

UNITED STATES TARIFF COMMISSION

FLUORSPAR

**Report to the Congress on Investigation No. 332-29
(Supplemental 2) Under Section 332 of the Tariff
Act of 1930 Made Pursuant to Senate Resolution 206,
87th Congress, Adopted September 23, 1961**



TC Publication 56

**Washington
May 1962**

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Introduction

This report is made pursuant to Senate Resolution 206, 87th Congress, adopted on September 23, 1961. The Tariff Commission was directed to bring up to date its previous section 332 reports on the domestic fluorspar industry. ^{1/} A copy of the resolution appears in appendix A. On October 5, 1961, the U.S. Tariff Commission instituted an investigation and set January 30, 1962, as the date for a public hearing. A copy of the notice was posted at the office of the Commission in Washington, D.C., and at its office in New York City, and published in the Federal Register (26 F.R. 9610) and in the October 12, 1961, issue of Treasury Decisions. The public hearing in this investigation was held on January 30, 1962, and all interested parties were given opportunity to be present, to produce evidence and to be heard.

In addition to the information obtained at the public hearing, the Commission used data from its files, from other official Government sources, from fieldwork, and from responses to questionnaires sent by the Commission to concerns producing, importing, and consuming fluorspar.

^{1/} U.S. Tariff Commission, Fluorspar: Report on Investigation Conducted Pursuant to Resolution by the Committee on Finance of the United States Senate Dated August 14, 1954, 1955 (processed).
U.S. Tariff Commission, Fluorspar: Report to the Congress on Investigation No. 332-29 (Supplemental) Under Section 332 of the Tariff Act of 1930 Made Pursuant to Senate Resolution 163, 86th Congress, Adopted August 21, 1959, 1960 (processed).

Actions with Regard to Domestic Fluorspar
Producers, 1953-60

The domestic fluorspar industry consists of two segments: the merchant, or independent, producers and the "captive" producers. The latter segment consists of mines and mills producing fluorspar for use of their parent concerns. During the past 8 years the independent producers have endeavored to obtain Government subsidies or additional restrictions on imports of fluorspar. The principal actions in this direction are summarized below:

On October 20, 1953, Ozark-Mahoning Co. and certain other domestic producers applied for an escape-clause investigation of fluorspar--later amending the application to cover only the acid grade--under section 7 of the Trade Agreements Extension Act of 1951, as amended. ^{1/} On October 29, 1953, the Tariff Commission instituted the investigation; on November 23, 1953, however, upon request by the applicants, the Commission dismissed the investigation.

On August 14, 1954, in response to complaints of economic distress by the industry, the Senate Finance Committee directed the Tariff Commission to make a thorough study under section 332 of all factors bearing on the domestic fluorspar situation. A report was submitted to that committee on June 6, 1955, and a supplemental statement was issued by the Commission on July 22, 1955. The supplemental statement was prepared

^{1/} The tariff treatment of imports of fluorspar containing not more than 97 percent of calcium fluoride (commonly called "metallurgical grade" fluorspar) is not the subject of a trade-agreement concession and therefore imports of such fluorspar cannot be the subject of an escape-clause investigation.

in response to a letter from the chairman of the Committee on Finance of the U.S. Senate.

On July 29, 1955, the Senate Finance Committee directed the Commission to make an escape-clause investigation of acid grade fluorspar. The Commission's report was submitted to the President on January 18, 1956. Three Commissioners found that the industry was not being seriously injured by imports at the reduced rate but was being threatened with serious injury. The other three Commissioners found that there was neither current serious injury nor the threat of serious injury. In a letter of March 20, 1956, the President accepted the finding of the latter group.

On May 26, 1958, legislation which had the approval of the Department of the Interior was introduced as Senate bill 3892 (85th Cong., 2d sess.). The bill, if enacted, would have provided for subsidizing the production of five minerals, including acid grade fluorspar; a number of fluorspar quota bills introduced earlier in the session were bypassed in committee pending action on the subsidy bill. Late in the session the revised subsidy bill (S. 4036) passed in the Senate but was defeated in the House.

On September 23, 1958, the Commission received an application from the Independent Domestic Fluorspar Producers Association for an escape-clause investigation of acid grade fluorspar. This application was rejected on the grounds that it was premature. In a letter dated

October 14, 1958, notifying the applicants of its decision, the Commission pointed out that the President on March 20, 1956, accepted the Commission's finding of no serious injury or threat thereof in its previous escape-clause investigation, and that a reasonable period had not elapsed since the President's action in which to determine whether conditions in the industry had changed sufficiently to warrant another investigation.

On October 29, 1958, the Independent Domestic Fluorspar Producers Association and others petitioned the Director of the Office of Civil and Defense Mobilization (OCDM) for an investigation under the provisions of section 8 of the Trade Agreements Extension Act of 1958. On September 25, 1959, the OCDM announced its conclusion "that imports of fluorspar are not threatening to impair the national security," and that "For U.S. defense purposes, it appears that the basic principle to be followed with regard to fluorspar is to prevent any substantial hindrance to imports of good quality fluorspar from any readily accessible source."

On April 7, 10, 13, and 14, 1959, a subcommittee of the Senate Committee on Interior and Insular Affairs held hearings on a bill (S. 1285, 86th Cong., 1st sess.) to place quotas on imports of all grades of fluorspar. This bill was referred to the Senate Finance Committee, which took no action thereon but reported a resolution calling for a section 332 investigation by the Tariff Commission.

On August 21, 1959, the Senate adopted Senate Resolution 163 (86th Cong.) directing the Commission to make a further investigation along the lines of the one made in response to a resolution of the Senate Committee on Finance, dated August 14, 1954, and to submit a supplemental report to the Congress on or before February 29, 1960. Senate Resolution 163 also directed the Commission to include specific findings---

with regard to the current condition of the fluorspar mining industry and as to what additional import restrictions, if any (by way of increased duties or import quotas, or both), need to be imposed upon articles dutiable under paragraph 207 of the Tariff Act of 1930 in order that fluorspar mining operations in the United States may be conducted on a sound and stable basis. The Commission shall also determine what action, if any, should be taken to correct the disparity in the existing rates of duty.

The Commission's report, submitted on February 29, 1960, described the U.S. fluorspar industry, foreign trade, prices, and patterns of distribution, and the industry and trade of principal producing countries. However, three of the five commissioners participating took the position that it would be an extralegal act for the Commission to make recommendations to the Congress regarding the need for import restrictions or for action to correct the disparity in the existing rates of duty, and accordingly the majority did not make such recommendations. The other two Commissioners took the position that it was incumbent upon them to presume that the Senate acted in accordance with the law; they held that additional import restrictions on either or both

tariff classes of fluorspar would not contribute to the soundness and stability of domestic fluorspar mining operations. ^{1/}

Description and Uses

Description

Fluorspar, or fluorite, is a moderately hard, transparent or translucent mineral, which varies in color from pure white through pink and yellow to deep purple. It is the principal source of calcium fluoride (CaF_2), which consists of 48.9 percent fluorine and 51.1 percent calcium. Although the term "fluorspar" applies more particularly to market grades of fluorspar, which are usually obtained only after beneficiation processes, it is also used in the trade to designate the crude ore from which the market grades of fluorspar are derived. ^{2/}

The mineral fluorspar occurs mostly in veins and replacement beds, and the deposits vary widely in their content of calcium fluoride and impurities. In some deposits the crude fluorspar is sufficiently high in calcium fluoride and low in impurities to permit the ore to be marketed without processing, except for simple washing and crushing

^{1/} Presumably in recognition of the majority position in the Commission's report in response to S. Res. 163, S. Res. 206 does not contain a request for findings regarding the need for additional import restrictions. In its report on S. Res. 206, the Senate Finance Committee emphasized that "The resolution is one which requires the Tariff Commission to furnish general information to the Congress and it does not require any recommendations as to changes in dutiable status." (S.Rept. No. 1103, 87th Cong., 1st sess.).

^{2/} Unless otherwise qualified, the term "fluorspar" as used hereafter in this report refers to finished fluorspar, i.e., fluorspar which has been so beneficiated as to be in a condition for use by the consumer without further refinement.

operations. Most crude fluorspar mined in the United States, however, must be milled to separate the mineral fluorspar from the impurities and other minerals with which it is associated. Among the minerals commonly found in fluorspar ores are calcite, quartz, barite, galena, and sphalerite.

The milling methods used to beneficiate fluorspar ores have changed greatly since 1930, when separation of fluorspar from other components of the crude ores was done by hand sorting, log washing, or wet milling with jigs and tables to effect gravity separation from the gangue (various other minerals and impurities). With the introduction of selective froth flotation in 1929 and with the development of the heavy-media, or sink-float, process in the middle 1940's, the technology for beneficiating fluorspar ores was greatly improved. These advances made possible the recovery of a much larger percentage of calcium fluoride from crude ores than was achieved formerly, more effective technical control in the output of market grades, and the utilization of certain ores which were formerly considered too low grade to mine. Most mills producing acid grade fluorspar now use both heavy-media and froth flotation concentration methods in their operations. Jigs and tables continue to be used, especially where the ore mined is high in grade, and in Mexico hand sorting is used in the production of acid lump and metallurgical gravel products.

Most finished fluorspar is marketed in three broad classifications-- acid, metallurgical, and ceramic--on the basis of (1) the calcium fluoride content, (2) the content of other materials, and (3) the physical form of the fluorspar (whether in lumps or fine particles). There are no uniform standards which apply to these market classifications since a variety of specifications are established by different users of a given grade of fluorspar. However, the general characteristics of the major market grades are indicated by the specifications established by individual consumers. Consumers' specifications for the purchase of acid grade fluorspar usually provide for a minimum content of 97 percent calcium fluoride and a maximum content of 1 percent silica, although some consumers prefer material with a minimum content of 98 percent calcium fluoride. The calcium fluoride content of ceramic grade fluorspar ordinarily ranges between 88 percent and 95 percent with a maximum silica content of $2\frac{1}{2}$ percent, but some consumers use a fluorspar for ceramic purposes that contains more than 97 percent calcium fluoride.

There are no prescribed minimum limits on the actual calcium fluoride content or maximum limits on the actual silica content of metallurgical grade fluorspar. Metallurgical fluorspar is graded on the basis of its "effective calcium fluoride content," which is determined by subtracting from the percentage of gross calcium fluoride content

a percentage which is equal to $2\frac{1}{2}$ times the percentage of silica content. ^{1/} Before 1940 most domestic consumers of metallurgical grade fluorspar required material with a minimum effective calcium fluoride content of 70 percent. During World War II, fluorspar with a minimum effective calcium fluoride content of about 60 percent was widely used, and material of this grade represented the bulk of the supplies available to domestic consumers from the early war years until about 1952. However, most if not all major steel companies now specify a minimum effective calcium fluoride content of either 70 or 72.5 percent, though some smaller users still purchase fluorspar with a minimum effective calcium fluoride content of only 60 percent. There are also commonly accepted requirements regarding the size of particles for the various grades. Ceramic and acid grades of fluorspar are usually marketed in finely ground form. ^{2/} Metallurgical grade fluorspar, on the other hand, almost always is marketed in either gravel (including fine particles pelletized to gravel size) or lump form to impart desired fluxing properties in metallurgy. ^{3/} Owing to these requirements

^{1/} Thus, fluorspar with a calcium fluoride content of 85 percent and a silica content of 5 percent is graded as metallurgical fluorspar with an effective calcium fluoride content of 85 minus 12.5 ($2\frac{1}{2}$ times 5), or 72.5 percent. This calculation is designed to take into account the extent to which the presence of the silica diminishes the effectiveness of the calcium fluoride in the use of fluorspar as a furnace flux. The formula assumes that each unit of silica which is present offsets $2\frac{1}{2}$ units of calcium fluoride in determining the effectiveness of the fluorspar for metallurgical purposes.

^{2/} Some high-grade acid fluorspar is also marketed in lump form, but such material is ground or otherwise processed when used by consumers.

^{3/} A small quantity of high-purity fluorspar in ground form is also used in metallurgy (e.g., in electric furnaces).

with regard to particle size, the number of fluorspar deposits and the kinds of milling processes that can be used in the production of metallurgical fluorspar are more restricted than those that can be used for the production of acid or ceramic fluorspar. Some fluorspar deposits cannot be beneficiated economically without the use of selective froth flotation, which involves grinding the ore finer than gravel size. Thus, although specifications for metallurgical fluorspar permit a lower calcium fluoride content and a higher silica content than those for acid or ceramic fluorspar, it has not been possible to produce satisfactory metallurgical grade gravel or lump fluorspar from some ores that can be used in the production of acid or ceramic fluorspar. ^{1/}

On the other hand, almost all fluorspar ores suitable for the production of metallurgical fluorspar can also be processed into the acid and ceramic grades of fluorspar.

Uses

Acid grade fluorspar is the basic raw material used in the production of hydrofluoric acid. Hydrofluoric acid is used for making uranium hexafluoride, as an alkylation catalyst in the production of high-octane gasoline, and in the manufacture of fluorinated hydrocarbons; the latter, in turn, are used in refrigeration and air conditioning, as gaseous propellants for aerosol packaging, and in the production of

^{1/} The quantity of acid grade concentrates being formed into bricks or large briquettes and used for metallurgical purposes has been increasing rapidly in recent years.

heat-resistant plastics. Hydrofluoric acid is also used in the manufacture of many different fluoride compounds, including sodium fluoride, sodium bifluoride, and aluminum fluoride. The last named is utilized in the manufacture of the fused salt electrolyte (synthetic cryolite) used in the electrolytic production of aluminum metal. Hydrofluoric acid is also used for etching glass and pickling stainless steels, and in the manufacture of elemental fluorine. The use of fluorine as an oxidizing agent in propellants for rockets and missiles has been undergoing extensive development; it is believed that this end use for fluorspar has not yet reached its full potential. Producers of hydrofluoric acid expect continued moderate increases in the industrial use of that product--perhaps more or less offset for a time by declining Government requirements for hydrofluoric acid.

Acid grade fluorspar in powder form is added to the electrolyte in aluminum electrolytic cells. It is also used as a flux in the production of electric furnace steel, ferroalloys, magnesium metal, and welding-rod coating compositions.

Ceramic grade fluorspar is used mainly in the manufacture of opaque glass and in vitreous enamels for coating household metal articles and appliances, such as refrigerators and stoves. The lower grades of ceramic fluorspar are finding increasing use in the manufacture of fiber glass and disposable glass containers.

Metallurgical grade fluorspar is used principally as a fluxing agent in steel furnaces (chiefly in the basic open-hearth furnace) to thin the slag and facilitate passage of the impurities from the molten metal into the slag. In basic open-hearth furnaces about $4\frac{1}{2}$ pounds of fluorspar is required per ton of steel processed. However, it has been reported that the consumption of fluorspar is considerably lower in the newer oxygen steelmaking furnaces than in basic open-hearth furnaces.

Fluorspar ore containing 40 to 50 percent of calcium fluoride is being used as a mineralizer and for reducing the alkali content in portland cement, particularly in high-early-strength and low-heat cements. Gangue minerals in this fluorspar ore are not deleterious in cement raw mixes.

From the standpoint of cost there is no satisfactory substitute for fluorspar in its metallurgical applications or as a raw material for the production of hydrofluoric acid; fluorine compounds obtained as byproducts in the processing of phosphate rock, however, have been so used but only to a minor extent. In the glass and ceramic industries several materials could be used for the same purposes as fluorspar, but they are considerably more expensive.

Tariff History

The Tariff Act of 1922 provided for one rate of duty, \$5.60 per long ton, applicable to all grades of fluorspar. In 1928 the duty on fluorspar containing not more than 93 percent of calcium fluoride was raised to \$8.40 per long ton pursuant to the Commission's recommendation to the President under section 315 of the Tariff Act of 1922. These rates of duty (\$5.60 and \$8.40 per long ton) were retained in the Tariff Act of 1930, but the dividing point between these two classifications was changed from 93 percent of calcium fluoride to 97 percent.

The rate of duty on fluorspar containing more than 97 percent of calcium fluoride (acid grade) was reduced on January 1, 1939, from the statutory rate of \$5.60 per long ton to \$4.20 per long ton pursuant to a bilateral trade agreement with the United Kingdom, and on January 30, 1943, the reduced rate was bound against increase pursuant to a trade agreement with Mexico. The agreement with the United Kingdom was suspended on January 1, 1948, when that country acceded to the General Agreement on Tariffs and Trade, and the agreement with Mexico was terminated January 1, 1951; on the latter date, therefore, the rate of duty on fluorspar containing more than 97 percent of calcium fluoride reverted to the statutory rate of \$5.60 per long ton. Effective June 6, 1951, however, the rate of duty on this grade of fluorspar was reduced to \$2.10 per long ton pursuant to the General Agreement on

Tariffs and Trade (Torquay), and that rate still remains in effect (table 1, in appendix B).

The rate of duty on fluorspar containing not more than 97 percent of calcium fluoride (metallurgical grade) was reduced on January 30, 1943, from the statutory rate of \$8.40 per long ton to \$6.30 per long ton pursuant to the trade agreement with Mexico. On January 1, 1951, as a result of the termination of the agreement with Mexico, the duty reverted to the statutory rate of \$8.40 per long ton; that rate is now in effect and is not now the subject of a trade-agreement tariff concession.

Since 1954 the average ad valorem equivalent of the specific rate of duty on acid grade fluorspar has varied only slightly from year to year (between 6.1 and 6.7 percent) because prices have been fairly stable and the rate of duty has not been changed. The average ad valorem equivalent of the specific rate of duty on metallurgical fluorspar, however, declined from 56.0 percent in 1955 to 37.9 percent in 1961 (table 2) because of the increasing unit value of imports during that interval.

U.S. Consumption 1/

Total consumption of fluorspar in the United States reached a record high of 676,095 tons ^{2/} in 1961, compared with a previous high of 649,042 tons in 1960 (table 3). Industry sources expect that in 1962 the consumption of fluorspar will set another record.

Trend of market grades

Statistics on the U.S. consumption of fluorspar in 1957-61 by grades and by principal uses are shown in table 4. The U.S. Bureau of Mines reported that the consumption, by market grades, of fluorspar (domestic plus imported) in 1956-61 was as follows (in thousands of tons):

Year	Consumption by market grades		
	Acid	Metallurgical	Ceramic
1956-----	296	287	38
1957-----	335	268	41
1958-----	266	192	37
1959-----	332	219	39
1960-----	377	232	40
1961-----	418	220	38

As shown in the above tabulation, the consumption of acid grade fluorspar increased rapidly during the past 4 years; in 1961 this grade accounted for 62 percent of the total tonnage. The consumption of acid grade fluorspar was 11 percent higher in 1961 than in 1960, the previous

1/ Unless otherwise qualified, the term "consumption" is used in this report to mean finished fluorspar (imported and domestic, whether the latter is produced by independent or captive operators) used by consumers; it does not include Government purchases.

2/ Unless otherwise qualified, the term "tons" is used hereafter in this report to mean short tons.

record year for consumption of acid fluorspar. This increase was accounted for entirely by increased consumption in the production of hydrofluoric acid, rather than in any of the minor uses of the acid grade; industry plans call for continued expansion of production of hydrofluoric acid.

The consumption of metallurgical grade fluorspar was only moderately lower in 1961 than in 1960. In the past, production of steel has been a good index of the consumption of metallurgical grade fluorspar; however, the steel industry is shifting from the basic open-hearth furnace to the oxygen furnace (which requires considerably less fluorspar per ton of steel). As a consequence, steel output is becoming a less accurate indicator.

Consumption of ceramic grade fluorspar was about 5 percent lower in 1961 than in 1960.

Shipments to consumers

Shipments of fluorspar in 1959-61 to users, by grades, reported to the Commission by domestic producers (captive and independent) and by importers are shown in table 5. The reported shipments of domestic and imported fluorspar combined, by grades, were as follows for the years 1956 and 1959-61 (in thousands of tons):

<u>Grade 1/</u>	<u>1956</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>
Acid-----	305	357	390	366
Ceramic-----	38	48	50	42
Metallurgical-----	308	199	248	186
All grades-----	<u>651</u>	<u>604</u>	<u>688</u>	<u>594</u>

1/ Shipments of imported acid grade for ceramic uses included in shipments of ceramic grade.

Importers supplied a somewhat larger share of each of the grades shipped to consumers in 1959 than they did in 1956, but in 1960 and 1961 the importers supplied a somewhat smaller share of each grade than in 1959. The following tabulation shows the ratios of reported shipments of imports ^{1/} to the combined total of shipments of imported and domestic fluorspar for each grade for 1956 and the years 1959-61:

<u>Grade</u>	<u>Shipments of imported fluorspar as a percent of total shipments of imported and domestic fluorspar</u>			
	<u>1956</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>
Acid-----	55	67	64	65
Ceramic-----	31	46	43	38
Metallurgical-----	79	82	78	79
All grades	65	71	67	68

Acid grade.--Some of the major industrial consumers of acid grade fluorspar, believing that reserves of economically obtainable fluorspar in this country are dwindling, have recently built, or are about to build, production facilities for hydrofluoric acid or for sodium aluminum fluoride in the Texas-Louisiana area, close to Mexican sources. These firms are Aluminum Co. of America, Kaiser Aluminum & Chemical Corp., and E. I. duPont de Nemours & Co., Inc. Other major consumers of acid grade fluorspar that own facilities for producing such fluorspar from Mexican ore are Allied Chemical and Reynolds. The Dow Chemical Co., which uses some acid grade fluorspar but currently sells most of its production, operates a fluorspar flotation mill in Mexico; that mill is located just across the river from Big Bend National Park in Texas (see section on industry and trade of principal foreign producing countries, p. 61).

^{1/} Shipments reported to the Tariff Commission by U.S. importers accounted for more than 90 percent of the imports during the years shown.

These developments will have a significant effect on the patterns of consumption. Shipments of flotation concentrates from the domestic mills owned by ALCOA in southern Illinois and by Allied Chemical in Colorado will probably decline while commercial imports from Mexico will probably increase.

Shipments into the 10 States in which the large plants producing sodium aluminum fluoride or hydrofluoric acid are located ^{1/} accounted for more than 95 percent of the total shipments of acid grade fluorspar by producers and importers during the 3 years 1959-61, or for about the same proportion as in earlier years. Shipments into Delaware-New Jersey have been the largest, while those to consuming plants in Illinois have ranked second in size, but declined sharply from 1960 to 1961 (table 6).

During the 3-year period 1959-61, as in 1958, about 75 percent of all shipments of domestic acid grade fluorspar was shipped from Illinois and Kentucky to the three major consumers located in these two States. Practically all of the remaining domestic shipments were from Colorado to California or from Illinois to West Virginia. Consumers in the other six States were supplied almost entirely by imported material.

Ceramic grade.--Shipments of ceramic grade fluorspar (both domestic and imported) are more widely distributed than are the shipments of the acid grade or metallurgical grade. According to data on destination

^{1/} Arkansas, California, Delaware, Illinois, Kentucky, Louisiana, New Jersey, Ohio, Texas, and West Virginia.

of shipments supplied the Commission by domestic producers and importers, the States receiving the largest quantities of combined shipments in 1959-61 were Pennsylvania, Ohio, New Jersey, Illinois, Indiana, New York, and West Virginia. During 1959-61 the bulk of the requirements of consumers in Illinois, Ohio, Indiana, and West Virginia was supplied from domestic production, ^{1/} whereas consumers in New Jersey and California bought almost exclusively from importers; consumers in Pennsylvania and New York were supplied both by domestic producers and by importers, with the latter supplying the larger part.

For ceramic grade fluorspar, as for acid grade, the freight-rate differentials favor producers in the Illinois-Kentucky area for shipments to consumers located in the central United States, but consumers closest to the ports of entry (Mexican border, Wilmington, and Cleveland) usually buy imported material.

Metallurgical grade.--States which rank the highest in steel production are those to which the largest quantities of metallurgical grade fluorspar are shipped, namely, Pennsylvania, Ohio, Illinois-Indiana, and Michigan (table 6).

During most of the 1956-61 period about 80 percent of the domestic requirements for metallurgical fluorspar were supplied by imports. Most of the production in Montana was shipped to plants in Indiana, Illinois, and Utah, while most of the production in Nevada was shipped

^{1/} Three other States which also obtained practically all of their ceramic grade fluorspar from domestic sources are Kentucky, Tennessee, and Michigan.

to California. The principal markets for the metallurgical grade fluorspar produced in the Illinois-Kentucky area were in Ohio, Illinois, Indiana, and Pennsylvania.

The bulk of the metallurgical fluorspar imported in 1958-61 originated in Mexico, and was shipped to steel mills located chiefly in Pennsylvania, Ohio, Alabama, Illinois, Indiana, Michigan, and Texas; about 70 percent of the Mexican material was shipped by barge. In all of the major consuming States except California, Indiana, and Utah, imports supplied the bulk of the steel mills' requirements in 1961.

U.S. Stockpiling Program

The acid and metallurgical grades of fluorspar have been officially identified as being strategic and critical materials; both have been stockpiled by the Government to assure sufficient supplies for military and essential civilian needs in time of emergency. ^{1/}

In March 1962 the Office of Emergency Planning (formerly Office of Civil and Defense Mobilization) declassified information on almost all of the strategic materials held in Government stockpiles. Data on stockpile holdings of acid and metallurgical grades of fluorspar were among those declassified. The tabulation below shows the maximum stockpile objective for each grade of fluorspar,

^{1/} Ceramic grade fluorspar is not considered to be a strategic or critical material.

as well as the inventories of each grade in the various stockpiles on December 31, 1961, and the quantities held on that date in excess of the maximum objectives (in thousands of tons, dry basis):

Grade of fluorspar	: Maximum : stockpile: : objective:	Government stockpiles, Dec. 31, 1961					: Surplus over : maximum : objective
		Total	: Strategic	: DPA <u>1/</u>	: CCC <u>2/</u> : supplemental:	and	
Acid-----	: 280	: 1,100	: <u>3/</u> 458	: 20	: 622	:	: 820
Metallur-	:	:	:	:	:	:	:
gical---	: 375	: 412	: 369	: -	: 43	:	: 37
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:

1/ Defense Production Authority.

2/ Commodity Credit Corporation.

3/ Includes substantial tonnages transferred from the DPA stockpile.

As shown above, the quantity of acid grade fluorspar in the stockpile was nearly four times the maximum objective for that grade.

The stockpiling of fluorspar by the U.S. Government was initiated in 1950, and Government procurement of this material has continued through the early part of 1962. However, Government acquisition of domestically produced fluorspar was terminated in the early part of 1959. Of the 1,100,000 tons of acid grade fluorspar in Government inventory on December 31, 1961, domestic material accounted for about 25 percent and imported material for about 75 percent. The domestic acid grade material was acquired under the Defense Production Act of 1950 and under the authority of Public Law 733 (84th Cong., 2d sess.). The imported material was acquired under three programs: (1) the National

Stockpile Purchase Program, (2) the Defense Production Act Expansion Program, and (3) barter agreements with certain countries whereby surplus agricultural commodities were exchanged for fluorspar.

In the early years of the stockpiling program only acid grade fluorspar was acquired; the Government contracted with producers (domestic and foreign) and importers for delivery, over varying periods of time, of specified quantities. One of the more important of these contracts, involving the purchase of Canadian fluorspar, was that negotiated with the St. Lawrence Fluorspar Co. under the Defense Production Act of 1950. This concern's flotation mill, located at Wilmington, Del., was constructed with the aid of a loan from the Defense Materials Procurement Agency. It processed preconcentrated Canadian fluorspar in bond and sold the entire output of acid grade material to the U.S. Government at a price considerably higher than the prevailing market price. This mill, which had a capacity of about 52,000 tons per year, ceased operation in the latter part of 1957 when its Government contract ended.

The foregoing tabulation shows that well over half of the Government inventory of acid grade fluorspar was acquired under Commodity Credit Corporation (CCC) and supplemental stockpile contracts; the supplemental stockpile includes deliveries under purchase contracts as well as barter arrangements. Beginning in 1955, the CCC negotiated barter transactions under the provisions of Public Law 480 (83d Cong., 1st sess.), whereby surplus agricultural commodities, principally wheat, were

exchanged for acid grade fluorspar from foreign sources, chiefly Mexico and Italy. In 1961 the CCC acquired a large tonnage of Mexican fluorspar through contracts with producers in that country; deliveries by Mexican producers were still being made under some of the CCC contracts in the early part of 1962. In 1961 a small tonnage of Spanish and West German acid grade fluorspar also was acquired under CCC contracts.

Under the provisions of the Defense Production Act of 1950, large tonnages of acid grade fluorspar were supplied by domestic producers. Over a period of several years, Ozark-Mahoning Co. sold large quantities to the Government from its three mills in Illinois and Colorado. Contracts for the tonnages from Colorado necessitated the installation of production facilities, and the prices paid by the Government for the product were such as to allow the amortization of most of the cost of the Colorado facilities during the periods of the contracts.

Under the authority of Public Law 733 (84th Cong., 2d sess.), the General Services Administration (GSA) in 1957 and 1958 purchased substantial quantities of acid grade fluorspar from domestic producers. This law expired on December 31, 1958. Contracts for acid grade material were made with two or three major milling companies; these contracts, however, benefited many small ore producers by assuring a large demand by mills filling Government contracts.

Substantial tonnages of domestically produced metallurgical grade fluorspar were procured under the minimum and long-term stockpile programs in 1956-58, and a much smaller tonnage in the first 3 months of 1959. The 1959 acquisitions resulted from the tardy delivery of domestic material purchased under a program in effect in 1958 and terminated on December 31 of that year. GSA obtained metallurgical fluorspar from at least a dozen domestic producers, which probably supplied about 75 percent of the 412,000 tons of metallurgical grade fluorspar that was in Government stockpiles on December 31, 1961.

The U.S. Industry

The fluorspar mining and processing industry in the United States is small compared with many other mining and processing industries. In 1959-61 the annual value of finished fluorspar produced in the United States ranged between \$7.5 million and \$9 million and the number of employees in mines and mills combined averaged about 650. During the years 1956-58, when Government stockpiling programs were in effect, the value of production of finished fluorspar was about \$15 million annually and the number of employees in mines and mills combined averaged about 850.

Number, location, and type of producing units

Although fluorspar is found in at least 15 States, many of the deposits are not suitable for development for one or more of the

following reasons: Inaccessibility, limited tonnage in the deposit, distance from consuming centers, low content of calcium fluoride, and high cost of removing impurities. Through the years a large number of marginal deposits have been worked; most of them were operated irregularly and many could not now provide ore in commercial quantities.

There are three types of "producers" in the U.S. fluorspar mining and milling industry: producers of ore only; producers of finished fluorspar only; and producers of both ore and finished fluorspar. More than 90 percent of the ore mined is milled by the same company that mines it; this is true of both "independent" and "captive" producers. With the exception of a small tonnage of Western ore--which is shipped to consumers with little or no processing except washing--all fluorspar ore is milled in a heavy-media mill, a flotation mill, or both.

In 1961 the three largest independent U.S. producers of fluorspar--Ozark-Mahoning Co., Minerva Oil Co., and Cummings-Roberts--accounted for about 45 percent of the total domestic production of all grades of fluorspar and 77 percent of that produced by independent operators. The bulk of Ozark-Mahoning's output was the acid grade, all of Cummings-Roberts' was metallurgical grade, and Minerva's was about evenly divided between ceramic grade and acid grade, plus a moderate tonnage of the metallurgical grade.

Ozark-Mahoning Co. maintains operations other than in fluorspar, and the sales of finished fluorspar and byproducts thereof constituted substantially less than half of its total sales volume in 1961. Minerva Oil Co. also has other operations, but in 1961 sales of finished fluorspar, including byproducts, constituted the bulk of its total sales. Virtually all of Cummings-Roberts' sales in 1961 were of finished fluorspar.

All of the U.S. captive producers of fluorspar ^{1/}(as well as one concern that mills Mexican ore in Texas ^{2/}) are large, diversified producers of chemicals or aluminum metal; for each of these concerns, fluorspar output accounts for only a small percentage of total company operations.

A number of individuals and small firms that produced ore in 1958 did not do so in 1961; few if any new companies or individuals are known to have undertaken production of either ore or finished fluorspar in recent years. The U.S. Bureau of Mines reported that 38 domestic fluorspar mines were operated in 1960. Seven of them produced more than 20,000 tons each, and their combined output accounted for 88 percent of the total tonnage produced in 1960. Comparable data for 1961 are not yet available.

^{1/} There are three captive producers in the United States, namely, Aluminum Co. of America, Pennsalt Chemicals Corp., and Allied Chemical Corp.

^{2/} Reynolds Metals Co.

In 1961 there were 10 active mills operated by 9 concerns (2 more mills than were active in 1959). In the Illinois-Kentucky area, finished fluorspar was produced in 1961 at 8 mills owned by 7 concerns. Outside the Illinois-Kentucky area in 1961, only 2 mills treated domestic ores: one at Boulder, Colo., made acid grade fluorspar, and the other at Darby, Mont., made metallurgical grade fluorspar. It has been reported that the captive Colorado mill and one of the captive Illinois-Kentucky-area mills have reduced, or are expected to reduce their outputs; the closing of one or both of these mills is expected to occur within the next few years.

Position of the United States in
world production

Before 1956 the United States was the free world's leading producer of finished fluorspar; since then, Mexico has been the principal producer, with the United States ranking second, except in 1958 (table 7). The United States' share of total world production declined from 18 percent in 1956 to 11 percent in 1960.

The U.S. Bureau of Mines estimated that in 1959-60 the production of finished fluorspar in the U.S.S.R. approximated that of the United States, and that the output in Communist China in those 2 years was moderately higher than that of the United States; a sizable tonnage of China's output of fluorspar in 1959-60 was shipped to the Soviet Union.

Production

Domestic production of finished fluorspar was maintained at an annual rate of about 326,000 tons during 1956-58, partly as a result of Government purchases; it dropped sharply to 185,000 tons in 1959 (a year in which both domestic consumption and imports were substantially higher than in the previous year), recovered to 230,000 tons in 1960, but declined to 197,000 tons in 1961.

Table 8 shows production (as measured by shipments) of all grades of fluorspar in the major producing States. Output of finished fluorspar was lower in 1961 than in 1960 in each major producing State except Kentucky, where captive production has been growing for some years. Output in Illinois was at its lowest point in many years--even lower than in 1959--and production in Montana was less than half of what it was in 1960.

The following tabulation compares the average annual production of fluorspar in 1956-58 with that in 1959-61 for the major producing States:

<u>State</u>	<u>Average annual production</u> (tons)		<u>Percentage change</u>
	<u>1956-58</u>	<u>1959-61</u>	
Illinois-----	166,760	119,118	-28.6
Kentucky-----	20,451	26,595	+30.0
Montana-----	59,256	21,573	-63.6
All other-----	79,568	35,126	-55.9
Total or average---	326,035	202,412	-37.9

The U.S. Bureau of Mines reported that domestic producers (independent and captive operations combined) shipped about 128,000 tons of acid grade fluorspar to industrial users in 1961--10 percent less than in 1960 but 10 percent more than in 1959. Shipments of domestically produced metallurgical grade fluorspar declined 28 percent from 59,000 tons in 1960 to 42,000 tons in 1961, while shipments of domestic fluorspar to ceramic users in 1961 amounted to about 27,000 tons or 7 percent less than in 1960.

The following tabulation shows the percentage composition, by grades, of shipments of domestic fluorspar, as reported by the U.S. Bureau of Mines, for 1956-61:

<u>Year</u>	<u>Percentage of total shipments of domestic fluorspar</u>		
	<u>Acid grade</u>	<u>Ceramic grade</u>	<u>Metallurgical grade</u>
1956-----	51.3	7.2	41.5
1957-----	57.7	9.1	33.2
1958-----	60.0	7.1	32.9
1959-----	63.1	13.8	23.1
1960-----	61.7	12.5	25.8
1961-----	65.0	13.5	21.5

The above data show the increased importance to the industry of sales of the acid and ceramic grades, and the corresponding decline in the metallurgical grade.

Several thousand tons of unbeneficiated fluorspar ore are used each year in cement raw mixtures. Current grade classifications (acid, ceramic, and metallurgical) provide no proper category for

this impure material, data for which are reported in the statistics for the metallurgical grade.

Production by captive versus independent operators

Captive production accounts for a major part of the domestic output of acid grade fluorspar. The proportions of industrial shipments of domestically produced acid grade fluorspar supplied by captive and by independent producers (based on data obtained by Commission questionnaires) were as follows in 1956 and 1958-61:

<u>Year</u>	<u>Percent of shipments ^{1/} of domestically produced acid grade fluorspar supplied by--</u>	
	<u>Captive producers</u>	<u>Independent producers</u>
1956-----	59	41
1958-----	66	34
1959-----	65	35
1960-----	61	39
1961-----	62	38

^{1/} Includes commercial shipments by independent producers, and intracompany transfers and commercial shipments by captive producers.

The above tabulation shows that a somewhat smaller proportion of the shipments was made by captive producers in 1960-61 than in 1958-59.

If one or two of the three captive mills should close, the proportion of total output accounted for by captive producers would decrease in the future.

There has been no captive production of fluorspar for metallurgical use since 1954, and there has never been any captive production of the ceramic grade. One cement company produces moderate tonnages of low-grade fluorspar ore for its own use in cement raw mixtures.

Coproducts and byproducts

Most of the domestic producers of acid grade fluorspar also produce lead sulfide mineral (galena) and zinc sulfide mineral (sphalerite) concentrates. One or the other and usually both of these minerals are widely disseminated through fluorspar deposits, especially those in Illinois and Kentucky. These sulfide minerals are deleterious in fluorspar concentrates and must be removed. Occasionally, the zinc sulfide mineral contains valuable amounts of germanium (a rare metal used in electronics), in which case the concentrate is sold to a zinc smelter equipped for the recovery of germanium.

Income derived from the sale of lead sulfide and zinc sulfide mineral concentrates is important in the profitability of some fluorspar milling operations, particularly in the Illinois-Kentucky fluorspar producing area. In recent years the market for lead concentrates has usually been depressed while the market for zinc concentrates has been stronger; hence, wherever practicable, producers favor the mining of ores relatively high in zinc. In some years, under good market conditions for both lead sulfide and zinc sulfide mineral concentrates,

income from the sale of these materials by some companies amounts to as much as 25 percent of the combined value of their sales of fluorspar, lead, and zinc.

Some fluorspar mines and mills sell small tonnages of waste rock for use as a road surfacing material or aggregate in concrete.

Changes in methods of operation

Recently, Ozark-Mahoning Co. built a heavy-media plant on its mine property near Cave in Rock, Ill.; that company now upgrades ore from the mine so as to reduce the tonnage of ore being hauled to the grinding and flotation facilities, located several miles away. Conceivably, this new facility could produce a metallurgical product if an ore low in metal sulfides is used. The new plant produces a limestone gravel byproduct which is being sold for use on roads.

One heavy-media plant near Marion, Ky., which operated mainly on barite in 1959, has been converted to the production of metallurgical fluorspar and is turning out moderate tonnages.

Ozark-Mahoning Co., which discontinued offering a pelletized concentrate product containing about 65 percent of calcium fluoride for use in the steel industry, has recently offered a pelletized acid grade product for the same purpose. However, it appears that acid concentrates formed into bricks or large briquettes are more acceptable to steelmakers than are the smaller pellets. It is estimated that in 1961 at least 10,000 short tons of imported acid grade concentrates in

the form of bricks or large briquettes was sold to steel producers, and certain importers expect that the use of such material will increase in the future and replace regular (natural gravel) metallurgical fluorspar even further.

Employment and wages

Employment.--Employment at the mines and mills ^{1/} of the domestic fluorspar industry (captive and independent producers) increased materially in the early 1950's under the impetus of increased demand for fluorspar engendered by the outbreak of hostilities in Korea, and later by Government purchases for stockpiling. The average number of all workers reached a peak of slightly more than 2,000 in 1952, declined to 1,059 in 1958, reached a low of 745 in 1959, and rose to 813 in 1961 (table 9). In all years of the period 1956-61, more than half, and in 1961 almost two-thirds, of the production and related workers were employed in the mines; the remainder were engaged in the mills processing the ore into finished fluorspar. In 1961 90 percent of all production and related workers employed in domestic fluorspar mines and mills were located in the Illinois-Kentucky region; in 1958 only 78 percent were located in that area (table 10).

The following tabulation, compiled from data submitted to the Commission by domestic producers, compares the average number of production and related workers employed by the independent concerns (total and at mines and mills separately) with corresponding employment

^{1/} Includes all employees in mines and mills producing fluorspar, whether or not they were also engaged in producing byproducts.

by all reporting concerns, both captive and independent, for the period 1956-61:

Year	Average number of production and related workers						
	Captive and independent concerns, combined			:	Independent concerns only		
	Total	At mines	At mills	:	Total	At mines	At mills
	:	:	:	:	:	:	:
1956-----	860	469	391	:	452	234	218
1957-----	901	505	396	:	483	257	226
1958-----	877	499	378	:	520	271	249
1959-----	604	377	227	:	325	213	112
1960-----	676	445	231	:	340	224	116
1961-----	687	455	232	:	352	241	111
	:	:	:	:	:	:	:

The above data indicate that the percentage increase in employment for all companies between 1959 and 1961 was about the same as for the independent concerns, and that most of this modest increase occurred in the mining, rather than in the milling operations. The increase in the number of miners employed is ascribed largely to one firm's stepped-up ore production program and another firm's shaft sinking and development work.

Part of the mining and also part of the trucking of fluorspar from the mines to the mills is performed for some of the reporting concerns by contractors; employees of such contractors are not reported in tables 9 and 10. The actual number of workers employed by the contractors during the period under consideration could not be readily determined, but is probably very small relative to total employment in the fluorspar industry.

Man-hours and wages.--The information reported to the Tariff Commission on employment of production and related workers in mines and in mills, man-hours worked, wages paid, and average hourly earnings in the fluorspar industry is shown for 1956-61 in table 11.

The following tabulation indicates the trend of total man-hours worked by production and related workers in the fluorspar industry compared with the trend of domestic production of finished fluorspar during the period 1956-61:

<u>Year</u>	<u>Man-hours worked</u> <u>(1,000 hours)</u>	<u>Domestic production</u> <u>of finished fluorspar</u> <u>(1,000 tons)</u>
1956-----	1,835	330
1957-----	1,944	329
1958-----	1,837	320
1959-----	1,186	185
1960-----	1,323	230
1961-----	1,353	197

The sharp decline in production from 1958 to 1959 (resulting from the termination of Government purchasing) was accompanied by a similar decline in man-hours worked. However, from 1956 to 1957, and from 1960 to 1961, domestic production either leveled off or declined while man-hours increased slightly.

Average hourly wages of all production and related workers at both the mines and the mills increased almost steadily during 1956-61--from \$1.85 in 1956 to \$2.09 in 1961 for mine workers, and from \$1.72 in 1956 to \$1.97 in 1961 for mill workers. Average hourly earnings for production and related workers at mines and mills in the Western States were higher in each of the years shown than corresponding hourly earnings in the Illinois-Kentucky region.

Profit-and-loss experience of domestic producers

Eleven independent operators of fluorspar mines and mills furnished the Commission with usable data relating to their financial experience for all or part of the period 1956-61; only seven supplied data for the entire period. Each of the 11 operators provided financial data on their total fluorspar operations. Data for some operators, however, covered mining operations only; for others they covered milling operations only; and for still others they covered both types of operations.

The profit-and-loss experience of the 11 independent operators that submitted usable profit-and-loss data is summarized in table 12. Nine of the eleven operators reported that sales of fluorspar accounted for all or virtually all of their total net sales, and the profit-and-loss data reported for these firms are for their entire operations. Two of the operators sold other products not covered by the investigation, such as oil and chemicals, but the profit-and-loss data reported by the two concerns relate only to their fluorspar operations. In conjunction with their fluorspar operations these two operators recovered other products such as zinc and lead concentrates, and the profit-and-loss data reported cover both their total fluorspar and related products operations.

Captive operations.--Three operators of captive mines and mills produced fluorspar during each of the years 1956-61. Another captive operator produced fluorspar during 1956 and 1957, but discontinued operations after 1957. However, no financial information was requested from captive operators because none of them sold any significant quantities of

fluorspar in the open market, and it was not feasible to determine a fair value for the fluorspar they produced and used in their own operations.

Independent producers as a group.--Usable profit-and-loss data were obtained from 9 of the 11 operators for 1956, from 10 operators for 1957, from all 11 of them for 1958, from 8 operators for 1959, and from 9 operators for both 1960 and 1961. The reporting operators in each year of the period 1956-61 accounted for nine-tenths or more of the value of the total sales by independent producers of domestic finished fluorspar, as well as for a substantial portion of the fluorspar ore sold by mine operators to mills for processing. In terms of total sales of finished fluorspar by the 11 concerns, the data shown in table 12 relate predominantly to the experience of concerns that engaged in both mining and milling.

Considered as a group, the operators of fluorspar mines and mills from which profit-and-loss data were obtained reported profits in each of the years 1956-61, although profits declined in each year except 1960. The aggregate net operating profit (before income taxes) of the group was equal to 25.1 percent of aggregate net sales in 1956, 22.4 percent

in 1957, 18.1 percent in 1958, 11.6 percent in 1959, 15.5 percent in 1960, and 6.1 percent in 1961. ^{1/}

The decline in aggregate net operating profits in the years 1959-61, compared with those in 1956-58, resulted largely from the cessation on December 31, 1958, of the purchases of domestic fluorspar by the U.S. Government for stockpiling. The aggregate net operating profit of the reporting operators declined from \$2.2 million in 1958 to \$0.6 million in 1959; rose to \$1 million in 1960, and then declined to \$0.3 million in 1961.

The aggregate net sales of fluorspar and byproducts by the reporting operators, which had risen under the impetus of the Government's stockpile program from \$10.5 million in 1956 to \$12.3 million in 1958, declined to \$5.3 million in 1959, rose to \$6.7 million in 1960, and declined to \$5.5 million in 1961.

^{1/} These figures are derived from data for a different number of concerns each year, as well as data from concerns engaged in varying types of activity (i.e., both mining and milling, mining only, or milling only). Nevertheless, the trend revealed by the percentage figures showing the ratio of net profit to net sales parallels closely the trend that would be shown by the experience of any representative group of these firms. For example, three of the firms, all of which were engaged in both mining and milling, reported profit-and-loss data to the Commission for all of the years shown in table 12. In recent years these three concerns have accounted for about 85 percent of U.S. sales by independent domestic producers of finished fluorspar. The respective percentages for the ratio of aggregate net profit to aggregate net sales for these firms were as follows: In 1956, 26 percent; 1957, 23 percent; 1958, 19 percent; 1959, 12 percent; 1960, 16 percent; and 1961, 6 percent. Another comparison may be made with respect to the profit experience of seven firms, including the three just referred to, each of which reported for all the years shown in the table (in addition to the three engaged in both mining and milling, there were three engaged in mining only, and one in milling only). The respective percentages calculated for these firms are virtually identical to those shown in the table. In recent years the seven firms have accounted for more than 90 percent of the finished fluorspar marketed by independent domestic producers.

Sales of byproducts (mainly zinc and lead concentrates) by the reporting operators accounted for 16 percent of the aggregate net sales value of fluorspar and byproducts by the reporting operators in 1959; they accounted for 23 percent of net sales in 1960 and 22 percent in 1961, but only 7 percent in 1958. Several factors contributed to the improvement in 1960 over 1959 in the value of sales and in the net operating profits of the reporting operators. The price received for zinc and lead concentrates was higher during 1960 than during either 1959 or 1961. Also, some fluorspar-consuming industries, particularly the steel and foundry companies, purchased more fluorspar in 1960 than in 1959 to meet their current needs and to build up inventories. Declining prices received for zinc and lead concentrates during 1961 and the fact that consuming industries met an increased share of their needs from inventories during 1961, adversely affected the net sales and the net operating profits of the reporting operators in that year.

Of the independent domestic producers for which data are included in table 12, 7 reported profits on their fluorspar operations in 1956, and 2 reported losses in that year; 8 reported profits and 2 reported losses in 1957; 10 reported profits and 1 reported a loss in 1958; 6 reported profits and 2 reported losses in 1959; all 9 reported profits in 1960; and 5 reported profits and 4 reported losses in 1961.

U.S. Reserves

The extent of U.S. fluorspar reserves has been the subject of much disagreement in recent years, with consumers and importers understandably more pessimistic than independent domestic producers. Because of the nature of fluorspar deposits in the major domestic producing areas, a great deal of time and money would be required to determine with any degree of exactness either the total tonnage, the accessibility, or the quality of fluorspar ore available. The Tariff Commission, therefore, has not undertaken to evaluate the various estimates of U.S. reserves, or to determine the prices which would have to be obtained for market grades of fluorspar to render profitable the exploitation of various deposits.

Producing companies have widely different definitions for the word "ore," ^{1/}and these differences lead to misunderstandings in the compilation of reserve tonnage estimates. According to some major captive producers of fluorspar, no deposit is "ore" unless it occurs in large quantity, is of good grade, and is well situated geologically

^{1/} The U.S. Geological Survey has said (in the Paley report) that "mineral reserves" or "ore" refers "only to the material that in some degree has been inventoried in terms of commercial enterprise. It is material that can be mined, processed, and marketed without financial loss under the economic and technologic conditions prevailing" at the time the estimate is made. A reserve estimate applies only at the time and under the conditions prevailing when the estimate is made. As costs and market price fluctuate up and down, so also does the ore reserve tonnage, "for at all times there is present in by far the greater number of deposits material of submarginal grade or material of a quality unsuited to the production practices of the day." Thus, "the reserve is a constantly changing factor. . ." (President's Materials Policy Commission Report, Resources for Freedom, vol. 2, The Outlook for Key Commodities, 1952, p. 136).

and geographically for profitable mining on a large scale. Few of the undeveloped ore bodies known or believed to exist in the United States would meet all of these requirements. The same producers also maintain that as a practical matter certain fluorspar deposits in Western States should not be regarded as "ore" inasmuch as they are too far from centers where fluorspar can be marketed economically; that "ore" reserves in the Illinois-Kentucky area have been extensively depleted by past mining; and that large tonnages of reserves that were barely marginal during the post-World War II periods of acute scarcity have become submarginal under current market conditions. Major independent producers, on the other hand, contend that the discovery of reserves is largely determined by the prosperity of the industry, and that when profits are again sufficient to support an active exploration program more ore will be found.

In November 1956 the Department of the Interior gave its estimate of reserves for that year, in comparison with estimates made in previous years, as shown below:

<u>Year</u>	<u>Tons</u>
1945-----	14,500,000
1952-----	15,000,000
1954-----	17,500,000
1956-----	22,600,000

The geographical locations of the 1956 estimated tonnage and the amounts of measured and inferred reserves were as follows (in millions of tons):

<u>Region</u>	<u>Measured</u>	<u>Inferred</u>	<u>Total</u>
Illinois-Kentucky----	8.1	4.0	12.1
Rocky Mountain-----	4.5	3.7	8.2
Other-----	1.2	1.1	2.3
Total-----	13.8	8.8	22.6

The above figures include reserves containing 35 percent or more of calcium fluoride, or the equivalent thereof in calcium fluoride plus metallic sulfide mineral values. No agency of the U.S. Government has prepared an estimate of fluorspar reserves since 1956; however, there has been little exploratory drilling since then. After account is taken of the quantities mined in 1957-61, it may be assumed that about 20 million tons of the mineral reserves identified in 1956 are still available.

About 12.1 million tons of the 1956 reserves were in the Illinois-Kentucky district; these, because of their location, could reasonably be considered available to supply most of the domestic hydrofluoric acid manufacturers. Although estimates have been made of how long this tonnage will last, such estimates are based on assumed but unpredictable rates of consumption and are therefore of little value. Virtually all of the remaining 10.5 million tons of reserves were located so far from plants consuming acid grade fluorspar that the delivered prices for

acid fluorspar at consuming plants would have to be substantially higher than at present to make their mining and milling profitable.

Many ores suitable for making the higher valued acid grade fluorspar are not suitable for making the lower valued metallurgical gravel. Consideration of type of ore is more important in the production of metallurgical grade than in that of the acid grade. Deposits of fluorspar suitable for making metallurgical gravel have been seriously depleted in the Illinois-Kentucky district, where most of the deposits contain finely disseminated lead and zinc sulfide minerals which are deleterious in the common metallurgical uses of fluorspar. Ore bodies readily amenable to the production of a high-quality metallurgical product occur in Western States, with the large Darby, Mont., deposit being the outstanding example.

Ceramic grade material can be made by flotation processes from almost any fluorspar ore because the silica content of the ceramic grade can be much higher than that of the acid grade.

U.S. Foreign Trade

U.S. imports

Before World War II, U.S. imports of fluorspar were small. Imports of all grades averaged 24,000 tons annually in 1937-39, and then rose to a wartime peak of 105,000 tons in 1945. After a decline in the years immediately after the war, imports increased rapidly, owing partly to stockpile purchases by the U.S. Government. Imports, which averaged about

335,000 tons annually in 1952-54, rose to a peak of 631,000 tons in 1957, declined to 392,000 tons in the recession year of 1958, but averaged 524,000 tons during 1959-61. Of approximately 600,000 tons of fluorspar (all grades) either shipped by domestic producers to users or imported for industrial use in 1961, about 33 percent was of domestic origin, 43 percent was imported from Mexico, 13 percent from Spain, 10 percent from Italy, and 1 percent from other countries.

In 1956-61 dutiable imports (for use by industry) and imports of fluorspar for Government use were as follows (in thousands of tons):

Year	Dutiable imports by calcium fluoride content		Entered for use by the U.S. Government	Total imports
	More than 97 percent	Not more than 97 percent		
	:	:	:	:
1956-----	168	235	1/ 83	486
1957-----	249	219	1/163	631
1958-----	195	117	80	392
1959-----	274	204	78	556
1960-----	245	195	70	510
1961-----	250	152	104	506

1/ Includes imports from Canada on which duty was paid; this material was sold to the U.S. Government.

During 1953-59 imports supplied an increasing share of the domestic market 1/ for both metallurgical and acid uses. In 1960 and 1961, however, imports supplied a somewhat smaller share than in

1/ Including consumption by companies with captive mines and mills.

1959. The proportions of all shipments of domestic and imported fluorspar ^{1/}supplied by imports were as follows for the period 1956 through 1961:

Year	Percent of total shipments of domestic and imported fluorspar supplied by imports for--	
	Acid and ceramic uses	Metallurgical uses
1956-----	50	72
1957-----	60	81
1958-----	61	82
1959-----	66	83
1960-----	59	77
1961-----	62	78

Metallurgical grade.--Inasmuch as almost all metallurgical grade fluorspar has been used in making steel and imports have supplied a very substantial share of the shipments to U.S. steel plants, the imports of fluorspar containing not more than 97 percent of calcium fluoride (practically all of which is of the metallurgical grade) have been affected by the volume of steel production in the United States.

Before World War II, about 90 percent of the metallurgical fluorspar going into domestic consumption came from domestic sources; after the

^{1/} Domestic shipments as reported by the U.S. Bureau of Mines excluding those for the U.S. Government; shipments of imported material are dutiable imports for consumption as reported by the Census Bureau.

war, however, imports became increasingly important. In 1950-54, approximately half of the metallurgical grade used in industry was imported. Beginning in 1955, there was a further shift to the use of imported material, and in 1958-61, imports (mostly from Mexico) supplied about four-fifths of the metallurgical grade used.

Imports of metallurgical grade fluorspar for industrial use were lower in 1960 than in 1959, and those in 1961 were substantially (22 percent) lower than in 1960. Stocks of this material held by steel plants were 16 percent lower on December 31, 1961, than a year earlier (table 13).

Acid grade.--During and immediately after World War II, nearly all of the acid grade fluorspar used in the United States was domestic material. Since then, however, imports have supplied an increasingly larger share of the industrial market for this grade. The increasing shares, expressed in terms of approximate ratios of the tonnages of imported acid grade used to the total consumed, are as follows: in 1946-48, 1 out of every 7 tons; in 1949-51, 1 of every 4; in 1952-56, 1 of every 2; and in 1957-61, 2 of every 3.

In recent years imports of acid grade fluorspar for use by industry have increased markedly, but in 1960 and 1961 they were somewhat lower than in 1959. The production of fluorine chemicals, particularly at plants in Texas and Louisiana that are supplied with imported fluorspar, is expected to increase appreciably in the next

few years; such a development would have a tendency to encourage larger imports of acid grade fluorspar.

Ceramic grade.--Until the middle 1950's, virtually all of the fluorspar consumed in ceramic uses was of domestic origin. From about 1955 to 1959, an increasing share of the U.S. market for fluorspar for ceramic purposes was supplied by importers of acid grade material. ^{1/} However, the trend appears to have been reversed; in 1961, fluorspar importers supplied only 38 percent of the requirements of the U.S. ceramic industry compared with 46 percent in 1959.

Sources.--Before World War II, Germany, France, and Canada (Newfoundland) were the principal suppliers of imported fluorspar. Since the war, Mexico has become the principal supplier; during 1953-58 it furnished 40 percent of all imported fluorspar containing more than 97 percent of calcium fluoride (acid grade), and 87 percent of that containing not more than 97 percent of calcium fluoride (metallurgical grade). Italy was the second largest supplier of imported acid grade during this period, with Spain ranking third; these two countries together supplied about 40 percent of the total imports of acid grade in 1953-58. Spain was the second largest supplier of metallurgical grade fluorspar. West Germany and Canada were the only other significant suppliers of either grade during this period.

^{1/} Acid grade material is very satisfactory, and even preferred, for use in ceramics. Because of the lower duty levied on acid grade, virtually all of the imported material used by the ceramics industry is acid grade fluorspar.

During the 3-year period 1959-61, Mexico continued as the major supplier of both grades of fluorspar, furnishing 43 percent of the imports of acid grade and 93 percent of the imports of the metallurgical grade (tables 14-16).

The completed and the contemplated construction of hydrofluoric acid production facilities in Texas and Louisiana should result in Mexico's supplying a larger part of future U.S. requirements for acid grade fluorspar. The proposed increase in the Mexican export tax on fluorspar, if put into effect, however, would reduce the present price advantage in those States of the Mexican material over that available from Europe.

Of approximately 840,000 tons of fluorspar imported for the account of the Government during the years 1953-61, about half came from Mexico, with Italy and Canada supplying most of the remainder.

Most of the acid grade fluorspar imported for the Government stockpile in recent years has come from Italy and Mexico; such imports from these 2 countries averaged over 70,000 tons annually during the 4-year period 1958-61. Whether fluorspar, as well as other materials, will be imported for stockpiling in the future will depend upon the decision by the Congress, which now has the broad stockpiling program under review.

Methods and costs of importing.--In 1961, as in 1959, about 25 firms imported fluorspar. Most of them, almost all of which are

^{1/} These ratios are based on data that include the duty-free imports for the Government stockpile.

located in New York City, Cleveland, Cincinnati, and Philadelphia and along the Mexican border, operate as merchant importers or brokers. Virtually all of their imports have been of finished fluorspar. Only one industrial consumer imports any appreciable quantity for its own use. This consumer has its own source of foreign material and operates a bonded flotation mill in Texas using Mexican ores. Another domestic producer-consumer of acid grade produces metallurgical grade fluorspar in Mexico, but sells virtually all of this production through U.S. importers.

European acid grade fluorspar is delivered to the United States in the form of damp filtercake, usually in chartered freighters. The cost of ocean freight from Europe averaged somewhat lower in 1961 than in 1959, as indicated by the following reported average costs per ton for ocean transportation of acid grade fluorspar:

<u>Country of origin</u>	<u>Ocean transportation, average cost per ton</u>		
	<u>1959</u>	<u>1960</u>	<u>1961</u>
Spain-----	\$5.02	\$5.20	\$4.70
Italy-----	4.60	4.69	4.47

Unless the consuming plant has drying facilities, acid grade fluorspar shipped as damp filter cake must be unloaded, shipped to a drying plant and there dried and loaded into hopper cars or trucks for delivery to the consumer. The total cost of this operation, on

a custom basis, was about \$8.50 per ton; consumers' drying costs, however, were substantially less. Additional costs covering customs brokerage, financing, sampling, and assay were small.

For 1961 the average landed, duty-paid costs per short ton of acid grade fluorspar, entered from Spain, Italy, or Mexico (across the border) in the form of damp filtercake for sale to industrial users, were reported by importers as follows:

<u>Item of cost</u>	<u>Spain</u>	<u>Imported from--</u>	
		<u>Italy</u>	<u>Mexico</u>
Invoice cost, f.o.b. point of export-----	\$32.98	\$30.09	\$29.26
Transportation to the United States-----	4.70	4.47	1/
Duty-----	1.88	1.88	1.88
Other costs (partly estimated)-----	.60	.30	.10
Total-----	<u>40.16</u>	<u>36.74</u>	<u>31.24</u>

1/ Inasmuch as these averages relate only to acid grade fluorspar imported across the border there was no cost of transportation from the exporting country to the United States.

It was reported that in 1961 some Mexican acid grade fluorspar in the form of dry concentrate was sold at the Mexican border for about the same price as that for the damp filtercake. In that year, most of the commercial imports from Mexico were of dry material, averaging about \$34 per ton, duty-paid, at the border.

Practically all of the imports of metallurgical grade fluorspar in 1961 came from Mexico. Because barge transportation is used for

about two-thirds of the imports from Mexico that enter at Brownsville, Tex., the chief item of over-the-border costs is that for transferring the metallurgical grade fluorspar from midbridge at Brownsville to barges for water shipment to U.S. steel plants. The reported charge for this service is about \$2 per ton. Other costs incurred after entry at the Mexican border points are minor and, including the bridge toll, probably do not exceed \$1 per ton.

The average duty-paid costs per ton of metallurgical grade fluorspar entered from Mexico in 1959, 1960, and 1961 were reported by importers to have been \$27.50, \$30.42, and \$30.69, respectively.

The bulk of these imports met specifications for a minimum effective calcium fluoride content of 70 or $72\frac{1}{2}$ percent, but actually were somewhat higher than the specified minimum.

U.S. exports

U.S. exports of fluorspar, which have not been important since World War II, declined to less than 500 tons in 1960; during 1961 they amounted to 338 tons (table 3). Most of the small exports have gone to Canada.

Prices and Average Selling Values

Recent trends of prices and average selling values for the three grades of finished fluorspar (acid, ceramic, and metallurgical) are discussed in individual sections below. The prices at which fluorspar is sold are usually determined by negotiated contracts extending for a year or more. The prices at which fluorspar is delivered during a given month or year, therefore, are not necessarily reflected in published price quotations. ^{1/} Nevertheless, these quotations (tables 17 and 18) do reflect the approximate selling prices and the trend of such prices. The published quotations for all grades of domestic fluorspar are given f.o.b. the Illinois-Kentucky district.

For imports, price quotations for the metallurgical grade from Mexico are reported on a duty-paid basis midbridge or barge at Brownsville, Tex. There are no published quotations for acid grade fluorspar from Mexico; prices for this grade quoted by importers are usually for dry material. The published quotations for acid grade entering from Europe are usually for fluorspar in a dry condition, at one of the Wilmington drying plants. Ozark-Mahoning Co. and the St. Lawrence Fluorspar Co. do custom drying in Wilmington, and the Great Lakes St. Lawrence Fluorspar Co. has a drying plant in Cleveland; the two latter companies are affiliated. Some large chemical companies dry the damp filtercake at their own acid plants.

^{1/} The quotations are published in the E & MJ Metal and Mineral Markets.

Some of the purchases of acid grade fluorspar for the Government stockpile have been made at prices appreciably above those for fluorspar sold commercially in order to allow for the amortization of plant facilities.

Acid grade

The cost of the fluorspar used in making hydrofluoric acid represents a substantial part of the cost of producing the acid. Producers of hydrofluoric acid, therefore, consider the accessibility of low-cost fluorspar as an important factor in locating their plants. It is also important for producers of aluminum to obtain fluorspar, as well as bauxite and electric power, at the lowest possible delivered cost.

Data on delivered costs of both domestic and imported acid grade fluorspar, as well as costs at point of shipment in the United States, were reported by 12 consuming plants which together accounted for more than 90 percent of the total domestic consumption of that grade of fluorspar in 1961. The average costs to the consumer, which are the same as average selling values for the producer or importer, are the best measure of the effective selling prices.

The average selling values per ton for both domestic and imported dry acid grade fluorspar at the point of shipment in the United States and delivered to the consumers plant were generally somewhat lower in 1961 than in either 1958 or 1959, as indicated by the following data reported by the major U.S. consumers:

Selling value f.o.b. U.S. shipping point:	<u>Domestic</u>	<u>Imported</u>
1958-----	\$50.00	\$47.44
1959-----	45.00	44.88
1961-----	45.35	43.31
Delivered cost f.o.b. consum- ing plant:		
1938-----	55.75	51.12
1959-----	49.50	48.85
1961-----	49.28	47.26

The average cost to industrial consumers, f.o.b. the border in Texas, for the imported Mexican acid grade fluorspar in 1961, on a dry basis, was \$36.30 per ton, compared with a landed cost of \$48.44 per ton for that imported from Spain, and \$45.29 for imports from Italy (table 19). The lower cost of acid grade fluorspar from Mexico has doubtless been an important factor encouraging several large consumers of acid grade fluorspar to set up new production facilities in Texas.

Ceramic grade

The price of ceramic grade fluorspar varies according to its calcium fluoride content and to the form in which it is sold (in bulk or in bags). Differences between average selling values of domestic and of imported ceramic grade fluorspar, therefore, may reflect differences in the calcium fluoride content as well as differences in the proportions sold in bulk and in bags.

Price quotations for domestic ceramic grade fluorspar in bulk, f.o.b. the Illinois-Kentucky mines, are reported separately in table 18 for (1) fluorspar with a minimum effective calcium fluoride content of 93-94 percent, and (2) that with a minimum effective content of 95 percent. Fluorspar in bags is sold for \$4 to \$5 more per ton. There was a moderate upward trend in prices for domestic ceramic grades of fluorspar during the period 1956-61. Quoted prices for the 93- to 94-percent fluorspar were \$41 per ton in 1956 and \$43-\$45 per ton in 1961; for the 95-percent fluorspar the price quotation was \$43-\$45 per ton in 1956 and \$45-\$48 per ton in 1961.

There are no separate published quotations for imported acid grade fluorspar sold for ceramic use. However, dried acid grade fluorspar, in bulk, was quoted in late 1961, f.o.b. Wilmington, at \$50-\$51 per ton. A direct comparison of the prices or the average selling values of the domestic and the imported fluorspar used for ceramic purposes would have little significance because of differences in grade, packing, and other specifications, as between the domestic and the imported material.

Metallurgical grade

Table 20 shows the shipments (as reported to the Tariff Commission) of domestic and of imported metallurgical grade fluorspar according to the minimum effective calcium fluoride content, together with the average sales values, f.o.b. U.S. point of shipment, for 1959, 1960,

and 1961. More than half of the domestic metallurgical fluorspar shipped to consumers during this 3-year period had a minimum effective calcium fluoride content of 80 percent, and more than half of the shipments of imported metallurgical fluorspar had a minimum effective calcium fluoride content of $72\frac{1}{2}$ percent, a grade not produced domestically in recent years in any appreciable quantities. Domestic production includes a sizable quantity of metallurgical fluorspar (chiefly from Nevada) having a minimum effective calcium fluoride content of 60 percent, a grade which is not imported.

Price quotations from 1956 through 1961 for domestic metallurgical grade fluorspar from the Illinois-Kentucky area remained stable, whereas there was a general upward trend in the prices quoted for this grade imported from Mexico (table 17).

In 1961 the average selling value of the domestic metallurgical grade fluorspar with a minimum effective calcium fluoride content of 70 percent, f.o.b. U.S. shipping point, was \$37.58 per ton; the corresponding average selling value for similar imported material was \$29.19 per ton, and for that with a calcium fluoride content of $72\frac{1}{2}$ percent it was \$35.01 per ton (table 20). The average selling value in 1961 of the domestic fluorspar with a minimum effective calcium fluoride content of 80 percent or more (surface mined in Montana) was lower than either the average selling value of the 70-percent material from the Illinois-Kentucky district or the $72\frac{1}{2}$ -percent material that is imported.

Inasmuch as the metallurgical grade fluorspar from Mexico was of a higher grade than that produced in the Illinois-Kentucky district and supplies in that district were limited, many consumers in such cities as Detroit and Buffalo paid a delivered cost for the Mexican material that was higher than the delivered cost of material from the Illinois-Kentucky district.

U.S. Stocks of Fluorspar

Producers' stocks

Producers' yearend stocks of the acid and ceramic grades of fluorspar have been small relative to shipments, but their stocks of the metallurgical grade have been much larger relative to shipments. For the 3-year period 1959-61 the ratio of yearend stocks to total shipments for the acid and ceramic grades was less than 5 percent, whereas that for the metallurgical grade was 43 percent.

Producers' stocks of acid and ceramic grade fluorspar were larger on December 31, 1961, than 2 years earlier, whereas stocks of the metallurgical grade were lower, as indicated by the following data from the U.S. Bureau of Mines (in thousands of tons):

	<u>1959</u>	<u>1960</u>	<u>1961</u>
Ceramic and acid grade----	6.2	5.3	9.6
Metallurgical grade-----	25.5	18.8	17.4

Consumers' stocks

Stocks of fluorspar held by consumers (table 13) are generally considerably larger than those held by producers. Consumers usually carry stocks of the acid and ceramic grades of fluorspar equivalent, on the average, to 1 to 2 months' consumption; for the metallurgical grade, consumers' stocks average 7 to 9 months' supply. The following data show yearend stocks held by the major industries consuming fluorspar in each of the years 1959-61 (in thousands of tons):

Industry	Stocks of fluorspar on Dec. 31--		
	1959	1960	1961
Hydrofluoric acid-----	40.8	38.9	31.0
Glass and enamel-----	4.8	3.8	4.8
Steel and foundry-----	129.1	162.2	139.2
All other-----	5.1	11.4	8.2
Total-----	179.8	216.3	183.2

The practice by the steel industry of carrying large stocks has enabled it in some years to draw upon these inventories for a substantial part of its needs for metallurgical fluorspar. In 1958, for example, industry stocks declined by 46,000 tons during the year, indicating that withdrawals from stocks supplied about one-fourth of its total consumption in that year; similarly, in 1961, stocks were reduced by 28,000 tons, equivalent to about one-tenth of the consumption that year (table 13).

Stocks of acid and ceramic grade fluorspar (domestic and imported) held by consumers have not been large relative to consumption. For the 3-year period 1959-61 yearend stocks were equivalent to less than 2 months' consumption at the average rate of consumption during that period.

Industry and Trade of Principal Foreign Producing Countries

World production of fluorspar has increased markedly in recent years; in 1960 it was 61 percent greater than the average for the period 1951-55. The 11 principal producing countries in order of their importance as producers in 1960 were Mexico, China, the United States, the U.S.S.R., Italy, West Germany, France, Spain, the Union of South Africa, the United Kingdom, and Canada; these countries together accounted for 86 percent of world production of fluorspar in that year (table 7). Of these countries, only Mexico, Italy, Spain, and China were exporters of substantial quantities of fluorspar.

The highly industrialized nations are the principal consumers of fluorspar, and fluorspar consumption is expected to increase steadily with the growing production of steel, aluminum, and particularly fluorine chemicals. Since World War II, the United States has been the most important fluorspar market of the major exporting countries (excluding China). The share of its total production that each major

supplier exported to the United States in 1960 was, for Mexico, 81 percent; Italy, 93 percent; and Spain, 97 percent.

Mexico

Mexico advanced from an insignificant producer of fluorspar in the early 1940's to the world's largest producer in 1956, and except for 1958 has maintained that position. Because domestic demand in Mexico is small, nearly all of its production of fluorspar is exported; most of its exports are shipped to the United States. The following tabulation shows Mexico's production and exports of fluorspar in each of the years 1958-60 (in thousands of tons):

<u>Year</u>	<u>Production</u>	<u>Exports to--</u>	
		<u>All countries</u>	<u>United States</u>
1958-----	<u>1/</u> 308	310	290
1959-----	362	341	305
1960-----	400	386	313

1/ Revised figure supplied by Camara Minera de Mexico.

Fluorspar deposits are widespread in Mexico, occurring in 16 of the 29 States. Many of these deposits are located in the State of Coahuila near the U.S. border. Deposits of easy-to-mine, surface metallurgical grade fluorspar are being depleted, and in the future, mining companies producing metallurgical grade fluorspar will be confronted with heavier investment costs than has thus far been typical of Mexican operations.

In 1961 the six Mexican flotation mills producing acid grade fluorspar had a combined monthly capacity of about 20,000 tons; the country's capacity will be increased to about 29,000 tons per month in 1962 when the San Francisco Mines of Mexico, Ltd., and Cia Mineral Rio Colorado, S.A., begin milling operations. The former company plans to recover fluorspar by flotation from an available supply of lead-zinc mill tailings averaging 15 percent calcium fluoride.

To assure themselves of adequate and low-cost supplies of acid grade fluorspar, several U.S. companies in recent years have become increasingly interested in the development of Mexican fluorspar operations. The Dow Chemical Co. operates a mill with a monthly capacity of 3,000 tons on the Mexican side of the Rio Grande River, south of Marathon, Tex. This mill ships acid grade fluorspar in both wet filtercake and dry form; the former has been stockpiled for the U.S. Government at Marathon, and the latter shipped by rail from Marathon to a producer of hydrofluoric acid in the Wilmington area.

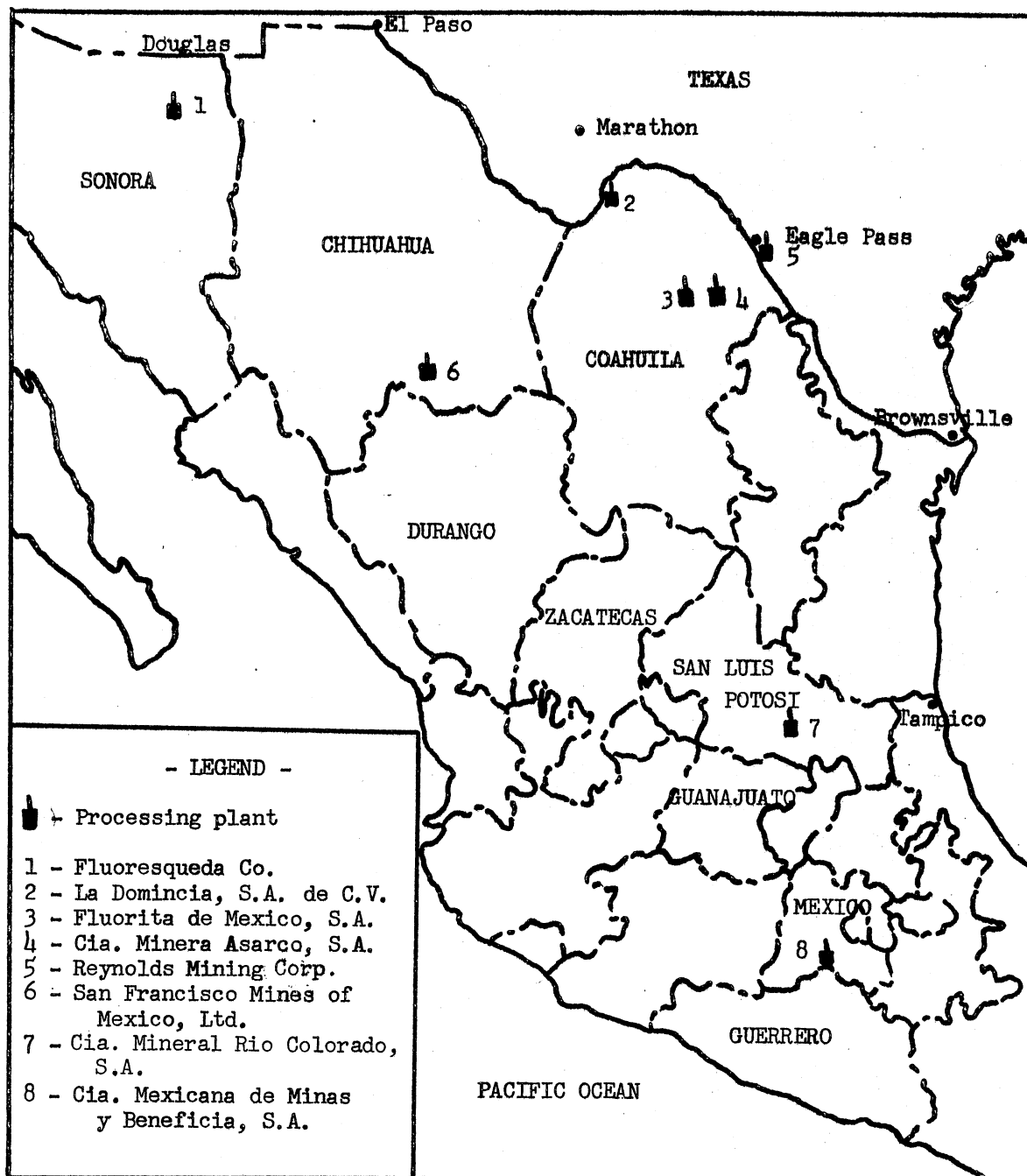
Reynolds Mining Corp. operates a bonded flotation mill at Eagle Pass, Tex., using Mexican ore exclusively. The low-grade ore is imported in bond and, after processing, is withdrawn as dry, acid grade fluorspar; thus, the company pays duty at the lower rate applicable to fluorspar containing more than 97 percent calcium fluoride. The bulk of this fluorspar is shipped to the company's aluminum reduction plant at Bauxite, Ark.

The locations (see map on p. 63) and approximate capacities of the eight mills which are now or will be producing acid grade fluorspar in 1962 from Mexican ore are given below:

Mexican mill and associated U.S. concern	Location	Estimated monthly capacity 1/ Tons
Fluoresqueda Co.	Esqueda, Sonora, Mexico.	2,750
La Dominica, S.A. de C.V. (Dow Chemical Co.).	Stillwell's Crossing, Coahuila, Mexico.	3,000
Reynolds Mining Corp. (Reynolds Metals Co.).	Eagle Pass, Tex.	2,500
Fluorita de Mexico, S.A. (Con- tinental Ore Corp.).	Muzquiz, Coahuila, Mexico.	6,500
Cia. Minera Asarco, S.A. (Amer- ican Smelting & Refining Co.).	Agujita, Coahuila, Mexico.	3,500
Cia. Mexicana de Minas y Beneficia, S.A.	Taxco, Guerrero, Mexico.	1,500
Cia. Mineral Rio Colorado, S.A. (Allied Chemical Corp.).	Rio Verde, San Luis Potosi, Mexico.	3,750
San Francisco Mines of Mexico, Ltd. (American Metal Climax, Inc.).	Hidalgo del Parral, Chihuahua, Mexico.	5,000

1/ Estimated by the U.S. Tariff Commission on the basis of information obtained from trade sources.

Locations of Plants Producing Acid Grade Fluorspar From Mexican Ore



Mexico will become a more important consumer of fluorspar in the future. The hydrofluoric acid plant of Fluor-Mex, S.A., a subsidiary of Stauffer Chemical Co. located in San Luis Potosi, was completed in 1961. Its production goes to Petroleas Mexicanos (Pemex) for use as a catalyst in the production of high-octane gasoline. In 1962, Allied Chemical Corp.'s General Chemical Division and Celulosa y Derivados, S.A., began a joint venture for the production of fluorinated hydrocarbons. The fluorspar for this operation will be supplied by the new El Refugio mines in Guanajuato and milled at General Chemical's plant in Rio Verde, San Luis Potosi.

Mexico assesses an export duty of $7\frac{1}{2}$ percent ad valorem on all fluorspar exports, based on either commercial invoice values or the official valuations, whichever is the higher. The official valuation provides a minimum base for calculating the export duty. In April 1962 the official valuation was 357 pesos (equivalent to \$28.63) per metric ton for acid grade fluorspar and 212.50 pesos equivalent to \$17.04) per metric ton for metallurgical grade fluorspar. The resultant export duty on acid grade fluorspar was \$1.95 per ton, which is slightly in excess of the U.S. import duty (\$1.875) on the same grade. The calculated export duty for the metallurgical grade was \$1.16 per ton, compared with the U.S. import

duty of \$7.50. The Mexican Government is currently studying the possibility of increasing the export tax on both grades of fluorspar.

Imports of fluorspar into Mexico are negligible, and that country assesses a single duty on fluorspar, regardless of grade. The duty is 2 centavos per kilogram plus 4 percent ad valorem, based on either commercial import values or an official valuation of 50 centavos per kilogram. Using the official valuation, this compound duty is calculated to be at least \$3.20 per metric ton (equivalent to \$2.91 per short ton).

Italy

Most of the fluorspar produced in Italy comes from the northern Provinces, but some is produced on the Island of Sardinia. There have been no important discoveries of fluorspar deposits in Italy since 1954. Italian fluorspar production has increased in recent years, owing primarily to an expanding demand for exports, but also to development loan funds made available by the United States. These funds were made repayable in shipments of acid grade fluorspar to the U.S. Government stockpile.

During 1954-60 Italy was the second largest supplier of U.S. imports of fluorspar. ^{1/} Nearly half of the fluorspar imported from

^{1/} In 1961, U.S. imports from Spain exceeded those from Italy and the latter country dropped to third position among the supplying countries.

Italy in these years was purchased for the U.S. Government stockpile. The great bulk of the shipments from Italy to the United States have consisted of acid grade filtercake. Italian production and exports of fluorspar in 1958-60 are shown below (in thousands of tons):

<u>Year</u>	<u>Production</u>	<u>Exports to--</u>	
		<u>All countries</u>	<u>United States</u>
1958-----	163	91	77
1959-----	174	134	131
1960-----	167	79	73

U.S. import data for 1961 indicate a further decline in Italian exports to the United States in that year. Since 1958 some of the Italian exports of fluorspar have gone to West Germany, where domestic production can no longer compete with imported fluorspar. It is expected that in the future an increasing European demand, coupled with depletion of Italian fluorspar deposits, will result in Italy's becoming a less important supplier to the United States.

There are no export taxes on Italian fluorspar. Imports of fluorspar into Italy during the years 1956-59 were negligible relative to exports. The import duty is 5.4 percent ad valorem for all grades from members of the European Economic Community and 7.0 percent ad valorem for all grades imported from all other countries. In addition, there is a sales tax of 3.3 percent of the duty-paid value, regardless of the source of the fluorspar, and a "compensatory tax" of 2 percent on the sum of the sales value plus the duty.

Spain

The production of fluorspar in Spain was stimulated by a \$400,000 loan in 1954 from the Export-Import Bank to Fluoruros, S.A., the principal Spanish producer. The money was used to improve production facilities for both metallurgical and acid grade fluorspar.

In 1961, there were three large mills producing acid grade fluorspar, two located on the Bay of Biscay and one in eastern Spain on the Mediterranean Sea. Plans for two additional mills are now under consideration.

Except for a small decline in 1959, production of fluorspar in Spain has increased in each year since 1951. The 1960 production of 119,036 tons was 74 percent greater than the annual average in the period 1951-55. The bulk of this production, including both acid and metallurgical grade fluorspar, is exported, principally to the United States. Total exports and exports to the United States increased significantly between 1959 and 1961, owing partly to a renewal of purchases by the U.S. Government; in 1961 Spain became the second largest supplier of fluorspar imported into the United States. Spain's production and exports of fluorspar in 1958-60 are shown below (in thousands of tons):

<u>Year</u>	<u>Production</u>	<u>Exports to--</u>	
		<u>All countries</u>	<u>United States</u>
1958-----	100	72	65
1959-----	98	70	58
1960-----	119	112	1/ 85

1/ U.S. imports from Spain. Spanish export data by country of destination were unavailable at the time of writing.

Spain imposes no export taxes on fluorspar. The import duty is 30 percent on the c.i.f. value, plus a 7-percent fiscal tax on the duty-paid value.

West Germany

The production of fluorspar in West Germany has declined in recent years (from 191,000 tons in 1954 to an annual average of 130,000 tons in 1958-60) owing primarily to the lower calcium fluoride content of the ore deposits mined. This, coupled with an increasing domestic demand, has caused West Germany to become a net importer of fluorspar since 1958.

The decline of fluorspar exports by more than one-third from 1958 to 1959 is attributable almost entirely to the cessation of sales to the United States, where buyers apparently preferred the less expensive material from Italy and Spain. In 1960 and 1961 West Germany again exported small tonnages of fluorspar (all acid grade) to the United States.

The West German import duty on fluorspar in 1961 was 2 percent based on the landed cost from members of the Common Market and 3 percent from other countries. In addition, there is a "turnover equalization tax" of 4 percent on the duty-paid value.

Canada

In mid-1957 the U.S. Government terminated its contract with the St. Lawrence Corp. of Newfoundland, Ltd., and Canadian

production of fluorspar in that year showed a sharp decline from the 1956 high of 140,000 tons. Production declined still further in 1958 to 62,000 tons and then increased to 78,000 tons in 1960. The bulk of Canadian output since 1959 has been produced by Newfoundland Fluorspar Ltd., a wholly-owned subsidiary of the Aluminum Co. of Canada, Ltd. ^{1/} This company ships most of its output of heavy-media concentrates to Quebec, where it is processed by flotation to produce acid grade fluorspar for use by the Aluminum Co. of Canada, Ltd. After a closure of almost 3 years, the St. Lawrence Corp. of Newfoundland resumed operations in mid-1960, exporting most or all of its output to the United States.

Canada imposes neither an export tax nor an import duty on fluorspar.

^{1/} Controlled by Aluminium, Ltd.

APPENDIX A
SENATE RESOLUTION 206

87TH CONGRESS
1ST SESSION

S. RES. 206

[Report No. 1103]

IN THE SENATE OF THE UNITED STATES

SEPTEMBER 11, 1961

Mr. DIRKSEN (for himself, Mr. MANSFIELD, Mr. COOPER, Mr. MORTON, Mr. ALLOTT, and Mr. DWORSHAK) submitted the following resolution; which was referred to the Committee on Finance

SEPTEMBER 21, 1961

Reported by Mr. BYRD of Virginia, with amendments

SEPTEMBER 23, 1961

Considered, amended, and agreed to; preamble agreed to

RESOLUTION

Whereas, pursuant to a resolution of the Senate Committee on Finance, dated August 14, 1954, the United States Tariff Commission made an investigation under section 332 of the Tariff Act of 1930, of the domestic fluorspar industry and submitted a report of the results thereof to the said committee on June 6, 1955, and the Senate of the United States subsequently on August 21, 1959, by S. Res. 163, directed the United States Tariff Commission to bring up to date said report and to submit its findings not later than February 21, 1960; and

Whereas, pursuant to a resolution of the United States Senate adopted August 21, 1959, the United States Tariff Commission was directed to make a supplemental investigation of conditions in the lead and zinc industry and to bring up to date its report on lead and zinc which had previously been made on April 19, 1954; and

Whereas, pursuant to a resolution of the Senate Committee on Finance, dated March 17, 1958, the United States Tariff Commission made an investigation under section 332 of the Tariff Act of 1930, of the domestic mercury (quicksilver) industry and submitted a report of the results thereof to the said committee on December 1, 1958; and

Whereas the industries producing manganese, cobalt, and beryllium are becoming more and more distressed and such distress could have an effect on our national security: Now, therefore, be it

1 *Resolved*, That the United States Tariff Commission is
2 hereby directed, pursuant to section 332 of the Tariff Act
3 of 1930, to make further studies and bring up to date the
4 reports on lead, zinc, mercury, and fluorspar and to report
5 to the Congress on or before May 15, 1962, and to conduct
6 investigations of conditions in the industries producing
7 manganese, cobalt, and beryllium and report to Congress
8 not later than August 31, 1962.

9 The supplemental reports and new reports shall include
10 a summary of the facts obtained in the investigation, in-
11 cluding a description of the domestic industry, domestic
12 production, foreign production, imports, consumption, chan-
13 nels and methods of distribution, United States exports, and
14 other factors affecting the competition between domestic
15 and imported products. In the course of the investigations,
16 the Commission shall hold hearings, giving adequate oppor-

1 tunity to interested parties to appear and be heard, except
2 that in the case of lead, zinc, mercury, and fluorspar where
3 reports are being brought up to date, the matter of further
4 hearings shall be left to the discretion of the Tariff Commis-
5 sion.

APPENDIX B
STATISTICAL TABLES

Table 1.--Fluorspar: U.S. rates of duty under the Tariff Act of 1930 and under that act as modified to May 1962

Tariff paragraph and description	Tariff Act of 1930			
	Statutory rate	Trade-agreement modification		
		Rate	Effective date and trade agreement	
Par. 207:				
Fluorspar:				
Containing more than 97 per- cent of calcium fluoride.	\$5.60 per long ton ^{1/} (\$5.00 per short ton).	\$4.20 per long ton (\$3.75 per short ton).	1/1/39; United Kingd	
		\$4.20 per long ton (\$3.75 per short ton).	1/30/43; Mexico.	
		\$5.60 per long ton (\$5.00 per short ton).	1/1/51; termination trade agreement w Mexico.	
		\$2.10 per long ton (\$1.875 per short ton).	6/6/51; GATT. ^{2/}	
Containing not more than 97 percent of calcium fluoride.	\$8.40 per long ton (\$7.50 per short ton).	\$6.30 per long ton (\$5.625 per short ton).	1/30/43; Mexico.	
		\$8.40 per long ton (\$7.50 per short ton).	1/1/51; termination trade agreement w Mexico.	

^{1/} Currently applicable to the products of Communist-dominated countries (except Poland) or areas designated (during 1951-53) by the President pursuant to sec. 5 of the Trade Agreements Extension Act of 1951.

^{2/} General Agreement on Tariffs and Trade.

Table 2.--Fluorspar: Average ad valorem equivalents of the 1962
U.S. rates of duty, by tariff classes, based on values of dutiable
imports, 1950-61

(In percentages)			
Year	: Containing more than : 97 percent of : calcium fluoride	:	: Containing not more than : 97 percent of : calcium fluoride
1950-----	: 8.0	:	: 59.4
1951-----	: 6.0	:	: 43.8
1952-----	: 4.3	:	: 37.6
1953-----	: 4.9	:	: 41.3
1954-----	: 5.4	:	: 47.4
1955-----	: 6.1	:	: 56.0
1956-----	: 6.3	:	: 52.3
1957-----	: 6.4	:	: 48.5
1958-----	: 6.6	:	: 49.0
1959-----	: 6.7	:	: 46.2
1960 1/-----	: 6.6	:	: 45.1
1961 1/-----	: 6.3	:	: 37.9

1/ Preliminary.

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

Table 3.--Fluorspar: U.S. consumption, production (shipments), stocks, imports for consumption, exports of domestic merchandise, and supply, 1953-61

Year	Consumption 1/		Production 2/		Industry stocks at end of period 3/		Imports for consumption 4/		Domestic exports 5/		Supply 6/		Ratio of imports to--	
	Short tons		Short tons		At producers' mines	At consumers' plants	Short tons		Short tons		Short tons		Percent	Percent
1953	586,798		318,036		31,896	227,511	359,741		767		677,010		113.1	53.1
1954	480,374		245,628		26,370	143,813	293,320		643		538,305		119.4	54.5
1955	570,261		279,540		23,439	140,577	363,496		873		642,163		130.0	56.6
1956	621,354		329,719		21,794	189,679	485,552		197		815,074		147.3	59.6
1957	644,688		328,872		17,329	227,990	631,368		754		959,486		192.0	65.8
1958	494,227		319,513		18,677	185,291	392,164		3,374		708,303		122.7	55.4
1959	589,979		185,091		21,417	179,771	555,751		1,144		739,698		300.3	75.1
1960 7/	8/ 649,042		8/ 229,996		24,155	218,211	8/ 510,836		458		8/ 740,374		222.1	69.0
1961 7/	676,095		197,313		26,978	183,248	506,021		338		702,996		256.5	72.0

1/ As reported to the U.S. Bureau of Mines by consumers; excludes purchases by the U.S. Government.

2/ Shipments by domestic producers; includes shipments for the account of the U.S. Government.

3/ Finished fluorspar.

4/ Includes imports entered free of duty for U.S. Government use, largely acid grade fluorspar, as follows:

Short tons		Short tons	
Year		Year	
1953	107,719	1958	80,009
1954	50,774	1959	77,831
1955	12,412	1960 (preliminary)	70,431
1956	48,550	1961 (preliminary)	104,181
1957	143,851		

5/ Partly estimated.

6/ Represents production (shipments) plus net imports (imports less exports).

7/ Preliminary.

8/ Revised.

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

Table 4.--Fluorspar: U.S. consumption, by grades and industries, 1957-61

Grade and year	Hydrofluoric acid	Glass	Enamel	Steel	Foundry	All other	Total
Quantity (short tons)							
Acid grade:							
1957-----	328,672	3,221	118	-	-	2,713	334,724
1958-----	258,935	3,916	125	-	-	2,972	265,948
1959-----	324,519	3,864	185	-	-	3,367	331,935
1960 1/-----	372,654	3,874	135	-	-	2,913	379,576
1961 1/-----	412,555	2/3,037	3/	-	-	2,738	418,330
Ceramic grade:							
1957-----	-	27,899	4,314	-	-	9,255	41,468
1958-----	-	25,123	4,776	-	-	6,673	36,572
1959-----	-	25,560	5,561	-	-	8,214	39,335
1960 1/-----	-	22,396	4,676	-	-	7,182	34,254
1961 1/-----	-	24,301	4,683	-	-	8,680	37,664
Metallurgical grade:							
1957-----	-	1,017	800	243,108	15,382	8,189	268,496
1958-----	-	824	88	174,508	12,883	3,404	191,707
1959-----	-	751	5	194,230	13,529	10,194	218,709
1960 1/-----	-	687	4	214,563	11,810	2,865	229,929
1961 1/-----	-	2/887	3/	204,842	10,053	4,329	220,111
All grades:							
1957-----	328,672	32,137	5,232	243,108	15,382	20,157	644,688
1958-----	258,935	29,863	4,989	174,508	12,883	13,049	494,227
1959-----	324,519	30,175	5,751	194,230	13,529	21,775	589,979
1960 1/-----	372,654	26,957	4,815	214,563	11,810	12,960	643,759
1961 1/-----	412,555	4/28,215	4,683	204,842	10,053	15,747	676,095
Percent of total							
Acid grade:							
1957-----	98.2	2/1.0	5/	-	-	0.8	100.0
1958-----	97.4	1.5	2/	-	-	1.1	100.0
1959-----	97.8	1.1	0.1	-	-	1.0	100.0
1960 1/-----	98.2	1.0	5/	-	-	.8	100.0
1961 1/-----	98.6	2/ .7	3/	-	-	.7	100.0
Ceramic grade:							
1957-----	-	67.3	10.4	-	-	22.3	100.0
1958-----	-	68.7	13.1	-	-	18.2	100.0
1959-----	-	65.0	14.1	-	-	20.9	100.0
1960 1/-----	-	65.4	13.7	-	-	20.9	100.0
1961 1/-----	-	64.5	12.4	-	-	23.1	100.0
Metallurgical grade:							
1957-----	-	.4	5/ .3	90.5	5.7	3.1	100.0
1958-----	-	.4	5/	91.0	6.7	1.9	100.0
1959-----	-	.3	5/	88.8	6.2	4.7	100.0
1960 1/-----	-	.3	5/	93.3	5.1	1.3	100.0
1961 1/-----	-	2/ .4	3/	93.1	4.6	1.9	100.0
All grades:							
1957-----	51.0	5.0	.8	37.7	2.4	3.1	100.0
1958-----	52.4	6.0	1.0	35.3	2.6	2.7	100.0
1959-----	55.0	5.1	1.0	32.9	2.3	3.7	100.0
1960 1/-----	57.9	4.2	.7	33.3	1.8	2.1	100.0
1961 1/-----	61.0	4/4.2	.7	30.3	1.5	2.3	100.0

1/ Preliminary.

2/ Includes fluorspar consumption at enamel plants.

3/ Included with fluorspar consumption in the glass industry.

4/ Includes consumption of acid grade and metallurgical grade fluorspar at enamel plants.

5/ Less than 0.05 percent.

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

Table 5.---Fluorspar: Shipments of domestic and imported material to industrial users in the United States, by grades, 1959-61

Grade	1959		1960		1961	
	Domestic ^{1/} : Imported ^{2/} :	Total shipments	Domestic ^{1/} : Imported ^{2/} :	Total shipments	Domestic ^{1/} : Imported ^{2/} :	Total shipments
	Quantity (short tons)					
Acid-----	116,287 : 240,619 :	356,906 :	141,571 : 248,630 :	390,201 :	127,581 : 238,375 :	365,956
Ceramic-----	26,008 : 22,343 :	48,351 :	28,054 : 21,457 :	49,511 :	26,224 : 16,055 :	42,279
Metallurgical-----	34,844 : 163,976 :	198,820 :	55,586 : 192,584 :	248,170 :	38,558 : 147,737 :	186,295
Total-----	177,139 : 426,938 :	604,077 :	225,211 : 462,671 :	687,882 :	192,363 : 402,167 :	594,530
	Percent of total shipments					
Acid-----	32.6 : 67.4 :	100.0 :	36.3 : 63.7 :	100.0 :	34.9 : 65.1 :	100.0
Ceramic-----	53.8 : 46.2 :	100.0 :	56.7 : 43.3 :	100.0 :	62.0 : 38.0 :	100.0
Metallurgical-----	17.5 : 82.5 :	100.0 :	22.4 : 77.6 :	100.0 :	20.7 : 79.3 :	100.0
Average-----	29.3 : 70.7 :	100.0 :	32.7 : 67.3 :	100.0 :	32.4 : 67.6 :	100.0
	Percent of all grades					
Acid-----	65.6 : 56.4 :	59.1 :	62.9 : 53.8 :	56.7 :	66.3 : 59.3 :	61.6
Ceramic-----	14.7 : 5.2 :	8.0 :	12.4 : 4.6 :	7.2 :	13.7 : 4.0 :	7.1
Metallurgical-----	19.7 : 38.4 :	32.9 :	24.7 : 41.6 :	36.1 :	20.0 : 36.7 :	31.3
Total-----	100.0 : 100.0 :	100.0 :	100.0 : 100.0 :	100.0 :	100.0 : 100.0 :	100.0

^{1/} Includes commercial shipments by independent (and captive, if any) producers and intracompany shipments by captive producers; does not include shipments to the U.S. Government.

^{2/} Shipments of imported acid grade fluorspar for ceramic uses included in shipments of ceramic grade.

Source: Compiled from data submitted to the U.S. Tariff Commission by importers and by domestic producers.

Note.---Shipments were reported to the Tariff Commission by importers that accounted for 90 percent of the imports of fluorspar containing more than 97 percent calcium fluoride (almost all of which is sold as acid and ceramic grade) during 1959-61, and 94 percent of the imports of fluorspar containing not more than 97 percent calcium fluoride (sold as metallurgical grade) during that period.

Table 6.--Fluorspar: Percentage distribution of industrial shipments of domestic and imported material, by grades and by States of destination, 1959-61

Region and State	1959			1960			1961		
	Acid	Ceramic	Metallurgical	Acid	Ceramic	Metallurgical	Acid	Ceramic	Metallurgical
New England: Connecticut	-	0.3	-	-	0.9	-	-	1.1	-
Middle Atlantic:	-	-	-	-	-	-	-	-	-
New York	-	6.2	5.1	-	3.2	4.9	-	7.5	2.4
New Jersey and Delaware	28.5	10.4	-	25.2	9.8	-	35.0	8.6	-
Pennsylvania	.1	19.2	31.7	.3	19.9	31.8	.6	16.2	19.0
East North Central:	-	-	-	-	-	-	-	-	-
Ohio	6.9	12.5	15.9	8.5	12.6	9.8	7.9	14.5	10.3
Indiana	-	8.3	2.5	-	9.0	5.7	-	7.8	4.3
Illinois	17.4	7.7	12.5	18.3	6.3	8.5	12.4	8.4	15.4
Michigan	.8	2.0	6.5	1.8	2.3	8.6	.4	2.1	10.9
West North Central:	-	-	-	-	-	-	-	-	-
Missouri	-	-	2.3	-	-	1.2	-	-	1.5
South Atlantic:	-	-	-	-	-	-	-	-	-
Maryland	-	3.9	-	-	3.7	-	-	5.0	-
West Virginia	4.3	10.2	.7	6.0	8.2	.1	7.6	5.1	.6
South Carolina	-	3.0	-	-	3.9	-	-	1.8	-
East South Central:	-	-	-	-	-	-	-	-	-
Kentucky	9.1	3.0	-	8.4	5.0	-	10.2	3.4	-
Tennessee	-	2.2	-	-	2.6	-	-	2.3	-
Alabama	-	-	1.7	-	-	5.2	-	-	5.3
West South Central:	-	-	-	-	-	-	-	-	-
Arkansas	10.5	-	-	6.7	-	-	2.2	-	-
Louisiana	9.2	-	-	10.2	-	-	6.3	-	-
Oklahoma	-	4.1	-	-	2.9	-	-	3.6	-
Texas	5.7	.9	1.3	7.7	.8	7.0	10.7	1.3	9.2
Mountain: Utah	-	-	4.2	-	-	4.9	-	-	2.8
Pacific: California	6.4	2.2	6.1	4.9	2.2	6.6	5.3	2.5	10.3
All other States	1.1	3.9	9.5	2.0	6.7	5.7	1.4	8.8	8.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Compiled from data submitted to the U.S. Tariff Commission by importers and by domestic producers that accounted for substantially all the industrial shipments of fluorspar in the period covered.

Table 7.--Fluorspar, all grades: World production, by principal producing countries, 1956-60

Country	1956	1957	1958	1959 <u>1/</u>	1960 <u>1/</u>
	Quantity (1,000 short tons)				
Canada-----	140 :	66 :	<u>2/</u> 62 :	<u>2/</u> 74 :	<u>2/</u> 78
France-----	93 :	120 :	107 :	99 :	132
Italy-----	138 :	159 :	163 :	174 :	167
Mexico-----	345 :	<u>3/</u> 436 :	<u>3/</u> 308 :	362 :	400
Spain-----	81 :	97 :	100 :	98 :	119
Union of South Africa-----	35 :	35 :	48 :	70 :	114
United Kingdom-----	103 :	104 :	87 :	93 :	109
United States-----	330 :	329 :	320 :	185 :	230
U.S.S.R. <u>2/</u> -----	165 :	165 :	180 :	190 :	210
West Germany-----	161 :	149 :	130 :	126 :	133
China <u>2/</u> -----	145 :	165 :	165 :	220 :	275
All other-----	139 :	160 :	166 :	164 :	193
World total-----	1,875 :	<u>4/</u> 1,985 :	<u>4/</u> 1,836 :	1,855 :	2,160
	Percent of total				
Canada-----	7.5 :	3.3 :	<u>2/3.</u> 4 :	<u>2/</u> 4.0 :	<u>2/</u> 3.6
France-----	5.0 :	6.0 :	5.8 :	5.3 :	6.1
Italy-----	7.4 :	8.0 :	8.9 :	9.4 :	7.7
Mexico-----	18.4 :	22.0 :	16.8 :	19.5 :	18.5
Spain-----	4.3 :	4.9 :	5.4 :	5.3 :	5.5
Union of South Africa-----	1.9 :	1.8 :	2.6 :	3.8 :	5.3
United Kingdom-----	5.5 :	5.2 :	4.7 :	5.0 :	5.1
United States-----	17.6 :	16.6 :	17.4 :	10.0 :	10.7
U.S.S.R. <u>2/</u> -----	8.8 :	8.3 :	9.8 :	10.2 :	9.7
West Germany-----	8.6 :	7.5 :	7.1 :	6.8 :	6.2
China <u>2/</u> -----	7.7 :	8.3 :	9.0 :	11.9 :	12.7
All other-----	7.3 :	8.1 :	9.1 :	8.8 :	8.9
World total-----	100.0 :	100.0 :	100.0 :	100.0 :	100.0

1/ Preliminary.2/ Estimated.3/ Revised figure supplied by Camara Minera de Mexico.4/ Revised.

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

Table 8.--Fluorspar: U.S. production (shipments), total and by principal producing States, 1953-61

Year	Total	(In short tons)								All other
		Illinois	Kentucky	Colorado	New Mexico	Utah	Nevada	Montana	Arizona	
1953	318,036	163,303	47,244	53,276	11,890	15,527	1/ 18,487	5,932	1,951	426
1954	245,628	107,830	35,831	59,197	8,876	4,403	2/ 14,389	15,102	3/	-
1955	279,540	166,337	8,899	4/ 71,753	5/	7,328	5/	25,223	5/	-
1956	329,719	178,254	14,865	4/ 66,244	5/	10,581	5/	59,775	5/	-
1957	328,872	169,939	20,626	4/ 62,881	5/	11,087	5/	64,339	5/	-
1958	319,513	152,087	25,861	4/ 71,802	5/	16,109	5/	53,654	5/	-
1959	185,091	112,469	18,579	6/	200	6/	16,743	18,542	-	18,558
1960 7/	229,782	134,529	25,855	6/	-	1,912	18,505	31,273	-	17,708
1961 7/	192,363	110,355	35,350	6/	-	6/	16,086	14,903	-	15,669

1/ Includes shipments from Idaho.

2/ Includes shipments from Arizona and Idaho.

3/ Included with Nevada.

4/ Includes shipments from California, New Mexico, Arizona, and Nevada.

5/ Included with Colorado.

6/ Included in "All other."

7/ Preliminary.

8/ Represents nearly complete coverage of the domestic industry.

Source: 1953-60, compiled from official statistics of the U.S. Bureau of Mines; 1961, compiled from data supplied to the U.S. Tariff Commission by domestic producers.

Table 9. --Average number of employees and of production and related workers in the U.S. fluorspar mining and processing industry, 1956-61, and by months, 1958 and 1961 ^{1/}

Period	All employees	Production and related workers ^{2/} at--	
		Mines	Mills
1956-----	1,025	469	391
1957-----	1,094	505	396
1958-----	1,059	499	378
1959-----	745	377	227
1960-----	817	445	231
1961-----	813	455	232
1958:			
January-----	1,114	523	415
February-----	1,104	522	408
March-----	1,100	519	392
April-----	1,057	495	380
May-----	1,089	530	380
June-----	1,090	519	382
July-----	1,101	504	401
August-----	1,055	489	377
September-----	1,050	497	366
October-----	993	466	352
November-----	989	467	349
December-----	968	449	347
1961:			
January-----	842	474	239
February-----	854	481	244
March-----	836	467	242
April-----	838	473	240
May-----	771	431	217
June-----	788	441	223
July-----	787	438	224
August-----	789	441	225
September-----	836	467	245
October-----	820	466	233
November-----	788	441	226
December-----	790	443	226

^{1/} The domestic producers that reported the employment data presented herein accounted for approximately 90 percent of both the total crude fluorspar mined and the finished fluorspar shipped in the year 1958, and for more than 95 percent of the 1961 totals.

^{2/} Production and related workers include all employees at the mines and mills except supervisory personnel above the working foreman level, salesmen, and general office workers.

Source: Compiled from data submitted to the U.S. Tariff Commission by the domestic producers.

Table 10.--Reported number of employees in U.S. fluorspar mines and mills, by regions and by months, 1958 and 1961

Year and month	Illinois-Kentucky region			Western States ^{1/}		
	All employees	Production and related workers		All employees	Production and related workers	
		Mines	Mills		Mines	Mills
1958:						
January-----	916	437	327	198	86	88
February-----	913	438	324	191	84	84
March-----	914	436	312	186	83	80
April-----	865	410	296	192	85	84
May-----	860	406	298	229	124	82
June-----	861	396	299	229	123	83
July-----	865	386	310	236	118	91
August-----	813	369	282	242	120	95
September-----	802	370	271	248	127	95
October-----	792	368	271	201	98	81
November-----	790	368	271	199	99	78
December-----	782	360	272	186	89	75
Average----	848	395	294	211	104	84
1961:						
January-----	759	417	224	83	57	15
February-----	772	425	229	82	56	15
March-----	759	414	229	77	53	13
April-----	764	423	228	74	50	12
May-----	695	380	204	76	51	13
June-----	695	378	204	93	63	19
July-----	694	377	205	93	61	19
August-----	696	380	206	93	61	19
September-----	744	407	226	92	60	19
October-----	735	412	216	85	54	17
November-----	703	385	211	85	56	15
December-----	707	388	211	83	55	15
Average----	727	398	216	85	56	16

^{1/} Montana, Colorado, Utah, and Nevada.

Source: Compiled from data submitted to the U.S. Tariff Commission by domestic producers.

Table 11--Employment of production and related workers, man-hours worked, wages paid, and average hourly earnings in U.S. fluorspar mines and mills, total and by regions, and average hourly earnings in all nonmetallic mining and quarrying in the United States, 1956-61

Item	United States total						Illinois-Kentucky						Western States 1/					
	1956	1957	1958	1959	1960	1961	1956	1957	1958	1959	1960	1961	1956	1957	1958	1959	1960	1961
Mines:																		
Number of concerns reporting 2/	12	13	12	13	14	12	7	8	8	8	9	7	6	6	5	6	6	5
Average number of workers	469	505	499	377	445	455	365	411	395	308	381	398	104	94	104	69	64	57
Man-hours worked thousands	995	1,083	1,038	722	834	915	762	873	813	594	702	808	233	210	225	128	132	107
Wages paid, total 1,000 dollars	1,839	2,068	2,079	1,420	1,703	1,910	1,331	1,592	1,531	1,125	1,394	1,652	508	476	548	295	309	259
Average hourly earnings 3/	\$1.85	\$1.91	\$2.00	\$1.97	\$2.04	\$2.09	\$1.75	\$1.82	\$1.88	\$1.89	\$1.98	\$2.04	\$2.18	\$2.27	\$2.43	\$2.30	\$2.35	\$2.41
Mills:																		
Number of concerns reporting 2/	7	9	8	8	8	9	5	6	6	7	7	7	3	4	3	3	2	3
Average number of workers	391	396	378	227	231	232	307	309	294	204	212	216	84	87	84	23	19	16
Man-hours worked thousands	840	861	799	464	489	438	644	658	607	420	453	409	196	203	192	44	36	29
Wages paid, total 1,000 dollars	1,446	1,556	1,483	861	937	861	1,071	1,152	1,098	766	855	796	375	404	385	95	82	65
Average hourly earnings 3/	\$1.72	\$1.81	\$1.86	\$1.86	\$1.92	\$1.97	\$1.66	\$1.75	\$1.81	\$1.82	\$1.89	\$1.94	\$1.91	\$1.99	\$2.00	\$2.18	\$2.25	\$2.26
Average hourly earnings: in all nonmetallic mining and quarrying in the United States 4/	\$1.88	\$1.96	\$2.04	\$2.13	\$2.21	5/	5/	5/	5/	5/	5/	5/	5/	5/	5/	5/	5/	5/

1/ Montana, Colorado, Utah, and Nevada.

2/ 1 concern operated fluorspar mines and mills both in the Illinois-Kentucky region and in the Western States. This concern provided separate employment and wage data for each of the 2 regions, and such data are included in the table.

3/ Computed from unrounded figures.

4/ Data from U.S. Bureau of Labor Statistics, revised on the basis of the 1957 Standard Industrial Classification.

5/ Not available.

Source: Compiled from data supplied to the U.S. Tariff Commission by domestic producers, except as noted.

Table 12.--Fluorspar: Profit-and-loss experience before income taxes, reported for a specified number of independent U.S. mine and mill operators, 1956-61 ^{1/}

(Money figures in thousands of dollars)							
Item	1956	1957	1958	1959	1960	1961	
Total mine and mill operators reporting:							
Number of operators-----	9	10	11	8	9	9	
Percent of total value of the sales by independent producers of domestic finished fluorspar accounted for by reporting operators-----	90.0	96.0	94.0	93.0	95.0	93.0	
Net sales-----	10,485	11,458	12,306	5,318	6,734	5,537	
Net operating profit-----	2,632	2,564	2,224	618	1,047	336	
Ratio (percent) of net operating profit to net sales-----	25.1	22.4	18.1	11.6	15.5	6.1	
Profitable operators:							
Number of operators-----	7	8	10	6	9	5	
Ratio (percent) of net operating profit to net sales-----	26.2	22.9	2/	20.4	15.5	14.7	
Unprofitable operators:							
Number of operators-----	2	2	1	2	3/	4	
Ratio (percent) of net operating loss to net sales-----	6.4	5.2	2/	7.5	3/	6.4	

^{1/} Includes net sales and net operating profit derived from the sale of the principal byproducts of fluorspar operations, such as zinc and lead concentrates. The value of such sales in 1961 amounted to approximately 22 percent of the aggregate net sales value reported by all independent mine and mill operators for their fluorspar operations.

^{2/} Data not shown in order to avoid disclosing operations of individual concerns.

^{3/} There were no unprofitable operators in 1960.

Source: Compiled from information submitted to the U.S. Tariff Commission by domestic producers.

Table 13.---Fluorspar: U.S. consumption and year-end stocks at consumers' plants,
by grades, 1956-61

Year	Metallurgical grade				Acid and ceramic grades			
	Total	Stocks on	Ratio of		Total	Stocks on	Ratio of	
	consumption	Dec. 31	consumption	stocks to	consumption	Dec. 31	consumption	stocks to
	1,000 short	1,000 short	Percent	consumption	1,000 short	1,000 short	Percent	consumption
	tons	tons			tons	tons		
1956	287	159	55		334	30	9	
1957	269	177	66		376	50	13	
1958	192	131	68		302	54	18	
1959	219	132	60		371	48	13	
1960	230	171	74		414	46	11	
1961	229	143	62		458	1/ 40	9	
1/ Partly estimated.								

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

Table 14.--Fluorspar: U.S. imports entered free of duty for U.S. Government use, by principal sources and by tariff classes, 1956-61

Year	Mexico			Spain			Italy			West Germany			Total		
	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :	Containing : more than : 97% of : calcium : fluoride :
1956-----	21,010	-	-	-	-	-	27,540	-	-	-	-	-	1/ 48,550	-	-
1957-----	82,234	-	-	-	-	-	61,617	-	-	-	-	-	1/ 143,851	-	-
1958-----	72,965	7,044	-	-	-	-	-	-	-	-	-	-	72,965	7,044	-
1959-----	253	12,694	-	-	-	-	64,884	-	-	-	-	-	65,137	12,694	-
1960 2/-----	4,570	-	-	3/ 5,151	-	-	50,091	-	-	-	-	-	3/ 59,812	4/ 10,619	-
1961 2/-----	90,779	43	-	9,834	-	-	-	-	3,525	-	-	-	104,138	43	-
Quantity (short tons)															
Foreign value															
1956-----	\$703,113	-	-	-	-	-	\$1,127,578	-	-	-	-	-	1/ \$1,830,691	-	-
1957-----	2,833,190	-	-	-	-	-	1,961,465	-	-	-	-	-	1/ 4,794,655	-	-
1958-----	2,384,899	\$98,778	-	-	-	-	-	-	-	-	-	-	2,384,899	\$98,778	-
1959-----	8,832	190,427	-	-	-	-	2,198,188	-	-	-	-	-	2,207,020	190,427	-
1960 2/-----	125,782	-	-	3/ \$177,389	-	-	1,695,867	-	-	-	-	-	3/ 1,999,038	4/ 149,086	-
1961 2/-----	2,649,123	1,063	-	381,530	-	-	-	-	\$123,920	-	-	-	3,154,573	1,063	-

1/ Does not include a substantial amount delivered to the U.S. Government from the Wilmington, Del., flotation mill of the St. Lawrence Fluorspar Co.

2/ Preliminary.

3/ Corrected.

4/ From the Union of South Africa.

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

Table 15.--Fluorspar: U.S. imports for consumption, excluding imports entered free of duty for U.S. Government use, by principal sources and by tariff classes, 1956-61

Year	Mexico			Spain			Italy			West Germany			Total		
	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride	Containing more than 97% of calcium fluoride
	Quantity (short tons)														
1956-----	79,817	214,783	39,757	18,043	27,202	1,604	21,043	1/ 202,490	234,512						
1957-----	100,655	208,159	53,629	8,478	77,148	1,516	13,627	1/ 268,395	219,121						
1958-----	55,789	109,185	48,369	8,144	59,132	-	19,338	194,826	117,329						
1959-----	127,392	186,706	71,616	-	70,347	-	-	274,340	203,580						
1960 2/-----	98,836	184,121	74,096	6,201	46,033	-	13,712	245,206	195,200						
1961 2/-----	103,728	149,853	78,160	-	62,310	-	3,590	249,392	152,448						
	Foreign value														
1956-----	\$2,224,347	\$3,070,550	\$972,020	\$241,590	\$750,648	\$52,440	\$715,843	1/ \$6,028,159	\$3,366,118						
1957-----	2,998,910	3,196,126	1,263,647	113,758	2,042,377	36,898	521,006	1/ 7,845,340	3,391,090						
1958-----	1,815,602	1,686,195	1,182,919	108,593	1,479,339	-	679,427	5,498,392	1,794,888						
1959-----	3,950,725	2,952,204	1,734,389	-	1,821,050	-	-	7,644,108	3,306,717						
1960 2/-----	3,274,671	3,440,583	2,423,721	59,619	1,253,922	-	507,342	7,810,262	3,836,243						
1961 2/-----	3,201,440	2,957,223	2,216,073	-	1,890,740	-	125,269	7,473,322	3,015,104						

1/ Includes substantial amount delivered to the U.S. Government from the Wilmington, Del., flotation mill of the St. Lawrence Fluorspar Co.
2/ Preliminary.

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

Table 16.--Fluorspar: U.S. imports for consumption, 1/ by principal sources and by tariff classes, 1956-61

Year	Mexico				Spain				Italy				West Germany				Total				
	Containing : more than : 97% of : calcium : fluoride :				Containing : more than : 97% of : calcium : fluoride :				Containing : more than : 97% of : calcium : fluoride :				Containing : more than : 97% of : calcium : fluoride :				Containing : more than : 97% of : calcium : fluoride :				
	100,827	214,783	39,757	18,043	54,742	1,604	21,043	234,512	138,765	1,516	13,627	412,246	267,791	19,338	339,477	305,017	353,530	219,121	124,373	216,274	205,819
1956	182,889	208,159	53,629	8,478	138,765	1,516	13,627	251,040	59,132	-	19,338	412,246	267,791	19,338	339,477	305,017	353,530	219,121	124,373	216,274	205,819
1957	128,754	116,229	48,369	8,144	59,132	-	-	234,512	138,765	-	-	412,246	267,791	-	339,477	-	-	219,121	124,373	216,274	205,819
1958	127,645	199,400	71,616	-	135,231	-	-	216,274	59,132	-	-	412,246	267,791	-	339,477	-	-	219,121	124,373	216,274	205,819
1959	103,406	184,121	3/ 79,246	6,201	96,124	-	-	205,819	135,231	-	-	339,477	305,017	-	305,017	-	-	205,819	124,373	216,274	205,819
1960 2/	194,507	149,896	87,994	-	62,310	-	-	152,491	96,124	-	-	339,477	305,017	-	305,017	-	-	152,491	124,373	216,274	205,819
1961 2/																					
Quantity (short tons)																					
Foreign value																					
1956	\$2,927,460	\$3,070,550	\$972,020	\$241,590	\$1,878,226	\$52,440	\$715,843	\$3,366,118	\$1,878,226	\$52,440	\$715,843	\$7,858,850	\$1,878,226	\$52,440	\$715,843	\$7,858,850	\$3,366,118	\$3,366,118	\$3,366,118	\$3,366,118	\$3,366,118
1957	5,832,100	3,196,126	1,263,647	113,758	4,003,842	36,898	521,006	3,391,090	4,003,842	36,898	521,006	12,639,995	4,003,842	36,898	521,006	12,639,995	3,391,090	3,391,090	3,391,090	3,391,090	3,391,090
1958	4,200,501	1,784,973	1,182,919	108,693	1,479,339	-	679,427	1,893,666	1,479,339	-	679,427	7,883,291	1,479,339	-	679,427	7,883,291	1,893,666	1,893,666	1,893,666	1,893,666	1,893,666
1959	3,959,557	3,142,631	1,734,389	-	4,019,238	-	-	3,497,144	4,019,238	-	-	9,851,128	4,019,238	-	-	9,851,128	3,497,144	3,497,144	3,497,144	3,497,144	3,497,144
1960 2/	3,400,453	3,440,583	2,601,110	59,619	2,949,789	-	507,342	3,785,329	2,949,789	-	507,342	9,809,300	2,949,789	-	507,342	9,809,300	3,785,329	3,785,329	3,785,329	3,785,329	3,785,329
1961 2/	5,850,563	2,968,286	2,597,603	-	1,890,740	-	249,189	3,016,167	1,890,740	-	249,189	10,627,895	1,890,740	-	249,189	10,627,895	3,016,167	3,016,167	3,016,167	3,016,167	3,016,167

1/ Includes imports entered free of duty for U.S. Government use.

2/ Preliminary.

3/ Corrected.

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

Table 17.--Metallurgical fluorspar: Changes in U.S. price quotations on domestic and imported material, Feb. 9, 1956 to Mar. 29, 1962

Date of change	(Per short ton, in bulk, in carload lots)				
	Domestic, f.o.b. mines, Illinois and Kentucky		Imported, duty paid, f.o.b. port of entry		
	60 percent plus 1/	70 percent 1/	Mexico	Europe, 72 1/2 percent 1/	
			All rail, 1/ : F.o.b. barge 2/ : 72 1/2 percent 1/ :		
1956:					
Feb. 9-----	\$28.00-\$30.00	\$32.00-\$33.00	\$26.00	\$28.00-\$28.50	3/ \$32.00-\$34.00
Apr. 5-----	28.00-30.00	32.00-34.00	26.00	28.00-28.50	32.00-34.00
Aug. 9-----	33.00-35.00	36.00-38.00	26.00	28.00-28.50	32.00-34.00
Sept. 27----	33.00-36.50	36.00-40.00	\$27.00-27.75	29.00-30.00	32.00-34.00
1957:					
Apr. 18-----	33.00-36.50	36.00-40.00	27.00-27.75	29.00	34.00-35.00
June 13-----	33.00-36.50	36.00-40.00	25.25-25.75	27.50	33.00-34.00
Nov. 7-----	33.00-36.50	36.00-40.00	25.00	27.00	30.00-35.00
1959:					
Jan. 15-----	33.00-36.00	36.00-40.00	25.00	27.00	30.00-34.00
Aug. 6-----	33.00-36.00	36.00-40.00	26.50-27.50	28.50-29.50	32.00-34.00
1960:					
Nov. 3-----	33.00-36.00	36.00-40.00	26.50-28.50	28.50-30.50	32.00-34.00
1961:					
Apr. 13-----	33.00-36.00	36.00-40.00	4/	4/	30.00-33.00
Aug. 10-----	33.00-36.00	36.00-40.00	27.00-28.00	30.50-31.50	30.00-33.00
Sept. 21----	33.00-36.00	36.00-40.00	27.00-28.00	31.50-32.50	30.00-33.00
1962:					
Mar. 29-----	34.00-34.50	37.00-37.50	26.50-28.00	5/ 30.50-32.50	30.00-33.00

1/ Percentages denote effective calcium fluoride content.

2/ At Brownsville, Tex.

3/ Quotation for minimum of 70 percent effective calcium fluoride content.

4/ Not reported.

5/ Also quoted were Tampico, Mexico, vessel, \$21.00-\$23.50; U.S. Atlantic ports, cars, \$34.00-\$36.50; Lake Erie, cars, \$37.00-\$39.50.

Source: Compiled from E & MJ Metal and Mineral Markets.

Table 18.--Fluorspar: Changes in U.S. price quotations on domestic and imported acid grade material and on domestic ceramic grade material only, Feb. 9, 1956, to Mar. 29, 1962 ^{1/}

(Per short ton, in bulk, in carload lots)									
Date of change	Acid grade, dry basis ^{2/}			Ceramic grade, domestic, f.o.b. mines, Illinois and Kentucky					
	Domestic, f.o.b. mines, Illinois and Kentucky	Imported, duty paid, f.o.b. port of entry ^{3/}		93-94 percent ^{4/}		95 percent ^{4/}			
				\$41.00	\$41.00	\$43.00	\$43.00	\$43.00	\$43.00
1956: Feb. 9-----	\$47.50	\$50.00-\$52.50		\$41.00	\$41.00	\$43.00	\$43.00	\$43.00	\$43.00
Apr. 5-----	47.50	50.00- 52.50		\$41.00- 43.00	\$41.00- 43.00	43.00- 45.00	43.00- 45.00	43.00- 45.00	43.00- 45.00
Aug. 9-----	52.50	50.00- 52.50		41.00- 43.00	41.00- 43.00	43.00- 45.00	43.00- 45.00	43.00- 45.00	43.00- 45.00
Sept. 27-----	\$52.50- 55.00	50.00- 52.50		41.00- 43.00	41.00- 43.00	43.00- 45.00	43.00- 45.00	43.00- 45.00	43.00- 45.00
1957: Apr. 18-----	5/ 50.00- 55.00	50.00- 52.50		43.00- 46.00	43.00- 46.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00
Nov. 7-----	5/ 50.00- 55.00	50.00- 53.00		43.00- 53.00	43.00- 53.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00
1958: Dec. 4-----	5/ 50.00	50.00- 53.00		43.00- 46.00	43.00- 46.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00
1959: Jan. 15-----	5/ 50.00	50.00- 51.00		43.00- 46.00	43.00- 46.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00
Aug. 6-----	5/ 45.00- 49.00	50.00- 51.00		43.00- 45.00	43.00- 45.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00
1961: Apr. 13-----	6/ 45.00- 60.00	50.00- 51.00		43.00- 45.00	43.00- 45.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00
1962: Mar. 29-----	6/ 45.00- 60.00	50.00- 51.00		43.00- 45.00	43.00- 45.00	45.00- 48.00	45.00- 48.00	45.00- 48.00	45.00- 48.00

^{1/} Little, if any, ceramic grade fluorspar similar to that domestically produced, and dutiable at \$7.50 per short ton, is imported. The imported acid grade fluorspar, dutiable at \$1.875 per short ton, competes actively with the domestic ceramic grade.

^{2/} Acid grade fluorspar contains more than 97 percent of calcium fluoride.

^{3/} European only, at North Atlantic ports of entry.

^{4/} Percentages denote actual calcium fluoride content.

^{5/} Quoted for Colorado also.

^{6/} Includes pellets at \$55.00 and \$60.00.

Source: Compiled from E & MJ Metal and Mineral Markets.

Table 19. Acid grade fluorspar: Consumption by U.S. producers of hydrofluoric acid and aluminum, and costs of delivery to consumers, by sources, 1961

Source	Cost per short ton, dry weight basis						
	Quantity delivered	F.o.b. shipping point in the United States 1/		Transportation to consumer		Other costs of delivery	Total delivered cost
		Short tons					
Domestic, from--							
Captive producers	79,304	2/	\$43.07	\$6.10	\$0.10		\$49.27
Merchant producers	48,725		45.35	3.68	.25		49.28
Total or average	128,029		43.93	5.18	.16		49.27
Imported, from--							
Mexico	74,791	3/	36.30	3/ 7.92	3/ .60		3/ 44.82
Spain	67,858		48.44	1.04	.39		49.87
Italy	59,444		45.29	.73	.98		47.00
Total or average	202,093	3/	43.31	3/ 3.31	3/ .64		3/ 47.26

1/ Includes cost of drying whether done by shipper or by consumer.

2/ Average intra-company transfer value of shipments by captive producers.

3/ Excludes imports from flotation mill owned by a consumer.

Source: Compiled from reports submitted to the U.S. Tariff Commission by domestic consumers.

Table 20.--Fluorspar, metallurgical grade: U.S. commercial shipments of domestic and imported material, by minimum percent of effective calcium fluoride content, 1959-61

Year and calcium fluoride content	Domestic				Imported			
	Quantity	Percent of total quantity	Average sales value, f.o.b. U.S.		Quantity	Percent of total quantity	Average sales value, f.o.b. U.S.	
			shipping point				shipping point	
	Short tons		Per ton		Short tons		Per ton	
1959:								
60 percent	6,838	19.6	\$24.98					
70 percent	3,348	9.6	38.72		36,567	22.3	\$27.49	
72½ percent	70	.2	1/		119,488	72.9	31.90	
80 percent	19,477	55.9	1/		7,048	4.3	31.00	
90 percent	-	-	-		873	.5	35.65	
Other	5,111	14.7	12.13		-	-	-	
Total or average	34,844	100.0	1/		163,976	100.0	30.90	
1960:								
60 percent	9,683	17.4	24.33					
70 percent	3,735	6.7	36.83		44,229	23.0	28.37	
72½ percent	432	.8	1/		141,048	73.2	34.08	
80 percent	34,089	61.3	1/		4,677	2.4	29.89	
90 percent	-	-	-		2,391	1.2	43.20	
Other	7,647	13.8	10.47		239	.2	27.10	
Total or average	55,586	100.0	1/		192,584	100.0	32.78	
1961:								
60 percent	9,704	25.2	24.10					
70 percent	3,276	8.5	37.58		39,740	26.9	29.19	
72½ percent	13	2/	37.08		97,624	66.1	35.01	
80 percent	17,009	44.1	1/		3,124	2.1	31.66	
90 percent	-	-	1/		3,996	2.7	43.14	
Other	8,556	22.2	8.84		3,253	2.2	31.83	
Total or average	38,558	100.0	1/		147,737	100.0	33.51	
1/ Omitted to avoid possible disclosure.				2/ Less than 0.05 percent of the total.				

Source: Compiled from data submitted to the U.S. Tariff Commission by importers and domestic producers.

Note.--The average selling values, f.o.b. shipping point, for imports include various costs of transportation depending on whether shipments were entered at the Mexican border or shipped by water to ports on the Atlantic seaboard or the Great Lakes.

Table 21.--U.S. rail freight transportation charges per ton for fluorspar from specified shipping points to principal consuming points, as of Jan. 30, 1962

Destination of shipments	Shipping points for domestic production		Ports of entry for imports	
	Rosiclare, Ill. 1/	Boulder, Colo.	Wilmington, Del.	Eagle Pass, Tex. 2/
Carneys Point (and Paulsboro 3/), N.J-----	\$10.79	\$24.48	\$3.08	\$15.20
North Claymont, Del-----	4/ 17.17	24.48	3.33	4/ 24.48
Cleveland, Ohio-----	10.87	22.12	10.07	22.12
Calvert City, Ky-----	3.03	17.33	16.43	13.90
East St. Louis, Ill-----	4.85	12.60	19.62	15.70
Bauxite, Ark-----	10.92	13.75	24.60	10.88
Baton Rouge, La-----	11.80	16.72	26.00	10.88
Houston, Tex-----	7.66	12.71	29.40	6.14
Nichols, Calif-----	35.90	14.30	51.40	15.30
Nitro, W. Va-----	10.87	22.12	10.47	22.86
Joliet, Ill-----	5.10	15.30	17.01	15.70

1/ Rates are the same for shipments from Marion, Ky., with minor exceptions.

2/ Rates are the same for shipments from Brownsville and Marathon, Tex.

3/ Information on rates to Paulsboro is not available, but the rates are believed to be the same as those to nearby Carneys Point, N.J.

4/ Probably could be negotiated to the same rate as that in effect for Carneys Point, N.J.

Source: Compiled from data submitted to the U.S. Tariff Commission by domestic producers and importers. The figures given relate to charges as of Jan. 30, 1962, and represent the minimum freight charges per short ton for rail shipments between the points shown.