hearing submit prehearing briefs enumerating and discussing the issues which they wish to raise at the hearing. Nineteen copies of such prehearing briefs should be submitted to the Secretary to the Commission no later than the close of business on Friday, July 10, 1981. Copies of prehearing briefs submitted will be made available for public inspection in the Office of the Secretary. While submission of prehearing briefs does not prohibit submission of prepared statements in accordance with section 201.12(d) of the Commission's *Rules of Practice and Procedure* (19 CFR 201.12(d)), it would be unnecessary to submit such a statement if a prehearing brief is submitted instead. Oral presentations should, to the extent possible, be limited to issues raised in the prehearing briefs.

A prehearing conference will be held on Thursday, July 2, 1981, at 10:00 a.m., e.d.t., in Room 117 of the U.S. International Trade Commission Building.

Persons not represented by counsel or public officials who have relevant matters to present may give testimony without regard to the suggested prehearing procedures outlined above.

Inspection of petition. The petition filed in this case is available for public inspection at the Office of the Secretary, U.S. International Trade Commission.

By order of the Commission.

Issued: May 28, 1981.

Kenneth R. Mason,

Secretary.

[FR Doc. 81-16568 Filed 6-2-81; 8:45 am]

BILLING CODE 7020-02-M

APPENDIX C

LIST OF WITNESSESS APPEARING AT THE COMMISSION'S HEARING

TENTATIVE CALENDAR OF PUBLIC HEARING

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

Subject : High-Carbon Ferrochromium

Inv. No. : TA-203-8

Date and time: July 22, 1981 - 10:00 a.m., e.d.t.

Sessions were held in the Hearing Room of the United States International Trade Commission, 701 E Street, N.W., in Washington.

In support of the petition:

Leva, Hawes, Symington, Martin & Oppenheimer--Counsel
Washington, D.C.
on behalf of

Committee of Producers of High Carbon Ferrochromium

Alfred D. Gate, Chairman, HCF Committee, & Vice President, Globe Metallurgical Division, Interlake, Inc.

Norris B. McFarlane, President, Macalloy Corporation

Jack Winterhaler, Executive Vice President, Macalloy Corporation

William R. Schneider, Vice President, Engineering, Macalloy Corporation

Ara Oztemel, Chairman of the Board, Satra Corporation

Thomas M. Lemberg)
Simon M. Kriesberg)--OF COUNSEL

In opposition to the petition:

Busby, Rehm and Leonard--Counsel
Washington, D.C.
on behalf of

The Ferro Alloy Producers' Association of South Africa

Pieter E. Streicher, Chairman

John C. Hall, Vice Chairman

John B. Rehm--OF COUNSEL

- more -

Union Carbide Corporation, New York, N. Y.

Richard L. Schult, Business Manager - Chromium

Charles F. Raeburn

Harris, Berg & Creskoff--Counsel
Washington, D.C.
on behalf of

Almet, Inc.

William E. Smith, Executive President

Stephen M. Creskoff)
Elizabeth Smith)--OF COUNSEL

Collier, Shannon, Rill & Scott--Counsel
Washington, D.C.
on behalf of

The Tool and Stainless Steel Industry Committee

H. O. Beaver, Chairman of the Board, Carpenter Technology Corporation

Economic Consulting Services, Washington, D.C.

Stanley Nehmer, President

Clark Chandler

David A. Hartquist)
Robert L. Meuser)--OF COUNSEL

APPENDIX D

DETERMINATION, FINDINGS, AND RECOMMENDATION
OF THE COMMISSION IN INVESTIGATION NO TA-201-35

DETERMINATION, FINDINGS, AND RECOMMENDATIONS OF THE COMMISSION

Determination

On the basis of its investigation, the Commission determines 1/ that ferrochromium, containing over 3 percent by weight of carbon, provided for in item 607.31 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 to the domestic industry producing an article like or directly competitive with the imported article.

Findings and Recommendations

Commissioners Moore, Bedell, and Minchew 2/ find and recommend that the imposition of rates of duty as follows, in addition to the existing column 1 rate of duty, is necessary to remedy the serious injury:

Ferrochromium, containing over 3 percent by weight of carbon, classifiable under item 607.31 of the TSUS:

1st year	2d year	3d year	4th year	5th year
30% ad val.	30% ad val.	25% ad val.	20% ad val.	20% ad val.

Commissioner Ablondi finds and recommends that the imposition of rates of duty as follows, in addition to the existing column 1 rate of duty, is necessary to remedy the serious injury:

Ferrochromium, containing over 3 percent by weight of carbon, classifiable under item 607.31 of the TSUS:

1st year	2d year	3d year
8% ad val.	8% ad val.	8% ad val.

1/ Vice Chairman Alberger and Commissioners Moore, Bedell, and Ablondi determine in the affirmative. Chairman Parker did not participate in this investigation and Commissioner Minchew did not participate in the vote on injury.

2/ Commissioner Minchew, noting that the Commission has made an affirmative determination, has made a recommendation of remedy.

Vice Chairman Alberger finds and recommends that the imposition of quotas 1/ as follows is necessary to remedy the serious injury (in short tons, chromium content):

	1978 2/	1979	1980	1981	1982
South Africa--------------:	35,150	35,150	36,908	38,754	40,692
All other countries-------:	59,850	59,850	62,842	65,984	69,283
Total-----------------:	95,000	95,000	99,750	104,738	109,975
Rhodesia 3/---------------:	27,550	27,550	28,928	30,375	31,894
All other countries 3/----:	32,300	32,300	33,914	35,609	37,389

Quotas are to be applied quarterly, both to prevent the flooding of the market and to allow Rhodesia's share to be reached in the "all other countries" category if the embargo is lifted. Quota levels are raised by 5 percent each year after 1979 in order to account for projected growth in U.S. high-carbon ferrochromium consumption, and yearend variances from quota levels are not to be carried forward into succeeding years (i.e., imports from South Africa in 1978 in excess of 35,150 tons would not be subtracted from that country's allocation for 1979).

1/ Quota levels were calculated on the basis of average annual imports during 1972-77. As South Africa and Rhodesia were the primary sources of imports during this period (accounting for well over 50 percent of total imports each year), only those countries are given specific allocations of the total quota. These allocations are based on average share of total imports accounted for by these countries during 1972-77.

2/ Quotas are to be retroactive to Jan. 1, 1978.

3/ The quota for Rhodesia is stand-by in nature, and is to be implemented in the event that the embargo currently in effect with regard to imports from that country is lifted. As long as the embargo remains in effect, Rhodesia's share of the quota is to be added to the "all other countries" category.

APPENDIX E

FERROCHROMIUM REGRESSION RESULTS

Ferrochromium Regression Results

Attempts were made to estimate U.S. high-carbon ferrochromium demand under the assumptions that it is influenced by its own price, the price of a substitute product, and by the level of stainless steel production. Movements in domestic demand were most successfully explained by the log-linear equation which is presented below;

$$\ln DCONST = \underset{(1.0654)}{10.4173} \underset{(.2059)}{-0.88316} \ln PR + \underset{(.10107)}{0.560905} \ln SSO$$

R^2=.93
DW=1.9733

The data used to estimate this equation were quarterly, commencing in 1974 and continuing through the second quarter in 1978. The dependent variable, apparent domestic consumption (DCONST), was regressed on a weighted average price of domestic and imported high-carbon ferrochromium (PR) and a stainless-steel-output variable (SSO). The numbers in parentheses below the coefficients are the respective standard errors.

The Cochrane-Orcutt iterative technique was employed to estimate this equation because the original equation, estimated using ordinary least squares (OLS) yielded a Durbin-Watson (DW) statistic of 0.7451. This presented strong evidence that autocorrelation existed, implying that the coefficients estimated using OLS were inefficient.

These results indicate that about 93 percent of the variation in domestic high-carbon ferrochromium consumption can be attributed to variations in the price of high-carbon ferrochromium and the level of stainless steel production. The coefficients on both the high-carbon ferrochromium price variable and the stainless-steel-output variable were significant at the 0.5 percent level and can be shown to represent their respective elasticities.

The coefficient on the price variable at -0.88 implies that a 1-percent rise in the price of high carbon ferrochromium leads to a 0.88-percent decline in the quantity consumed. The 95 percent confidence interval for this estimated coefficient ranges from -0.48 to -1.3.

The coefficient of 0.56 on the stainless-steel-output variable indicates that a 1-percent increase in stainless steel production leads to a concomitant increase of only 0.56 percent in high-carbon ferrochromium consumption. Since the demand for high-carbon ferrochromium is primarily derived from the level of stainless steel demand it seems more likely that a 1-percent rise in stainless steel production would be followed by a 1-percent rise in high-carbon ferrochromium consumption. The lower elasticity of 0.56 percent could be explained by the fact that an expansion of stainless steel production enlarges the supply of stainless steel scrap which can be substituted for high-carbon ferrochromium as a source of chromium in stainless steel production. It is therefore plausible that the percentage rise in high-carbon ferrochromium consumption may be less than the percentage rise in stainless steel output due to the greater availability of stainless steel scrap, which is a substitute for high-carbon ferrochromium.

The attempt to estimate high-carbon ferrochromium demand with the addition of a stainless steel-scrap-price variable (SP), again using the Cochrane-Orcutt iterative procedure and a log-linear equation, generated the following results;

$$\ln DCONST = 10.6654 - 0.857616 \ln PR + 0.594544 \ln SSO - 0.106599 \ln SP$$
$$(1.15714)\ (0.219666)\quad (0.134190)\quad (0.188705)$$

$R^2 = 0.93$
DW = 1.9953

This equation has a comparable R^2 and the coefficients estimated on the high-carbon ferrochromium price variable and on the stainless-steel-output variable very closely resemble those estimated when the scrap price variable was omitted. While one would expect the sign of the cross-price elasticity on a substitute good to be positive, the coeffient on the scrap price is negative, but not significant. This suggests that it is not a relevant explanatory variable.

Attempts to estimate demand equations for imported and domestically produced high-carbon ferrochromium proved less fruitful. None of the import-demand equations bear reporting, but the demand for domestically produced high-carbon ferrochromium (DSHIP) was estimated more satisfactorily.

$$\ln DSHIP = 3.82887 - 0.43446 \ln DP + 0.302602 \ln SSO + 1.26071 \ln SP$$
$$(1.74195)(0.284111)\quad (0.309858)\quad (.364291)$$

$R^2 = .82$
DW = 2.30

$$\ln DSHIP = 3.37373 - 0.548867 \ln DP + 0.295962 \ln SSO$$
$$(2.14068)(.413998)\quad (.320127)$$

$$+ 1.33303 \ln SP + .163709 \ln IP$$
$$(0.418823)\quad (0.418355)$$

$R^2 = 0.82$
DW = 2.29

A domestic shipments variable (DSHIP), a proxy for domestically produced high-carbon ferrochromium demand, was regressed on a domestic high-carbon ferrochromium price variable (DP), an imported high-carbon ferrochromium price variable (IP), a stainless-steel-output variable (SSO), and a stainless-steel-scrap price variable (SP). These results indicate that changes in the demand for domestically produced high-carbon ferrochromium are most heavily influenced by the variation in the stainless-steel-scrap price variable and that the relationship is positive. The coefficient on the stainless-steel-output variable is also positive, but not significant, and the addition of the import price variable barely increases the explanatory power of the equation. The coefficient estimated on the domestic high-carbon ferrochromium price variable in the equation not containing the import-price variable is negative and significant at the 10-percent level. When the equation was estimated without the stainless-steel-scrap price variable, the coefficient on the stainless-steel-output variable became significant at the 0.5 percent level. This suggests that multicollinearity exists between the stainless-steel-scrap price variable and the stainless-steel-output variable.

A more complete model of the ferrochromium market would encompass at least one additional equation explaining the supply of high-carbon ferrochromium and would estimate the equations simultaneously because it is not clear that the demand-only model is appropriate here. The assumption that supply is not responsive to changes in the price of high-carbon ferrochromium which underpins this demand-only specification should be explored to determine its veracity. Furthermore, the relationship between the price of stainless steel scrap and the level of stainless steel production should be quantified so that that information could be incorporated directly into the model. These efforts would enhance the credibility of the estimates.

Data Sources and Variables

The source of the domestic consumption and shipments data was the U.S. Bureau of Mines. The high-carbon ferrochromium price variable used in the consumption equations is a weighted-average price, weighted by the volume of imports and U.S. shipments, based on price information on the single largest sale given on U.S. International Trade Commission questionnaires. The domestic and import price variables represent a weighted price based on price and associated single-largest-sale information from responses to Commission questionnaires. The stainless-steel-scrap price variable is the "steel scrap, stainless bundles" price index from the U.S. Bureau of Labor Statistics. All prices used were deflated by the Producer Price Index. The stainless steel output variable represents domestic stainless steel output as computed from responses to Commission questionnaire.

APPENDIX F

THE EFFECT OF LOCATION ON THE U.S. INDUSTRY

The Effect of Location on the U.S. Industry

This appendix estimates the locational disadvantage of the domestic high-carbon ferrochromium industry relative to the South African industry. 1/ The South Africans are located near considerable reserves of chromium ore, a critical raw material input, while chromium ore is not mined in commercial quantities in the United States. Their greater proximity to this raw material gives the South Afican producers a cost advantage relative to the domestic producers. This advantage will be offset to some degree by the South African producers' need to ship their finished product over longer distances. 2/

Determining the effect of location on the relative competitiveness of South African and U.S. producers requires estimating the differences between the South African and domestic producers' costs of obtaining ore and transporting ferrochromium. These differences are then compared with the average c.i.f. value of imported high-carbon ferrochromium to measure their significance.

The South African ore cost advantage

International transportation costs.--The cost of transporting chromium ore to the United States from South Africa is substantial. Three estimates of these costs are currently available. Executives of * * * estimate that it costs * * * per metric ton to ship ore from South Africa to Louisiana. Mr. Bob Goldman, of the Federal Maritime Commission, estimates that it costs * * * per metric ton to ship ore from South Africa to the United States and data compiled by the U.S. Bureau of the Census indicate that in January-May 1981, the average cost of shipping a metric ton of chromium ore from South Africa to the United States was $21.87. Thus, the evidence indicates that it costs from $21.87 to $30 to ship a metric ton of chromium ore from South Africa to the United States.

Intranational transportation costs.--The cost of transportation between countries is only part of the U.S. producers' cost of transporting ore. The cost of moving ore from the mine to the South African port of export and from the U.S. port of entry to the domestic producers' plants may also be quite important.

* * * executives estimate that it costs their firm $25 per metric ton to ship ore from the mine to the port in South Africa. Other producers' costs of shipping ore within South Africa are unknown.

1/ Data used for analysis are principally official statistics of the U.S. Department of Commerce.

2/ The only cost differences between South African and U.S. producers considered in this appendix are differences in the cost of ore and of transporting ferrochromium.

The South African producers may also incur a cost to transport ore from the mine to their plants. Two of the five South African producers are located next to chromium mines, so for them this cost is minimal. The other three producers are within 100 miles of a chromium mine. It costs $7.39 per metric ton to ship ore 100 miles within South Africa. 1/

The cost of transporting ore within the United States varies among the domestic producers. This cost is minimal for the producer in Charleston, S.C., who takes ore directly from ocean going vessels. However, the producers in Ohio and Tennessee incur substantial costs to transport ore within the United States. Ore bound for these producers is often unloaded in New Orleans, and barged up river to their plants. 2/ Table F-1 shows transportation rates for barge and truck shipping of chromium ore from New Orleans to the plant location of each of the four U.S. producers of ferrochromium.

Table F-1.--Transportation rates for chromium ore shipments, 1981

(Per metric ton)

Origin	Destination	Rate
New Orleans, La.	Marietta, Ohio	$8.78
Do.	Beverly, Ohio	20.62
Do.	Steubenville, Ohio	9.39
Do.	Woodstock, Tenn.	9.29

Source: The General Services Administration (GSA). Valley Barge Lines, a major Mississippi River barge operator, provided the barge rates to GSA. Rates to Beverly and Woodstock include the costs of unloading the ore at a river port and trucking it to its final destination.

Other ore cost differences.--The data in table F-2 show that the average c.i.f. value of U.S. imports of South African ore in January-May 1981 is lower than the average c.i.f. value of ore from all sources. 3/ U.S. producers probably pay less for South African ore than ore from other sources because South African mining costs are low. The average f.a.s. value of all U.S. ore imports is 24.3 percent higher than the f.a.s. value of imports from

1/ This figure was determined using the current South African railway rates, and assuming an exchange rate of $1.07 to the rand.

2/ In 1980, 56.5 percent of U.S. imports of chromium ore entered through Charleston and New Orleans. Chromium ore was also shipped to other east coast ports and moved to the plants by rail. Comprehensive data on rail rates on ore are not available, however this method of transporting ore is almost certainly more expensive than barge travel up the Mississippi.

3/ During this period, 63.0 percent of U.S. imports of chromium ore came from South Africa.

South Africa. 1/ These data indicate that the cost of producing ore in South Africa is lower than the cost of producing ore in other countries.

Some domestic producers contend that ore from other countries is cheaper because of lower mining costs and lower transportation costs than South Africa. 2/ However, the available data do not support this contention. The data in table F-2 indicate that South African producers have an ore cost advantage not only because of the cost of transporting South African ore to the United States, but also because U.S. producers buy some of their ore from sources that are more expensive than South Africa.

Table F-2.--Chromium ore: Average c.i.f. value of U.S. imports, January-May 1981

(Per long ton, chromium content)

Chromium content 1/	From South Africa	From all countries
Not over 40 percent	$171.83	$259.81
Over 40 percent but less than 46 percent	165.81	167.79
Not less than 46 percent	179.66	203.48
Average, all ore	169.43	207.97

1/ The 3 categories of ore that this table uses are the categories given in the Tariff Schedule of the United States Annotated.

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

1/ This figure is based on the average value of all ore imported during the first 5 months of 1981 measured in dollars per ton of contained chromium. The f.a.s. value of imports is their value alongside the carrier in the foreign port of exportation.

This differential in f.a.s. values is consistent with the testimony of Pieter S. Streicher, Managing Director of S.A. Manganese Amcor, Ltd., a South African ore and ferrochromium producer. Mr. Streicher testified that South African chromium ore is easily mined (transcript of the hearing, pp. 149 and 150).

2/ An executive of Macalloy, one of the domestic producers, testified that his firm could get a better price for ore and lower transportation costs by buying ore from countries other than South Africa. See the testimony of Mr. Jack Winterthaler, Executive Vice President of Macalloy Corp, transcript of the hearing, p. 35.

To estimate the South Africans' total ore cost advantage, table F-3 compares the f.a.s. value of U.S. imports of ore in South Africa with the average c.i.f. value of all U.S. imports of ore. C.i.f. value represents the cost of U.S. imports; the f.a.s. value of U.S. imports from South Africa represents the cost of ore in that country. 1/ The f.a.s. value of imports includes the cost of transportation to the port of export and the c.i.f. value excludes the cost of inland transportation from the U.S. port of entry. Therefore, this comparison includes the effects of international transportation costs but excludes the effects of intranational transportation costs. The data in table F-3 indicate that ore costs to the U.S. industry are 74.7 percent higher than ore costs to the South African industry.

Table F-3.--Chromium ore: Average f.a.s. value of U.S. imports from South Africa and c.i.f. value of total imports, January-May 1981

(Per long ton, chromium content)

Chromium content	From South Africa 1/	From all countries 2/	U.S. disadvantage
			Percent
Not over 40 percent	$99.59	$259.81	160.9
Over 40 percent but than 46 percent	121.69	167.79	37.9
Not less than 46 percent	124.05	203.48	64.0
Average	119.05	207.97	74.7

1/ F.a.s. value.
2/ C.i.f. value.

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

As can be seen in table F-4, the South Africans' ore cost advantage is not a short-lived phenomenon as the South Africans have consistently had such an advantage in recent years.

1/ The f.a.s. value of South African ore exports is an imperfect measure of the South African ferrochromium industry's cost of ore. Market imperfections could result in foreign purchasers paying a different price for ore than domestic purchasers. Since several major South African ferrochromium producers mine ore, it is unlikely that the price of their ore exports to the United States is lower than their own cost of obtaining ore. Therefore, if the price of exports to the United States is different from the price of ore to South African producers, these data will underestimate the South Africans' advantage.

Table F-4.--Chromium ore: Average f.a.s. value of U.S. imports from South Africa and c.i.f. value of total imports, 1976-80

(Per long ton, chromium content)

Year	From South Africa 1/	From all countries 2/	U.S. disadvantage
			Percent
1976	$81.74	$175.94	115.2
1977	97.66	173.25	77.9
1978	106.20	154.77	45.7
1979	116.27	180.98	55.7
1980	119.77	200.01	67.0

1/ F.a.s. value.
2/ C.i.f. value.

Source: Compiled from official statistics of the U.S. Department of Commerce except for 1978. Because of an apparent error in the Commerce data for 1978, data from the U.S. Bureau of Mines, Mineral Yearbook 1978 (Washington, D.C., 1979), were used for f.a.s. values and quantities. C.i.f. values were found by adding Commerce data on transportation charges to the f.a.s. value.

The cost of transporting high-carbon ferrochromium

The South African producers' ore cost advantage is partially offset by their cost of shipping high-carbon ferrochromium to the United States. This cost can also be estimated.

International transportation costs.--The U.S. Bureau of the Census also collects data on the cost of shipping high-carbon ferrochromium from the port of export in South Africa to the port of entry in the United States. An analysis of these data indicates that in January-May 1981, the average cost of shipping a metric ton of high-carbon ferrochromium from South Africa to the United States was $30.63.

Intranational transportation costs.--Data on the cost of transporting hgh-carbon ferrochromium within South Africa are not available. These costs depend on the distance travelled and so will vary depending on the locations of the plant and port involved in the movement.

It is possible, however, to compare the costs of transporting ore and high-carbon ferrochromium within South Africa. The $25 per metric ton estimate of * * * cost of shipping ore within South Africa indicates a length of haul of from * * * to * * * kilometers. 1/ A comparison of the rate schedules for chromium ore and high-carbon ferrochromium indicates that the rate on ore shipments is higher if the distance travelled is from 230 to 2,350 kilometers. For longer or shorter hauls it costs more to ship a ton of high-carbon ferrochromium than to ship a ton of ore. Thus, over distances similar to the distance between * * * ore source and the port of exportation it is more expensive to ship ore than high-carbon ferrochromium.

The cost of shipping high-carbon ferrochromium from the U.S. port of entry to the purchaser depends on the purchaser's location. Thus, these costs are likely to be different for each individual purchaser. Data on these costs are not available; however, the transportation costs incurred in moving high-carbon ferrochromium to locations in the United States that are comparable to the locations of domestic producers can be estimated.

The two major ports of entry for high-carbon ferrochromium are Baltimore and New Orleans. In 1980, 17.6 percent of imports passed through Baltimore and 67.3 percent passed through New Orleans. 2/ One domestic high-carbon ferrochromium producer is located near the port of Charleston, S.C. It is doubtful that the producer in Charleston is in a better location relative to high-carbon ferrochromium purchasers than are the ports of entry. In fact, Baltimore is likely to be more advantageously located than Charleston since Baltimore is closer to the Midwest, where most of this country's steel is produced. Therefore, in comparing the South African producers' costs with those of the producer in Charleston, it is not necessary to add additional costs for transporting high-carbon ferrochromium within the United States.

A large amount of imported high-carbon ferrochromium moves by barge from New Orleans to a central warehouse in East Liverpool, Ohio. The location of this warehouse seems to be as advantageous as the location of the four producers in the interior United States. The cost of shipping high-carbon ferrochromium from New Orleans to East Liverpool is $9.39 per metric ton. 3/

1/ The uncertainty concerning the length of haul arises because the estimate of * * * costs is in U.S. dollars, whereas the South African rail rates are in rands. It is not known what exchange rate * * * used in determining its costs. In the last 5 months, the rand's value declined from $1.25 to $1.07. Using a $1.25 exchange rate, their estimate of transportation costs corresponds with a length of haul of * * * kilometers. The $1.07 exchange rate leads to an estimated length of haul of * * * kilometers.

2/ These figures are based on Commerce data for imports of high-carbon ferrochromium measured in terms of pounds of contained chrome.

3/ The GSA determined this rate; it is based on information provided by Valley Barge Line. Some high-carbon ferrochromium is shipped by barge from New Orleans to Pittsburgh. The GSA found that the rate for these shipments is also $9.39. The locations of the interior domestic producers are given in table F-1.

Determining the South Africans' net advantage

The South Africans' net cost advantage is determined by subtracting their transportation costs per unit of high-carbon ferrochromium from their ore cost savings per unit of ferrochromium. This calculation requires converting the ore cost savings to a per-unit-of-ferrochromium basis. This conversion can be done using the ore-ferrochromium ratio (the amount of ore that must be used to make a unit of high-carbon ferrochromium). The South Africans' cost savings per unit of high-carbon ferrochromium will equal this ratio multiplied by their cost savings per unit of ore. The available evidence indicates that this ratio is between 2.2 and 2.5. 1/

Tables F-5 and F-6 summarize the determination of South Africa's cost advantage. Table F-5 assumes the minimum value of the ore/ferrochromium ratio (2.2:1) and table F-6 assumes the maximum ratio (2.5:1). These tables estimate the four components of the South African advantage.

Multiplying the estimates of the cost of transporting ore from South Africa to the United States by the ore-ferrochromium ratio yields an estimate of the cost of transporting the ore needed to make one long ton of high-carbon ferrochromium . Subtracting the cost of transporting a long ton of high-carbon ferrochromium from this figure yields an estimate of the South Africans' international transportation cost advantage.

Additional ore costs represent that part of the difference between the value of ore in South Africa and in the United States that cannot be attributed to the cost of transportation. Table F-3 shows that ore in the United States, on average, costs $88.92 more per long ton of chromium content. On average, 2.3 tons of ore contain 1 ton of chrome, 2/ so the extra cost is $38.66 per long ton or $38.35 per metric ton. Subtracting the cost of transporting ore from South Africa to the United States yields the additional ore costs paid by the domestic producers.

The cost of moving a ton of ore within South Africa is taken to be zero for the South African producers and $25 for the U.S. producers. The cost of moving a ton of high-carbon ferrochromium to the port of export is unknown, so it was assumed to be equal to the cost of moving a ton of ore. As was discussed earlier, this procedure is likely to overestimate the cost of shipping high-carbon ferrochromium.

The costs of transportation within the United States are only relevant when comparing the costs of the four producers in the interior of the United States with those of South African producers. The lowest barge rate from New

---

1/ A representative of * * * estimates that that firm must use from 2.2 to 2.4 tons of ore to make one ton of high-carbon ferrochromium. This ratio does not vary greatly with the type of ore used. An earlier Commission report stated that it takes approximately 2.5 tons of ore to make one ton of high-carbon ferrochromium. (See High-Carbon Ferrochromium, Sept. 1978, p. A-10.)

2/ This figure is the ratio of gross tons to contained tons of chromium for imports of ore from South Africa in the first five months of 1981.

Table F-5.--High-carbon ferrochromium: U.S. and South African producers' estimated costs using an ore-ferrochromium ratio of 2.2 to 1, January-May 1981

(Per metric ton)

Item	U.S. producers' cost	South African producers' cost	South African advantage	Advantage as a percent of cost
				Percent
International transportation	$48.11-66.00	$30.63	$17.48-35.37	3.3-6.7
Additional ore costs	18.37-36.26	0	18.37-36.26	3.5-6.8
Subtotal	84.37	30.63	53.24	10.1
Transportation in South Africa	55.00	25.00	30.00	5.7
Subtotal	139.37	55.63	83.74	15.8
Transportation in the United States	19.32	9.39	9.93	1.9
Total	158.69	65.02	93.67	17.7

Source: Compiled from estimates discussed earlier in this appendix.

Table F-6.--High-carbon ferrochromium: U.S. and South African producers' estimated costs using an ore-ferrochromium ratio of 2.5 to 1, January-May 1981

(Per metric ton)

Item	U.S. producers' cost	South African producers' cost	South African advantage	Advantage as a percent of cost
				Percent
International transportation	$54.68-75.00	$30.63	$24.05-44.37	4.5-8.4
Additional ore costs	20.88-41.20	0	20.88-41.20	3.9-7.8
Subtotal	95.88	30.63	65.25	12.3
Transportation in South Africa	62.50	25.00	37.50	7.1
Subtotal	158.38	55.63	102.75	19.4
Transportation in the United States	21.95	9.39	12.56	2.4
Total	180.33	65.02	115.31	21.8

Source: Compiled from estimates discussed earlier in this appendix.

Orleans to a domestic producer's plant is the basis for the estimate of the U.S. producers' transportation cost. The South African producers' cost is the barge rate for moving a long ton of high-carbon ferrochromium from New Orleans to East Liverpool, Ohio.

Tables F-5 and F-6 express the South African cost advantage both in value terms and as a percent of the cost (c.i.f. value) of imported high-carbon ferrochromium. 1/ The South Africans have a cost advantage over the interior domestic producers of from $93.67 to $115.31 per metric ton, or from 17.7 percent to 21.8 percent of the cost of imported high-carbon ferrochromium. The South African's have an advantage over the producer in South Carolina of from $83.74 to $102.75 per metric ton, or from 15.8 percent to 19.4 percent of the cost of imported high-carbon ferrochromium.

When converted to cents per pound, chromium content, the South Africans have a cost advantage over the interior domestic producers of 7.7 to 9.5 cents and an advantage over Macalloy of 6.9 to 8.5 cents.

1/ The cost of imported high-carbon ferrochromium is represented by the average c.i.f. value of the high-carbon ferrochromium imported in January-May 1981--$530.07 per metric ton.

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

OFFICIAL BUSINESS

ADDRESS CORRECTION REQUESTED

Postage And Fees Paid
U.S. International Trade Commission

U.S. MAIL

ADDRESS CHANGE

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