

Table 18.—Energy and chemicals: U.S. shipments, imports, exports, apparent consumption, and employment, 1979-83

Item	1979	1980	1981	1982	1983
Producers' shipments—million dollars—	422,126	530,181	611,375	591,552	650,707
U.S. exports:					
Total—do—	25,023	31,333	33,942	34,891	31,615
To Israel—do—	86	84	79	87	81
U.S. imports:					
Total—do—	71,040	90,867	93,843	78,062	72,144
From Israel:					
Total—do—	73	89	121	130	133
Duty-free under GSP—percent—	58	42	44	44	53
Duty-free under col. 1—do—	36	53	52	52	43
Dutiable—do—	6	5	4	4	4
Apparent consumption—million dollars—					
Ratio of:					
Imports from Israel to total U.S. imports—percent—	0.1	0.1	0.1	0.2	0.2
Total U.S. imports to consumption—do—					
Imports from Israel to consumption—do—					
Total employment—1,000 workers—	2,466	2,509	2,492	2,389	2,340

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

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remaining products—chemicals, coal, and related products—was a positive \$12 billion in 1983.

U.S. imports in this sector rose from \$71 billion in 1979 to \$94 billion in 1981 and then declined to \$72 billion in 1983. The decline since 1981 is mostly attributable to declining aggregate imports of crude petroleum and natural gas and their products, which amounted to \$57 billion in 1983. The portion of consumption supplied by imports declined from 15 percent in 1979 to 10 percent in 1983. The market penetration of the chemicals, coal, and related products portion of the sector remained less than 6 percent during 1979-83. The largest sources of imports in 1983 were the Organization of Petroleum Exporting Countries (OPEC) at \$23 billion, Canada at \$11 billion, and the EC at \$10 billion. The largest product imported in 1983 was crude petroleum, at \$36 billion.

U.S. exports in the sector rose from \$25 billion in 1979 to \$35 billion in 1982 but dropped to \$32 billion in 1983. Coal constituted the largest product area exported, at \$4.5 billion. The largest markets in 1983 were the EC (\$7.5 billion), Canada (\$4.9 billion), and Japan (\$4.8 billion).

For the manufacture of the articles in this sector, the United States has, in general, production technology that is as good as (and in some cases better than) that of its trading partners. To a great extent, the degree of technology excellence is a function of the amount of research and development input. Because the United States is a large market for these products in relation to the rest of the world and the majority of consumption is supplied by plants established in the United States, this nation has been able to become a forerunner in technological development through large expenditures in development and construction. Some U.S. trading partners, as they have increased their output, now challenge the United States in technological development in several areas such as plastics, drugs, dyes, and chemical

intermediates. Furthermore, most of the new plant construction in basic chemicals is now being done abroad, although it is based on licensed U.S. technology.

Since about 1974, the United States has enjoyed an advantage over its trading partners in the production of many synthetic organic chemicals through the availability and relatively low cost of hydrocarbon raw materials. This advantage has begun to decline, however, as petroleum-rich nations upgrade their crude petroleum and natural gas producing facilities to include the manufacture of petrochemicals.

The productivity of labor and the age of producing plants for the United States and its trading partners are, overall, about equal. An area where U.S. trading partners do have an advantage, though, is in Government support of operations. Many foreign governments assist producers in the home country through such devices as special tax treatment for exports, low-cost loans, and direct aid in negotiating or obtaining foreign sales.

#### Israel Sector Profile

The Israel chemical industry began in the early 1920's when a small plant was started to produce potash and bromine from the Dead Sea. Since then the Israel chemical industry had grown substantially, so that by 1981 the output of the chemical industry amounted to about \$3.6 billion. Close to one-third of the chemicals produced in Israel are exported (about 28 percent in 1981) compared with a much smaller export ratio for chemicals produced in the United States (about 13 percent in 1981).

Exports of chemicals from Israel are abetted by two key factors: the existence of a highly educated labor force attuned to high technology, lead by successive Governments which have sought to expand the chemical industry; and the exploitation of the Dead Sea, one of the richest sources of dissolved

minerals in the world, from which are extracted potash, bromine, magnesia, and salt. In addition, the State of Israel possesses vast phosphate fields in the Negev which are used domestically and for export to produce fertilizers, feed additives, and detergents.

Because the Dead Sea contains enormous amounts of dissolved bromides (about three times more concentrated than U.S. sources) from which elemental bromine is produced, Israel ranks as the second largest producer of bromine and bromine compounds in the Western world, producing about 20 percent of the world's total in 1982. Although second to the United States in production, Israel ranks as the world's largest exporter of bromine and bromine compounds because of Israel's proximity to major European markets, duty-free access to the European and Japanese markets, and because of the limited size of the domestic Israel market. Sales of bromine and bromine compounds in 1982 reached \$73 million. Research and development (R. & D.) efforts are currently being conducted aimed at doubling Israel's share of the world market in bromine and bromine compounds in the near future. <sup>1/</sup>

Not all of Israel's successes in chemical production and exports are in products where Israel has a competitive edge because of natural resources. As a result of investment in the chemical area, including R. & D., estimated to have been \$365 million in 1983, Israel has become a major producer and exporter of high-value-added products such as pesticides and pharmaceuticals. Exports of pesticides and disinfectants amounted to \$97 million in 1982, whereas exports of pharmaceuticals amounted to \$34 million in that year. Much of these investments were funded by the Government of Israel <sup>2/</sup> although

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<sup>1/</sup> The Israel Export and Trade Journal, September-October, 1980.

<sup>2/</sup> Innovation, October 1982, pp. 1, 2.

significant capital investments and R & D expenditures were also funded by private capital, some of which originated from outside Israel. 1/

Exports of chemicals from Israel have also been enhanced as a result of direct support from the Government of Israel for Israel exports—see appendix D.

The chemical industry of Israel has recently shown a reduced rate of growth as a result of the worldwide recession (particularly as it has affected Europe, Israel's largest market for chemical exports), currency devaluations in Israel and Europe, and Israel's rising rate of inflation. Because of these economic problems, Israel's exports of chemicals declined slightly in 1982 and rose by only 3 percent during January–October 1983. 2/ Israel's petrochemical industry appears to be the weak link in the Israel chemical industry and had been operating at only about 60 percent of capacity during 1980–83. 3/ The Israel petrochemical industry has also suffered from organizational problems. 4/

#### Israel Exports

During 1979–82, the value of Israel exports of energy and chemicals to all markets increased by 41 percent, from \$735 million in 1979 to about \$1 billion in 1981 and then declined to \$929 million in 1982. 5/ There are no data available for 1983; however, industry analysts estimate that total Israel exports of these products increased to about \$1 billion. The major products exported are basic chemical compounds, chemical preparations, and manufactured

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1/ Business America, June 2, 1980, and conversations with industry analysts.

2/ Chemical and Engineering News, Dec. 19, 1983, p. 48.

3/ Conversations with industry observers and Aussenhandel, Mar. 19, 1982, p. 1.

4/ Aussenhandel, Aug. 5, 1982, p. 1

5/ Based on United Nations data.

fertilizers. The United States received 11 percent of all Israel exports of energy and chemicals during 1979-82.

#### Exports to the United States

Exports of energy and chemicals to the United States increased from \$73 million in 1979 to \$133 million in 1983 and amounted to 0.1 to 0.2 percent of entries from all countries of these items into the United States during 1979-83. The imports-to-consumption ratio of these products entered from Israel did not exceed 0.02 percent during any year 1979-83. Thus, although the United States is an important export market for Israel, Israel is a relatively minor source for U.S. imports of energy and chemicals.

Crude and manufactured fertilizers, inorganic chemicals and minerals, and certain basic organic chemicals make up the bulk (77 percent) of Israel exports to the United States. Included in both the inorganic and organic chemicals groups are exports of bromine compounds.

In 1983, 4 percent of all Israel exports of energy and chemicals entered into the United States were subject to duty. More than one-half of these imports were classified in categories subject to GSP treatment. Most of the remainder of these imports were free of duty under column 1.

#### Exports to countries other than the United States

Exports of energy and chemicals from Israel to the rest of the world increased from \$657 million in 1979 to \$902 million in 1980 and 1981 and then declined to \$812 million in 1982. During 1979-82, the largest single destination for Israel exports was Italy (1979 and 1980), the United States (1981), and Norway (1982). Other major markets include various Western European and Asian countries. Major export categories are similar to those named above for the United States.

### Position of Interested Parties

A representative of a multinational chemical company headquartered in West Germany expressed their concern that the proposed free-trade agreement might be used by countries other than Israel to avoid paying duties on articles imported by the United States; this could occur if goods which enter Israel at low or zero duty rates are reexported to the United States.

With regard to already-growing U.S. imports of bromine chemicals from Israel, both sides referred to the coming demise, for toxicological reasons, of by far the most important market for bromine--ethylene dibromide, used in automobile antiknock fluids and as a pesticide.

Israel's bromine industry spokesmen believe that growth in fast-growing U.S. markets for bromine-based flame retardants and well-drilling fluids will more than offset the increase in Israel imports and the loss of the ethylene dibromide market. Their view is that the U.S. industry "is in excellent health . . . the elimination of tariff walls will, at best, slightly diminish the competitive edge enjoyed by domestic producers"--the "edge" consisting mostly of shipping costs.

The U.S. bromine industry's position is that duty-free access will further open the U.S. market for organic specialties which now have substantial tariff protection, which the U.S. industry was counting on for growth areas to offset the loss of ethylene dibromide demand. "Some growth . . . will occur, but not sufficient to maintain the adequate output levels from U.S. producers if unrestrained duty-free access (is) given to the Israeli bromine industry."

Since most U.S. bromine is made from brines mined in Arkansas, the U.S. industry's position is strongly supported by officials from that State, including Governor Bill Clinton, Senator Dale Bumpers, Senator David Pryor,

Congressman Baryl Anthony, Jr., and Mr. Jerry L. Maulden, chairman of the Arkansas Industrial Development Corp., all of whom testified at the Commission hearing. Similar views were presented by Senator Quayle of Indiana, and Congressman Ed Bethune of Arkansas.

A large U.S. chemical producer called for correction under the proposed agreement of alleged problems that arise from Israel patent procedure laws that adversely affect the international competitiveness of U.S. chemical producers. The company also asked that safeguards similar to the GSP competitive need limits be placed in the legislation, and that non-tariff barriers and other trade-distorting practices such as export subsidies be addressed. The company does, however, support the efforts to strengthen U.S. international economic relations through bilateral trade and investment treaties with our trading partners.

#### Probable Effects of Duty-Free Imports From Israel

In the aggregate, the probable economic effect of granting duty-free treatment to imports of energy and chemicals from Israel on U.S. industries and consumers would be negligible. In recent years, dutiable imports have been about 4 percent of the total value of imports of these products from Israel. About 53 percent of energy and chemicals imports from Israel in 1983 entered free of duty under the GSP, and 43 percent were duty-free under the column 1 rate of duty. Overall, therefore, there is little potential for these imports to increase as a result of the free-trade agreement, except possibly for those import classes which have GSP treatment, and, thus, are subject to competitive-need limitations.

An area within this sector, however, which could suffer a significant adverse effect is that comprising bromine compounds. The column 1 and final MTN rates for certain bromine compounds are presented in table 19.

Table 10 - Certain bromine compounds: Present and final chemical formulae of duty, amount from 1940, 1941, and probable economic effect of duty from 1942 to 1945 (by function)

1940 Use No.	Brief description	Col. 1940 of duty		1941 Final col. from 1940		Probable economic effect from 1942 to 1945
		Percent of value	Value	Percent of value	Value	
00100 (01)	Halogenated hydrocarbons in chemical appendix: Pentabromethyl bromide and tribromocumene	10.25	0.1E	10.25	0.1E	25
00151 (01)	Phenol and phenol alcohols, and halogenated derivatives of phenols or phenol alcohols in chemical appendix (tribromophenols)	107	7.7	107	7.7	00
00153	Certain halogenated or sulfonated deriva- tives of phenols or phenol alcohols	11.4	0.7	11.4	0.7	00
00160 (01)	Ethers, other alcohols, and their deriva- tives in the chemical appendix: Dibromodiphenyl ether, octabromodiphenyl ether, other alcohols, other phenols and derivatives, and polyarylsulphides and sulfoxides in chemical appendix: Tetra bromophthalic anhydride	11.52	0.52	22.2	2.0	2
00161 (01)	Carbon halide- functional derivatives (compounds: Ethylmethyl ether, methyl alide)	11.52	0.52	11.52	0.52	0
00162 (01)	Certain brominated derived products Dibromodiphenyl ether, octabromodiphenyl ether	11.52	0.52	11.52	0.52	0
00163	Sodium bromide	0.57	31	0.57	31	011

1/ Value of duty: 1940, 1941, 1942, 1943, 1944, 1945  
2/ Probable economic effect only to the extent part of 1942-1945 duty

As noted in the Israel sector profile, Israel possesses large natural resources of bromine minerals in the Dead Sea. Bromine is produced from these deposits as a byproduct of potash manufacture. In the United States, bromine is extracted as a primary product from less concentrated underground brines, which must be reached by drilling. Because of those differences in sources, in addition to tighter environmental restrictions 1/ in the United States, data submitted by the interested parties show that the average manufacturing cost of Israel bromine is 21 cents per pound compared with 26 cents per pound for the three U.S. producers.

Israel has a particular cost advantage in producing bromine compounds and is second only to the United States in bromine output and it is reported that Israel is expanding its bromine and bromine chemical facilities.

U.S. demand for bromine has been declining, largely because of reduced output of leaded gasoline, which incorporates ethylene dibromide as an ingredient. U.S. exports of bromine chemicals have also declined. 2/ The U.S. bromine chemicals industry peaked in 1979, when 497 million pounds of bromine was sold or used by U.S. producers. Since then the sales-use of bromine has declined irregularly to an estimated 380 million pounds in 1983. 2/ In future years, because of its toxicity, ethylene dibromide production may drop to zero. It is already banned as a pesticide, and the EPA is advocating a speedup of the scheduled phasing out of leaded gasoline, in 1988 or even sooner. However, the growing consumption of bromine in flame retardants and well-drilling fluids should offset the loss of the ethylene dibromide market. The Bureau of Mines estimates that 1990 demand for U.S.-produced bromine will not exceed 380 million pounds (including exports) and the Commission staff

1/ Based on Commission hearing testimony from U.S. and Israel producers, transcript pp. 36-37 and 79-81.

2/ Bureau of Mines, January 1984.

estimate yields similar results as indicated in the following tabulation (in millions of pounds):

Bromine consumed in U.S. production of bromine compounds (including production of chemicals for export)	1979	1983	1990
Ethylene dibromide	244	120	0
Flame retardants	1/	95	2/ 145
Well-drilling fluids	1/	75	3/ 150
Methyl bromide	44	40	4/ 38
Other	1/	50	5/ 67
Total	497	380	400

1/ Not available

2/ U.S. market growth 8 percent per year (including exports and imports)---  
Chemical Week, Aug. 24, 1983; European Chemical News, Mar. 7, 1983; SRI International, July 1983.

3/ Production of these fluids was growing by 20 percent per year until 1981 and 1982, and crude petroleum and natural gas drilling grew by 17 percent per year and wellhead price of oil increased by 40 percent per year. But by 1983, drilling (footage) dropped by 20 percent, and crude petroleum price dropped by 18 percent. Extrapolating (to 1990) the overall growth trend of 1977-83 of only 7 percent per year for drilling and noting that others' estimates of crude petroleum prices indicate little increase if any, the Commission staff estimates U.S. market growth of bromine-based drilling fluids will be 10 percent per year. The forecast of growth of these fluids to 1990 of a major U.S. petroleum company is substantially more conservative than the Commission estimate.

4/ Methyl bromide, a hazardous pesticide, may suffer further limitation because of toxicity.

5/ U.S. market growth was estimated by the Commission staff at 5 percent per year, which is somewhat higher than published future growth estimates for the entire chemical industry.

Source: 1979 and 1983, data were adapted from official statistics of the U.S. Department of the Interior; 1990, data were estimated by the Commission staff.

The above tabulation does not include imports of bromine chemicals from Israel which were an estimated 13 million pounds of bromine content in 1983; their estimated dollar value was about \$9.7 million. More than 80 percent of these imports were duty free under the GSP.

Imports of bromine chemicals from Israel have increased rapidly in recent years, and, the potential exists for imports of certain bromine chemicals to increase significantly if the relatively high duty rates were eliminated.

Imports of most of these products now are small, and the increases in imports are likely to displace the U.S. products, resulting in declines in U.S. output. U.S. producers at the Commission hearing estimated that imports from Israel would quintuple in dollar value, to \$50 million, by 1990, given the free-trade agreement. The representative of the Dead Sea Bromine Group estimated at the hearing that such imports would double to \$20 million in "the next several years," which, if extrapolated to 1990, would not be a greatly different estimate from the U.S. producers' estimate. The bromine compounds most likely to show increases in imports are principally organic flame retardants.

Based on the above estimates of production and imports, the following tabulation provide apparent consumption data for bromine compounds (in millions of pounds of bromine content)

<u>Item</u>	<u>1979</u>	<u>1983</u>	<u>1990</u>
U.S. production	497	380	380
Exports	88	50	1/ 50
Imports (from Israel)	4	13	50
Apparent U.S. consumption	413	343	380

1/ The above estimate of no increase in U.S. exports by 1990 is based on their decrease in recent years and the fact that Israel, with duty-free access to Europe and Japan, has a significant advantage over the United States in the export market for many bromine chemicals.

Using the above tabulation as a scenario of what could happen, the penetration of Israel imports (ratio of imports to consumption) would be increasing from 1 percent in 1979 and 4 percent in 1983 to 14 percent in 1990.

The rising market penetration by Israel would be principally due to lower delivered prices in the United States for imports in the absence of duties than for the domestically produced articles. In response to the Commission's questions at the hearing, both the Israel and the U.S. producers submitted comparable data on manufacturing, shipping, and inventory costs for

tetrabromobisphenol A (TBBPA), an important organic chemical flame retardant typical of many similar high-duty bromine chemicals. This chemical, and its manufacturing technology, is typical of most of the organic bromine chemicals. Since it is the largest-volume product of its type in the United States, its U.S. production economics should be most competitive with Israel production. As indicated in the following tabulation, the Israelis have the cost advantage on TBBPA, even after paying the shipping cost, but the present duty equivalent of 12 cents per pound maintains U.S. competitiveness.

Type of expense	Cost of TBBPA delivered to U.S. customer	
	From Israel	From U.S. producer
	Cents per pound	
Bromine and other raw materials	37.3	1/ 49.2
Depreciation (10 year straight line)	2.0	5.6
Other manufacturing cost	30.8	27.4
Total, manufacturing cost	70.1	82.2
Ocean shipping	5.0	0
Land shipping (to Southeast United States) 2/	2.7	1.9
Total, shipping cost	7.7	1.9
Grand total	77.8	84.1

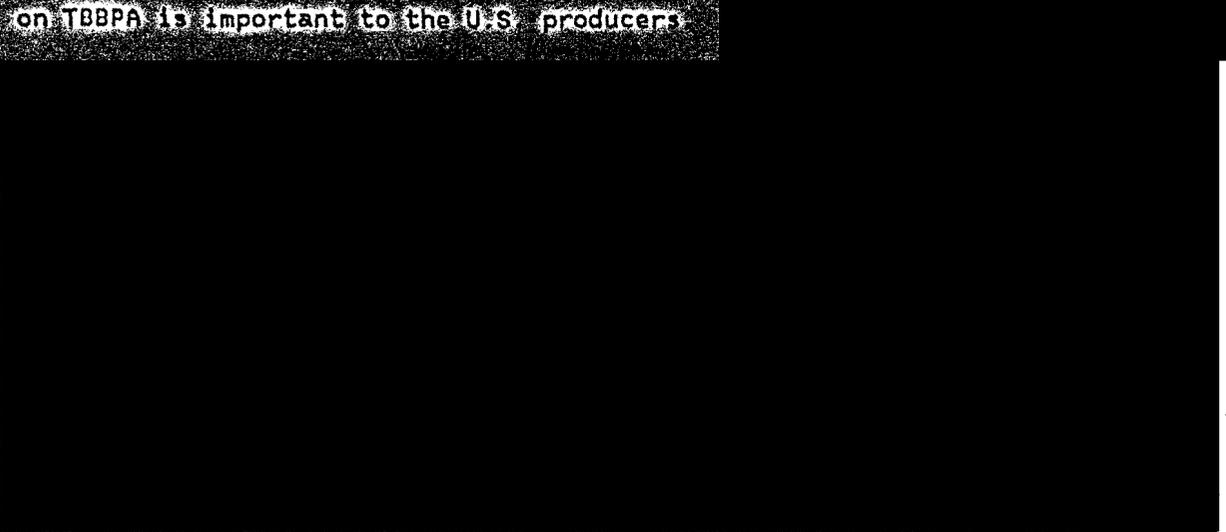
1/ Cost after credit of 15.5 cents for byproducts; it is possible that some of this credit should have been deducted from depreciation and so forth rather than all from raw materials, but this would not change the total cost.

2/ The Southeast United States is a market area typical of sales of both the U.S. and imported chemical.

Inventory costs are slightly higher for the Israelis (about 1 cent per pound), because the normal U.S. inventory for TBBPA is 29 weeks of shipments compared with 7 to 8 weeks for U.S. producers. The above costs are for near-capacity operation and do not include any return on invested capital or interest on debt. Neither does the above cost for the Israel product include all of the Government assistance described in appendix D, such as investment

grants and reductions and exemptions from income taxes, or the advantage it may derive from being produced by a company owned by the Government of Israel.

It is apparent from the above that the 12-cent-per-pound duty equivalent on TBBPA is important to the U.S. producers



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With duty-free trade, Israel could exploit its 5-cents-per-pound cost advantage in bromine, which is used to produce bromine chemicals of concern here, and its similar advantage (including shipping costs) in TBBPA and other organic bromine chemicals. It would be in a position to cut prices of the bromine chemicals to stimulate sales growth, with adverse effects on the U.S. bromine and bromine chemicals industry. Such adverse effects include the possible loss of 10 percent of the domestic market for bromine compounds (principally organic flame retardants and other organic compounds) by 1990



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with accompanying reduction in production and employment. <sup>1/</sup> The closing of plants or withdrawal of domestic producers as a result of duty-free treatment for those products, however, is not likely. The effect of duty-free treatment on imports of inorganic bromine compounds would probably be different than on the organic compounds. Although data on production and transportation costs are similar to those for organic compounds, much of the imports of inorganic compounds are entered under tariff classifications which have low duty rates, and much of this is already provided duty-free treatment under the GSP. Therefore, imports of inorganic compounds show little opportunity for being affected by the proposed free trade agreement.

Duty savings as a result of the free-trade agreement would most likely benefit the industrial/intermediate consumer, but the consuming public is not expected to benefit from the duty savings, which would probably be absorbed in the trade.

Table 20 briefly summarizes U.S. trade and consumption in bromine compounds in 1983.

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<sup>1/</sup> The 10 percent market loss is based on the preceding analysis of market penetration (p. 92) which used domestic and Israel producers' estimates of import increases following implementation of a free-trade area.

Table 20 — Bromine compounds: U.S. employment, apparent consumption, production, exports, and imports, 1983

Item	1983
Employment—1,000 workers—	
Apparent consumption—1,000 dollars—	<u>1/</u> ■
Production—do—	
Exports:	
Total—do—	21,000
To Israel—do—	<u>2/</u>
Imports:	
Total—do—	<u>1/</u> 14,000
From Israel—do—	<u>1/</u> 10,000
Ratio of—	
Imports from Israel to total imports—percent—	<u>1/</u> 71
Total imports to consumption—do—	<u>1/</u> ■
Imports from Israel to consumption—percent—	<u>1/</u> ■

1/ Estimated by the Commission staff

2/ Not available

Note.—Specific data on production and imports of these compounds are not available. Therefore, estimates of these data have been made for the most recent calendar year.

## MINERALS AND METALS 1/

## U.S. Sector Profile and Conditions of Competition

Although it represents a relatively small part of the economy, the minerals and metals sector is considered an important part of modern industrial society due to the broad range of applications of the materials produced. The materials produced are largely primary or intermediate in nature, making demand for them largely dependent on developments in markets such as automobiles, appliances, construction materials, and machinery and equipment. Although the industries which produce the metals and various products included in the sector are located throughout the United States, the mineral deposits on which they rely for primary raw materials are localized in nature and unequally distributed throughout the world. In many instances, the world's principal ore-producing and metal-producing countries are distant from the principal consuming countries, resulting in these articles entering into international commerce in significant quantities.

The minerals and metals sector includes industries engaged in mining metallic and nonmetallic ores and manufacturing products therefrom. The nonmetallic products include glass, cement, structural clay products, abrasives, asbestos, refractories, and pottery. The metallic ores are used to manufacture products of iron and steel, copper, aluminum, nickel, tin, lead, zinc, and other metals. Approximately 2.1 million persons were employed by a total of nearly 10,000 companies in the minerals and metals sector in 1983 (table 21). This represented a drop of about 700,000 in employment from the 1979 level of 2.8 million.

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1/ Included here are the commodities in the following portions of the Tariff Schedules of the United States: Schedule 5 (Nonmetallic minerals and products), except pt. 1(J (pt.)) and schedule 6 (Metals and metal products), pts. 1, 2, 3.

Table 21.--Minerals and metals: U.S. shipments, imports, exports, apparent consumption, and employment, 1979-83

Item	1979	1980	1981	1982	1983
Producers' shipments-----million dollars--	234,919	227,635	233,035	199,020	214,485
U.S. exports:					
Total-----do-----	19,530	25,090	19,953	14,760	13,682
To Israel-----do-----	109	115	117	91	109
U.S. imports:					
Total-----do-----	27,156	31,751	34,386	29,247	29,333
From Israel:					
Total-----do-----	378	521	626	490	551
Duty free under GSP-----percent-----	8.0	6.2	6.7	8.4	8.1
Duty free under col. 1-----do-----	91.4	92.5	91.0	90.5	91.6
Dutiable-----do-----	0.7	1.3	2.3	1.2	0.4
Apparent consumption-----million dollars--	242,545	234,296	247,468	213,507	230,136
Ratio of					
Imports from Israel to total U.S.					
Imports-----percent-----	1.4	1.6	1.8	1.7	1.9
Total U.S. imports to consumption-----do-----	11.2	13.6	13.9	13.7	12.8
Imports from Israel to consumption-----do-----	0.2	0.2	0.3	0.2	0.2
Total employment-----1,000 workers--	2,766	2,613	2,488	2,191	2,100

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

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Consumption of minerals and metals in the U.S. economy during 1979-83 fluctuated from a high of \$247 million in 1981 to a low of \$214 million in 1982, and totaled \$230 million in 1983, representing 5 percent less than consumption in 1979, by value. U.S. producers' shipments followed the same trend as consumption, decreasing from a high of \$233 million in 1981 to a low of \$199 million in 1982, and totaled \$214 million in 1983, 9 percent less than the value of producers' shipments in 1979.

In all 5 years, the United States experienced a trade deficit in the sector. The sector deficit amounted to \$7.6 billion in 1979 and \$6.7 billion in 1980, then more than doubled to \$14.4 billion in 1981, and totaled \$15.6 billion in 1983. Imports rose during the first 3 years from \$27 billion in 1979 to \$34 billion in 1981; then decreased 15 percent to \$29 billion in 1982 and 1983, and averaged about 13 percent of domestic consumption for the period. The principal countries (or areas) of origin were Canada, Japan, and the EC. Exports increased from \$19.5 billion in 1979 to \$25 billion in 1980 and decreased continually during 1981-83, totaling \$13.7 billion in 1983. The major foreign markets for exports, which ranged from 11 percent of the value of producers' shipments in 1980 to a low of 6 percent in 1983, included the EC, Canada, Mexico, and Japan.

For many of the minerals within this sector, such as gemstones, fluorspar, magnesite, and mica, the United States has limited or no reserves, and imports supply the major part or all of domestic demand. Imports of other nonmetallic mineral products usually are of comparable quality to and often undersell domestic products. Domestic products manufactured from these

minerals, such as glass, glassware, and ceramic articles, are generally like in quality and competitive with foreign products in the U.S. and world markets, but are usually higher priced.

The relative strengths of the metals and metal products industries in this sector lie in the large size of the U.S. market and the skilled domestic labor force. Relative weaknesses of these industries include low profitability, which has resulted in relatively low levels of capital formation in many industries, and the development of competitive basic metals industries abroad. The competitiveness of the United States in domestic and world markets varies among the industries, with comparative cost structures and the quality and availability of domestic mineral reserves significant factors in determining U.S. competitive positions.

#### Israel Sector Profile

The natural resource base of Israel is limited, necessitating import dependence on many of the minerals and metals covered in this sector. From these raw materials are manufactured many of the semifinished and finished products essential to the health of the Israel industry and economy. A portion of these manufactures are consumed by the small domestic market, but an even greater emphasis is placed on exports, which generate the cash required to sustain the high level of imports.

The most significant industry in this sector is the diamond industry, with diamond exports amounting to 5 percent (approximately \$1.2 billion) of the Gross National Product in 1982. <sup>1/</sup> This industry had benefited directly

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<sup>1/</sup> Suzann C. Ambrosio, "The Mineral Industry of Israel," Minerals Yearbook, Volume III, Area Reports: International, 1982 Edition, p. 495.

from the emphasis placed on the export thrust and accelerated industrialization, becoming the largest share of Israel exports. Imported rough diamonds are cut and polished by Israel craftsmen and then sold through international diamond dealers. Nearly all of these cut gemstones are exported to various world markets, with the United States the principal export market. The Israel diamond industry accounts for more than one-half of the international trade in cut and polished diamonds, and the industry is currently expanding into other precious and semiprecious stones (particularly emeralds) due to the decline in demand for diamonds during the recent economic slowdown. 1/ Approximately 850 companies, employing about 9,500 workers, cut diamonds in Israel, with total annual sales of about \$1 billion during 1979-83. 2/

Israel nonmetallic mineral production consists of some clays, sand, and building materials, such as cement. In addition, articles such as tiles, bricks, and glass are manufactured for construction purposes. Most of these products are produced in quantities to supply the domestic market and would not be a significant factor in world trade. 3/

According to trade sources, Israel currently imports all of its glass tableware but anticipates supplying one-quarter of its domestic demand when production of these products resumes at Israel's major glass company. 4/ The Israel industries producing other glassware, ceramic tableware, and other

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1/ Ibid., p. 496.

2/ Israel Diamonds, International Edition, April/May/June 1983, p. 33; State of Israel, Ministry of Industry and Trade, Diamond Department, Import and Export of Diamonds, Diamond Tools, and Coloured Stones 1981

3/ Minerals Yearbook, p. 496; The American University, Israel, A Country Study, 1979, p. 205.

4/ "Israel: Glass Production Resumes," tableware International, November 1983.

ceramic articles are believed to be firmly established in the Israel market but are not believed to have the capacity to make inroads in major export markets.

The Israel steel industry relies on raw-material imports to manufacture its raw steel. Preliminary 1982 data indicate that production of raw steel in Israel totaled 96,000 tons, the lowest level during 1979-82. Four known companies manufacture rolled steel products, with an estimated capacity totaling at least 350,000 tons. Israel remains a net importer of steel and steel mill products and is not expected to become a major factor in world steel production despite planned expansion into wire rods, tube rounds, and billets of carbon and low-alloy steels by one of the manufacturers. 1/

Israel metal ore production is limited to copper which is mined in small quantities and amounted to an estimated 3,500 metric tons in 1982. 2/ Although a major copper mine reopened recently, only small production increases are anticipated due to high recovery costs. 3/

Of the various metal products included in this sector, interchangeable tools are the most significant Israel export to the United States. Approximately 15 Israel companies, employing about 1,200 workers, manufacture milling cutters, which account for the greatest share of U.S. interchangeable tool imports from Israel. Total worldwide Israel sales are estimated at between \$80 million to \$90 million, with the EC the principal export market. Industry sources indicate that production of these tools in Israel is

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1/ American Iron and Steel Institute, 1982 Annual Statistical Report, p. 115; "Iron and Steel Works of the World," Metal Bulletin, 1978 7th ed., pp. 389-391.

2/ Minerals Yearbook, pp. 496 and 497

3/ Israel, A Country Study, p. 204

primarily for export and that the industry has the potential to expand capacity to meet any future increased demand. At the present time, however, Israel is not a major factor in the world market for these goods. 1/

#### Israel Exports

Israel exports to all world markets of the products included in this sector attained their highest level in 1980, amounting to \$2.2 billion. During the other 3 years of the period, Israel exports remained at approximately \$1.9 billion. Israel exports to the United States averaged about 25 percent of these exports over the 4-year period.

By far the largest group of products exported from Israel were pearls and semiprecious and precious stones, amounting to \$1.2 billion in 1982, down from \$1.7 billion in the peak year of 1980. The United States was the principal export market during the period, accounting for an average of 30 percent of total Israel exports of these items.

Israel exports of miscellaneous metal manufactures was the next largest group of products shipped to world markets. This category includes such articles as locksmiths' wares, safes, chain, pins and needles, and other base metal items. These exports amounted to \$506 million in 1982, up 53 percent from the 1979 total of \$331 million. Although the United States was the largest known market for these items in 1982, they accounted for an average of 2 percent of these exports during 1979-82.

The third largest group of products exported from Israel were tools, such as pliers, interchangeable tools, and cutting blades. Tool exports from Israel fell from \$44 million in 1980, the peak year, to \$40 million in 1982.

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1/ Conversations with industry sources

However, the United States was the largest export market during the period, averaging 34 percent of total exports of these tools.

The United States is the principal export market for Israel products due to the duty-free status of over 99 percent of U.S. imports from Israel and the close political and economic ties between the United States and Israel. The EC, which already provides duty-free status under a similar arrangement for most imports from Israel, is the second major Israel export market. Due to the duty-free status of most Israel exports to the United States and the EC, the trade in products of this sector between Israel and these markets is not expected to change.

#### Exports to the United States

Total Israel exports to the United States fluctuated during 1979-83, rising from \$378 million in 1979 to \$626 million in 1981 before declining to \$490 million in 1982. Exports to the United States rose again in 1983, totaling \$551 million.

Cut diamonds of not over 1/2 carat was the leading import classification for all U.S. imports from Israel during 1979-83, totaling \$342 million in 1983 and accounting for 28 percent of U.S. imports. Cut diamonds over 1/2 carat, the second largest classification for all U.S. imports from Israel, amounted to \$132 million in 1983 and accounted for 18 percent of U.S. imports. These two categories together accounted for 86 percent of U.S. imports from Israel in the minerals and metals sector. Cut emeralds was another leading U.S. import category, amounting to \$18 million in 1983, down from \$23 million in

the past year of 1981. These cut emeralds accounted for 13 percent of U.S. imports and 4 percent of apparent consumption in 1983, as imports supplied most of the U.S. demand for these products.

Other major product areas where Israel is one of the United States' principal import suppliers include miscellaneous porcelain and subporcelain ceramic wares (53 percent, or \$726,329, of U.S. imports in 1983); other unwrought or semimanufactured silver (18 percent or \$428,039); other alloyed copper pipe and tube fittings (15 percent or \$848,013); tungsten waste and scrap containing by weight over 50 percent of tungsten (45 percent or \$2.8 million); metal teeth and cutting segments (15 percent or \$109,343); safety razors valued not over 50 cents each (33 percent of \$1.3 million); cutting tools and their parts (20 percent or \$522,424); safes and strongboxes (23 percent or \$4.4 million), and articles of gold (23 percent or \$307,574). Israel is a major import supplier for each of these items, but these imports are a minimal factor in apparent U.S. consumption of each product grouping.

In 1983, less than 0.5 percent of U.S. imports from Israel were subject to duty. Over 91 percent of these imports were duty free for most-favored-nation countries (including Israel), and 8 percent were duty free under provisions of the GSP.

#### Exports to countries other than the United States

Israel exports to countries other than the United States rose from \$1.5 billion in 1979 to a high of \$1.7 billion in 1980 and then fell during 1981 and 1982 to \$1.4 billion. The principal products exported to other markets were pearls and semiprecious and precious stones (particularly diamonds), with Belgium-Luxembourg, Hong Kong, and Japan the principal export markets.

Another major group of products exported from Israel was miscellaneous metal manufactures. Nearly all of these exports were shipped to unspecified destinations.

The third largest group of exports were tools, with West Germany and Belgium-Luxembourg the secondary export markets.

#### Probable Effects of Duty-Free Imports from Israel

The overall impact of the Israel free-trade agreement on the level of U.S. imports, the U.S. industries in this sector, and U.S. consumers would be negligible. Over 99 percent of Israel's exports to the United States currently enter duty free as a result of GSP status or a duty-free rate based on its designation as a most-favored-nation country. For those product areas that are dutiable, such as ceramic tiles, ceramic dinnerware, and glassware, the Israel industries are not major factors in the international trade of these articles and are not expected to adversely affect corresponding U.S. industries.

MACHINERY AND EQUIPMENT 1/

U.S. Sector Profile and Conditions of Competition

The machinery and equipment sector covers U.S. industries producing nonelectrical machinery, electrical machinery, and transportation equipment. Included in the sector are more than 50,000 U.S. firms which together employed 5.9 million persons in 1983. 2/ Typical products produced by the firms include motor vehicles, aircraft, construction machinery, office machines, communications products, and electrical generation, transmission, and distribution apparatus. Second only to the services industry, machinery and equipment products constitute the largest individual sector in the U.S. economy.

Apparent U.S. consumption of machinery and equipment products increased from \$385 billion in 1979 to \$451 billion in 1983, or by 17 percent (table 22). U.S. shipments followed a similar growth pattern, increasing irregularly from \$402 billion to \$448 billion. Exports of machinery and equipment also showed strong growth during the first half of the 5-year period, increasing from \$70 billion in 1979 to \$96 billion in 1981. However, during 1982 and 1983, U.S. exports declined to \$82 billion, or by 14 percent, as U.S. products became less competitive in foreign markets. As a share of U.S. shipments, exports fluctuated between 17 and 21 percent during the period; principal export markets were Canada, Western Europe, Japan, and certain oil-producing (OPEC) countries.

1/ Included are products classified in schedule 6, pts. 4, 5, and 6 of the Tariff Schedules of the United States, which comprise machinery and mechanical equipment, electrical machinery and equipment, and transportation equipment, respectively.

2/ An Evaluation of U.S. Imports Under the Generalized System of Preferences, USITC Publication 1379, May 1983, p. 61.

Table 23 Machinery and equipment: U.S. shipments, imports, exports, apparent consumption, and employment, 1979-83

Item	1979	1980	1981	1982	1983
Producers' shipments <sup>1/</sup> million dollars	401,674	413,785	445,533	430,709	448,020
U.S. exports					
Total	70,260	84,307	93,536	87,291	82,354
To Israel	815	706	748	808	1,024
U.S. imports					
Total	53,630	60,071	61,512	72,360	84,956
From Israel					
Total	132	173	233	260	241
Duty free under GSP	86.9	117.6	140.7	181.8	171.1
Duty free under col <sup>1/</sup>	8.6	54.0	56.9	18.3	34.6
Dutiable	4.5	4.4	2.9	2.9	4.9
Apparent consumption <sup>1/</sup> million dollars	385,044	389,556	410,539	415,536	450,622
Ratio of imports from Israel to total U.S. imports	2	3	4	4	3
Total U.S. imports to consumption <sup>1/</sup> percent	13.9	15.4	16.4	17.4	18.9
Imports from Israel to consumption <sup>1/</sup> percent	2/	2/	0.1	0.1	0.1
Total employment <sup>1/</sup> 1,000 workers	6,025	6,024	6,004	5,755	5,927

<sup>1/</sup> Estimated.

<sup>2/</sup> Less than 0.05 percent.

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

U.S. imports of products covered by this sector increased during 1979-83 from \$54 billion to \$85 billion, or by 58 percent. As a share of apparent U.S. consumption, imports increased from 13.9 percent during 1979 to 18.9 percent in 1983. Rising imports coupled with diminishing exports during the period resulted in a negative U.S. trade balance in machinery and equipment for the first time in 1983. The negative trade balance of \$2.6 billion in 1983 contrasts sharply with a \$27 billion surplus in 1981. Significant increases in U.S. imports of motor vehicles, consumer electronic products, telephone and telegraph apparatus, and numerous other sector articles caused the trade balance deterioration. Canada, Japan, and the EC supplied 76 percent of the value of machinery and equipment products imported in 1983.

With certain exceptions, competitive conditions in the U.S. market largely favor U.S. producers of machinery and equipment. U.S. producers are located in the world's largest market for these products, and in order to compete in this market, foreign producers must incur additional transportation and related costs. Also, major products in this sector include such articles as heavy electrical equipment, construction equipment, and transport equipment, all of which are difficult (and expensive) to transport or assemble and disassemble; many of these products are produced only in industrialized countries having the necessary infrastructure and advanced technology. Developing countries, however, are often used to perform labor-intensive operations which cannot be easily automated.

Japanese producers and producers in the EC are also strong competitors in the production of machinery and equipment. Japanese producers have made significant penetration in the U.S. market for products such as passenger automobiles, metal working machine tools, consumer electronic products, and semiconductors. Other producers have combined the advantages offered in the

United States and other countries to penetrate the U.S. market through foreign subsidiaries, which maximize the use of available land, tax incentives, and low-wage labor rates. Multinational firms also benefit from local production, gaining access to markets otherwise often denied to U.S. exporters.

#### Israel Sector Profile

Israel is a country lacking in natural resources and highly dependent on exports. Earnings from exports are needed to purchase imported components, materials, and energy supplies. To promote exports, the Israel Government encourages the development of high-technology industries and industries producing machinery and equipment. As a result, the economy is shifting toward industries producing telecommunications, aircraft, computers, and electronics. The shift is being achieved by Government incentives to attract foreign investment and by funding for research and development. Incentives include cash grants, low-interest rate loans for up to 75 percent of investment in fixed assets, and unlimited repatriation of profits and principal. <sup>1/</sup> In 1982, gross foreign investment in Israel reached \$825 million, \$216 million higher than in 1981. <sup>2/</sup> Separate from Government incentives, the Israel-United States Binational Industrial Research & Development Foundation supports up to 50 percent of the cost of industrial research not related to defense. <sup>3/</sup>

The machinery and equipment industry in Israel is relatively small and highly export dependent. According to data published by the Central Bureau of Statistics, Israel shipments of machinery and equipment decreased irregularly from \$1.7 billion in 1979 to \$1.6 billion in 1982. During the period nonelectric machinery accounted for 41 percent of the value, and electric

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1/ "The Selling of Israel," IndustryWeek, Jan. 23, 1984, p. 18

2/ Ibid.

3/ Ibid.

machinery accounted for 30 percent. Transport equipment accounted for the remainder. About 53 percent of the value of machinery and equipment produced in Israel during 1979-82 was exported.

#### Israel Exports

According to official statistics of the United Nations, exports of machinery and equipment from Israel increased from \$530 million in 1979 to \$985 million in 1981. During the period, transport equipment, largely aircraft, accounted for about 38 percent of total exports, and the remaining export share was divided about equally between nonelectric and electric machinery. In 1982, exports from Israel decreased to \$854 million as a result of a 25-percent decline in combined exports of nonelectric machinery and transportation equipment, as shown in the following tabulation (in millions of dollars):

<u>Item</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Nonelectric machinery	129	247	365	273
Electric machinery	128	199	266	313
Transport equipment	273	235	354	268
<u>Total</u>	<u>530</u>	<u>681</u>	<u>985</u>	<u>854</u>

The largest market for Israel exports of machinery and equipment during 1979-82 was the United States. The U.S. share of Israel exports increased from 19 percent in 1978 to 30 percent in 1982. Following the United States, exports of machinery and equipment to "unspecified destinations" accounted for 30 percent of Israel exports in 1982. It is believed that such exports were shipments of aircraft and other military merchandise. The remainder of Israel exports went principally to the EC, South America, and Africa. In 1982, the EC accounted for 14 percent of Israel exports, followed by South America (8 percent) and Africa (7 percent).