# ANHYDROUS AMMONIA FROM THE U.S.S.R.

**Report to the President on Investigation No. TA-406-5, Under Section 406 of the Trade Act of 1974**

**USITC PUBLICATION 1006**

**OCTOBER 1979**

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

# UNITED STATES INTERNATIONAL TRADE COMMISSION

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# USITC DETERMINES THAT ANHYDROUS AMMONIA IMPORTS FROM THE U.S.S.R. ARE CAUSING MARKET DISRUPTION

The United States International Trade Commission today reported to the President that market disruption exists with respect to imports of anhydrous ammonia from the U.S.S.R.

Chairman Joseph O. Parker and Commissioners George M. Moore and Catherine Bedell determined in the affirmative, finding that in order to remedy such market disruption it is necessary to impose a 3-year quota on U.S. imports of anhydrous ammonia from the U.S.S.R. for the years 1980-82 as follows: 1980, 1,000,000 short tons; 1981, 1,100,000 short tons; and 1982, 1,300,000 short tons. Vice Chairman Bill Alberger and Commissioner Paula Stern found that market disruption does not exist. Commissioners Alberger and Stern recommended that no remedy was appropriate.

The Commission investigation was instituted on July 18, 1979, under section 406(a) of the Trade Act of 1974 to determine with respect to imports of anhydrous ammonia, the product of the U.S.S.R., whether market disruption exists, with respect to an article produced by a domestic industry.

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U.S. imports of anhydrous ammonia from the U.S.S.R. increased from zero in 1977 to 315,000 short tons (equivalent to 2 percent of U.S. consumption) in 1978. Imports from all sources increased from 1.1 million short tons in 1977 to 1.5 million short tons (equivalent to 8 percent of U.S. consumption) in 1978.

Anhydrous ammonia is produced from natural gas, and is used mainly as a fertilizer.

Twelve domestic firms, accounting for 45 percent of U.S. production in 1978, were petitioners in this investigation: Agrico Chemical Co.; CF Industries, Inc.; Felmont Oil Corp.; First Mississippi Corp.; W. R. Grace Co.; International Minerals & Chemical Corp.; Mississippi Chemical Corp.; Olin Corp.; Terra Chemicals International, Inc.; Union Oil Co. of California; Vistron Corp.; and Wycon Chemical Co. Most domestic ammonia plants are located in those States which have large supplies of natural gas. In 1978, 29 percent of the ammonia productive capacity was located in Louisiana, 12 percent was in Texas, and 10 percent was in Oklahoma.

The Commission's public report, Anhydrous Ammonia From the U.S.S.R. (USITC Publication 1006), contains the views of the Commissioners in the investigation (No. TA-406-5). Copies may be obtained by calling (202) 523-5178; from the Office of the Secretary, 701 E Street NW., Washington, D.C. 20436; or at the USITC's New York office, 6 World Trade Center, Suite 629, New York, N.Y. 10048, telephone (212) 466-5598.

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C O N T E N T S

CONTENTS

CONTENTS



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

# REPORT TO THE PRESIDENT

United States International Trade Commission
October 11, 1979

To the President:

In accordance with section 406(a)(3) of the Trade Act of 1974, the United States International Trade Commission herein reports the results of an investigation relating to anhydrous ammonia (ammonia) from the U.S.S.R. The investigation (No. TA-406-5) was undertaken to determine with respect to imports of ammonia provided for in items 417.22 and 480.65 of the Tariff Schedules of the United States (TSUS), which are the product of the U.S.S.R. whether market disruption exists with respect to an article produced by a domestic industry.

The Commission instituted the investigation, under the authority of section 406(a) of the Trade Act, on July 18, 1979, following the receipt of a petition under section 406 of the Trade Act for relief from ammonia imported from the U.S.S.R. filed on behalf of 12 U.S. producers and 1 U.S. distributor of ammonia. The Commission held a public hearing on this matter in Washington, D.C. on August 29-31, 1979. Notice of the institution of the investigation and of the public hearing was published in the Federal Register of July 25, 1979 (44 F.R. 43536).

The information in this report was obtained from fieldwork and interviews by members of the Commission's staff, from other Federal agencies, from responses to the Commission's questionnaires, from information presented at the public hearing, from briefs submitted by interested parties, and from the Commission's files.

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

## DETERMINATION, FINDINGS AND RECOMMENDATIONS OF THE COMMISSION

### Determination

On the basis of the investigation, the Commission (Vice Chairman Alberger and Commissioner Stern dissenting) determines, with respect to imports of anhydrous ammonia the product of the U.S.S.R., provided for in items 417.22 and 480.65 of the TSUS, that market disruption exists with respect to an article produced by a domestic industry.

### Findings and Recommendations

Chairman Parker and Commissioners Bedell and Moore find and recommend that, in order to remedy such market disruption, it is necessary to impose a quota of 3 years duration on U.S. imports of anhydrous ammonia the product of the U.S.S.R., provided for in items 417.22 and 480.65 of the TSUS, as specified below.

The quotas for the 3-year period beginning with calendar year 1980 would be as follows--

| Year | Quantity of imports to be allowed entry (short tons) |
|---|---|
| 1st year (1980) | 1,000,000 |
| 2nd year (1981) | 1,100,000 |
| 3rd year (1982) | 1,300,000 |

Vice Chairman Alberger and Commissioner Stern, recommend that there be no remedy in this investigation.

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

STATEMENT OF REASONS FOR THE DETERMINATION OF CHAIRMAN JOSEPH O. PARKER AND COMMISSIONERS GEORGE M. MOORE AND CATHERINE BEDELL

This investigation is before the Commission as a result of a petition for import relief filed by 12 domestic producers and 1 domestic distributor of anhydrous ammonia (ammonia). Petitioners allege that imports of ammonia from the U.S.S.R. are causing market disruption within the meaning of section 406 of the Trade Act of 1974. The Commission instituted investigation No. TA-406-5 to determine whether imports of ammonia from the U.S.S.R. are causing market disruption.

The term "market disruption" is defined in section 406(e)(2) of the Trade Act of 1974 as follows:

> Market disruption exists within a domestic industry whenever imports of an article, like or directly competitive with an article produced by such domestic industry, are increasing rapidly, either absolutely or relatively, so as to be a significant cause of material injury, or threat thereof, to such domestic industry.

In accordance with section 406(e)(2), the Commission is to examine the impact of imports of ammonia from the U.S.S.R. on the domestic industry producing a like or directly competitive article. Ammonia is identical in physical characteristics and quality regardless of source. Therefore, for the purpose of this investigation, we consider the domestic industry to be the facilities in the United States devoted to the production of ammonia.

In 1978, 59 companies operated ammonia plants at 93 locations with a total operating design capacity of 22.0 million short tons per year. The domestic producers range in structure from small chemical or fertilizer companies to large integrated multinational oil and chemical corporations; some of the largest ammonia producers are farmers' cooperatives.

In order to make an affirmative determination of market disruption, the Commission must find that imports are "increasing rapidly, either absolutely or relatively." This requirement reflects the concerns of Congress regarding the ability of Communist countries to direct their exports by virtue of their control of distribution and price "so as to flood domestic markets within a shorter time period than could occur under free market conditions." 1/ Although the term is not statutorily defined. the Senate Finance Committee report provides further guidance as to its meaning:

> The increase in imports required by the market disruption criteria must have occurred during a recent period of time, as determined by the Commission taking into account any historical trade levels which may have existed. 2/

It is clear that the increase in imports can be either absolute or relative and must have been recent in time. The increase must also have been rapid and of a magnitude to be a significant cause of material injury within the meaning of the act. 3/

In 1973, Occidental Petroleum Corp. entered into an agreement with the Soviet Union which, among other things, gave Occidental the exclusive right to any specified amounts of Soviet ammonia for sale in the United States beginning in 1978.

Prior to 1978, there were no imports of ammonia from the U.S.S.R. except for a nominal amount in 1976. More than 300,000 short tons was imported in 1978. Imports further increased from 121,000 short tons in January-June 1978 to 267,000 short tons in the corresponding period of 1979.

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1/ U.S. Senate, Trade Reform Act of 1974: Report of the Committee on Finance . . ., S. Rept. No. 93-1298 (93d Cong., 2d sess.), 1974, p. 210.

2/ Ibid., p. 212.

3/ Statement of reasons for determinations of Commissioners George M. Moore, Catherine Bedell, and Italo H. Ablondi, and Views of Chairman Joseph O. Parker, in Clothespins From the People's Republic of China, the Polish People's Republic, and the Socialist Republic of Romania, USITC Publication 902, August 1978.

Occidental has advised that imports will total about 1 million short tons in 1979, 1.5 million in 1980, and 2 million in 1981.

Imports of ammonia from the U.S.S.R. were the equivalent of about 2 percent of domestic production in 1978. It is estimated that they will be the equivalent of 6 percent of domestic production in 1979 and will rise to about 12 percent in 1981.

Considering historical trade levels and increases occurring during the most recent period of time, it is evident that these imports are increasing rapidly, both absolutely and relatively, within the meaning of section 406.

Section 406 also requires that the rapid increase in imports be a "significant cause of material injury or threat thereof" to a domestic industry. Like the term "increasing rapidly," the statutory terms "significant cause," and "material injury or threat thereof" are not defined in the statute but are discussed in the legislative history of this section. These terms should not be confused with the causation and injury standards of section 201. That section is structured to permit the Commission to address the problems of increased imports from all sources, whereas section 406 is specifically designed to address the unique problems of imports from nonmarket economies. In explanation of the differences between the causation standard in section 406 and the causation standard in section 201, the report of the Finance Committee states:

> This market disruption definition contained in the Committee bill is formulated along lines similar to the criteria for import relief under section 201 of this bill. However, the market disruption test is intended to be more easily met than the serious injury tests in section 201. While section 201(b) would require that increased imports of the article be a "substantial cause" of the requisite injury, or the threat thereof, to a domestic industry, section 406 would require that the article is being, or is likely to be, imported in

> such increased quantities as to be a "significant cause" of material injury, or the threat thereof. The term "significant cause" is intended to be an easier standard to satisfy than that of "substantial cause". On the other hand, "significant cause" is meant to require a more direct causal relationship between increased imports and injury than the standard used in the case of worker, firm and community adjustment assistance, i.e., "contribute importantly." In addition, the term "material injury" in section 406 is intended to represent a lesser degree of injury than the term "serious injury" standard employed in section 201. 1/

It is clear from the legislative comments that a "significant cause" in section 406 investigations must be an important and factually identifiable cause, but the causation requirement is intended to be more easily satisfied than the requirement of section 201.

Neither is the term "material injury or threat thereof" defined in the statute. The statutory history indicates, however, that "material injury or threat thereof" as used in section 406 is intended to represent a lesser degree of injury than the "serious injury" standard of section 201.

When imports of ammonia from the U.S.S.R. commenced in 1978, the domestic industry was in a substantially weakened competitive position. The industry's vulnerability was, in part, the result of unused capacity following the expansion of production facilities in the mid-1970's, and the increasing costs of natural gas.

U.S. production levels decreased in 1978. They increased in January-June 1979, but the U.S. producers' share of domestic consumption decreased by 2 percent from the share in the corresponding period of 1978, notwithstanding an increase in consumption.

Available profit-and-loss information shows net operating profit on ammonia operations declining from $316 million in 1976 to $149 million in 1977 and to $10 million in 1978. In January-June 1979,

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1/ Trade Reform Act of 1974: Report of the Committee on Finance . . ., p. 212.

the domestic producers suffered a combined net loss of $4 million in comparison with a $30 million profit in the corresponding period of 1978.

Occidental has contracted with the U.S.S.R. to purchase annual quantities of ammonia during the 20-year period beginning in 1978. The contract has been modified several times since the original contract. On two occasions the modifications resulted in the U.S.S.R.'s being obligated to supply increased quantities of ammonia to Occidental for sale in the United States. The contract quantities have not been reduced.

The strategy used to market Soviet imports consists of entering into long-term forward pricing contracts. Occidental negotiates with potential customers and obtains letters of intent to purchase quantities of ammonia at certain prices and then, in turn, agrees upon prices and quantities with the U.S.S.R. with fixed prices for specific periods of time. The contracts under which Occidental sells to its customers are for periods up to 10 years with prices fixed during the first 3 years. The prices in the second and third years are fixed except for nominal price increases through escalation clauses ranging from 3 percent to 6 percent per year. Occidental is thus able to offer ammonia in the U.S. market at firm prices for specified periods of time by virtue of the arrangements it has been able to make with its Soviet supplier. The production and sale of ammonia by the U.S.S.R is a governmental operation and does not, therefore, have to be responsive to the disciplines of a free market economy, disciplines which the domestic industry must face. Hence, pricing and marketing procedures are being used which are extraordinarily difficult, if not impossible for U.S. producers, to meet. The prices at which the ammonia was sold in the first year of the contracts appear to have been at levels comparable to U.S. market prices at the time these forward price contracts were entered into. However, in

subsequent years, the price at the time of delivery, even with the application of a price escalation clause, will likely be below U.S. market prices of domestically produced ammonia. The forward pricing of U.S.S.R. ammonia which does not reflect the escalating raw material costs being experienced by U.S. producers serves to aggravate the cost-price squeeze which the domestic industry is experiencing. U.S. producers who are confronted with rapidly increasing costs of natural gas are unable to compete with forward price long-term contracts made available by the U.S.S.R.

As a result of Occidental's unique ability to forward price through long-term arrangements with the U.S.S.R., imports from the U.S.S.R. are able to penetrate the market to an unlimited extent. During the most recent period for which data are available, January-June 1979, apparent domestic consumption has increased by approximately 280,000 short tons, or about 3 percent over that in the corresponding period of 1978. Total imports supplied approximately 85 percent of this growth, with imports from the U.S.S.R. capturing about 50 percent. But for the declaration of a force majeure by the U.S.S.R. in January 1979, which caused its failure to meet early 1979 delivery commitments, Soviet import penetration would have been materially higher. Minimum imports are predictable and certain because of the fixed long-term nature of the supply and pricing provisions in Occidental's agreements with the U.S.S.R. and in its agreements with U.S. customers.

Soviet ammonia production capacity is scheduled to double between 1977 and 1982 from 17 million short tons to 34 million short tons. Soviet ammonia production capacity, which was about 20 percent less than U.S. ammonia production capacity in 1977, will be about 75 percent greater than U.S. ammonia production capacity in 1982. This tremendous growth in Soviet

productive capacity over a short 5-year period does not appear to reflect either Soviet or world market needs. The CIA, in an October 1978 report titled Soviet Chemical Equipment Purchases from the West: Impact on Production and Foreign Trade, predicted that U.S.S.R. exports of ammonia "will be an important destabilizing factor in world ammonia markets in the 1980's" The report further states that "producers in the developed Western countries almost certainly will be affected . . . with depressed prices and profits in store."

A further significant consequence of these sales could be the potential dependency on the U.S.S.R. for a vital raw material. This was of particular concern to the Senate Finance Committee which states in its report that it "expects the Commission and the President to monitor carefully important trends and to view each case with the goal of preventing imprudent dependence on a nonmarket economy for a vital material." 1/ Certainly the ability of the United States to maintain its highly efficient agricultural productive enterprise is vital to our economy and to our national welfare as well as the free world which is also the beneficiary of our agricultural efficiency. An adequate supply of ammonia for the production of nitrogeneous fertilizers is essential. A dependence on Soviet produced and supplied ammonia for a significant portion of our nitrogen requirements would place our agricultural and other national requirements in a vulnerable position. Ammonia plants are capital intensive. Capital requirements will be difficult to obtain to meet current and future needs if the market structure is disrupted by Soviet produced ammonia which is marketed under terms and arrangements with which the U.S. industry cannot compete because of the disciplines of a free market economy.

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1/ Ibid., p. 211.

The risks are heightened with each further reduction in U.S. ammonia production capacity. Statements given at the Commission's hearings indicate that the lower long-term prices of Soviet imports were used to encourage the cessation of domestic production by some U.S. producers in favor of the purchase of Soviet imports. 1/ As Soviet imports continue to capture a larger share of the total U.S. ammonia market, the vulnerability to sudden shortages will become increasingly significant.

Conclusion

On the basis of these factors, we have made an affirmative determination of market disruption.

1/ Statement of Donald V. Borst at the U.S. International Trade Commission hearing on Investigation No. TA-406-5, Attachment A, Exhibit 6.

## VIEWS OF CHAIRMAN PARKER AND COMMISSIONERS MOORE AND BEDELL ON REMEDY

Section 406(a)(3) of the Trade Act requires that if the Commission makes an affirmative determination of market disruption, "it shall find the amount of increase in, or imposition of, any duty or other import restriction. . . which is necessary to prevent or remedy such market disruption. . . ."

We are recommending a quota as the import restriction which would best prevent market disruption in the domestic anhydrous ammonia industry. This would be a quota of three years duration, beginning with calendar year 1980, on imports of anhydrous ammonia from the U.S.S.R. provided for in items 417.22 and 480.65 of the TSUS, as follows:

| Year | Quantity of imports to be allowed entry (short tons) |
|---|---|
| 1980 | 1,000,000 |
| 1981 | 1,100,000 |
| 1982 | 1,300,000 |

By statute,quota levels recommended can be no less than the quantity imported during the most recent representative period. In 1978, the first year of Soviet imports, approximately 300,000 short tons were imported. In 1979 Occidental, the exclusive importer, estimates that it will import about 1,000,000 short tons. Occidental has advised that imports in 1979 will total about 1 million short tons, 1.5 million in 1980 and 2 million in 1981.

The recommended quota level for 1980 will hold imports to the estimated 1979 level, which is the highest level reached to date by Soviet imports. In our judgment our recommended quotas will provide the domestic industry the opportunity to strengthen its competitive position, and prevent the disruptive effects of forward pricing contracts involving larger quantities of ammonia. Increases in the quota levels for 1981 and 1982 would permit U.S.S.R. imports to reasonably participate in the expected growth in United States consumption, but limit the market disruption which would be caused if imports were not restricted to prevent the preemption of an undefined portion of the domestic market.

STATEMENT OF REASONS FOR THE DETERMINATION OF COMMISSIONERS PAULA STERN AND BILL ALBERGER

On the basis of information developed during the course of this investigation, we determine that market disruption as defined in Section 406 of the Trade Act of 1974 (Trade Act) [1/] does not exist with respect to imports of anhydrous ammonia from the Union of Soviet Socialist Republics (U.S.S.R.).

The product and the domestic industry

Anhydrous ammonia is used as a major end product and as an intermediate in the production of more complex chemicals. Nearly 75 percent of the ammonia consumed in the United States is used as fertilizer. Ammonia can be either applied directly to farmland or upgraded into other types of fertilizer. It is also used in the production of explosives, livestock feeds, fibers, plastics, resins, and elastomers.

In 1978, ammonia was produced in the United States by fifty-nine companies operating at 93 locations throughout the country. These producers vary in size from small chemical fertilizer producers to large, integrated, multinational oil and chemical corporations, with farmers cooperatives being among the largest producers.

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1/ 19 U.S.C. § 2436.

Ammonia producing plants may be classified into three general categories by their size and the nature of the technology employed. The least efficient producers are small plants which utilize reciprocating compressor units and have a capacity of less than 200,000 short tons yearly. The most efficient producers are large plants which utilize the newest centrifugal compressors and have a capacity in excess of 340,000 tons yearly. The intermediate range includes plants using either type of compressor.

In the last decade, in order to increase efficiency and competitiveness, the domestic industry has built several large plants with the newest technology. During this period, the domestic industry has also been wracked by the escalating cost of natural gas, the major feedstock for the production of anhydrous ammonia.

The domestic producers who are petitioners accounted for 45 percent of domestic production in 1978. Two of the petitioners, CF Industries, Inc. and W. R. Grace and Co., are also major importers by virtue of their ownership of foreign facilities.

## Imports

### A. The Occidental Petroleum Co. - U.S.S.R. Global Agreement

Central to this investigation is the basic 1973 Global Agreement between the U.S.S.R. and the Occidental Petroleum Corporation of California (Occidental). Among other things, Occidental agreed to provide the

U.S.S.R. with design and equipment technology for the construction of modern ammonia plants. In addition, the Agreement called for the U.S.S.R. to purchase 20 million tons of superphosphoric acid from Occidental. In exchange, Occidental committed itself under an exclusive licensing agreement to purchase and market 2.3 million short tons of U.S.S.R. produced ammonia each year from 1978 through 1987 and 1.5 million short tons yearly between 1988 and 1997. 2/ The prices paid by Occidental to the U.S.S.R. for this ammonia have been set for periods of up to three years.

Occidental ships virtually all of its imports of Soviet ammonia to nine customers in the United States. These customers have agreed to purchase a fixed amount each year over the length of their contracts, running anywhere from two to ten years. The purchases are made on a fixed-price basis with an automatic escalator clause of from three to six percent per year applicable to shipments in the second and third years of the contract, with prices for subsequent years subject to further negotiation.

U.S. imports of ammonia from the U.S.S.R. increased from a quantity of zero in 1977 to 315 thousand short tons in 1978. Such imports are expected to increase to about 1 million short tons in 1979, 1.5 million in 1980, and 2 million in 1981.

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2/ Appendix D of the Staff Report gives a detailed analysis of the agreements.

B. Other Foreign Sources

The trend in imports from the U.S.S.R. follows the trend of increasing imports from some other countries. Imports from Canada increased from 93 thousand short tons in 1974 to 632 thousand short tons in 1977 before falling to 517 thousand short tons in 1978. Imports from Mexico similarly increased from 2 thousand short tons in 1974 to 349 thousand short tons in 1978. While imports from all countries tripled from 1974 to 1978, the ratio of imports to apparent U.S. consumption was only eight percent in 1978. In that year, the U.S.S.R., with 21 percent of total imports, was only the third largest foreign supplier of anhydrous ammonia to the United States. Canada, where CF Industries owns major facilities, was the largest foreign source with 34 percent. Mexico was second with 23 percent. Just behind the Soviet Union, with 18 percent of all imports, stood Trinidad, where W. R. Grace and Co. has a wholly-owned subsidiary and in partnership with the goverment of Trinidad owns a second plant with a 400 thousand ton capacity.

Statutory framework

Section 406(a)(1) of the Trade Act provides that "upon the filing of a petition . . . the International Trade Commission . . . shall promptly make an investigation to determine, with respect to the imports of an article which is the product of a Communist country, whether market disruption exists with respect to an article produced by a domestic industry." 3/

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3/ 19 U.S.C. 2436(a)(1).

"Communist country" is defined in Section 406(e)(1) to mean "any country dominated or controlled by Communism." 4/

Section 406(e)(2) defines market disruption:

> Market disruption exists within a domestic industry whenever imports of an article, like or directly competitive with an article produced by such domestic industry, are increasing rapidly, either absolutely or relatively, so as to be a significant cause of material injury, or threat thereof, to such domestic industry. 5/

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4/ 19 U.S.C. 2436(e)(1).

5/ 19 U.S.C. 2436(e)(2).

These statutory criteria may be summarized as follows.[6/] The imported article must be --

(1) the product of a communist country;

(2) like or directly competitive with a domestically produced article;

(3) increasing rapidly, either absolutely or relatively; and

(4) a significant cause of material injury, or threat thereof, to a domestic industry producing such an article.

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6/ Much testimony was offered concerning the reliability of Soviet exports and suggesting that the United States might become overdependent on the Soviet Union for ammonia. However, it is not a statutory responsibility of the Commission to make a finding on this question. Clearly, the Senate Finance Committee wished to prevent "imprudent dependence" by the United States on a communist nation for a "vital material." (S. Rept. No. 93-1298, 93d Cong., 2d Sess. (1974), p. 211.) On the other hand, the Senate Finance Committee specifically envisioned that a "reasonable quantity of such materials could be imported without causing market disruption . . . ." (Id. at 211.)

The information received by the Commission indicates that the maximum market share the U.S.S.R. may attain in 1981 will be less than ten percent. The United States can rely on the reserve capacity of the domestic industry as well as the many foreign suppliers, including the foreign facilities of two of the petitioners. Overseas sources include significant capacity in Europe, rapidly growing capacity which has kept ahead of domestic consumption in Mexico, recently-doubled capacity in Trinidad (with a planned expansion in progress), and expanding facilities in the remainder of Latin America, Africa and non-communist Asia.

A serious analysis of the difficult concept of "dependence" would require the weighing of a broad range of economic and political factors far beyond the scope of the present investigation.

Communist country

The definition of a "Communist country" provided by Section 406(e)(1) is clearly satisfied by the U.S.S.R., the first nation to adopt a political system dominated by a communist party.

The original classification of nations as "Communist" by the government of the United States is found in Proclamation No. 2935 [7] issued by President Truman on August 1, 1951, which gave effect inter alia [8] to Section 5 of the Trade Agreements Extension Act of 1951. The U.S.S.R. was not included in the original list of communist countries. However, in 1953, President Eisenhower added the U.S.S.R. to the list. [9] This list of communist countries was incorporated into general headnote 3(e) of the Tariff Schedule of the United States (TSUS), provided for by Section 102(4) of the Tariff Classification Act of 1962. General

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7/ 3 C.F.R. 121 (1949-1953 Compilation) (1951).

8/ 19 U.S.C. § 1202. Section 5 provides for discriminatory treatment of products of communist nations. It requires the President to "suspend, withdraw or prevent the application of any reduction in any rate of duty . . . or other concession contained in any trade agreement entered into under Section 350 of the Tariff Act of 1930, as amended and extended, to imports from any nation or area dominated or controlled by the foreign government or foreign organization controlling the world communist movement."

9/ Letter of President Eisenhower, dated January 17, 1953, 3 C.F.R. 1051 (1949-1953 Compilation).

headnote 3(e) relates to tariff treatment of products of communist countries.[10/]

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10/ This list does not, however, contain the names of all communist countries and does contain the names of areas which are not nations. For example, since 1960 four nations (Poland, Yugoslavia, Romania, Hungary) have been removed from the list of those ineligible for the nondiscriminatory treatment afforded by column 1 rates in the TSUS. In this regard it is also important to note that Title IV of the Trade Act, in sections other than 406, often refers to "nonmarket economy" countries. In particular, Section 410 of the Trade Act requires the Commission to "establish and maintain a program to monitor imports of articles into the United States from nonmarket economy countries and exports of articles from the United States to nonmarket economy countries." The distinction, if any, between a "nonmarket economy" and a "communist country" is not clearly established. It is possible to conceive of a market economy run by a government formed by a communist country; likewise, it is also possible to conceive of a basically nonmarket economy whose government is noncommunist. While problems resulting from the alternation of political and economic terms in Title IV are not present in this case, they may present themselves in the future. Therefore, the Congress may want to review Title IV in order to avoid future confusion.

Like and directly competitive

Anhydrous ammonia is a chemical product and completely fungible. On arrival, the imports from the U.S.S.R. are indistinguishable from the domestic product. However, Occidental claims to serve a distinct market. Soviet ammonia is most often sold for upgrading into other fertilizer products. Domestic ammonia is primarily used in captive operations of U.S. producers and is also sold for direct application by farmers. The ammonia in each case is identical, and the domestic industry is capable of supplying all customers. We, therefore, find that anhydrous ammonia from the U.S.S.R. is like and directly competitive with the domestic product.

Rapidly increasing imports

The Senate Finance Committee Report on the Trade Act of 1974 explains the rationale behind "increasing rapidly":

> The Committee recognizes that a communist country, through control of the distribution process and the price at which articles are sold, could disrupt the domestic markets of its trading partners and thereby injure producers in those countries. In particular, exports from communist countries could be directed so as to flood domestic markets within a shorter period of time than could occur under free market conditions. 11/

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11/ S. Rept. No. 93-1298, op. cit. at 210.

During the early 1970s there was a growing concern that the United States was not -- relative to other western nations -- moving rapidly enough to develop trade with the east. In order to encourage bilateral trade, Title IV of the Trade Act provided conditions for the extension of most favored nation tariff treatment to communist countries then receiving discriminatory column 2 treatment in the TSUS. But to afford domestic producers protection, Section 406 was designed to thwart the possibility that communist, nonmarket economies could, over a brief period of time, rapidly increase imports so as to "constitute, or lead to, a flooding of the domestic market." 12/ The Senate Finance Committee was particularly careful to specify that the concern was in preventing abnormal increases by noting that "/a/ reasonable quantity of such materials could be imported from communist countries without causing market disruption. . . ." 13/ The Committee went on to point out that "/t/he increase in imports required by the market disruption criteria must have occurred during a recent period of time, as determined by the Commission taking into account any historical trade levels which

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12/ Id. at 212.

13/ Id. at 211.

may have existed.[14/] Thus, in order to obtain an affirmative determination in a Section 406 investigation, it must first be demonstrated that the imports in question have been increasing rapidly, rather than simply shall at some future point in time be increasing rapidly.

The statute grants the Commission the discretionary power of analyzing the increase "absolutely or relatively." The Conference Report on the Trade Act indicates that the relative comparison should be made with respect to total domestic consumption.[15/] However, where there is no historic level of imports to use as a base, it is difficult to put absolute growth rates in a proper perspective. Imports from the Soviet Union were zero in 1977. Thus, there is no existing historical trade level to use as a standard for an absolute growth rate. Three hundred thousand short tons were imported in 1978. During the first half of 1979, such imports further increased to 267 tons from 131 thousand during the same period of 1978.

On a relative basis, Soviet ammonia captured two percent of the domestic market in 1978. The U.S.S.R. share of the domestic market increased to 2.6 percent in the first half of 1979, with a projected share of 5.0 percent for all of 1979.[16/] In the last five years, three other countries -- Canada, Trinidad and Mexico -- have all become

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14/ Id. at 212.

15/ H.R. Rept. No. 93-1644, 93d Cong., 2d Sess. (1974), p. 48.

16/ This projection is based on contracts which have already been signed and on an estimate of total domestic consumption for 1979.

factors in the domestic market with shares varying up to four percent. Imports from each of these market economies have exhibited upward swings in market share of one to two percent in a single year.

We find that Soviet imports minimally meet the criterion of increasing rapidly within the meaning of Section 406.

Material Injury

The term "material injury" is not explicitly defined in Section 406 of the Trade Act. The Senate Finance Committee Report offers some guidance, observing that "the term 'material injury' in Section 406 is intended to represent a lesser degree of injury than the term 'serious injury' standard employed in Section 201." 17/ We also believe it is useful to bear in mind the definition of "material injury" in the Trade Agreements Act of 1979, even though that definition is used in the context of the Antidumping Act. Section 771(7)(a) of the Trade Agreements Act defines "material injury" to be "harm which is not inconsequential, immaterial, or unimportant." 18/

In discussing the meaning of "market disruption," the Senate Finance Committee noted that the definition of the term "is formulated along lines similar to criteria for import relief under Section 201 of

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17/ Id. at 212.

18/ Public Law 96-39, 93 Stat. (1979).

this bill." [19/] Section 201(b)(2) of the Trade Act directs the Commission to "take into account all economic factors which it considers relevant, including (but not limited to), . . . the significant idling of productive facilities in the industry, the inability of a significant number of firms to operate at a reasonable level of profit, and significant unemployment or underemployment within the industry . . . ." We have examined these factors as well as other economic indicators which we believe assist in understanding the situation of this industry. Careful analysis of all these economic indicators shows that the ammonia industry in the United States has been experiencing material injury since mid-1975, well before Soviet imports began to enter the United States.

The capacity utilization of the domestic producers steadily fell from a peak of 91 percent in 1974 to 77 percent in 1978. However, figures for the first half of 1979 show capacity utilization making a startling recovery to 86 percent, a full nine percent higher than the figure for the first half of 1978. Since 1974, a total of 45 plants have come on stream or expanded their productive capacity, the largest addition of new capacity coming in 1977. Since 1976, however, 3.6 million short tons of United States productive capacity have been idled or closed. After the ebb and flow of additions and closings, large, newer plants now account for 53 percent of total capacity compared to only 34 percent in 1976.

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19/ S. Rept. No. 1231, op. cit. at 212.

The profitability reported on domestic ammonia operations has declined dramatically since 1976. The ratio of net profit to total sales fell from 28 percent in 1976 to one percent in 1978, and a net loss in the first half 1979. Profit figures are based in part on estimates submitted by thirty-five domestic producers, which cover three-fourths of United States production. Often the ammonia operations of these firms are not separate accounting units. Moreover, half of United States production is captively consumed with transfer prices in 1978 varying between $23 and $140 per short ton. Clearly, profitability is extremely sensitive to the methods producers use in allocating profits and imputing prices for internal transfers. While the derived profitability figures are thus not necessarily very reliable, there is no reason to doubt the overall trends and the implication of injury.

Employment, measured in both number of workers and hours employed, grew between 1974 and 1977 before beginning a decline that continued until the present. United States production increased steadily from 15.7 thousand short tons (1974) to 17.6 thousand tons (1977); it then fell to 17.0 in 1978. However, the first half of 1979 shows a rise of 4.4 percent over the statistics for the similar period in 1978.

Inventories, which fluctuate seasonally, have been analyzed at the yearend. Compared with a 1975 level of 2.1 thousand short tons, they grew in 1976 to 2.3 thousand short tons and again in 1977 to 2.8 thousand, before declining in 1978 to 2.4 thousand. Analysis of the season-by-season figures shows that the decline has continued unabated through June 30, 1979.

Significant cause

The Senate Finance Committee Report explains clearly the meaning of "significant cause" within the framework of Section 406:

> The term "significant cause" is intended to be an easier standard to satisfy than that of "substantial cause." On the other hand, "significant cause" is meant to require a more direct causal relationship between increased imports and injury than the standard used in . . . adjustment assistance, i.e., "contribute importantly." 20/

Thus, a direct causal link is required between the subject imports and material injury; however, the subject imports need not be at least as important as any other cause of material injury.

The factors that have proved of assistance in assessing causality are detailed analyses of the behavior of input costs and output prices, the history and effects of expansion of domestic facilities, the character and timing of the closing of U.S. plants, the growth of the Soviet share of the market, the nature of alleged lost sales, and the recent turnaround of some important indicators in the face of increasing Soviet imports. After full consideration of all the available information in this case, we have not been able to find any credible shred of evidence that would link the Soviet imports to the material injury the domestic industry has experienced or may continue to experience.

The United States ammonia industry enjoyed a boom period from 1974 through mid-1975. Demand was strong and spot prices soared to a record high of $400 per short ton. With ammonia plants running at full

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20/ Id. at 212.

capacity (91 percent), profits reached unprecedented levels. Domestic producers with full knowledge of the general magnitude of the agreement between Occidental Petroleum Corporation and the U.S.S.R., anticipated continued shortages of ammonia and individually began to construct new plants and to expand old ones. By the middle of 1975, almost three years before the arrival of the first ton of Soviet ammonia, it became apparent to the U.S. industry that the boom would not last. Weakened demand was reflected in U.S. Gulf Coast spot prices as they fell steadily from the peak $400 per short ton (1975) to $78 a short ton during the summer of 1978. Meanwhile, those plants whose construction had begun during the 1974-1975 boom gradually came on stream. Altogether 7.6 million short tons of new capacity, representing 44 percent of the total U.S. capacity in 1974, have been added since 1974. The boom was followed by a bust of three years duration, mid-1975 to mid-1978.

Exacerbating the problems of domestic producers was the rapid increase in the cost of natural gas, the basic feedstock used in the production of ammonia. In 1978, for example, natural gas accounted for 64 percent of the cost of production. The average price of natural gas paid by U.S. ammonia producers in 1974 was $0.48 per thousand cubic feet. By the first half of 1979 this had almost tripled to $1.40.

Increasing costs, combined with overcapacity and decreasing prices, led to fierce competition in the domestic market and the closure of older, less efficient plants. It is very instructive to examine the

technology of the plants that were idled or shut down during the period. The year 1963 was a turning point in ammonia technology. New plants used centrifugal compressors instead of the older reciprocating ones; maximum annual capacity of a plant increased from less than 200,000 short tons to over 400,000, with the prospects of great savings in the costs to produce each ton of ammonia. The new generation of large plants have about half the nongas costs per ton of output than the smaller, older plants. Also, as big consumers, they are in a good position to obtain more favorable natural gas contracts. A study by the accounting firm Ernst and Ernst for the Fertilizer Institute indicates that the average cost of natural gas between 1974 and 1978 was thirty to fifty percent lower for large plants than for medium and small ones. These facts were not lost on domestic producers who have a history of undertaking large expansions in response to tight market periods, such as the one experienced in 1974. With a two-year lag between planning and completion of a new facility, the domestic industry in 1976 started to contend with new plants coming on stream after demand and prices had begun to fall. The solution was to idle or close high-cost facilities. Thirty-two of the plants which have closed since 1976 are of the older, smaller, reciprocating type using the now outmoded pre-1963 technology. Only four are centrifugal plants. None of these four is in the league of the modern giants with capacities of 340,000 short tons per year or more.

Analysis of confidential information shows that Soviet ammonia was not in any way related to the closings of the four centrifugal plants.

Imports of Soviet ammonia began to enter the United States in 1978 at the tail-end of the domestic industry's bust cycle. In that year imports from the U.S.S.R. accounted for only two percent of U.S. consumption. Although the staff received allegations of three sales lost to Occidental, there is not a single instance of a documented lost sale by a domestic producer. Documentation revealed that these sales were lost by a foreign facility owned by a domestic producer. Our analysis of Occidental's principal customers confirms that sales of Soviet ammonia have not in any way injured domestic producers of ammonia. In each case, the spot price of ammonia at the time of the sale was competitive with the price offered by Occidental. Often Occidental's first-year price was higher than its customer could have obtained on the spot market. 21/ Most of the nine customers had compelling non-price reasons to choose offshore suppliers. Two California customers, faced with only one domestic producer in the region, decided to go offshore in order to secure alternative sources. Two Florida customers' needs are centered at Tampa, a port which can be economically served by offshore producets. The natural source of supply of three

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21/ The question of the effect of the second and third years of the contract will be discussed under "Threat of Significant Cause of Material Injury" because Soviet ammonia has been on the U.S. market for only little more than one year.

Eastern seaboard customers is offshore ammonia. Another customer, which has closed its internal production facilities, needed a long-term contract to satisfy its outstanding commitments. The ninth customer similarly wanted a long-term contract. Public and confidential information indicate good reasons for believing that price was also not the main reason for either of these latter two customers' seeking Occidental.

With the exception of 1976, imports have grown every year with or without the presence of Soviet ammonia on the market. There is every reason to believe that most, if not all, of Occidental's customers would have gone offshore for their ammonia purchases even in the absence of Soviet ammonia from the market.

The significant causes of material injury to the U.S. ammonia industry have been temporary but substantial overexpansion, declining demand and consequently lower prices concurrent with a surge in natural gas costs. The Soviet ammonia imports are not a factor worthy of mention in relation to any of these developments. The ammonia market apparently bottomed out during the summer of 1978 and is now on the upswing. Domestic demand for ammonia appears to be catching up with U.S. production capacity. Even with increased imports from the U.S.S.R., Gulf Coast spot prices have risen by 50 percent from $78 per short ton in July 1978 to $120 in July 1979. As previously noted, inventories have been falling since late-1978.

Significant cause of threat of material injury

Having found that market disruption does not presently exist due to importation of anhydrous ammonia from the U.S.S.R., we must now consider whether such imports are a significant cause of threat of material injury to the domestic industry.

The relevant legislative history and the four previous market disruption cases decided by the Commission under Section 406 of the Trade Act of 1974 provide no direct guidance as to how threat of material injury should be examined. However, there is apparently little difference between the concepts of "threat" and "likelihood" of injury, and therefore, we believe it is useful to consider how these concepts are dealt with in other import relief statutes. The Senate Finance Committee Report on the Trade Act of 1974, concludes without criticism that the Commission in antidumping cases based determinations of likelihood of injury upon "evidence showing that the likelihood is real and imminent and not on mere supposition, speculation, or conjecture." 22/ The word "imminent" also occupied an important place in the Committee's discussion of Section 201: "It is the intention of the Committee that the threat of serious injury exists when serious injury, although not yet existing, is clearly imminent if import trends continue unabated." 23/ In market disruption cases under Section 406, a case may be made that the future period should be further compressed compared to other cases because Congress was concerned that "exports from Communist countries

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22/ S. Rept. No. 93-1298, op. cit. at 180.

23/ Id. at 121.

could be directed so as to flood domestic markets within a shorter time period than could occur under free market conditions." 24/

In part, because communist centrally-planned economies could purportedly engage in such flooding, Section 201 (import relief) was not deemed adequate protection for the United States. We cannot believe that the notion of flooding contemplates slowly-increasing market penetration over a long period of time. Therefore, we feel that the "real and imminent" standard in the Section 406 context should narrow our consideration of threat to the likelihood of Soviet imports becoming a significant cause of material injury within a relatively short period of time. In our dissenting opinion in Methyl Alcohol from Canada, we found that injury contemplated three years in the future did not meet the standard of "real and imminent." 25/

While lacking specific legislative direction with respect to what factors to examine for threat of injury in an investigation under Section 406, the escape clause under Section 201 provides useful guidance. Section 201(b)(2) of the Trade Act of 1974 directs the Commission in cases of import relief to "take into account all economic factors which it considers relevant, including (but not limited to)," with respect to threat of injury, "a decline in sales, a higher and growing inventory, and a downward trend in production, profits, wages, or employment . . .

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24/ Id. at 210.

25/ For a thorough discussion of the issues involved in the determination of likelihood of injury under the Antidumping Act of 1921, see Methyl Alcohol from Canada, USITC Pub. 986, June 1979, pp. 13-15.

in the domestic industry concerned." In the present case, we have examined all relevant factors for the next three years -- far beyond the period contemplated by "imminent" in a market disruption case -- and still cannot find any reasonable indication that imports of ammonia from the U.S.S.R. threaten to become a significant cause of material injury.

The petitioners have argued that the present injured state of the domestic industry leaves it vulnerable to injury by the planned increased flow of Soviet imports. Ammonia from the U.S.S.R., they claim, is a significant cause of threat of material injury because the Soviet ammonia will capture a significant part of the growth in a domestic market only now starting to recover from a bust period. The Soviets, it is alleged, will gather this increased market share at the expense of the domestic producers by underselling made easy because the U.S.S.R. is a nonmarket economy and need not be sensitive to costs of production. Hence, Occidental can offer advantageous multi-year contracts with low fixed price escalators. Though there are no verified lost sales, customers attracted to Occidental by such provisions are said to be lost by the domestic industry. Also, petitioners allege that the volume of Soviet imports will suppress the needed recovery in prices. We have carefully examined the elements of this scenario and find: there are definite signs that a strong recovery is underway in spite of the presence of Soviet imports; there is no reason to expect that Occidental will inaugurate a policy of underselling domestic ammonia; growth in the

domestic market would likely go to other foreign producers were Soviet ammonia to become unavailable; and finally, prices appear to be undergoing a full recovery in any case.

The factors which explain the downward trends in some of the economic indicators of threat do not include imports from the Soviet Union. Examination of threat is a particularly difficult task, for it involves judgments about the future. The "real and imminent" standard requires that the threat not be speculative. In this case, even the speculative information indicates that no threat exists.

The drastic domestic expansion brought on by peaking of ammonia prices in 1974-1975, only to be followed by a downward trend in prices for the ensuing four years, demonstrates how hazardous predictions are for this industry. The reliability of all predictions falls rapidly as the time period is extended; thus, the wisdom of Congress in suggesting a standard for threat of "real and imminent" becomes apparent. However, cautious consideration of available scientific forecasts indicates that the economic indicators are dramatically reversing themselves and that a recovery is underway despite increased U.S.S.R.

import penetration. One such study by Chase Econometrics, Fertilizer Model Forecasts, took cognizance of the planned sales of Soviet ammonia. Based on a full range of direct and indirect determinants of ammonia supply and demand, it predicts that the Gulf Coast spot price of ammonia will rise almost 50 percent between July-September 1979 and April-June 1981. Indeed, from their nadir in the summer of 1978, these prices had already risen to 54 percent by July 1979. Over the past year, ammonia prices seem to have registered a substantial recovery to a point which may already cover the average costs of production of even the least efficient group (small plants) remaining in use. The further recovery in prices predicted by the Chase Econometrics forecast would return the domestic industry to a fully healthy state before 1981. United States production over the period will rise slightly with capacity utilization reaching 90 percent by 1981, according to Chase. The experience of 1974-1975 shows that this figure in fact represents the maximum achievable.

The specifics of the situation of the domestic industry make absolutely clear that imports of Soviet ammonia are not likely to be a significant causal factor even were there to be any material injury to this industry during the next few years. The plant closings are illustrative of an accelerated restructuring of an industry sloughing off outmoded technology. No large, modern plants have been idled with

the exception of First Mississippi's Ampro plant, which did not open when completed in 1977 due to a failure to secure natural gas. This plant is now scheduled to open in 1980, and will add to domestic capacity.

Some parties have implied that the decline in capital expenditures from a peak of $446 million (1976) to $175 million (1978) is an indication of future problems. But the industry has a history of dramatic spurts of investment in new capacity followed by lulls. Its post-World War II growth has been marked by spurts in 1950-1952, the mid-1960s, and 1974-1975. Each fit of expansion has been followed by a reversal in the market conditions that brought it about. The cyclical pattern appears to be well enough established to indicate that the present decline in capital expenditures will not be followed by future problems. On the contrary, the industry is in the healthy position of having modernized many of its facilities.

Domestic production for the first half of 1979 exhibited a modest increase over the same period a year earlier. Inventories have continually declined since the end of 1978. Employment in the chemical industry is not a very sensitive indicator because of the high capital intensity and the growth of productivity in this industry. Because the percentage of large, modern plants has been rapidly rising, declines in employment since 1978 may very well continue and are unlikely in any case to be reversed. Employment needs that will be reduced to lower levels by modernization do not properly constitute an indication of impending injury to the industry.

The penetration of imports from the U.S.S.R. stood in 1978 at two percent of domestic consumption. Reliable indications are that it will rise to approximately nine or ten percent by 1981 and remain at that level or decline slightly. There is no reason to believe that the levels agreed to in the Occidental-U.S.S.R. Global Agreement will be exceeded. This year the U.S.S.R. has yet to deliver the full contracted amount. Our analysis of Occidental's present nine customers shows that they fit an overall pattern likely to continue as Soviet ammonia expands its market share in the United States. Three customers never purchased any ammonia on the domestic market prior to idling their internal facilities in favor of purchases from Occidental. Five of the remaining six customers continue to fill part of their ammonia needs on the spot market supplied by domestic and non-Soviet imports. They are almost certain to continue doing so. For only two of the nine -- these two account for only about 20 percent of Occidental's sales -- does the availability of multi-year contracts appear to be the critical factor in choosing Soviet ammonia. Occidental has never followed a policy of underselling spot prices in the first year of its contracts.[26/] Nor is there

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26/ Much testimony at the hearings seemed to allege that Soviet ammonia was being sold at below some notion of fair value. In Section 406, the price of the imported article is not a direct issue. The Conference Report on the Trade Act specifically substituted "significant cause of material injury" for the House's original wording, "are offered at prices substantially below those of comparable domestic article." (H.R. No. 93-1644, op. cit. at 48.) The price of the imported article is a matter of interest only to the extent that it can establish a causal linkage between the imports and injury experienced by the domestic industry, e.g., lost sales. Import price, in and of itself, is not an index of injury. Dumping of imports is not germaine to a Section 406 case.

any reason to believe it will begin to do so in the future. Occidental's three-year contracts with fixed cost escalators may impart some cost advantages to Soviet ammonia in the second and third years given expected increases in domestic natural gas prices. However, the problems associated with having a supplier at the end of a pipeline ten thousand miles long are not insignificant and this burden must be balanced against the price advantage which may come for the customer in the second or third year. For the firms for which a multi-year contract is a top priority, it thus seems unlikely that future price is the key variable.

Looking at all customers, the significant reason for choosing Occidental was the search for an offshore supplier. If Soviet imports were to be limited, other offshore suppliers -- such as Trinidad and Mexico -- would likely be sought out. Mexico's capacity is growing, and Trinidad expects completion of a new plant by 1981. Clearly, the overwhelming limitation on the growth of the domestic producers is the unequivocal desire of domestic consumers for offshore suppliers.

As the U.S. ammonia market expands, the share of Soviet ammonia will grow on the basis of its present customers and new ones with similar needs for offshore sources. Even if one were to construe as material injury the failure of the domestic industry to capture this growth, the availability of Soviet ammonia alone could not possibly be a significant cause.

Conclusion

The case of imports of anhydrous ammonia from the U.S.S.R. is unique in many respects and warrants the exhaustive attention we hope we have given it. It is the first case of alleged market disruption involving the Soviet Union. From an economic point of view, it is also one of the largest cases in which the Commission has made a determination.

We have found that while imports of anhydrous ammonia from the U.S.S.R. have satisfied the statutory standard of "increasing rapidly," there is no indication whatsoever that they have been a significant cause of material injury to the domestic industry. Nor can any reasonable interpretation of the abundant information in this case suggest that they are a significant cause of threat of material injury during the next three years, no less the shorter period suggested by the standard of "real and imminent."

Our analysis has shown that the recovery of the domestic industry is now underway. Elimination of Soviet imports will not increase the growth of the domestic industry. A purported remedy that places a quota on Soviet imports will probably drive customers seeking offshore sources to other foreign producers. The claims by the petitioners that lost growth and consequent slower domestic recovery indicate a threat of injury could only properly be considered in an investigation under

Section 201 of the Trade Act, which allows the Commission to look at the impact of all imports. 27/

27/ We note the remedies offered by Section 201 can be applied to all imports. However, such remedies would affect the foreign facilities of two of the petitioners.

## VIEWS OF COMMISSIONER STERN ON REMEDY

After thoroughly analyzing the information developed in this investigation by the Commission staff and all the interested parties, I believe that there is clearly no basis in either law or fact upon which to determine that imports of anhydrous ammonia from the Soviet Union are, or threaten to become, a significant cause of material injury to the domestic industry. Accordingly, I am unable to envision any remedy which would be appropriate under these circumstances and, indeed, any remedy at all would be perverse. Therefore, I recommend no remedy in this investigation.

VIEWS OF COMMISSIONER ALBERGER ON REMEDY

In this investigation, I determined that it would be inappropriate for me to attempt to fashion a remedy. While I did find material injury, I did not find the rapidly increasing imports from the U.S.S.R. to be a significant cause.

Additionally, my three colleagues who found market disruption reached agreement on a remedy. With only five members on the Commission, it is not possible to have a second remedy supported by three Commissioners. Therefore, no further options could be provided for a potential Congressional override of a Presidential decision not to institute the recommended relief.[1/]

Thus unlike the CB radio case,[2/] where I saw compelling reasons for participation in formulating a remedy, no such justification exists here. I feel strongly that relief is not warranted and I recommend no remedy.

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1/ 19 U.S.C. 1330 (d) (1)
2/ Citizens Band (CB) Radio Transceivers: Report to the President on Investigation No. TA-201-29 . . ., USITC Publication 852, 1978.

## SUMMARY

On July 11, 1979, 12 U.S. producers and 1 U.S. distributor of anhydrous ammonia (ammonia) petitioned the U.S. International Trade Commission (Commission) for import relief under section 406 of the Trade Act of 1974. The petition alleged that market disruption exists with respect to domestically produced ammonia because of ammonia imported into the United States from the U.S.S.R. In response to the petition, the Commission instituted investigation No. TA-406-5 on July 18, 1979. A public hearing in connection with this investigation was held on August 29-31, 1979.

Nearly 75 percent of the ammonia consumed in the United States is used as fertilizer. There was a surge in U.S. ammonia productive capacity in the mid-1960's, which was triggered by innovations in production technology. These new plants were larger than the older plants and offered considerable economies of scale.

Fifty-nine companies produced 17.0 million short tons of ammonia at 93 locations in the United States in 1978. The petitioners accounted for 45 percent of U.S. production of ammonia in that year.

Beginning in 1971, the U.S.S.R. embarked on an ambitious program to build 40 large ammonia plants by 1982. Most of the new ammonia plants in the U.S.S.R. are financed through countertrade arrangements. One such countertrade arrangement was entered into by the U.S.S.R. with Occidental Petroleum Corp. (Occidental) of California. In exchange for technology and equipment, Occidental was granted the exclusive right to sell up to 1.7 million short tons of U.S.S.R.-produced ammonia in the United States each year during 1978-98; this quantity was subsequently increased to 2.8 million short tons each year for the first 10 years of the agreement.

No ammonia was imported from the U.S.S.R. in 1977. In 1978, more than 300,000 short tons, or 21 percent of all imports, were imported from the U.S.S.R. Revised agreements between Occidental and the U.S.S.R. call for the importation of nearly 1 million short tons of ammonia from the U.S.S.R. in 1979. Occidental has advised the Commission that it will import approximately 1.5 million short tons in 1980 and approximately 2.0 million short tons in 1981 from the U.S.S.R.

U.S. annual capacity to produce ammonia increased from 17.2 million short tons in 1974 to 22.0 million short tons in 1978 and decreased to 20.4 million short tons in 1979. Capacity utilization decreased from 91 percent in 1974 to 77 percent in 1978. Thirty-six ammonia production facilities, with a total capacity of 3.6 million short tons, have been closed or idled in the United States since 1977. In 1979 alone, 26 plants have been closed or idled. Year-end inventories of ammonia held by U.S. producers increased from 12.6 percent of U.S. production in 1975 to 15.8 percent in 1977, and subsequently declined to 14.7 percent in 1978.

The number of production and related workers declined from 4,744 in 1977 to 4,610 in 1978 and 4,128 in January-June 1979. Capital expenditures for ammonia producing operations in the United States have similarly decreased,

from $446 million in 1976 to $365 million in 1977 and $175 million in 1978. Such expenditures further decreased to only $17 million in January-June 1979.

Natural gas accounted for 64 percent of the cost of producing ammonia in 1978. Sharp increases in the cost of natural gas have led to dramatic increases in the average cost of production since 1973. Smaller production facilities built before the technological innovations of the mid-1960's and those without long-term natural gas contracts have been especially affected by the natural gas price increases. In 1978, the average cost to produce a ton of ammonia was about $81 per short ton, according to a 1979 study conducted by Ernst and Ernst for The Fertilizer Institute. The average spot price for ammonia in 1978 was an estimated $84 per short ton as reported by Green Markets, a weekly trade journal. Spot prices for ammonia have recovered from the low of $78 per short ton in June 1978 to $120 per short ton in July 1979.

With increasing costs and declining prices, profits on U.S. ammonia production operations decreased from $316 million in 1976 to $10 million in 1978. Profits declined further, from $30 million in January-June 1978 to a loss of $4 million in the corresponding period of 1979.

# INFORMATION OBTAINED IN THE INVESTIGATION

## Introduction

On July 11, 1979, the Commission received a petition filed on behalf of 12 U.S. producers and 1 U.S. distributor of ammonia for import relief under section 406 of the Trade Act of 1974. The petition was found to be properly filed, and accordingly, the Commission, on July 18, 1979, instituted an investigation under section 406(a) of the Trade Act of 1974 (19 U.S.C. 2436) to determine, with respect to ammonia provided for in items 417.22 and 480.65 of the Tariff Schedules of the United States (TSUS), which are products of the U.S.S.R., whether market disruption exists with respect to merchandise produced by a domestic industry. Section 406(e)(2) of the Trade Act defines market disruption to exist within a domestic industry if "imports of an article, like or directly competitive with an article produced by such domestic industry, are increasing rapidly, either absolutely or relatively, so as to be a significant cause of material injury, or threat thereof, to such domestic industry." The statute requires the Commission submits its determination to the President within 3 months--in this case by October 11, 1979.

A public hearing in connection with this investigation was held in Washington, D.C., on August 29-31, 1979. Notice of the investigation and the public hearing was given by posting copies of the notice at the Office of the Secretary, U.S. International Trade Commission, Washington, D.C., and at the Commission's office in New York City, and by publishing the notice in the Federal Register of July 25, 1979 (44 F.R. 43536). 1/

## Description and Uses

In this report the terms "anhydrous ammonia" and "ammonia" are used synonymously. The term "anhydrous," which means without water, is often used by the industry to distinguish pure ammonia, $NH_3$, from aqua ammonia, $NH_3 \cdot H_2O$, which is a solution of ammonia dissolved in water. By weight, ammonia is 82 percent nitrogen and 18 percent hydrogen.

Ammonia is one of the most basic commercially produced chemicals in the world. It is used as a major end product and as an intermediate in the production of more complex chemicals. Virtually all commercially fixed nitrogen (chemically combined) is derived from ammonia.

Nearly 75 percent of the ammonia consumed in the United States is used as fertilizer. Ammonia can be applied directly to farmland or it can be upgraded into other fertilizers. In addition, ammonia is used in the production of explosives and blasting agents, livestock feeds, fibers, plastics, resins, and elastomers. U.S. consumption of ammonia, by end uses, is shown in table 1.

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1/ A copy of the Commission's notice of investigation and hearing is presented in app. A.

Table 1.--Anhydrous ammonia: Share of U.S. consumption by end uses, 1975

(In percent)

| End use | Share of consumption |
|---|---|
| Fertilizers: | |
| Ammonia, direct application | 29.1 |
| Ammonium nitrate | 18.1 |
| Urea | 12.5 |
| Ammonium phosphates | 7.5 |
| Ammonium sulfate | 3.7 |
| All other (nitrogen solutions, etc.) | 2.8 |
| Total | 73.7 |
| Explosives and blasting agents: | |
| Commercial | 3.6 |
| Military | .2 |
| Total | 3.8 |
| Livestock feeds | 3.8 |
| Fibers, plastics, resins, and elastomers | 6.1 |
| Miscellaneous | 12.6 |
| Grand total | 100.0 |

Source: Copyright permission granted by Stanford Research Institute, Chemicals Economics Handbook, April 1977.

At normal atmospheric temperatures and pressures, ammonia is a colorless gas with a sharp, intensely irritating odor. Ammonia is toxic and hazardous; inhalation of concentrated fumes can be fatal. In addition, ammonia is a moderate fire hazard.

Ammonia gas can be easily liquified by increasing the pressure or decreasing the temperature. The industry has found that ammonia in liquid form is easiest to ship or store. Consequently, rail tank cars, tractor trailers, pipelines, ocean-going vessels, and storage tanks have been specially designed to handle liquified ammonia.

Modern ammonia plants produce one grade of ammonia. Most ammonia is sold with a guaranteed purity of 99.5 percent. When used for refrigeration and metallurgy, however, ammonia must possess a purity of 99.98 percent and 99.99 percent, respectively. Extra precautions may be required in handling ammonia for these special end uses to prevent contamination.

## Production Process

The basic feedstocks for ammonia plants in the United States are air, which is 78 percent nitrogen, natural gas, and water. In some foreign plants, naphtha, oil, or coal is used in lieu of natural gas. 1/

1/ A detailed discussion of the ammonia production process is presented in app. B.

The first commercial process for the direct synthesis of ammonia was developed in Germany by Fritz Haber and Carl Bosch during the early 1900's. The first plant utilizing the Haber-Bosch process was constructed in Germany in 1913. During World War I, the great need for nitrates in munitions and the difficulty of importing sodium nitrate during wartime led the U.S. Government to construct the first U.S. direct-synthesis plant for producing ammonia at Muscle Shoals, Ala. in 1918. This plant had a design capacity of 10,000 short tons per year.

During the period 1920-60, the U.S. ammonia industry expanded rapidly in the United States because of the continuing demand for military explosives and propellants, and impressive increases in farm crop yields that resulted from the application of nitrogenous fertilizers. Ammonia plants increased gradually in size, with plants built during this era generally having a capacity ranging from 30,000 to 100,000 tons per year.

Beginning in 1963, the United States experienced a surge in ammonia production capacity as a result of major changes in engineering technology. A new concept in ammonia plant design was developed in which waste heat recovery was increased throughout the system, high-pressure steam was used to drive compressors and other equipment, higher pressure was used in the gas preparation section, and an integrated system was used throughout the plant which balanced energy consumption, energy production, equipment size, and catalyst volumes. In addition, the ammonia converters (the reaction vessels in which hydrogen reacts with nitrogen to form ammonia) dramatically increased in size, and centrifugal compressors were utilized in place of the much more cumbersome and expensive reciprocating compressors. These changes resulted in the construction of large, single-train (one ammonia converter per plant) ammonia plants with initial capacities of 200,000 tons per year. This technology was later scaled up, enabling plants to have capacities between 340,000 to 510,000 short tons per year (fig. 1). The unit cost of ammonia production dropped sharply, and capital construction cost per ton of capacity was substantially reduced. The new ammonia plant technology was rapidly adopted throughout the world, and world ammonia capacity increased dramatically.

Pullman Kellogg Co. of Houston, Tex., is generally credited with most of the innovations that caused the major shift in ammonia plant design in the early 1960's, although other chemical plant vendors were quick to recognize and adopt the principal improvements and to offer ammonia plants of comparable capacity. The economic impact of the new ammonia plant technology is summarized in a paper, "The Ammonia Supply Dilemma," by George C. Sweeney of Arthur D. Little, Inc., written in February 1979. Mr. Sweeney wrote:

> . . . the development of the all-centrifugal plant brought significant reductions in the capital cost per annual ton of ammonia, to such a degree that most major producers rushed to install these new generation plants in the mid-1960's. Somewhat overlooked in the scramble to get this new and cheaper technology was the fact that it could only be obtained in large plants. Larger plants produce more product, and this requires larger markets. It became

Figure 1.--Anhydrous ammonia: Maxium sizes of U.S. production facilities, 1930-70.

* * * * * * *

Source: A.V. Slack, "History and Status of Ammonia Production and Use," in Ammonia, ed. A.V. Slack and G. Russell James, Marcel Dekker, New York, 1973.

clear in the latter part of the 1960's that in its fascination with this new technology, the industry had neglected to do the necessary market arithmetic, and ammonia prices plunged to the range of $20-$25 per ton along the Gulf Coast. Even with the cheap gas and higher efficiency plants, these were "red ink" prices. Most companies posted losses in their fertilizer divisions for the period 1968-1970.

Demand continued to increase, however, and a gradual but slow recovery in prices took place. However, price controls which were imposed after the oil embargo in 1972 kept industry profits at too low a level to generate much interest in new plant construction, and it was not until controls were lifted that additional projects were undertaken. By this time, demand had increased to the point where ammonia was actually in short supply, and prices shot up to unbelievable levels. With apparently short memories, there was a rush of new plant construction, which again, as it turned out, was in excess of what the markets could absorb.

## The Petitioners

The petitioners and their individual share of total U.S. production in 1978 are listed below. In the aggregate, these firms accounted for 45 percent of U.S. production in 1978, as shown in the following tabulation:

| | Percent |
|---|---|
| Agrico Chemical Co | * * * |
| CF Industries, Inc | * * * |
| Center Plains Industries | 1/ |
| Felmont Oil Corp | * * * |
| First Mississippi Corp | * * * |
| W. R. Grace Co | * * * |
| International Minerals & Chemical Corp | * * * |
| Mississippi Chemical Corp | * * * |
| Olin Corp | * * * |
| Terra Chemicals International, Inc | * * * |
| Union Oil Co. of Calif | * * * |
| Vistron Corp | * * * |
| Wycon Chemical Co | * * * |
| Total | 45.1 |

1/ Center Plains Industries distributes ammonia in the United States; it does not produce ammonia.

## The Domestic Industry and the U.S. Market

In 1978, the U.S. domestic ammonia industry comprised 59 companies operating ammonia plants at 93 locations, with a total operating design capacity of 22.0 million short tons per year. 1/ The domestic producers range from small chemical or fertilizer companies to large integrated multinational oil and chemical corporations, with some of the largest ammonia producers being farmers' cooperatives.

Most domestic ammonia plants are located in those States which have large supplies of natural gas. In 1978, 29 percent of the ammonia productive capacity was located in Louisiana, 12 percent, in Texas, and 10 percent, in Oklahoma.

More than 50 percent of the ammonia produced in the United States is used by the ammonia producers for further processing into more advanced products, primarily fertilizers. According to a 1977 report prepared by the U.S. Department of Agriculture, 61 percent of the U.S. ammonia producers, accounting for 79 percent of U.S. production capacity, owned 88 percent of the U.S. capacity for processing ammonia into more advanced products in 1977, as shown in table 2.

Table 2.--Vertical integration of U.S. anhydrous ammonia firms, 1975-77

(In percent)

| Item | 1975 | 1976 | 1977 |
|---|---|---|---|
| Ammonia-producing firms owning 1 or more plants for processing ammonia into more advanced products 1/ | 76 | 71 | 61 |
| U.S. ammonia-producing capacity owned by those firms producing more advanced products 2/ | 91 | 81 | 79 |
| U.S. capacity for processing ammonia into more advanced products owned by ammonia producing firms | 92 | 89 | 88 |

1/ Including ammonium nitrate, ammonium phosphates, and urea.
2/ In terms of 100 percent nitrogen equivalents.

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

1/ A complete listing of U.S. producers, production sites, and the annual production capacities of their plants is presented in app. C.

Industrial consumers of ammonia purchase large quantities of ammonia on a continuous long-term basis, while the fertilizer market for direct-application ammonia is seasonal in nature. Industrial consumers include fertilizer producers that use ammonia in the production of ammonium phosphates, ammonium sulfate, and other mixed chemical fertilizers. Other industrial consumers include chemical plants that purchase ammonia to produce chemicals other than fertilizers.

The efficiency requirement that most ammonia plants operate continuously at near capacity must be balanced against the seasonal nature of the fertilizer market, which is the principal end-use market for ammonia. The situation is further complicated by the physical-chemical properties of ammonia that require it to be stored and transported as a refrigerated liquid at -28° F, or as a pressurized liquid in a vessel designed for a working pressure of at least 250 psi (pounds per square inch), or about 17 times atmospheric pressure. Storage facilities for ammonia are expensive to construct and maintain and are, therefore, limited to a maximum of a few months production.

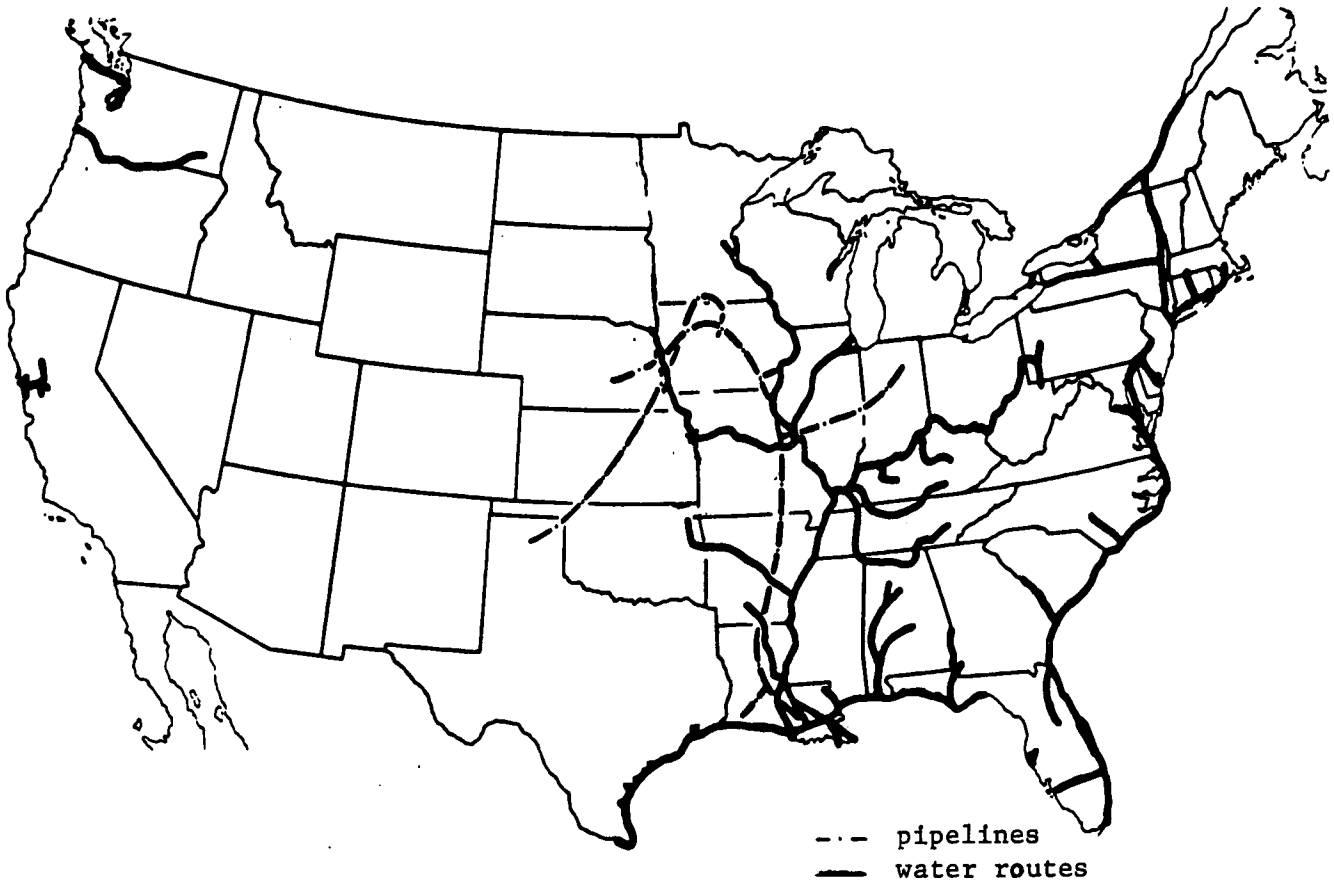
Virtually all forms of transportation, except air, are used to move ammonia to markets. For example, a pipeline system 1,700-mile-long carries liquid anhydrous ammonia from Louisiana to Iowa, Nebraska, Illinois, Indiana, Missouri, and other Midwestern consuming areas. Another long-distance ammonia pipeline stretches over 700 miles, from Borger, Tex., to distribution points in Kansas, Nebraska, and Iowa (fig. 2). Refrigerated storage tanks are built at stategic points along these lines.

In addition to pipelines, anhydrous ammonia is transported by barges, railroad tank cars, transport trucks, and tank trailers. Large tonnages of ammonia move by barges up the Mississippi river and along the other inland waterways. Barge transportation is a relatively low-cost means of transportation for the areas that have access to the waterways. One type of barge is designed for high-pressure use and is capable of transporting liquid anhydrous ammonia at ambient temperatures at which ammonia can have high vapor pressures, while another type of barge is designed for low-pressure usage. Low-pressure barges have insulated storage tanks and mechanical refrigeration units which keep the vapor pressure of ammonia below the maximum allowable design pressure of the cargo containers.

A standard railroad tank car with a capacity of 11,000 gallons transports 25 to 26 tons of liquid ammonia. Such a car has an inner high-pressure tank covered by a layer of insulating material with an outer shell of light steel construction. Jumbo tank cars with a capacity of 30,000 gallons (70 tons) now move most of the rail-shipped ammonia. The jumbo tanks cars have non-insulated tanks designed for high pressures.

Highway transport trucks, usually tractor trailer rigs with high-pressure tanks varying in size from 6,000 to 9,000 gallons, haul from 12 to 19 tons of ammonia per trip. Some transport trucks are equipped with vapor compressors or liquid pumps for unloading. Other trucks have no pumping equipment and must be unloaded by pumps or compressors located at the delivery storage tank.

Figure 2 .--Anhydrous ammonia: U.S. water transportation routes and pipeline systems.




Source: Tennessee Valley Authority.

For direct farm applications, ammonia is moved from the retail dealer's storage tank to the farmer's fields in high-pressure tanks with capacities of 500 or 1,000 gallons. The tanks are usually mounted on heavy duty two or four wheel wagons. At the 85-percent-full level, a 1,000-gallon tank contains about 2.2 tons of ammonia.

Farm equipment for the direct application of ammonia has improved considerably in the past several years so that ammonia can, in some cases, be applied at a rate of 40 acres per hour, or more. Large horsepower tractors pull plows at 5 miles per hour, with swath widths of up to 65 feet. Ammonia nurse tanks are mounted on or pulled behind these special plows. Ammonia flows from the nurse tank to a pressure manifold which distributes the ammonia through numerous hoses and tubes so that ammonia is injected behind each plow tine several inches below the soil surface. The vaporizing ammonia reacts immediately with moisture in the soil and, in addition, is adsorbed on particles of soil so that little or none escapes from the soil when proper application procedures are followed.

## U.S. Tariff Treatment

Virtually all ammonia imported into the United States, including the imports of ammonia from the U.S.S.R., enters under item 480.65 of the TSUS. Anhydrous ammonia of a grade used chiefly for fertilizer or chiefly as an ingredient in the manufacture of fertilizer is entered duty free under this item. According to a customs classification ruling in 1970, ammonia with a minimum purity of 99.5 percent by weight is chiefly used as a fertilizer or chiefly used as an ingredient in the manufacture of fertilizer. Since modern ammonia plants produce only one grade of ammonia, which is at least 99.5 percent pure, according to this ruling, all ammonia should enter under the duty-free TSUS item.

Small quantities of ammonia, however, enter under TSUS item 417.22, under which ammonia for other end-uses was originally classified. In view of the Customs ruling mentioned above, these imports appear to be misclassified. The most-favored-nation (MFN) rate of duty applicable to this item is 0.62 cents per pound ($12.40 per short ton). This rate has been in effect since 1972, when the final stage of the concessions granted in the Kennedy round of trade negotiations became effective. The column 2 rate of duty is 2.5 cents per pound ($50 per short ton). Imports under this item from designated beneficiary developing countries are eligible for duty-free treatment under the Generalized System of Preferences (GSP). When the final stage of concessions on this item granted in the Tokyo round of trade negotiations becomes effective, the applicable MFN rate will be 2.8 percent ad valorem.

## The Ammonia Industry of the U.S.S.R.

In its Ninth Five-Year Plan (1971-75), the U.S.S.R. committed itself to the rapid improvement of its faltering agricultural sector. Central to this plan is a program to construct approximately 40 large ammonia plants by 1982. These new plants will have an estimated total yearly capacity of approximately 22 million short tons.

According to a CIA report, Soviet Chemical Equipment Purchases from the West: Impact on Production and Foreign Trade, published in October 1978, the U.S.S.R. has contracted to buy at least 31 of these plants from Western firms. Many of the new ammonia plants are financed through countertrade arrangements in which Western exports of technology, know-how, machinery, and equipment needed for the production of ammonia are compensated in part by exports of ammonia from the U.S.S.R. Thus, in addition to export commitments to its usual trading partners in Eastern Europe and Cuba, the U.S.S.R. also has contracts to export ammonia to the United States, Denmark, Finland, France, Italy, and Japan. According to CIA estimates, the U.S.S.R. has contracted to export approximately 2 million short tons of ammonia to Western nations in 1979 and approximately 3 million short tons per year to those nations in 1980 and 1981.

Industry sources, however, doubt that the U.S.S.R. will be able either to meet its 1979 production targets or to fill all of its export obligations. According to both industry sources and the CIA, the assimilation of Western ammonia production technology by the U.S.S.R. is behind schedule. The 1978 CIA report stated:

> . . . one of the smaller Western-based units, located at Cherkassy, was at least two years late in coming on stream. A few large units that will at least partially depend on Western technology but incorporate a substantial amount of Soviet or Czechoslovak equipment apparently have had construction delays of one year or longer. Large Western-supplied ammonia installations at Nevinnomyssk in the Caucasus and Severodonetask in the Ukraine experienced frequent breakdowns during at least part of their first year of operation. Distribution problems affecting natural gas, the major Soviet feedstock for ammonia, have caused at least temporary under-utilization of some imported installations. Such problems are not uncommon in the West. Moreover, the Soviet delays in commissioning ammonia plants apparently are less serious than in the past. The construction period required per thousand tons of new ammonia capacity reportedly has been reduced to 45 percent of its former level.

According to a more recent unpublished CIA report, U.S.S.R.: Ammonia Exports to the United States, completed in July 1979, the U.S.S.R. ammonia plant construction program is still experiencing delays. The report states:

> The U.S.S.R. experienced severe problems in the first four or five months of 1979 that resulted from a combination of factors--lags in construction of new ammonia capacity in 1978, operating difficulties, transportation and other problems that reflected the unusually severe winter weather and the cutoff of the gas pipeline from Iran till late March 1979.

Natural gas imported from Iran is not used for producing ammonia in the U.S.S.R. However, because the winter of 1978-79, according to testimony presented at the hearing, was the coldest in 100 years, domestic natural gas supplies that would normally have been used in ammonia production were diverted to home heating because supplies of Iranian gas were curtailed. 1/ Nonetheless, the CIA concludes that "even with a shortfall in implementation of the plans, the increase in capacity will be substantial, and will enable the U.S.S.R. to expand exports considerably."

In addition, the CIA predicts that exports of ammonia from the U.S.S.R. "will be an important destabilizing factor in world ammonia markets in the 1980's." As a consequence, the CIA continues, "producers in the developed Western countries almost certainly will be affected, and with depressed prices and profits in store, the closing of at least older ammonia plants in those countries is likely."

Production of ammonia in the U.S.S.R., according to the CIA data, increased from 12 million short tons in 1974 to more than 15 million short tons in 1978, representing an increase of 25 percent, as shown in the following tabulation:

| Year | Millions of short tons 1/ |
|---|---|
| 1974 | 12.1 |
| 1975 | 13.2 |
| 1976 | 13.5 |
| 1977 | 14.4 |
| 1978 | 15.1-15.4 |

1/ Estimated by the Central Intelligence Agency.

According to estimates prepared by the CIA in July 1979, the U.S.S.R. will have a yearly nameplate ammonia production capacity of 27 million to 29 million short tons in 1980. However, because of production lags described above, the U.S.S.R. can be expected to optimally utilize 80 percent of this capacity. Total ammonia consumption in the U.S.S.R. in 1980, according to CIA estimates, will be between 15 million and 17 million short tons. Exports to the United States and elsewhere will be approximately 3 million-4 million short tons, as shown in the following tabulation:

1/ See transcript of the hearing p. 464.

| | Millions of short tons, 1980 |
|---|---|
| Capacity | 27-29 |
| Production | 22-24 |
| U.S.S.R. consumption: | |
| Fertilizer uses | 12-13 |
| Nonfertilizer uses | 3- 4 |
| Total | 15-17 |
| Export commitments | 4 |
| Waste | 1 |

The U.S.S.R.-Occidental agreements

A detailed analysis of the Occidental-U.S.S.R. agreements by the General Counsel's office is presented in appendix D. In April 1973, Occidental and the U.S.S.R. signed a 20-year $20 billion Global Agreement concerning, among other things, the export of ammonia from the U.S.S.R. to the United States. In this agreement the U.S.S.R. granted Occidental the exclusive right to purchase the U.S.S.R.-produced ammonia for sale in the United States. In return, Occidental agreed to purchase up to 1.7 million short tons of ammonia each year during 1978-98 from the U.S.S.R. This quantity was later increased to 2.8 million short tons each year for the first 10 years of the deal. In addition, Occidental agreed to purchase 1.1 million to 1.7 million short tons of urea and 1.1 million short tons of potash each year during 1978-98. In addition to its grant of an exclusive license to Occidental, the Soviet Union also agreed in the 1973 Global Agreement to make comparable purchases of U.S. goods, including 20 million tons of superphosphoric acid from Occidental. The Global Agreement requires that the U.S.S.R. pay for the superphosporic acid supplied by Occidental with the proceeds obtained by the U.S.S.R. from sales of ammonia, urea, and potash. The precise quantity, quality, price, and terms of delivery of the ammonia and urea have been the subjects of a series of separate purchasing agreements between the U.S.S.R. and Occidental.

The 1973 Global Agreement also contemplated the construction of several ammonia plants in the Togliatti area of the Soviet Union, as shown in figure 3. Occidental is not involved directly in the actual construction of these plants, with contracts for such construction being awarded to other U.S. and Japanese firms. A contract for four ammonia plants was awarded to Chemico, a U.S. firm, in July 1974, which called for the construction of four plants, each with a capacity of 450,000 tons, by the end of 1978. Chemico agreed to act as the prime contractor, supply technology, and supervise construction and start-up operations. Soviet enterprises are performing the actual construction of the plants. Chemico's ties with the Soviet Union date back to 1929 when the company built the first synthetic ammonia plant in that country.

Occidental's commitment under the Global Agreement also calls for the construction of a 1,600-mile ammonia pipeline connecting the ammonia complex at Togliatti with Odessa on the Black Sea. The parties involved in this project are Occidental, acting as the main contractor, two other U.S. firms in consulting capacity, and France's Societe Entrepose, a subsidiary of Vallourec

Figure 3.--Location of facilities in the U.S.S.R. associated with the Occidental/U.S.S.R. deal.

* * * * * * *

Source: Phosphorus and Potassium, May/June 1978.

SA. The U.S. firms agreed to oversee the engineering and construction work, with Entrepose supplying most of the equipment, including 180,000 tons of pipe. The agreement provided that equipment from French sources would be financed with French credit. The 14-inch diameter pipeline, with a projected annual capacity of 4.4 million tons, was originally scheduled to be completed by the end of 1978. However, Occidental officials report that the pipeline construction is behind schedule. Until the completion of the pipeline, ammonia is being delivered to the port in tank cars. The Odessa port facility will have storage capacity for 100,000 short tons of ammonia and can be served by rail with unloading capacity of 4.4 million tons per year. In addition, the Soviet Union will have a port facility at Venspils with ammonia storage capacity of 66,000 tons and rail unloading capacity of 4.4 million tons.

The financing of the original contract involved a U.S. Export-Import Bank (Eximbank) credit of $180 million at an annual interest rate of 6 percent granted in May 1974. This credit was matched by a commercial bank credit of $180 million provided by a nine-bank consortium headed by the Bank of America. The U.S. credits are repayable in 24 semiannual installments starting on May 20, 1979, with Eximbank's credit to be repaid out of the last 12 installments. The average annual interest rates on the combined credits is expected to be 7.8 percent. These credits represent the largest single loan which Eximbank has made to the Soviet Union in its 40-year history and one of the last Eximbank loans the Soviet Union received. Section 402 of the Trade Act of 1974 prohibits those countries not enjoying most-favored-nation treatment, including the Soviet Union, from participating in any program of the United States Government which extends credits, credit guarantees, or investment guarantees, directly or indirectly.

The Soviet Union also has countertrade agreements with a number of other countries. Early in 1978, major Soviet deliveries of ammonia and other chemicals to Italy began in compensation for ammonia plants and other industrial equipment supplied by Italy. The Soviet Union will also provide the French fertilizer industry with 150,000 to 200,000 tons of ammonia per year for 10 years in exchange for the construction of ammonia-producing facilities by Creusot Loire at Odessa.

The Eximbank's market analysis

Prior to granting its loan of $180 million to the U.S.S.R. to implement the U.S.S.R.-Occidental agreement, the Eximbank conducted a market study in the spring of 1974, which concluded that * * *.

## World Capacity and Consumption

Total world ammonia production capacity as reported by the Tennessee Valley Authority (TVA) increased from 50 million short tons in 1967 to 117 million short tons in 1979, representing an increase of more than 100 percent in 12 years. World capacity is expected to further increase by more than 20 percent, to 144 million short tons, by 1982. World and U.S.S.R. ammonia productive capacity, as reported by the TVA, for selected years 1967-78, and estimated capacity 1979-82, is presented in table 3.

While world consumption of ammonia and nitrogenous fertilizers has more than tripled since 1960, the TVA predicts that consumption of nitrogen fertilizers will, at least through 1985, fall short of production (fig. 4).

## The Question of Rapidly Increasing Imports

U.S. imports of ammonia from all countries more than tripled from less than 0.5 million short tons in 1974 to 1.5 million short tons in 1978. Imports of ammonia increased an additional 40 percent in January-June 1979, compared with imports in the corresponding period of 1978. The most important sources of imported ammonia in 1978, as shown in the following tabulation, were Canada, Mexico, the U.S.S.R., and Trinidad.

| | Percent of total imports, 1978 |
|---|---|
| Canada | 34 |
| Mexico | 23 |
| U.S.S.R | 21 |
| Trinidad | 18 |
| All other | 4 |
| Total | 100 |

Imports of ammonia from each of these countries have increased sharply since 1974.

Imports from the U.S.S.R. increased from 0 short tons in 1977 to more than 300,000 short tons in 1978, when they accounted for 21 percent of total imports. Imports from the U.S.S.R. further increased from 121,000 short tons in January-June 1978 to 267,000 short tons in the corresponding period of 1979 (table 4).

According to its response to the Commission's questionnaire, Occidental estimated it will import nearly 1 million short tons of ammonia from the U.S.S.R. in 1979, 1.5 million short tons in 1980, and 2 million short tons in 1981. Occidental has already signed definitive contracts with the U.S.S.R. concerning the price of * * * short tons of the quantity to be imported in 1980, and for * * * short tons, or * * * of the quantity to be entered in 1981, as shown in the following tabulation:

Table 3.--Anhydrous ammonia: Actual and predicted world production capacity, by regions, 1967, 1970, and 1973-82

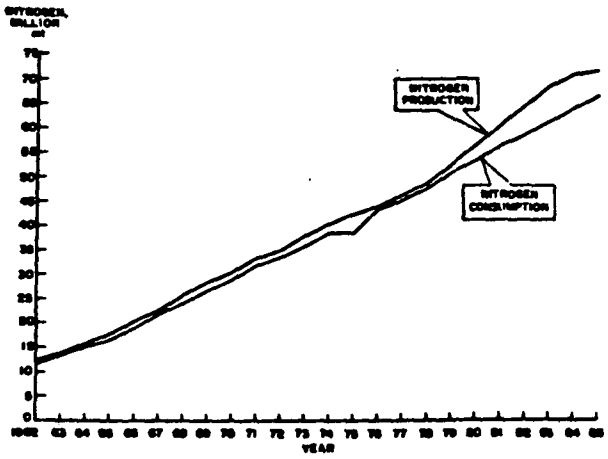
| Region | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | Indefinite 1/ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North America: | | | | | | | | | | | | | |
| Canada | 1,606 | 1,750 | 1,488 | 1,488 | 1,657 | 1,718 | 2,919 | 2,800 | 2,800 | 2,800 | 2,800 | 2,800 | 0 |
| U.S.A. | 13,301 | 16,879 | 17,367 | 17,217 | 18,387 | 19,028 | 21,548 | 22,021 | 20,360 | 20,825 | 20,825 | 20,825 | 409 |
| Total | 14,907 | 18,629 | 18,854 | 18,704 | 20,044 | 20,746 | 24,468 | 24,821 | 23,160 | 23,625 | 23,625 | 23,625 | 409 |
| Central and South America: | | | | | | | | | | | | | |
| Mexico | 392 | 761 | 761 | 761 | 1,091 | 1,091 | 1,091 | 2,062 | 2,392 | 2,890 | 3,387 | 3,387 | 1,989 |
| Netherlands Antilles | 129 | 129 | 129 | 129 | 129 | 129 | 129 | 0 | 0 | 0 | 0 | 0 | 0 |
| Trinidad | 500 | 500 | 366 | 366 | 366 | 366 | 366 | 762 | 762 | 762 | 762 | 1,493 | 0 |
| Venezuela | 39 | 39 | 367 | 878 | 878 | 878 | 878 | 878 | 878 | 878 | 878 | 878 | 0 |
| All other | 323 | 384 | 629 | 880 | 1,012 | 1,140 | 1,140 | 1,146 | 1,476 | 1,725 | 1,725 | 2,163 | 2,881 |
| Total | 1,383 | 1,813 | 2,252 | 3,014 | 3,476 | 3,604 | 3,604 | 4,848 | 5,508 | 6,255 | 6,752 | 7,921 | 4,870 |
| Western Europe | 13,181 | 16,530 | 19,178 | 19,036 | 19,401 | 19,741 | 19,829 | 19,822 | 21,172 | 20,574 | 20,574 | 20,574 | 2,717 |
| Eastern Europe | 4,822 | 7,883 | 9,248 | 10,839 | 11,269 | 12,363 | 12,622 | 13,347 | 14,010 | 14,010 | 15,142 | 16,519 | 3,700 |
| U.S.S.R. 2/ | 5,946 | 9,506 | 11,736 | 12,445 | 13,937 | 15,375 | 17,002 | 17,634 | 20,616 | 26,583 | 29,567 | 34,042 | 0 |
| Africa | 472 | 710 | 1,250 | 1,250 | 1,124 | 1,629 | 1,629 | 1,629 | 1,994 | 3,454 | 3,884 | 4,321 | 2,121 |
| Asia 3/ | 5,415 | 7,544 | 11,972 | 12,455 | 13,480 | 13,615 | 15,484 | 16,444 | 19,027 | 21,011 | 21,847 | 24,555 | 12,838 |
| Asia 4/ | 4,012 | 5,083 | 6,403 | 6,626 | 6,914 | 6,959 | 9,115 | 9,481 | 10,943 | 11,564 | 11,833 | 11,833 | 3,290 |
| Oceania | 175 | 690 | 599 | 599 | 599 | 599 | 599 | 599 | 599 | 599 | 699 | 699 | 0 |
| Grand total | 50,314 | 68,388 | 81,492 | 84,969 | 90,244 | 94,631 | 104,351 | 108,625 | 117,027 | 127,675 | 133,923 | 144,089 | 29,946 |

1/ Indicates capacities of plants not included in the yearly data for which there is insufficient information concerning actual construction plans.
2/ The Central Intelligence Agency, using a different method to estimate capacity, estimates 1978 U.S.S.R. capacity to be 19 million short tons, 1979 capacity to be between 24 million and 26 million short tons, and 1980 capacity to be 28 million short tons.
3/ Other than Communist Asia.
4/ Communist.

Source: The U.S. Tennessee Valley Authority.

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

Figure 4.--World nitrogen fertilizer production and consumption.




Source: Tennessee Valley Authority.

Table 4.--Anhydrous ammonia: U.S. imports for consumption, by principal sources, 1974-78, January-June 1978, and January-June 1979

| Source | 1974 | 1975 | 1976 | 1977 | 1978 | January-June-- 1978 | January-June-- 1979 |
|---|---|---|---|---|---|---|---|
| | Quantity (1,000 short tons) | | | | | | |
| U.S.S.R----- | 0 | 0 | 18 | 0 | 1/ 315 | 131 | 2/ 267 |
| Canada------ | 93 | 118 | 254 | 632 | 517 | 216 | 248 |
| Mexico------ | 2 | 7 | 21 | 56 | 349 | 100 | 146 |
| Netherlands Antilles-- | 49 | 107 | 78 | 34 | 38 | 0 | 0 |
| Trinidad---- | 125 | 148 | 192 | 171 | 276 | 133 | 161 |
| Venezuela--- | 67 | 54 | 54 | 27 | 0 | 0 | 0 |
| All other--- | 121 | 374 | 112 | 158 | 21 | 9 | 0 |
| Total--- | 457 | 808 | 730 | 1,078 | 1,516 | 590 | 2/ 822 |
| | Value (1,000 dollars) | | | | | | |
| U.S.S.R----- | - | - | 945 | - | 1/ 27,760 | 1/ 12,130 | 2/ 20,379 |
| Canada------ | 10,261 | 20,676 | 30,593 | 67,724 | 50,879 | 22,219 | 23,885 |
| Mexico------ | 482 | 1,536 | 787 | 3,551 | 24,898 | 7,330 | 10,510 |
| Netherlands Antilles-- | 2,859 | 12,417 | 9,465 | 3,339 | 4,310 | - | - |
| Trinidad---- | 5,423 | 9,359 | 13,301 | 11,917 | 23,979 | 10,644 | 15,740 |
| Venezuela--- | 13,049 | 6,652 | 4,305 | 2,206 | - | - | - |
| All other--- | 20,301 | 73,524 | 11,456 | 14,553 | 1,687 | 645 | - |
| Total--- | 52,375 | 124,164 | 70,852 | 103,290 | 133,513 | 52,968 | 2/ 70,514 |
| | Unit value (per short ton) | | | | | | |
| U.S.S.R----- | - | - | $53 | - | 1/ $88 | 1/ $92 | 2/ $76 |
| Canada------ | $110 | $175 | 120 | $107 | 98 | 103 | 96 |
| Mexico------ | 241 | 219 | 37 | 63 | 71 | 73 | 72 |
| Netherlands Antilles-- | 58 | 116 | 121 | 98 | 113 | - | - |
| Trinidad---- | 43 | 63 | 69 | 70 | 87 | 80 | - |
| Venezuela--- | 195 | 123 | 80 | 82 | - | - | 98 |
| All other--- | 168 | 197 | 102 | 92 | 76 | 69 | - |
| Average- | 115 | 154 | 97 | 96 | 88 | 90 | 2/ 86 |

1/ Includes 10,000 short tons of ammonia imported from the U.S.S.R. through Finland.

2/ Revised.

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

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

| | Estimated imports from the U.S.S.R. 1,000 short tons | Imports for which definitive contracts have been executed 1,000 short tons |
|---|---|---|
| 1979---- | * * * | *** |
| 1980---- | * * * | *** |
| 1981---- | * * * | *** |

As discussed in the section on the U.S.S.R. ammonia industry, the U.S.S.R. was unable to fully meet its delivery commitments in 1978 and in January-June 1979. It declared the existence of a force majeure on January 30, 1979, and at that time cut back on exports to the United States. Imports from the U.S.S.R. are now entering in large volume. By yearend the U.S.S.R. is expected to have met virtually all of its delivery commitments for 1979.

The ratios of imports of ammonia from all countries and from the U.S.S.R. to apparent U.S. consumption during 1974-78 and in January-June 1979 are shown in table 5.

Table 5.--Anhydrous ammonia: U.S. imports from all sources and from the U.S.S.R. as a percent of apparent consumption, 1974-78, January-June 1978, and January-June 1979

(In percent)

| Period | Imports from-- | |
|---|---|---|
| | All sources | U.S.S.R. |
| 1974 | 3 | 0 |
| 1975 | 5 | 0 |
| 1976 | 4 | 0.1 |
| 1977 | 6 | 0 |
| 1978 | 8 | 2 |
| January-June-- | | |
| 1978 | 6 | 1 |
| 1979 | 8 | 3 |

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

Mexican ammonia production capacity is expected to increase from 1.1 million short tons in 1977 to 3.4 million short tons in 1981. Most of the additional ammonia capacity is to be used to ultimately produce fertilizer for use in Mexico. The infrastructure of pipelines, tank cars, and storage facilities needed to distribute ammonia throughout the Mexican countryside has not developed as fast as the Mexican capacity to produce ammonia, and exports of ammonia from Mexico can therefore be expected to increase.

W. R. Grace (Grace), a petitioner in this proceeding, owns a 365,000 ton-capacity ammonia plant in Trinidad and owns 49 percent of another Trinidad plant, 51 percent of which is owned by the Trinidadian Government. This plant has an annual capacity of 400,000 short tons. * * *. In 1981, Amoco Oil Co. and the Trinidadian Government plan to open an ammonia plant in Trinidad with a 365,000-ton annual capacity. Most of this ammonia is expected to enter the export market. A 129,000-ton-capacity plant owned by Grace in the Netherlands Antilles was closed in 1977.

CF Industries, another petitioner, owns a share in two Canadian ammonia plants which have a combined annual capacity of 800,000 short tons. Imports by CF Industries from Canada enter the Northern States and are sold primarily to farmers through farmers' cooperatives.

Nitrogen trade balance

Frequently, the overall nitrogen trade balance is computed in order to determine the net demand for fixed nitrogen or anhydrous ammonia. To perform this exercise, the nitrogen-contents, or ammonia equivalents, are estimated for the principal nitrogen-containing chemicals imported into and exported from the United States. The chemicals most frequently included in computing the trade balance are anhydrous ammonia, ammonium nitrate, ammonium phosphates, sodium nitrate, urea, calcium cyanamide, calcium nitrate, nitrogen solutions, potassium nitrate, and mixed chemical fertilizers, all of which contain nitrogen.

Because of the numerous estimates that must be made to develop the nitrogen (or ammonia) balance, and because of the different chemicals (and different grades of chemicals) that can be included in the calculations, there are usually significant differences among the various published estimates of the trade balance. Of the various published data series, those done by the U.S. Bureau of Mines are generally considered complete and consistent from year to year. As shown in table 6, the United States was a net importer of nitrogen in each of the years 1974-78. Net imports averaged about 200,000 short tons each year except 1977, when the net import balance was nearly 850,000 short tons. Data for January-June 1979 indicate that the United States was a net exporter of nitrogen in that period.

Table 6.--Anhydrous ammonia equivalents: U.S. imports and exports of chemicals and fertilizers containing fixed nitrogen, 1974-78

(In thousands of short tons)

| Year | Imports | Exports | Net imports |
|---|---|---|---|
| 1974 | 1,403 | 1,215 | 188 |
| 1975 | 1,576 | 1,502 | 74 |
| 1976 | 1,719 | 1,554 | 165 |
| 1977 | 2,491 | 1,643 | 848 |
| 1978 1/ | 2,979 | 2,711 | 268 |

1/ Preliminary figures.

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

U.S. importers

More than 50 U.S. concerns imported ammonia into the United States in 1978, of which 19 are producers of ammonia. Other importers include brokers, traders, and chemical concerns. Six importers, as shown in the following tabulation, accounted for more than 50 percent of U.S. imports of ammonia in 1978:

| Importer | Imports | Producer | Petitioner |
|---|---|---|---|
| | Percent | | |
| * * * | *** | *** | *** |
| * * * | *** | *** | *** |
| * * * | *** | *** | *** |
| * * * | *** | *** | *** |
| * * * | *** | *** | *** |
| * * * | *** | *** | *** |
| Subtotal | 55 | | |
| All other | 45 | | |
| Grand total | 100 | | |

The Question of Material Injury or Threat Thereof

U.S. capacity, production, and consumption

U.S. ammonia production capacity increased irregularly from 17.4 million short tons in 1973 to 20.4 million short tons in 1979, representing an increase of 17 percent in 6 years. Capacity decreased slightly from 17.4 million short tons in 1973 to 17.2 million short tons in 1974, and subsequently increased steadily to 22.0 million short tons in 1978. U.S. capacity decreased by 7 percent to 20.4 million short tons in 1979.

U.S. production of ammonia increased from 15.2 million short tons in 1973 to 17.6 million short tons in 1977, or by 16 percent in 4 years. U.S. production subsequently decreased by 4 percent to 17.0 million short tons in 1978 (table 7).

Table 7.--Anhydrous ammonia: U.S. production capacity, production, and capacity utilization, 1973-79, January-June 1978, and January-June 1979

| Period | Capacity | Production | Capacity Utilization |
|---|---|---|---|
| | 1,000 short tons | 1,000 short tons | Percent |
| 1973 | 17,367 | 15,208 | 88 |
| 1974 | 17,217 | 15,733 | 91 |
| 1975 | 18,387 | 16,419 | 89 |
| 1976 | 19,028 | 16,716 | 88 |
| 1977 | 21,548 | 17,576 | 82 |
| 1978 | 22,021 | 16,967 | 77 |
| 1979 | 20,360 | - | - |
| January-June: | | | |
| 1978 | 11,011 | 8,458 | 77 |
| 1979 | 10,180 | 8,720 | 86 |

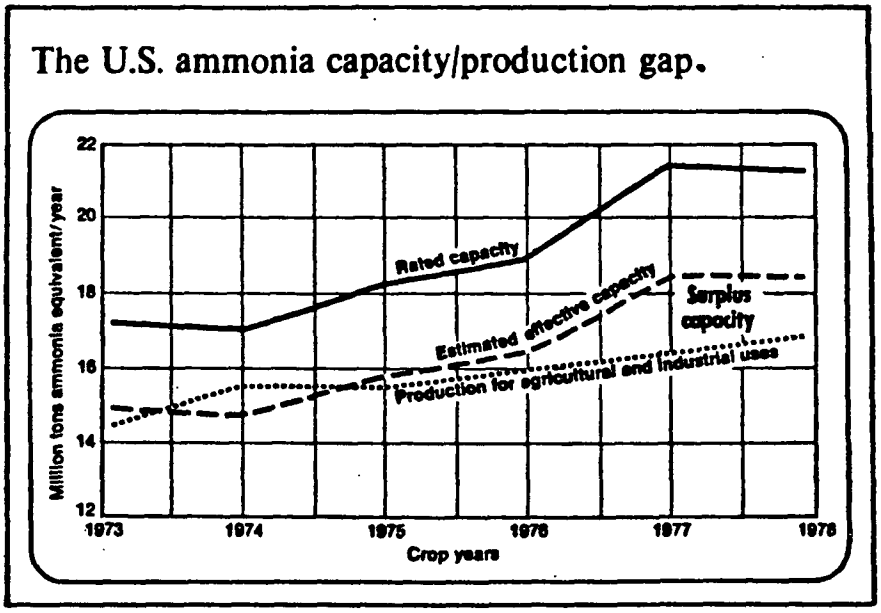
Source: The Tennessee Valley Authority, and official statistics of the U.S. Department of Commerce.

Utilization of U.S. productive capacity decreased steadily from 91 percent in 1974 to 77 percent in 1978 and then increased to 86 percent in January-June 1979. The capacity utilization rate of 91 percent, experienced in 1974 is, according to industry sources, the highest production rate that could have been attained in that year. In 1974-75 prices increased dramatically; U.S. plants were producing as much ammonia as possible to meet the demand. As shown in figure 5, utilization of effective capacity decreased during 1974-78.

U.S. consumption of ammonia increased steadily from 16.1 million short tons in 1974 to an estimated 18.3 million short tons in 1978, or by 14 percent (table 8). U.S. producers' share of U.S. consumption decreased irregularly from 97 percent in 1974 to 92 percent in 1978.

A large percentage of U.S.-produced ammonia is swapped among U.S. producers. U.S. producers generally swap ammonia in order to save transportation costs. A California producer, for example, might have a customer in Louisiana. Rather than shipping the ammonia from California, the California producer will arrange for a Louisiana producer to supply this customer with ammonia. The customer pays the California company for the ammonia it receives, and the transaction is recorded as a sale by the California company. In addition, this swap transaction is recorded on the books of each producer as so many tons received and so many tons owed. No dollar values are assigned.

Figure 5.--Anhydrous ammonia: U.S. production capacity and production, crop years 1973-78.




Source: Copyright permission granted by The Oil and Gas Journal, Jan. 1, 1979.

Table 8.--Anhydrous ammonia: U.S. producers' domestic shipments and intracompany transfers, imports and apparent consumption, 1974-78, January-June 1978, and January-June 1979

| Period | Producers'-- | | | Imports | Apparent consumption | Ratio of total domestic shipments and intracompany transfers to apparent consumption |
|---|---|---|---|---|---|---|
| | Domestic shipments | Intra-company transfers | Total | | | |
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | Percent |
| 1974 | 6,064 | 9,580 | 15,644 | 457 | 16,101 | 97 |
| 1975 | 6,653 | 8,968 | 15,621 | 808 | 16,429 | 95 |
| 1976 | 6,837 | 9,567 | 16,404 | 730 | 17,134 | 96 |
| 1977 | 7,351 | 9,424 | 16,775 | 1,078 | 17,853 | 94 |
| 1978 | 1/ | 1/ | 2/ 16,823 | 1,517 | 18,340 | 92 |
| January-June-- | | | | | | |
| 1978 | 1/ | 1/ | 2/ 9,443 | 590 | 10,033 | 94 |
| 1979 | 1/ | 1/ | 2/ 9,488 | 822 | 10,310 | 92 |

1/ Not available.

2/ Estimated by the U.S. International Trade Commission, U.S. production with adjustments for exports and inventory changes.

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

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

Some time later the California producer will provide a Pacific coast customer with ammonia for the Louisiana producer. In the long run, as shown in table 9, swaps made will equal swaps received. Swaps of ammonia increased from 5.1 million short tons, or 32 percent of U.S. consumption in 1974 to 8.2 million short tons, or 45 percent of U.S. consumption in 1978.

Table 9.--Anhydrous ammonia: U.S. producers swaps, 1974-78, January-June 1978, and January-June 1979

(In millions of short tons)

| Period | Swaps made 1/ | Swaps received |
|---|---|---|
| 1974 | 2.5 | 2.6 |
| 1975 | 2.9 | 3.1 |
| 1976 | 3.0 | 3.1 |
| 1977 | 3.8 | 3.7 |
| 1978 | 4.1 | 4.1 |
| January-June-- | | |
| 1978 | 2.2 | 2.2 |
| 1979 | 2.7 | 2.6 |

1/ Includes swaps made for materials other than anhydrous ammonia.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission. Forty-nine firms reported, which accounted for 95 percent of U.S. production in 1978.

U.S. plant expansions and closings

Since 1974, a total of 45 U.S. plants began operating or expanded production capabilities, adding 7.6 million short tons to U.S. ammonia production capacity. The greatest expansion occurred in 1977 when over 3 million short tons of capacity were added. Most of the new plants which began operating in 1977 were planned during 1974-75 when ammonia prices were high and shortages were predicted until the end of the century.

Of the new plants which have began operating since 1976, 10 have been large plants with annual capacities of 340,000 short tons or more. Large plants (more than 340,000 tons yearly capacity) accounted for 34 percent of capacity in 1976 and 53 percent of capacity in 1979 (table 10).

Since 1976, however, when the predictions of continued ammonia shortages were not borne out, 3.6 million short tons of U.S. production capacity have been idled or closed (table 11). In 1979 alone, 26 plants with a total of 1.3 million short tons of capacity have been idled or closed. Since 1976, the number of small production facilities with annual capacities of 200,000 short tons or less declined by 26 from 67 to 41 plants.

Table 10.--Anhydrous ammonia: U.S. production capacity, by plant sizes, 1974-79

| Item | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 |
|---|---|---|---|---|---|---|
| Plants with less than 200,000 tons yearly capacity: | | | | | | |
| Number | 55 | 60 | 67 | 67 | 62 | 41 |
| Total yearly capacity million short tons | 5.0 | 5.3 | 5.6 | 5.4 | 5.2 | 4.0 |
| Share of total U.S. capacity----percent | 29 | 29 | 29 | 25 | 24 | 20 |
| Plants with 200,000-340,000 tons yearly capacity: | | | | | | |
| Number | 26 | 25 | 25 | 24 | 23 | 21 |
| Total yearly capacity million short tons | 7.3 | 7.0 | 6.9 | 6.6 | 6.4 | 5.5 |
| Share of total U.S. capacity----percent | 42 | 38 | 36 | 31 | 29 | 27 |
| Plants with more than 340,000 tons yearly capacity: | | | | | | |
| Number | 11 | 14 | 15 | 21 | 24 | 25 |
| Total yearly capacity million short tons | 4.9 | 6.1 | 6.5 | 9.5 | 10.4 | 10.9 |
| Share of total U.S. capacity----percent | 28 | 33 | 34 | 44 | 47 | 53 |
| All U.S. plants: | | | | | | |
| Number | 92 | 99 | 107 | 112 | 109 | 87 |
| Total yearly capacity million short tons | 17.2 | 18.4 | 19.0 | 21.5 | 22.0 | 20.4 |
| Share of total U.S. capacity----percent | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Compiled from statistics of the Tennessee Valley Authority.

Table 11.--Anhydrous ammonia: Changes in U.S. production capacity, 1974-79

(In thousands of short tons)

| Year | New capacity | Idled and closed capacity | Change in capacity |
|---|---|---|---|
| 1974 | 421 | 573 | -152 |
| 1975 | 1,171 | 0 | 1,171 |
| 1976 | 642 | 0 | 642 |
| 1977 | 3,124 | 602 | 2,522 |
| 1978 | 910 | 438 | 472 |
| 1979 | 1,346 | 2,606 | -1,260 |

Source: Tennessee Valley Authority.

The newer ammonia plants, built after the mid-1960's, are most efficient when operated 24 hours per day, 7 days per week. The production rate in these newer plants can only be reduced to approximately 70 percent of capacity before energy imbalances and gas flow problems start to occur. Older ammonia plants with reciprocating compressor units have a greater degree of flexibility for operating at reduced rates of capacity.

According to U.S. industry representatives, an ammonia plant, if properly maintained, can be idled or closed and brought back to operation at a later date. Some of the plants idled and closed since 1976 could be brought back into production if ammonia prices increased to a level that would make it economically feasible. However, some of the closed facilities are antiquated, some are not maintained, and some have been cannibalized to supply spare parts for other ammonia plants. The cost to close and maintain a modern plant with an annual capacity of 400,000 short tons is illustrated by the experiences of First Mississippi with its Ampro plant located in Donaldsonville, La. This plant, which was completed in the fall of 1977, did not open because of failure to secure natural gas. The plant is now scheduled to open in January 1980. The total cost of mothballing, maintenance, demothballing, and depreciation of this facility is estimated by the owner to be $14 million. 1/

According to data developed by the U.S. Department of Commerce, 22 of the closed or idled plants are 10 years old or greater, and 17 plants are 15 years old or greater.

Of the U.S. plants that have been closed or idled since 1977, 30 are small plants with annual capacities of less than 200,000 short tons per year, 6 are medium-sized plants with capacities of 200,000 to 340,000 short tons per year, and none is a large plant with an annual capacity of more than 340,000 short tons (table 12).

1/ See transcript of the hearing, p. 40.

Table 12.--Anhydrous ammonia: Number of U.S. plants closed, by yearly capacities, 1977-79

| Year | Number of plants with a capacity of-- | |
|---|---|---|
| | Under 200,000 short tons | 200,000-340,000 short tons |
| 1977 | 4 | 1 |
| 1978 | 4 | 1 |
| 1979 | 22 | 4 |
| Total | 30 | 6 |

Source: The U.S. Tennessee Valley Authority.

In addition, 32 of the closed plants utilized reciprocating compressors while only 4 utilized centrifugal compressors, as shown in the following tabulation:

| Year | Reciprocating plants closed | Centrifugal plants closed |
|---|---|---|
| 1977 | 5 | 0 |
| 1978 | 4 | 1 |
| 1979 | 23 | 3 |
| Total | 32 | 4 |

In its questionnaire sent to all U.S. ammonia producers, the Commission requested information on plant closings since 1974. Seventeen firms responded to this section of the questionnaire. On the basis of information reported in annual reports, 10-K forms, and responses to the Commission's questionnaires, the most frequently cited reasons for closing ammonia plants since 1974 were the high cost of production, including the cost of natural gas (11 firms), the low price of ammonia (7 firms), and outmoded plant (4 firms), as shown in the following tabulation:

| Reason for closing plant | Number of firms |
|---|---|
| High cost of production, including cost of natural gas | 11 |
| Low ammonia price | 7 |
| Outmoded plant | 4 |
| Weak ammonia market | 3 |
| Oversupply | 2 |
| Low-priced imports | 1 |
| U.S. competition | 1 |
| Operating at a loss since 1976 | 1 |
| Loss of natural gas supply | 1 |

Note.--Firm's frequently cited more than one reason for closing its plant.

Seventeen firms reported temporary shutdowns because of natural gas curtailments, equipment failures, and strikes. According to data compiled by The Fertilizer Institute, approximately 1 to 3 percent of U.S. productive capacity was idled each fertilizer year during 1974-79 because of curtailments of natural gas supplies. The largest loss occurred in the winter of 1976-77, when 730,000 short tons of ammonia production were lost, as shown in the following table:

Table 13.--Anhydrous ammonia: U.S. production lost to natural gas curtailments, fertilizer years 1974-79

| Year ending June 30 | Quantity | Percent of capacity |
|---|---|---|
| | 1,000 short tons | |
| 1974 | 230 | 1.3 |
| 1975 | 356 | 1.9 |
| 1976 | 251 | 1.3 |
| 1977 | 730 | 3.4 |
| 1978 | 428 | 1.9 |
| 1979 | 245 | 1.2 |

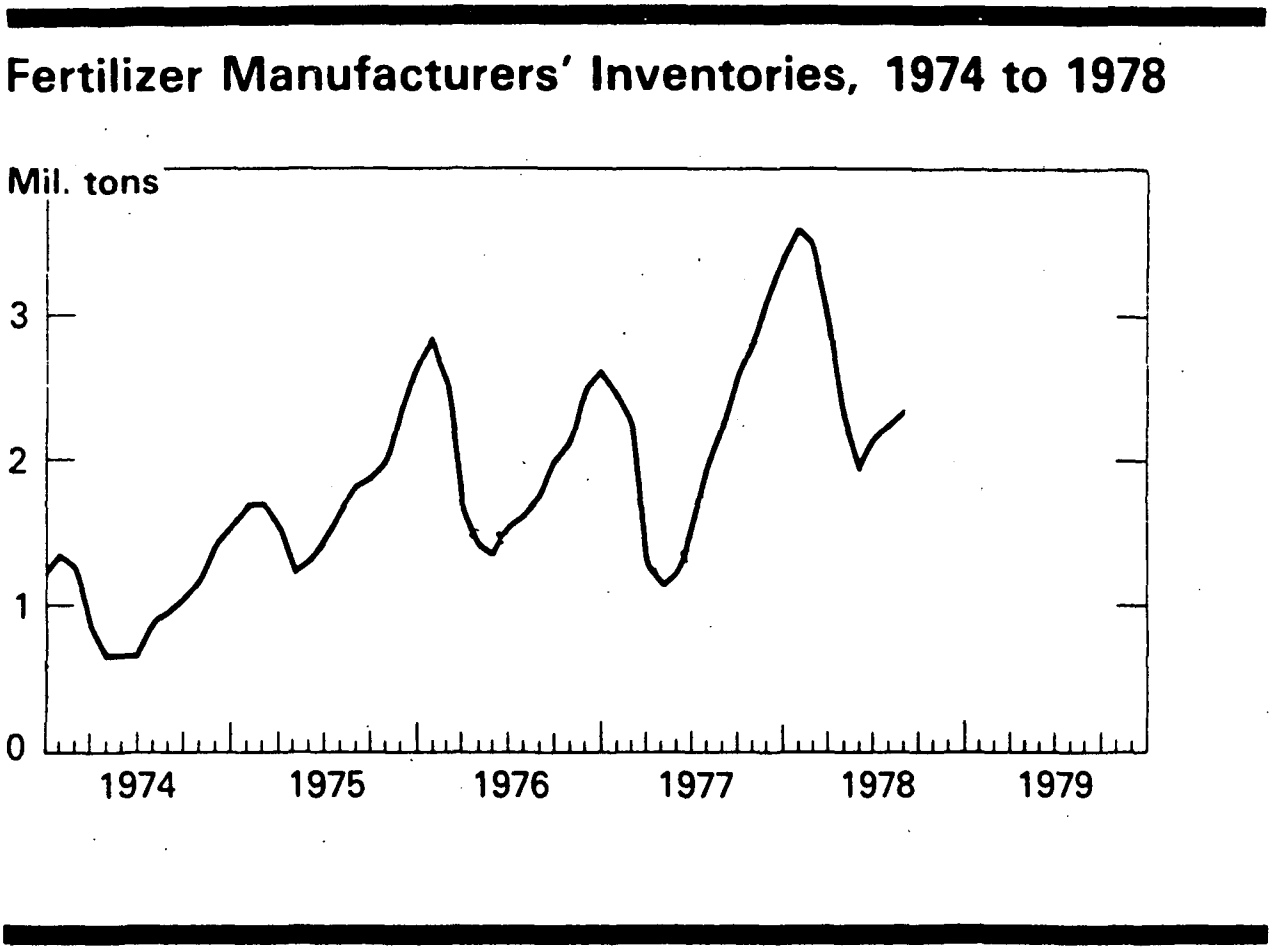
Source: The Fertilizer Institute.

Inventories

Inventories of nitrogenous fertilizers held by U.S. producers, as shown in figure 6, fluctuate seasonally. Inventories, built up for the spring planting, are highest in February and reach their lowest levels in May and June, after the planting season has ended. Weather plays an important role in determining the quantity of fertilizer applied each season. Farmers may be prevented from applying the optimum amount of ammonia to their fields if the winter is harsh, and the spring is cold. In addition, since anhydrous ammonia cannot be applied in fields that are too wet to plow, during a wet spring, farmers may choose to use urea or another source of nitrogen which can be applied to wet fields.

Yearend inventories of ammonia held by U.S. producers, as shown in table 14, increased from 2.1 million short tons in 1975 to 2.8 million short tons in 1977. Yearend inventories subsequently decreased to 2.5 million short tons in 1978.

Figure 6.--U.S. fertilizer manufacturers' inventories of nitrogenous fertilizers, 1/ 1974-78.




1/ Does not include urea.

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

Table 14.--Anhydrous ammonia: U.S. producers' inventories as of Feb. 28, June 30, and Dec. 31 of 1975-79

(In thousands of short tons)

| Year | Inventories as of-- | | |
|---|---|---|---|
| | Feb. 28 | June 30 | Dec. 31 |
| 1975 | 1,555 | 1,132 | 2,062 |
| 1976 | 2,545 | 1,427 | 2,251 |
| 1977 | 2,349 | 1,088 | 2,785 |
| 1978 | 3,273 | 1,671 | 2,486 |
| 1979 | 2,921 | 1,472 | - |

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

Yearend inventories held by U.S. producers as a percent of U.S. production, as shown in the tabulation below, increased from 12.6 percent in 1975 to 15.8 percent in 1977, and subsequently decreased to 14.7 percent in 1978.

| Inventories as of Dec. 31-- | Percent of U.S. production |
|---|---|
| 1975 | 12.6 |
| 1976 | 13.5 |
| 1977 | 15.8 |
| 1978 | 14.7 |

Employment

The number of production and related workers engaged in the production of ammonia in the United States, as reported by 47 firms, increased steadily from 3,828 in 1974 to 4,744 in 1977, and subsequently decreased by 3 percent to 4,610 in 1978. The number of such workers further decreased to 4,128 in January-June 1979, representing a decrease of 11 percent from the number of workers in the corresponding period of 1978. The number of hours worked by such workers followed a similar trend increasing from 8.4 million hours in 1974 to 10.3 million hours in 1977, and subsequently decreasing to 9.9 million hours in 1978. The number of hours worked further decreased from 5.2 million hours during January-June 1978 to 4.6 million hours during the corresponding period of 1979, representing a decrease of 11 percent, as shown in table 15.

Table 15.--Average number of U.S. production and related workers engaged in the production of anhydrous ammonia and the hours such workers were employed, 1974-78, January-June 1978, and January-June 1979

| Period | Production and related workers | Hours employed |
|---|---|---|
| | | 1,000 hours |
| 1974 | 3,828 | 8,416 |
| 1975 | 4,181 | 9,223 |
| 1976 | 4,350 | 9,582 |
| 1977 | 4,744 | 10,285 |
| 1978 | 4,610 | 9,918 |
| January-June-- | | |
| 1978 | 4,618 | 5,226 |
| 1979 | 4,128 | 4,631 |

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

## Capital expenditures

Since 1975, U.S. ammonia producers have spent more than $1 billion on capital expenditures. Such expenditures were greatest in 1976 and 1977, when $440 million and $360 million, respectively, were spent on machinery, equipment, and fixtures. In January-June 1979, only $17 million was spent by U.S. producers on capital expenditures, as shown in table 16. The trend in capital expenditures follows closely the trend in the industrywide ammonia plant expansion program which began in 1975 and which was essentially completed in 1978.

Table 16.--Anhydrous ammonia: U.S. producers capital expenditures, 1975-78 and January-June 1979

(In millions of dollars)

| Period | Capital expenditures on-- | | | Total |
|---|---|---|---|---|
| | Land or land improvements | Building or leasehold improvements | Machinery equipment, and fixtures | |
| 1975 | 1 | 2 | 129 | 131 |
| 1976 | 1 | 4 | 440 | 446 |
| 1977 | 3 | 3 | 360 | 365 |
| 1978 | 6 | 1 | 168 | 175 |
| 1979 (January-June) | 1/ | 1/ | 17 | 17 |

1/ Less than $500,000.

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

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

Profit and loss

The Commission sent questionnaires to all U.S. ammonia producers requesting information on the profitability of their ammonia production operations. Thirty-five firms, representing 72 percent of U.S. production in 1978, submitted usable information.

Most of the profit-and-loss data submitted to the Commission was based in part on estimates by U.S. producers. Many companies' ammonia operations are not separate profit centers, but are a component of larger accounting units which may include the production and sales operations of all fertilizers and other chemicals. In addition, nearly 50 percent of U.S.-produced ammonia is captively consumed. The value imputed for this captive consumption can affect the profitability of ammonia production operations. In 1978, for example, the values assigned to captive consumption ranged from $23 a short ton to $140 a short ton.

Net operating profits before taxes of the reporting firms on their ammonia operations declined from $316 million in 1976 to $149 million and $10 million in 1977 and 1978, respectively. Such profits declined further from $30 million in January-June 1978 to a loss of $4 million in the corresponding period of 1979. The ratio of net operating profits to total sales declined from 28 percent in 1976 to 1 percent in 1978. This ratio further declined from 5 percent in January-June 1978 to a loss of 1 percent in the corresponding period of 1979, as shown in table 17.

Sixteen firms in 1976 reported net operating margins of more than 30 percent. In January-June 1979 only 3 firms reported such high margins. The number of firms reporting losses increased from 2 firms in 1976 to 11 in January-June 1979, as shown in table 18.

Table 18.--35 U.S. anhydrous ammonia producers: Distribution of firms by net operating margins, 1976-78, January-June 1978, and January-June 1979

(Number of firms)

| Period | Net operating profit of-- | | | | Net operating loss |
|---|---|---|---|---|---|
| | More than 30 percent | 20 to 29.9 percent | 10 to 19.9 percent | 0 to 9.9 percent | |
| 1976 | 16 | 2 | 8 | 5 | 2 |
| 1977 | 5 | 9 | 4 | 6 | 9 |
| 1978 | 1 | 2 | 11 | 7 | 14 |
| Jan.-June-- | | | | | |
| 1978 | 2 | 4 | 9 | 6 | 14 |
| 1979 | 3 | 0 | 8 | 11 | 11 |

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

Table 17.--Profit-and-loss experience of 35 U.S. anhydrous ammonia producers on their anhydrous ammonia production operations, 1976-78, January-June 1978, and January-June 1979

| Period | Open market sales | Intracompany transfers | Total | Cost of goods sold | Gross profit | Administrative and selling expenses | Net profit before taxes | Ratio of net profit to total sales |
|---|---|---|---|---|---|---|---|---|
| | Millions of dollars | | | | | | | Percent |
| 1976 | 698 | 448 | 1,146 | 759 | 387 | 71 | 316 | 28 |
| 1977 | 684 | 524 | 1,208 | 991 | 217 | 68 | 149 | 12 |
| 1978 | 643 | 587 | 1,230 | 1,150 | 80 | 70 | 10 | 1 |
| January-June-- | | | | | | | | |
| 1978 | 334 | 286 | 620 | 554 | 66 | 36 | 30 | 5 |
| 1979 | 373 | 328 | 701 | 668 | 33 | 37 | -4 | -1 |

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

Return on investment

Officials at TVA and Arthur D. Little have indicated that U.S. producers require a 20-percent return on investment before taxes in order to stay in business. 1/ In its study, Investment and Production Costs for Fertilizers, the Food and Agriculture Organization of the United Nations reported in January 1979 that a 15-percent return on investment before taxes is appropriate. Using the 20-percent figure, an average unit value of $100 per short ton in 1978 would have been required to cover costs of production and a 20-percent return of investment (fig. 7) for 50 percent of U.S. production. The other 50 percent of U.S. production would require an even higher price. Sales and general administrative expenses are not included in this calculation.

The cost of building a modern centrifugal plant with 400,000 short tons of annual capacity, according to Pullman Kellogg, has increased from * * * million in 1974 to * * * million in 1979, representing an increase of * * * percent. Such costs are estimated to increase 7-10 percent by 1980-1981. The cost per ton of annual installed capacity has similarly increased, from * * * to * * *, as shown in table 19.

Table 19.--Anhydrous ammonia: U.S. plant capital costs and costs per ton of annual installed capacity, 1974-79

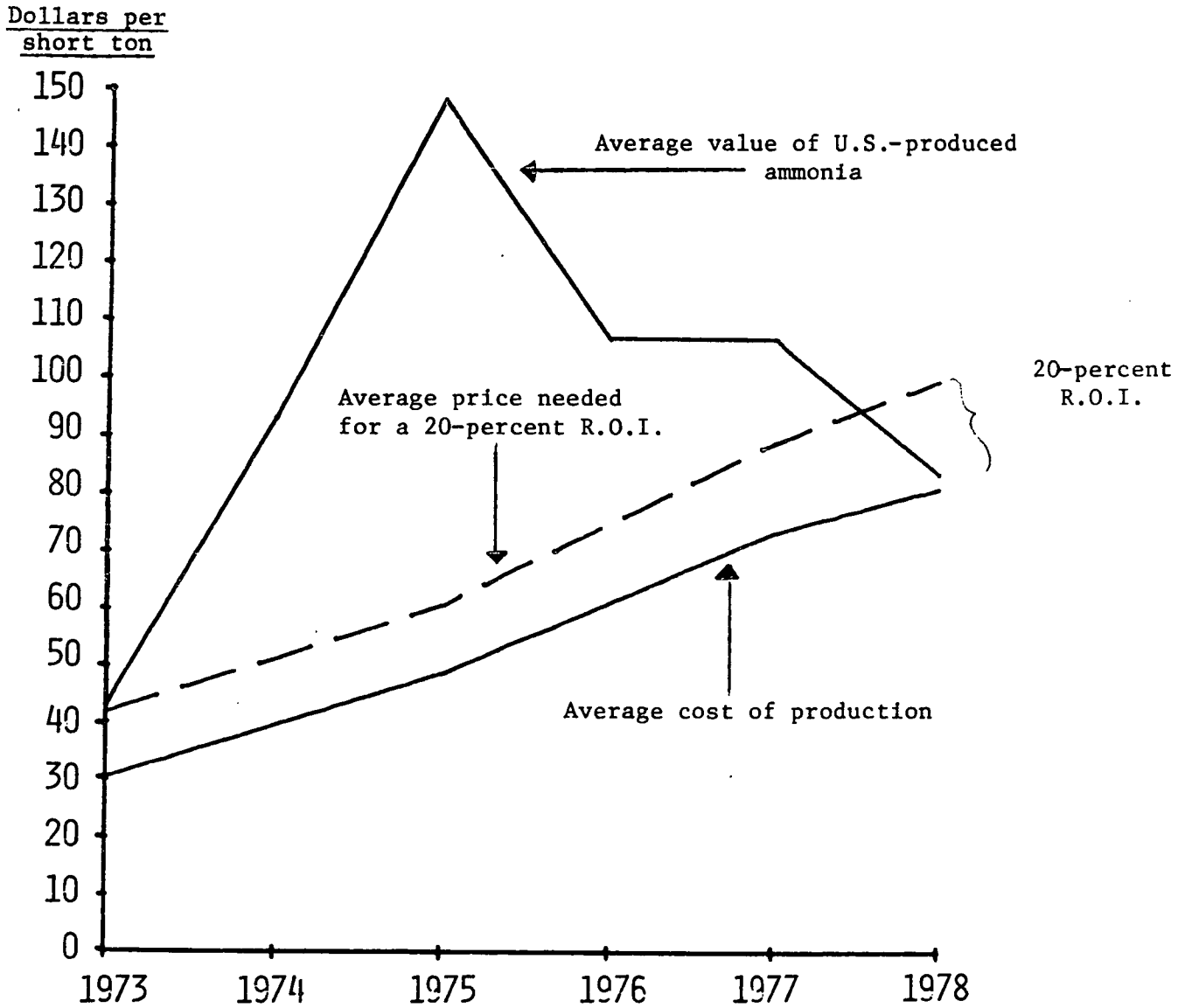
| Year construction completed | Capital costs 1/ | Cost per ton of annual installed capacity |
|---|---|---|
| | Million dollars | |
| 1974 | *** | $*** |
| 1975 | *** | *** |
| 1976 | *** | *** |
| 1977 | *** | *** |
| 1978 | *** | *** |
| 1979 | *** | *** |

1/ Includes cost of materials, engineering, management of construction, and labor for a turn-key plant with an annual capacity of 400,000 short tons. Does not include costs associated with storage and shipping terminals, site acquisition, or buildings other than control buildings.

Source: Pullman Kellogg.

1/ The Ammonia Supply Dilemma, op. cit., and Farm Chemicals, March 1979.

Figure 7.--Anhydrous ammonia: U.S. producers' average unit value of their shipments, average cost of production, and average price needed for a 20-percent return on investment (R.O.I.), 1973-78.




Source: The Fertilizer Institute's study, Ammonia Cost of Production, conducted by Ernst and Ernst, April 1979, and official statistics of the U.S. Department of Commerce.

Note.--Sales and general administrative costs are not included in the average price needed for a 20-percent return of investment.

## The Question of Causality

Counsel for Occidental contended at the Commission's hearing that if the domestic industry producing ammonia is experiencing material injury, it is primarily attributable to the overexpansion of U.S. production capacity and to the rapidly increasing cost of production. This increase in production cost was reported to be primarily attributable to large increases in the price of natural gas. The petitioners acknowledged that these factors contributed to the difficulties they have experienced since 1976, but they also contended that imports from the U.S.S.R. are a significant cause of material injury.

### Import penetration

Imports of ammonia from the U.S.S.R., as a percent of apparent U.S. consumption increased from zero percent in 1977 to 2.6 percent in January-June 1979. Based upon an estimated 5 percent annual growth rate in U.S. consumption of ammonia during the years 1979, 1980, and 1981 and based upon Occidental's estimates concerning its imports in each of those years, this ratio will increase to * * * percent in 1979, * * * percent in 1980, and * * * percent in 1981, as shown in the following tabulation:

| | Ratio of imports from the U.S.S.R. to U.S. consumption |
|---|---|
| | Percent |
| 1977 | - |
| 1978 | 1.7 |
| 1979 (January-June) | 2.6 |
| 1979 | 1/ *** |
| 1980 | 1/ *** |
| 1981 | 1/ *** |

1/ Estimated.

### Overexpansion of the U.S. industry

The issue of overexpansion regarding the U.S. industry is discussed in the sections of this report on U.S. capacity, production, consumption, and U.S. plant expansions and closings.

### Cost of production

In April 1979, the public accounting firm, Ernst and Ernst, completed a study for The Fertilizer Institute concerning the cost to produce ammonia in the United States during 1970-78. Thirty-four companies responded to the survey. Results indicated that the average cost to produce a ton of ammonia in the United States increased from $30 a short ton in 1973 to $81 a short ton in 1978. Natural gas, which accounts for about 64 percent of the cost of

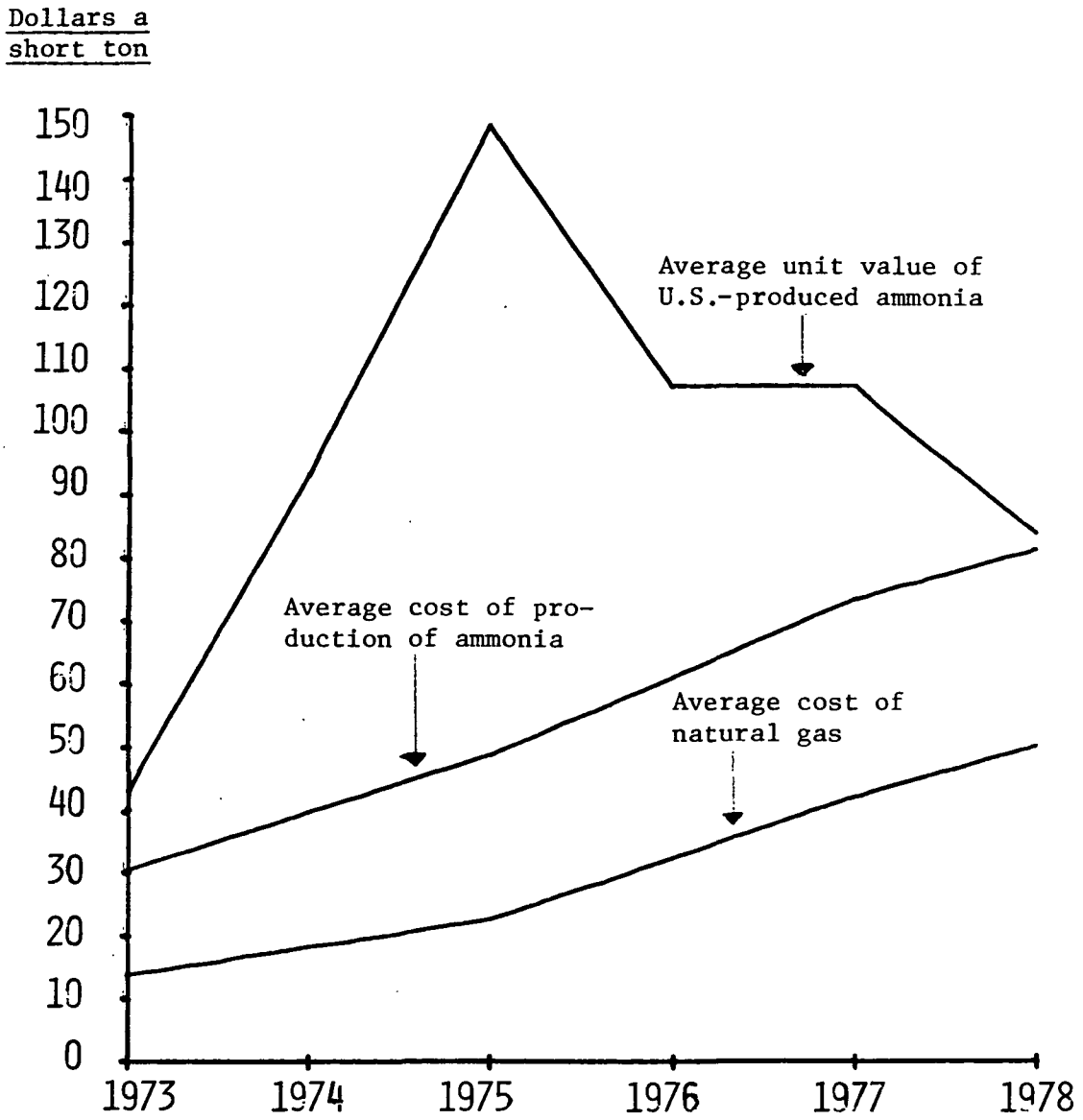
production, accounted for most of the increase in cost, rising from an average of $14 a short ton in 1973 to $50 a short ton in 1978 (fig. 8). In reviewing figures 8 and 9 it should be noted that the data on cost of production are based on the weighted average costs of 34 firms that responded to the survey conducted by Ernst and Ernst on ammonia production costs. Thus, the costs presented are strongly influenced by the output of the large-capacity plants, which are more efficient than the small- and medium-sized plants. It should also be noted that production costs do not include sales and general administrative costs.

According to data collected by the Commission, the average cost of natural gas to U.S. ammonia producers nearly tripled from $0.48 in 1974 to $1.40 in January-June 1979, as shown in the following tabulation:

| | Average price of 1,000 cubic feet of natural gas |
|---|---|
| 1974 | $0.48 |
| 1975 | .65 |
| 1976 | .94 |
| 1977 | 1.15 |
| 1978 | 1.27 |
| January-June | |
| 1978 | 1.24 |
| 1979 | 1.40 |

The increase in the price of natural gas is linked to the sharp increase in Organization of Petroleum Exporting Countries (OPEC) oil prices. The U.S. ammonia industry, using natural gas generally purchased on long-term contracts, was somewhat insulated from the suddenness of oil price increases. Nevertheless, a gradual plant-by-plant price increase was felt as contracts expired or were renegotiated, and as newly constructed plants signed new contracts for natural gas. In 1970, according to the Ernst and Ernst study, virtually all U.S. producers purchased natural gas at prices below $0.50 for 1,000 cubic feet. By January-June 1979, only 9 percent of the ammonia produced in the United States used natural gas priced under $0.50, while 15 percent of the natural gas used was priced over $2.00 for 1,000 cubic feet (table 20).

Figure 8.--Anhydrous ammonia: U.S. producers' average unit value of their shipments, average cost of production, and average cost of natural gas, 1973-78.




Source: The Fertilizer Institute's study, Ammonia Cost of Production, conducted by Ernst and Ernst, April 1979, and official statistics of the U.S. Department of Commerce.

Table 20.--Anhydrous ammonia: Cost of natural gas to U.S. ammonia producers, by percent of production, 1974-78, and January-June 1979 1/

(In percent)

| Price of 1,000 cubic feet natural gas | 1974 | 1975 | 1976 | 1977 | 1978 | January-June 1979 |
|---|---|---|---|---|---|---|
| Less than $0.50 | 61 | 39 | 15 | 10 | 8 | 9 |
| $0.50-$0.99 | 37 | 46 | 41 | 22 | 16 | 22 |
| $1.00-$1.49 | - | 13 | 33 | 44 | 28 | 18 |
| $1.50-$1.99 | 2 | 2 | 10 | 22 | 37 | 36 |
| More than $1.99 | - | - | - | 2 | 11 | 15 |

1/ Data account for the following shares of U.S. production (in percent):

| | |
|---|---|
| 1974 | 84 |
| 1975 | 89 |
| 1976 | 92 |
| 1977 | 92 |
| 1978 | 95 |

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

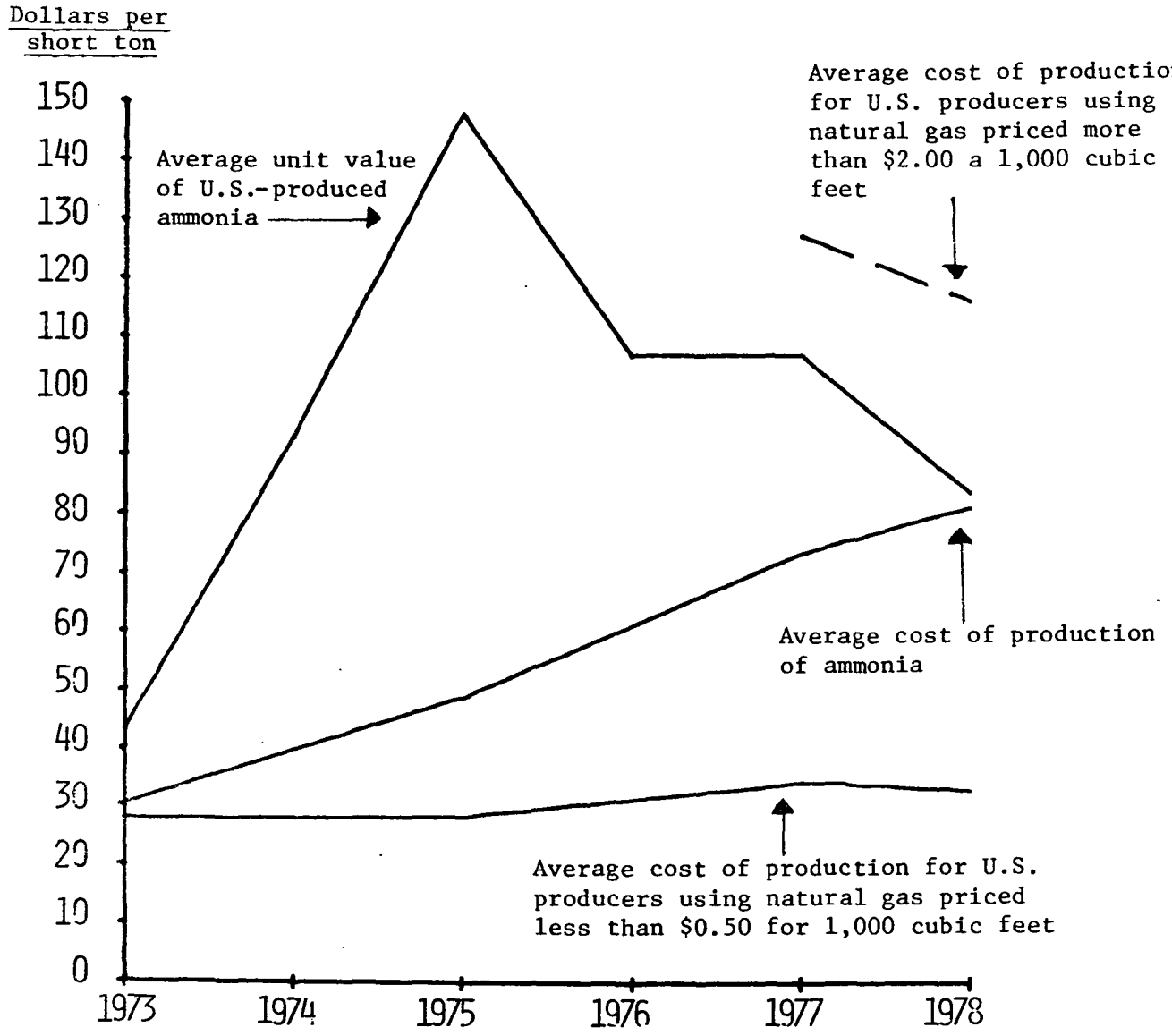
Note.--Because of rounding, figures may not add to 100 percent.

This wide range of prices paid for natural gas by U.S. producers in 1978 has led to a wide disparity in the cost of producing ammonia. For example, as shown in figure 9, in 1978 those producers using natural gas priced under $0.50 for a 1,000 cubic feet had an average cost of production of $33 a short ton, while those using natural gas priced over $2.00 for 1,000 cubic feet faced average costs of $116 to produce a short ton of ammonia.

While the amount of natural gas used to produce a ton of ammonia is approximately the same for all sizes of U.S. production facilities, most of the small plants use more expensive natural gas than the large plants (figure 10). In addition, the other costs of production, e.g., electricity, overhead, and labor, are about twice as high per ton of production for the older and smaller plant than for a large new plant (fig. 11).

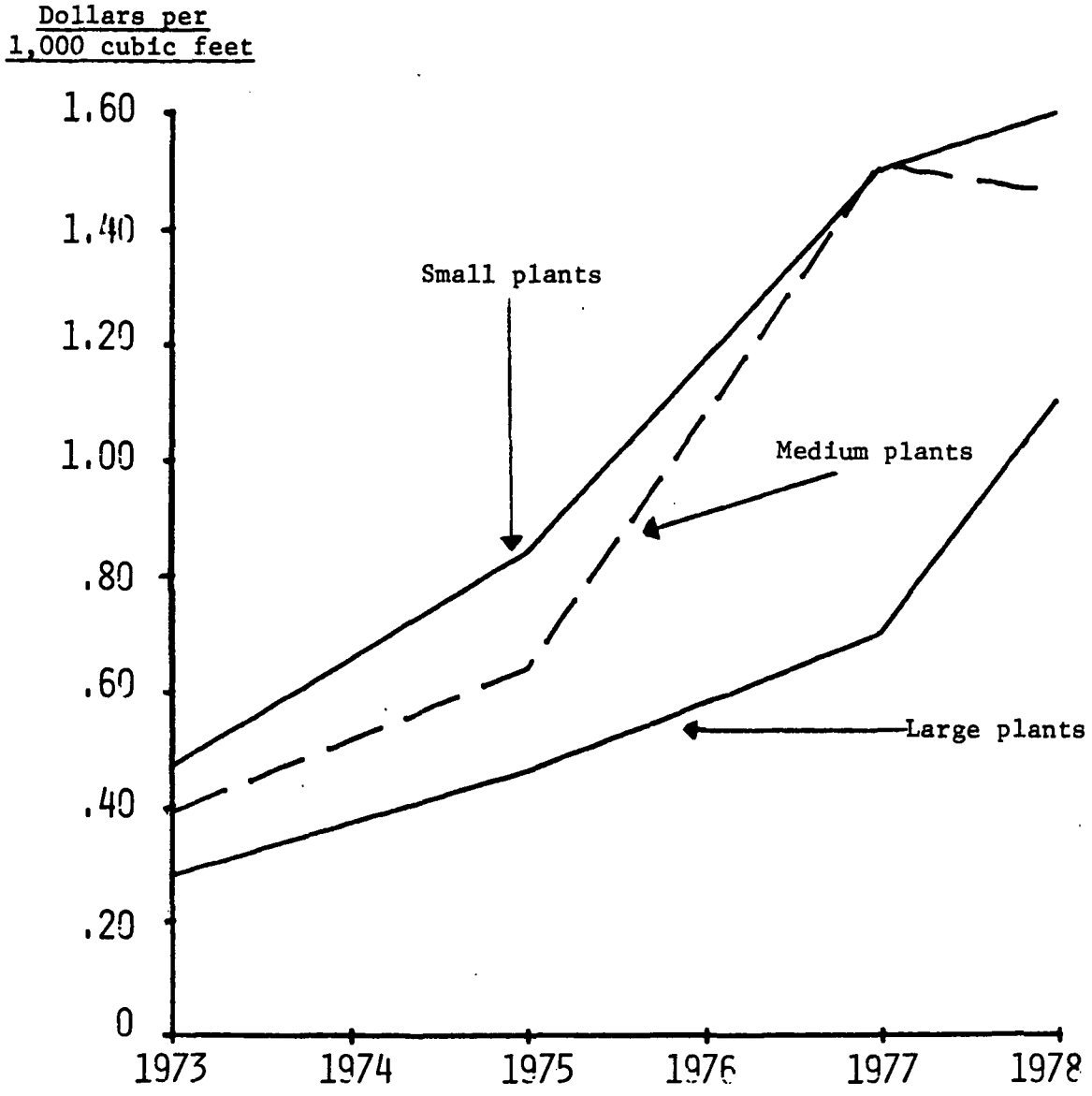
In 1978 SRI International published a study, Ammonia Production Cost Trends, which forecasts U.S. and Canadian ammonia production costs through 1984. The SRI forecasts were made on the assumption that all plants operating in 1977 and those that began operating after 1977 would be operating in 1984. Thus, the average production costs predicted by SRI includes those high-cost plants which have already shut down in 1978 and 1979. According to SRI projections, the average cost of production will increase from $77 a short ton in 1977 to $119 a short ton in 1981 assuming that all plants are operating at 100-percent capacity. The average cost of production in 1981, as shown in table 21, would be $124 and $130 a short ton if the plants are operated at 85 percent and 70 percent of capacity, respectively.

Figure 9.--Anhydrous ammonia: U.S. producers' average unit value of their shipments and average cost of production, 1973-78.




Source: The Fertilizer Institute's study, Ammonia Cost of Production, conducted by Ernst and Ernst, April 1979, and official statistics of the U.S. Department of Commerce.

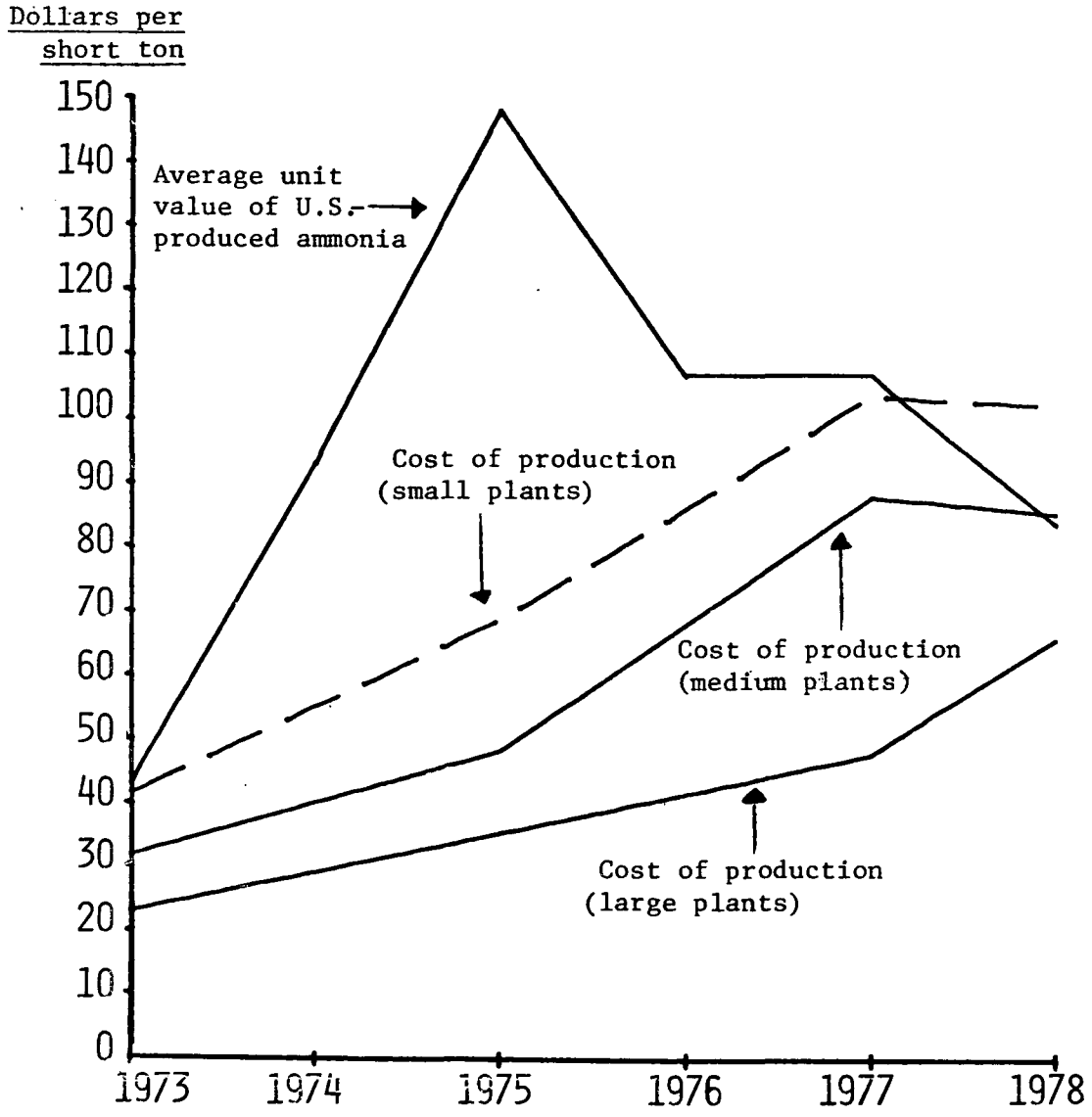
Figure 10.--Average cost of natural gas, by sizes of U.S. ammonia production facilities, 1973-78.




Source: The Fertilizer Institute's study, Ammonia Cost of Production, conducted by Ernst and Ernst, April 1979.

Note.--Large plant, capacity of more than 340,000 short tons a year; medium-size plant, capacity between 200,000 and 340,000 short tons a year; small-size plant, capacity less than 200,000 short tons a year.

Figure 11.--Anhydrous ammonia: U.S. producers' average unit value of their shipments and average cost of production, by plant sizes, 1973-78.




Source: The Fertilizer Institute's study, Ammonia Cost of Production, conducted by Ernst and Ernst, April 1979, and official statistics of the U.S. Department of Commerce.

Note.--Large plant, capacity of more than 340,000 short ton a year; medium plant, capacity between 200,000 and 340,000 short tons a year; small plant, capacity less than 200,000 short tons a year.

At the public hearing, testimony was presented indicating that SRI's cost projections, which were completed in the fall of 1978, did not take into account the Government's policy to decontrol U.S. crude oil and the recent crude oil price increases announced by OPEC. Thus, it is likely that natural gas prices and the average cost of ammonia production will be higher than SRI's projections.

Table 21.--Anhydrous ammonia: U.S. and Canadian weighted average total production costs, 1/ by varying rates of capacity utilization, 1977, 1978, and 1981

(Per short ton)

| Capacity utilization | 1977 | 1978 | 1981 |
|---|---|---|---|
| 100 percent | $77 | $86 | $119 |
| 85 percent | 79 | 90 | 124 |
| 70 percent | 84 | 94 | 130 |

1/ At plant gate, excluding return on investment, and assuming a 6-percent annual inflation rate, and no plant closures 1978-81.

Source: Copyright permission granted by SRI International, Ammonia Production Cost Trends, 1978 edition.

Note.--Current dollars.

## Prices

Ammonia is a fungible commodity, traded and consumed all over the world. Thus, U.S. prices are affected by worldwide prices. Prices of nitrogenous fertilizers traded on the international market increased rapidly from 1972 to 1975.

With the removal of Government import price controls, and faced with a shortage in the domestic market, U.S. prices for ammonia rose dramatically in 1974. Prices peaked at about $400 per short ton in early 1975, and then decreased precipitously during the next several months. Since 1976, although there have been seasonal fluctuations, the general trend in prices has been downward as domestic production and imports rose. As domestic capacity exceeded domestic demand by an increasing margin, a large number of domestic plants closed, and ammonia prices reached their nadir at about $78 per ton in the summer of 1978. Spot prices have subsequently increased to about $120 per ton in July 1979. The price increases registered in 1979 are believed to be attributed to improved worldwide demand and to the force majeure declared by the U.S.S.R. in January 30, 1979, and another force majeure declared by Mexico. The petitioners contend that the depressed prices in the U.S. market in 1978 and 1979 were attributable to the availability of large quantities of Soviet ammonia at low prices.

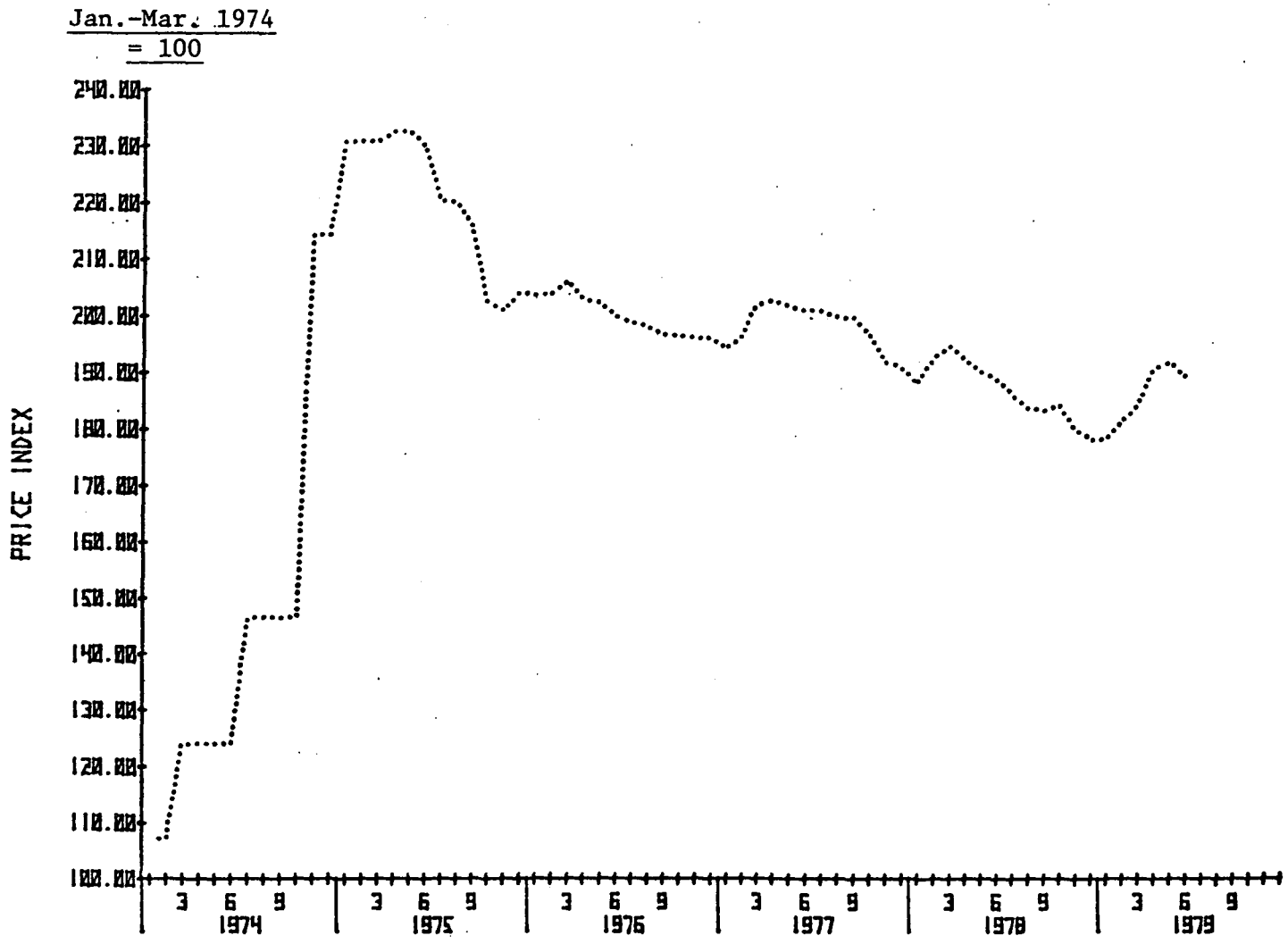
The movements in prices described above can be seen in the accompanying figures. Figure 12 is the Bureau of Labor Statistics producer price index for ammonia. The index represents a weighted average of spot and contract prices taken from a survey of domestic ammonia producers. Figure 13 shows the range of spot market prices reported by Green Markets. Green Markets, a fertilizer trade publication, publishes spot prices for ammonia each week. These prices are obtained through informal telephone surveys of U.S. producers willing to disclose their prices. While these prices are not obtained through a rigorous scientific survey, industry sources have indicated that no better listing of U.S. ammonia prices has been published. These prices are spot prices, and do not include intracompany transfer prices or long-term contract prices.

Officials at the TVA, U.S. Department of Agriculture, and The Fertilizer Institute report that the price of fertilizer is governed in large part by the price of crops. In the mid-1970's, massive world crop failures and the resultant food shortage forced a dramatic rise in the price of food. During the world food crisis, the demand for fertilizer products increased, driving up the price. As shown in figure 14, there are close parallels between the average unit price received by U.S. farmers for corn and the average unit value of ammonia. Nearly 75 percent of the nitrogenous fertilizers used in the United States are used in the production of corn.

In its questionnaire sent to all U.S. ammonia producers, the Commission requested pricing information from U.S. producers concerning their long-term contracts to customers which purchase ammonia for use in upgrading ammonia into more complex chemicals. From the questionnaire responses, the Commission has information concerning only eight long-term contracts which are comparable to Occidental's contracts in terms of the length of the contract and the starting date of first ammonia deliveries. The data furnished concerning these eight contracts indicate that Occidental's sales prices were at approximately the same level as the sales prices of the U.S. producers in the year that these contracts were signed. In subsequent years, however, U.S. producers prices were tied to cost of production or market price escalation clauses, whereas Occidental's prices in future years were, in most instances, tied to a fixed escalation clause that ranged between 3 percent and 6 percent per year. U.S. purchasers of ammonia advised that they considered this fixed escalation clause in the Occidental contract to be a decided advantage over the escalation clauses offered by U.S. producers.

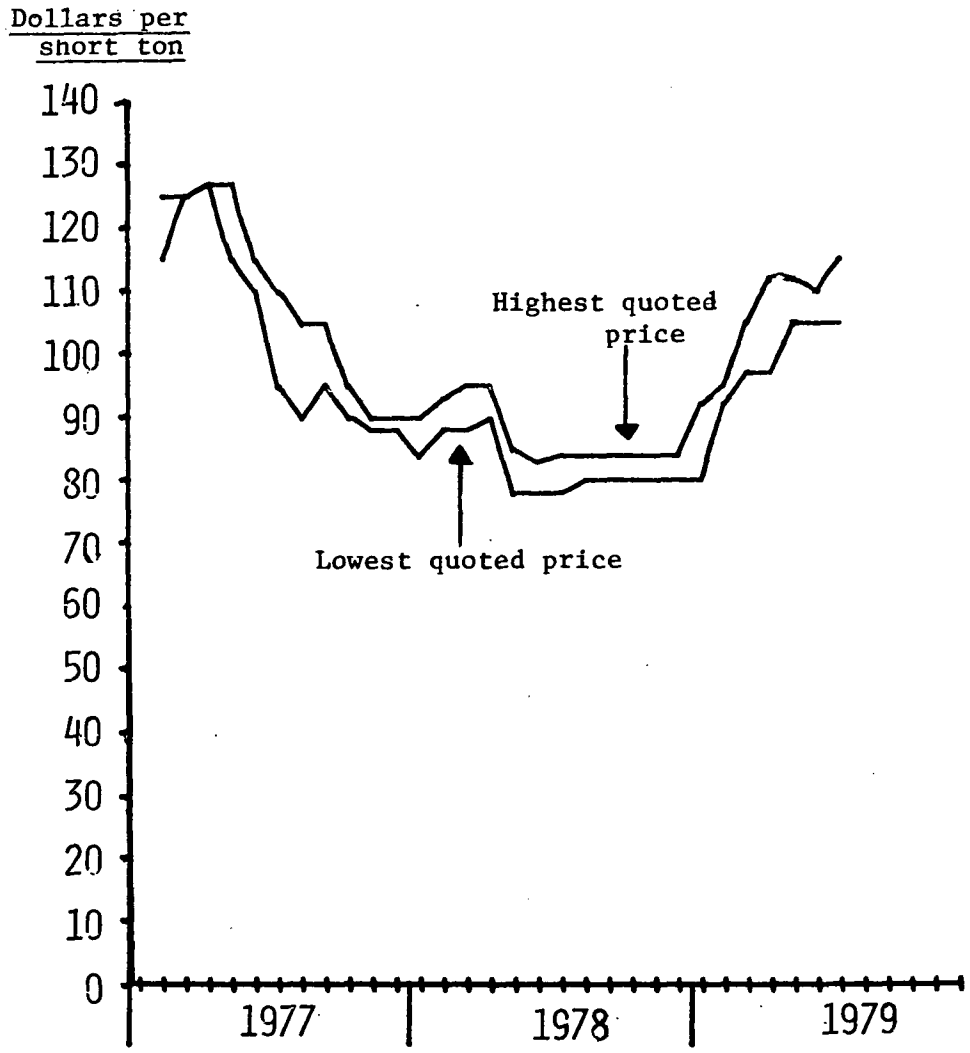
In July 1979, Chase Econometrics completed a study, Fertilizer Model Forecasts, which, among other things, projects future ammonia prices. The Chase projections were based upon several economic indicators, including U.S. agricultural demand for ammonia, U.S. farm price levels, U.S. acreage planted, crop failures worldwide, U.S. grain exports, the general state of the U.S. economy, including GNP, capital spending, the consumer price index, and interest rates, the cost of natural gas, U.S. rail transportation rates, the closing of naphtha-based ammonia plants in Japan and Europe, and U.S. imports from the U.S.S.R. According to this analysis, Chase predicts that the Gulf coast spot price of ammonia will increase steadily from $112 per short ton in July-September 1979 to $162 per short ton in April-June 1981 (table 22).

Figure 12.--Anhydrous ammonia: U.S. price index, by quarters, 1974-79.



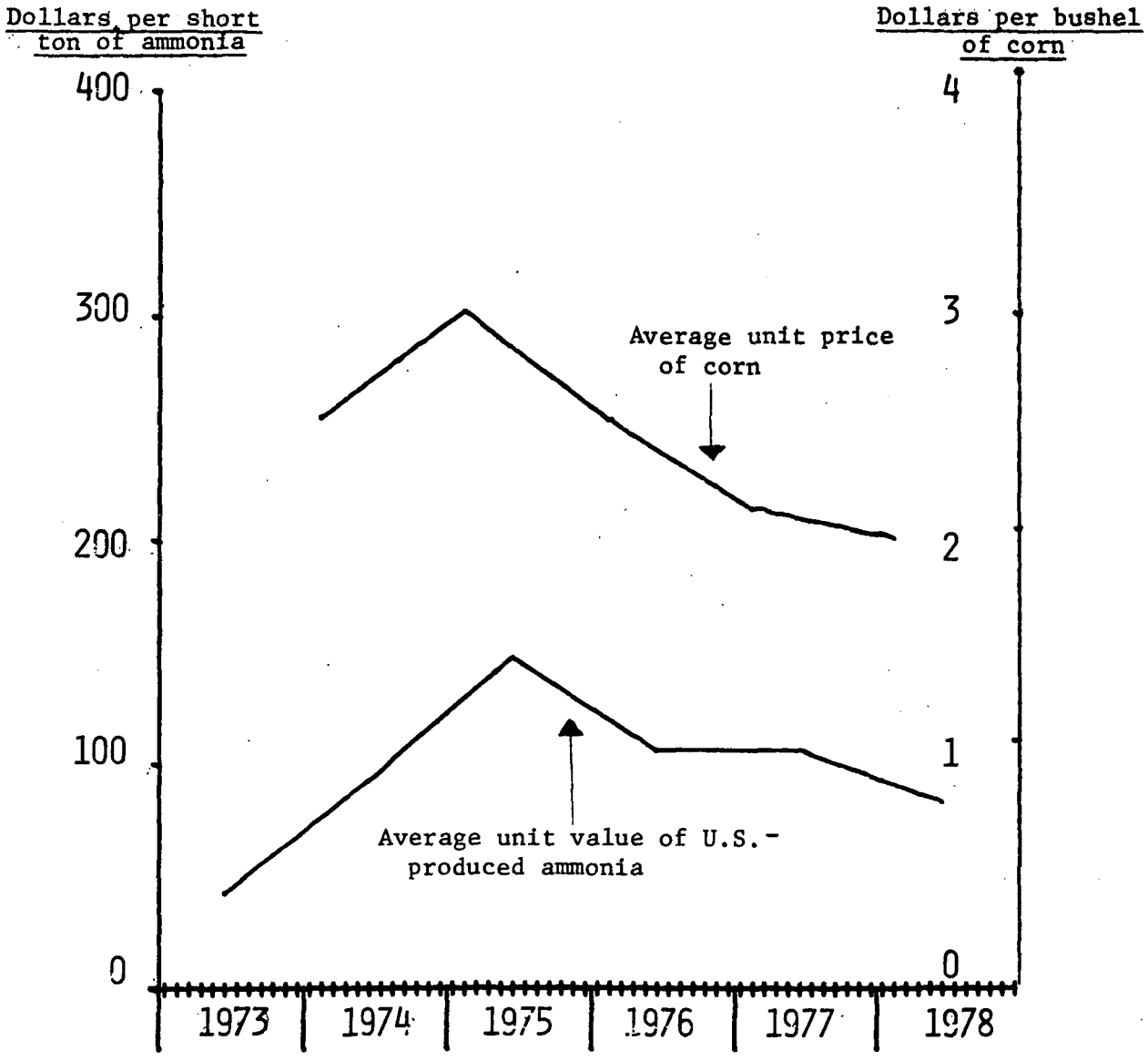

SOURCE: BUREAU OF LABOR STATISTICS.

Figure 13.--Anhydrous ammonia: Spot prices, f.o.b. U.S. Gulf coast February 1977-July 1979.




Source: Green Markets.

Figure 14.--Average unit values of U.S. producers' shipments of ammonia and average unit prices received by U.S. farmers for corn, 1973-78.




Source: Compiled from official statistics of the U.S. Departments of Agriculture and Commerce.

Table 22.--Anhydrous ammonia: Estimated U.S. Gulf coast spot prices, by quarters, July 1979-June 1981

(Per short ton)

| Period | Spot price |
|---|---|
| 1979: | |
| July-September | $112.00 |
| October-December | 118.00 |
| 1980: | |
| January-March | 122.99 |
| April-June | 126.63 |
| July-September | 135.90 |
| October-December | 144.89 |
| 1981: | |
| January-March | 153.87 |
| April-June | 161.70 |

Source: Fertilizer Model Forecasts, Chase Econometrics, July 27, 1979.

Lost sales

U.S. producers were requested in the Commission's questionnaires to supply information about sales of ammonia lost because of competition from ammonia imported from the U.S.S.R., or sales for which they were forced to reduce their price to meet the price of ammonia from the U.S.S.R. Only one U.S. producer, * * *, reported that it had lost sales to any of the nine firms to which Occidental is selling U.S.S.R. ammonia on a long-term contract basis. * * *.

U.S. producers also cited 10 other instances in which they lost sales or made price reductions in order to make a sale because of competition from U.S.S.R. ammonia. When contacted by the Commission, however, only two of these purchasing firms reported that they had bought ammonia from Occidental. Each bought on a spot basis. One of these purchasers reported that Occidental's spot price was higher than that of U.S. producers, and the other reported that Occidental's price was in line with prices quoted by other suppliers.

Occidental provided the Commission with detailed information concerning the terms of its sales contracts with each of the nine U.S. firms to which it had sold ammonia on a long-term contract basis. These contracts are for periods ranging from 1 to 10 years, with prices set for periods not exceeding 3 years. The terms of the contracts as reported by Occidental were verified by the Commission. In addition, Occidental provided information concerning its

understanding of the competitive situation at each of these accounts at the time the contracts were being negotiated. In one instance, Occidental reported the competitive bid was $10 per ton lower than it actually had been, and in another instance, the purchaser would not confirm the competitive situation reported by Occidental. The overall analysis of the competitive situation of Occidental's customers, however, indicated that Occidental's price was at approximately the same level as that of the low-end quotes of U.S. producers. Moreover, Occidental has one distinct advantage, other than prices, in selling to certain of its U.S. customers because it has built, is building, or is purchasing extensive storage facilities, that enable it to provide excellent service to these firms. As previously noted, Occidental's fixed escalation clauses are also perceived as being advantageous to its customers.

The nine U.S. firms which purchase U.S.S.R. ammonia from Occidental on a contract basis are listed below. As shown in the tabulation, six of these firms are U.S. producers of ammonia. All six of the producers have closed or idled U.S. ammonia-producing facilities since 1977. The annual capacity of the closed and idled facilities is more than 750,000 short tons. All of the closed and idled plants are relatively small, with the largest having an annual capacity of * * * short tons.

| Firm | Producer |
|---|---|
| * * * | *** |
| * * * | *** |
| * * * | *** |
| * * * | *** |
| * * * | *** |
| * * * | *** |
| * * * | *** |
| * * * | *** |
| * * * | *** |

# APPENDIX A

## THE COMMISSION'S NOTICE OF INVESTIGATION AND HEARING

[TA-406-5]

**Anhydrous Ammonia From the U.S.S.R.; Investigation and Hearing**

*Investigation instituted.* Following receipt of a petition on July 11, 1979, filed on behalf of twelve U.S. producers and one U.S. distributor of anhydrous ammonia, the U.S. International Trade Commission on July 18, 1979, instituted an investigation under section 403(a) of the Trade Act of 1974 (19 U.S.C. 2436) to determine, with respect to imports of anhydrous ammonia provided for in items 417.22 and 480.65 of the Tariff Schedules of the United States which are the products of the Union of Soviet Socialist Republics (U.S.S.R.), whether market disruption exists with respect to merchandise produced by a domestic industry. Section 406(e)(2) of the Trade Act defines market disruption to exist within a domestic industry if "imports of an article, like or directly competitive with an article produced by such domestic industry, are increasing rapidly, either absolutely or relatively, so as to be a significant cause of material injury, or threat thereof, to such domestic industry."

*Public hearing.* A public hearing in connection with this investigation will be held in Washington, D.C., at 10:00 a.m., e.d.t., on Wednesday, August 29, 1979. The hearing will be held in the Hearing Room, United States International Trade Commission Building, 701 E Street, NW., Washington, D.C. All parties will be given an opportunity to be present, to produce evidence, and to be heard at the hearing. Requests to appear at the hearing should be received in writing in the Office of the Secretary of the Commission not later than 5:00 p.m., Friday, August 24, 1979.

*Written statements.* Interested parties may submit statements in writing in lieu of, and in addition to, appearing at the public hearing. A signed original and nineteen true copies of such statements should be submitted. To be assured of their being given due consideration by the Commission, such statements should be received not later than Monday, September 10, 1979.

*Inspection of petition.* The petition filed in this case is available for public inspection at the Office of the Secretary, U.S. International Trade Commission and at the New York City office of the Commission located at 6 World Trade Center.

By order of the Commission.

Issued: July 19, 1979.

Kenneth R. Mason,

*Secretary.*

[FR Doc. 79-22991 Filed 7-24-79; 8:45 am]

BILLING CODE 7020-02-M

# APPENDIX B

# AMMONIA PRODUCTION PROCESS

A flow diagram of a typical ammonia plant's production process is presented in figure B1.

In a typical large ammonia plant, natural gas feedstock is compressed, if necessary, to 300 to 600 psi and desulfurized before it enters the primary reformer. Water, in the form of high-pressure steam, is added, and the mixture of steam and natural gas is passed through a series of tubes containing a nickel catalyst. In the primary reformer tubes, which are heated externally to supply energy for the reaction, the hydrocarbons in the natural gas react to form hydrogen, carbon monoxide, and carbon dioxide. The gas exit temperature from the primary reformer is about 1,500° F.

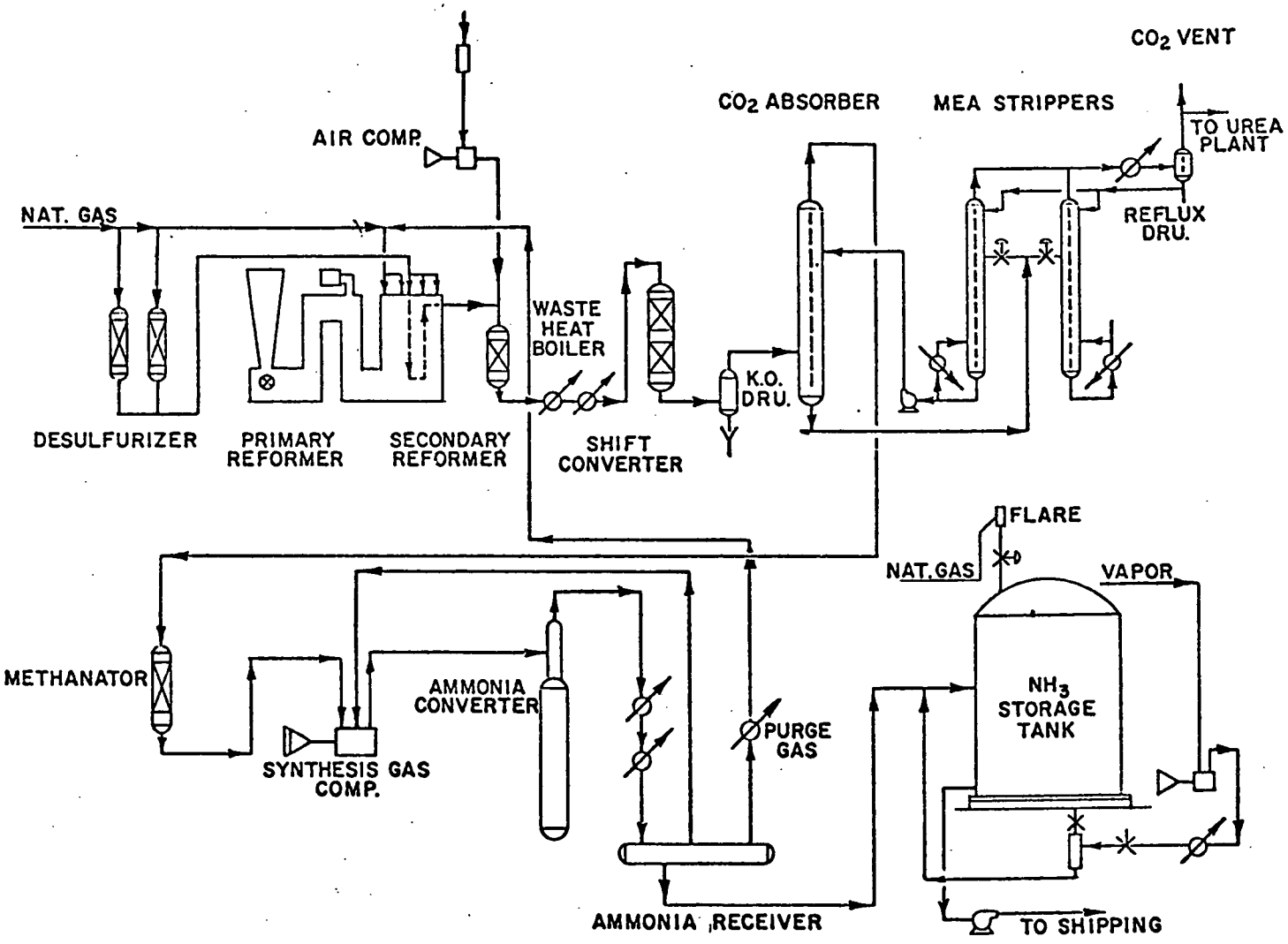
Next, the gaseous mixture enters a secondary reformer, which also contains a nickel catalyst. Compressed air is injected into the secondary reformer, and the oxygen in the air is completely consumed in exothermic reactions with hydrogen, carbon monoxide, and residual methane from the primary reformer. The gas from the secondary reformer then contains sufficient nitrogen (from the injected air) for the ammonia synthesis. Exit gas temperature from the secondary reformer is almost 2,000°F. The temperature of the outlet stream from the secondary reformer is reduced in a tubular waste heat boiler in which high-pressure steam is generated for use in the plant.

From the secondary reformer, the process gas enters a two-stage shift converter where the carbon monoxide is converted to carbon dioxide. Steam is added to a catalyst bed in the shift converter to effect the conversion of carbon monoxide to carbon dioxide. In the first stage, shift conversion is carried out over a chromium-promoted iron catalyst at a temperature of about 700° F. The second-stage shift conversion is carried out over a copper oxide, zinc oxide, aluminum oxide catalyst at a temperature of about 500° F.

The next step in the ammonia synthesis process is the removal of carbon dioxide from the gas stream, and a number of methods have been used to do this. One of the processes uses ethanolamines to scrub the synthesis gas. Ethanolamines have a high solubility for carbon dioxide, so one process consists of counter-current extraction in the absorber and subsequent regeneration of the ethanolamines in a reactivator by steam stripping and heating. The removed carbon dioxide is generally piped to a urea plant for use in urea synthesis or is vented to the atmosphere.

Before the synthesis gas is sent to the ammonia converter, the carbon dioxide and carbon monoxide content must be reduced to very low levels. One widely used process for doing this is the methanation process, in which carbon dioxide and carbon monoxide are reacted with hydrogen over a nickel catalyst to form methane and water. The remaining gas mixture now consists of the proper ratio of hydrogen and nitrogen and is ready for the ammonia synthesis

Figure B1.--Ammonia production process.




Source: Agrico Chemical Co.

reaction. The synthesis gas must be compressed before it enters the converter. The newer ammonia plants use centrifugal compressors driven by steam turbines, while older plants use reciprocating compressors driven by electrical motors. Reactor pressures of about 2,000 psi are common in 1,000-ton-per-day plants, while the optimum pressure in a 1,500-ton-per-day plant is about 3,500 psi, although some designers favor higher pressures, to about 4,500 psi. The ammonia synthesis is carried out at a temperature of about 1,000° F over an iron oxide catalyst promoted by aluminum oxide and potassium oxide, calcium oxide, or magnesium oxide. The reaction of hydrogen and nitrogen, in the presence of a catalyst, is highly exothermic, and means must be provided in the converter for dissipating the excess heat generated in the system. Effluent from the ammonia converter is heat-exchanged against fresh inlet gas, and a bypass line around this exchanger permits feed gas to be introduced into the converter without preheating and provides temperature control to the top catalyst bed.

Ammonia product is removed from the converter effluent by cooling the gas to a low enough temperature (-10° to 20° F) so that the ammonia condenses and is removed as liquid anhydrous ammonia, while the unreacted synthesis gas is recirculated back though the ammonia converter. Product ammonia is then piped as a liquid into refrigerated storage tanks or piped to shipping terminals for distribution.

# APPENDIX C

# U.S. PRODUCTION FACILITIES

WORLD FERTILIZER CAPACITY

ECONOMICS AND MARKETING RESEARCH SECTION
TENNESSEE VALLEY AUTHORITY
MUSCLE SHOALS, ALABAMA 35660

AMMONIA 07/27/79



CAPACITY DATA HAS BEEN COMPILED FROM PUBLISHED SOURCES, CONTACTS WITH INDUSTRY, AND OTHER SOURCES. TVA MAKES NO GUARANTEE OF COMPLETENESS OR ACCURACY OF THIS LIST. COMMENTS, CORRECTIONS, OR ADDITIONS WOULD BE APPRECIATED

## PLANT STATUS CODING

OPR - OPERATING UNIT

UCT - UNDER CONSTRUCTION

CTR - CONTRACTED

PLN - PLANNED

IDF - INDEFINITE OR INSUFFICIENT INFORMATION

EXP - EXPANSION OF EXISTING FACILITIES

CLS - CLOSED

IDL - IDLE

SLD - CHANGE IN OWNERSHIP

| COMPANY AND LOCATION | PLANT STATUS | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | IDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (THOUSAND SHORT TONS MATERIAL) | | | | | | | | | | | | | | | |
| USA | | | | | | | | | | | | | | | | | |
| AGRICO CHEM-WILLIAMS | | | | | | | | | | | | | | | | | |
| BLYTHEVILLE,ARK. | EXP | 340 | 340 | 390 | 390 | 407 | 407 | 407 | 407 | 407 | 407 | 407 | 407 | 407 | 407 | 407 | 407 |
| DONALD'VILLE,LA. | EXP | - | 340 | 400 | 400 | 434 | 434 | 468 | 468 | 468 | 468 | 468 | 468 | 468 | 468 | 468 | 468 |
| VERDIGRIS,OKLA. | OPR | - | - | - | - | 420 | 420 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 |
| AIR PRODUCTS & CHEM | | | | | | | | | | | | | | | | | |
| NEW ORLEANS,LA. | OPR | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| PACE JCT,FLA. | OPR | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| ALLIED CHEMICAL CORP | | | | | | | | | | | | | | | | | |
| LAPLATTE,NEB. | OPR | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 | 172 |
| | CLS | 28 | 28 | 28 | 28 | 28 | 28 | 28 | - | - | - | - | - | - | - | - | - |
| HOPEWELL,VA. | OPR | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| | CLS | 400 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| GEISMAR,LA. | OPR | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| SOUTH POINT,OH. | CLS | 80 | 80 | 80 | 80 | 80 | 80 | - | - | - | - | - | - | - | - | - | - |
| | CLS | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | - | - | - | - | - | - | - | - |
| | CLS | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | - | - | - | - | - | - | - | - |
| HELENA,ARKANSAS | OPR | - | - | - | - | - | - | - | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| AMERICAN CYANAMID | | | | | | | | | | | | | | | | | |
| FORTIER,LA. | OPR | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| | CLS | 54 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OPR | - | - | - | - | - | - | - | - | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| AMOCO OIL CO | | | | | | | | | | | | | | | | | |
| TEXAS CITY,TEX | IDL | 198 | 198 | 198 | 198 | 198 | 198 | - | - | - | - | - | - | - | - | - | - |
| | OPR | - | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 | 522 |
| APACHE POWDER CO. | | | | | | | | | | | | | | | | | |
| BENSON,ARIZONA | OPR | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| APPLE RIVER CHEMICAL | | | | | | | | | | | | | | | | | |
| EAST DUBUQUE,IL | SLD | 230 | 230 | 230 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ARKLA CHEM.CORP. | | | | | | | | | | | | | | | | | |
| HELENA,ARKANSAS | SLD | 210 | 210 | 210 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ATLAS CHEMICAL (TYLER) | | | | | | | | | | | | | | | | | |
| JOPLIN,MISSOURI | OPR | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 | 136 |
| BEKER INDUSTRIES | | | | | | | | | | | | | | | | | |
| CONDA,IDAHO | OPR | - | - | - | - | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| CARLSBAD,N.M. | IDL | - | - | - | - | - | 210 | 210 | - | - | - | - | - | - | - | - | - |
| BORDEN CHEM CO. | | | | | | | | | | | | | | | | | |
| GEISMAR,LA. | OPR | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| S.JACINTO,TX | CLS | 40 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CALUMET NITROGEN | | | | | | | | | | | | | | | | | |
| HAMMOND,INDIANA | CLS | 140 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CANEX, INC. | | | | | | | | | | | | | | | | | |
| BORGER,TEXAS | EXP | - | 340 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| CAR-REN | | | | | | | | | | | | | | | | | |
| COLUMBUS,MISS | OPR | - | - | - | - | - | - | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 |
| CF INDUSTRIES,INC. | | | | | | | | | | | | | | | | | |
| DONALD'VILLE,LA. | EXP | - | 340 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 |
| | EXP | - | 340 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 | 375 |
| | OPR | - | - | - | - | - | - | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 |
| FREMONT,NEB. | OPR | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| TERRE HAUTE,IND. | OPR | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

| COMPANY AND LOCATION | PLANT STATUS | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | IDF |
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| | | (THOUSAND SHORT TONS MATERIAL) | | | | | | | | | | | | | | | |
| USA | | | | | | | | | | | | | | | | | |
| CF INDUSTRIES,INC. | | | | | | | | | | | | | | | | | |
| TUNIS-AHOSKIE,NC | OPR | - | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| TYNER,TENN | OPR | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 | 170 |
| CHEMICALS,INC.--IMCC | | | | | | | | | | | | | | | | | |
| BARTOW,FLORIDA | CLS | 105 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CHEVRON CHEMICAL CO. | | | | | | | | | | | | | | | | | |
| PASCAGOULA,MISS. | OPR | - | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 |
| RICHMOND,CALIF. | IDL | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | - | - | - | - | - | - | - | - |
| FORT MADISON,IA. | OPR | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 |
| EL SEGUNDO,CALIF | EXP | - | - | 4 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| CITIES SERVICE | | | | | | | | | | | | | | | | | |
| LAKE CHARLES,LA. | CLS | 140 | 140 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| TAMPA,FLORIDA | SLD | 120 | 120 | 120 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| COLUMBIA NITROGEN | | | | | | | | | | | | | | | | | |
| AUGUSTA,GEORGIA | CLS | 122 | 122 | 122 | 122 | 122 | 122 | 122 | 122 | - | - | - | - | - | - | - | - |
| | OPR | - | - | - | - | - | - | - | - | 510 | 510 | 510 | 510 | 510 | 510 | 510 | 510 |
| DIAMOND SHAMROCK | | | | | | | | | | | | | | | | | |
| DEER PARK,TEXAS | CLS | 35 | 35 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| DUMAS,TEX. | OPR | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| DOW CHEMICAL CO. | | | | | | | | | | | | | | | | | |
| FREEPORT,TEXAS | OPR | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| MIDLAND,MICH. | CLS | 34 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PLAQUEMINE,LA. | CLS | 60 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PITTSBURG,CALIF. | CLS | 12 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| E.I.DUPONT DE NEMOUR | | | | | | | | | | | | | | | | | |
| BEAUMONT,TEXAS | OPR | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| BELLE,W.V. | CLS | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | - | - | - | - | - | - | - | - |
| | CLS | 275 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| GIBBSTOWN,N.J. | CLS | 75 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| VICTORIA,TEXAS | OPR | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| DUVAL CORP(OXY) | | | | | | | | | | | | | | | | | |
| HANFORD,CALIF | IDL | - | - | 21 | 21 | 21 | 21 | 21 | 21 | - | - | - | - | - | - | - | - |
| | IDL | - | - | - | - | 21 | 21 | 21 | 21 | - | - | - | - | - | - | - | - |
| EL PASO PRODUCTS | | | | | | | | | | | | | | | | | |
| ODESSA,TEXAS | OPR | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| | CLS | 20 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| FARMLAND INDUSTRIES | | | | | | | | | | | | | | | | | |
| FORT DODGE,IOWA | OPR | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| DODGE CITY, KANSAS | OPR | - | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| PLAINVIEW,TEXAS | CLS | 26 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| HASTINGS,NEB. | OPR | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| ENID,OKLAHOMA | OPR | - | - | - | - | 420 | 420 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 | 840 |
| LAWRENCE,KS. | CLS | 190 | 190 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OPR | - | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| POLLOCK, LA. | OPR | - | - | - | - | - | - | 420 | 420 | 420 | 420 | 420 | 420 | 420 | 420 | 420 | 420 |
| FELMONT OIL CORPORATION | | | | | | | | | | | | | | | | | |
| OLEAN,NEW YORK | OPR | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 |
| FIRST MISS CORP | | | | | | | | | | | | | | | | | |
| FORT MADISON,IA. | EXP | - | 340 | 340 | 340 | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| FIRST MISS CORP(AMPRO) | | | | | | | | | | | | | | | | | |
| DONALDSONVILLE, LA | PLN | - | - | - | - | - | - | - | - | - | 400 | 400 | 400 | 400 | 400 | 400 | 400 |

| COMPANY AND LOCATION | PLANT STATUS | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | IDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (THOUSAND SHORT TONS MATERIAL) | | | | | | | | | | | | | | | |
| USA | | | | | | | | | | | | | | | | | |
| FMC CORPORATION | | | | | | | | | | | | | | | | | |
| S.CHARLESTON,WV | OPR | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| GARDINIER | | | | | | | | | | | | | | | | | |
| TAMPA,FLA. | OPR | - | - | - | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| HELENA,ARKANSAS | SLD | - | - | - | 210 | 210 | 210 | 210 | - | - | - | - | - | - | - | - | - |
| GEORGIA NITROGEN | | | | | | | | | | | | | | | | | |
| GORDON,GEORGIA | SLD | - | - | - | - | - | 34 | - | - | - | - | - | - | - | - | - | - |
| GEORGIA PACIFIC | | | | | | | | | | | | | | | | | |
| PLAQUEMINE, LA. | OPR | - | - | - | - | - | - | - | - | 196 | 196 | 196 | 196 | 196 | 196 | 196 | 196 |
| GOODPASTURE,INC. | | | | | | | | | | | | | | | | | |
| DIMMITT,TEXAS | IDL | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | - | - | - | - | - | - | - | - |
| | OPR | - | - | - | - | - | 40 | 40 | 40 | 40 | 71 | 71 | 71 | 71 | 71 | 71 | 71 |
| GRACE AND EBASCO | | | | | | | | | | | | | | | | | |
| BASKETT, KENTUCKY | IDF | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 408 |
| GRACE-OKLA.NITROGEN | | | | | | | | | | | | | | | | | |
| WOODWARD,OKLA | OPR | - | - | - | - | - | - | - | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| W.R.GRACE & CO. | | | | | | | | | | | | | | | | | |
| WOODSTOCK,TENN | CLS | 275 | 275 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OPR | - | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| BIG SPRGS.,TEX | IDL | 100 | 100 | 100 | 100 | 100 | 100 | 100 | - | - | - | - | - | - | - | - | - |
| GREEN VALLEY CHEMICAL | | | | | | | | | | | | | | | | | |
| CRESTON,IOWA | OPR | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| GULF OIL CORPORATION | | | | | | | | | | | | | | | | | |
| PITTSBURG,KANSAS | CLS | 189 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| HENDERSON,KY. | CLS | 107 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| VICKSBURG,MISS. | CLS | 81 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| HAWKEYE CHEM(GETTY) | | | | | | | | | | | | | | | | | |
| CLINTON,IOWA | OPR | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 | 138 |
| HERCULES, INC. | | | | | | | | | | | | | | | | | |
| HERCULES,CALIF. | SLD | 70 | 70 | 70 | 70 | 70 | 70 | - | - | - | - | - | - | - | - | - | - |
| LOUISIANA,MO. | OPR | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| HOOKER CHEMICAL CO. | | | | | | | | | | | | | | | | | |
| TACOMA,WASH. | OPR | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| IMEX,INC. | | | | | | | | | | | | | | | | | |
| GORDON,GEORGIA | PLN | - | - | - | - | - | - | - | - | - | 34 | 34 | 34 | 34 | 34 | 34 | 34 |
| INTERNAT'L MINERALS | | | | | | | | | | | | | | | | | |
| STERLINGTON,LA. | CLS | 140 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | IDL | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | - | - | - | - | - | - | - | - |
| | IDL | - | - | - | - | - | 30 | 30 | 30 | - | - | - | - | - | - | - | - |
| | OPR | - | - | - | - | - | - | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| JUPITER CHEMICAL (TERRA | | | | | | | | | | | | | | | | | |
| LAKE CHARLES,LA. | OPR | - | - | - | - | - | - | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 |
| KAISER AG.CHEMICALS | | | | | | | | | | | | | | | | | |
| SAVANNAH,GA. | OPR | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | IDL | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | - | - | - | - | - | - | - | - |
| KETONA CHEMICAL CORP | | | | | | | | | | | | | | | | | |
| KETONA,ALABAMA | CLS | 51 | 51 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| MISS CHEMICAL CORP. | | | | | | | | | | | | | | | | | |
| YAZOO CITY,MISS. | EXP | 340 | 340 | 340 | 340 | 340 | 393 | 393 | 393 | 393 | 393 | 393 | 393 | 393 | 393 | 393 | 393 |
| | CLS | 113 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| COMPANY AND LOCATION | PLANT STATUS | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | IDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (THOUSAND SHORT TONS MATERIAL) | | | | | | | | | | | | | | | |
| USA | | | | | | | | | | | | | | | | | |
| MISS CHEMICAL CORP. | | | | | | | | | | | | | | | | | |
| PASCAGOULA,MISS. | OPR | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| MOBIL CHEMICAL CO. | | | | | | | | | | | | | | | | | |
| BEAUMONT,TEXAS | SLD | 300 | 300 | 300 | 300 | 300 | - | - | - | - | - | - | - | - | - | - | - |
| MONSANTO COMPANY | | | | | | | | | | | | | | | | | |
| EL DORADO,ARK. | CLS | 280 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| MUSCATINE,IOWA | CLS | 100 | 100 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| LULING,LA | OPR | 450 | 450 | 450 | 450 | 450 | 450 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 | 850 |
| NJ ZINC-GULF &WEST | | | | | | | | | | | | | | | | | |
| PALMERTON,PA. | OPR | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| NIPAK,INC.(ENSERCH) | | | | | | | | | | | | | | | | | |
| PRYOR,OKLA. | CLS | 105 | 105 | 105 | 105 | 105 | 105 | 105 | 105 | - | - | - | - | - | - | - | - |
| KERENS,TEXAS | CLS | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | - | - | - | - | - | - | - | - |
| | CLS | - | - | - | - | - | - | 19 | 19 | - | - | - | - | - | - | - | - |
| NITRIN,INC. | | | | | | | | | | | | | | | | | |
| CORDOVA,ILL. | CLS | 140 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| NORTHERN CHEM.IND. | | | | | | | | | | | | | | | | | |
| SEARSPORT,MAINE | CLS | 40 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| N-REN CORP(CHEROKEE N) | | | | | | | | | | | | | | | | | |
| PRYOR, OKLAHOMA | EXP | 55 | 55 | 55 | 55 | 55 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| N-REN CORP (FARM NAT) | | | | | | | | | | | | | | | | | |
| PLAINVIEW, TEXAS | CLS | - | - | - | 60 | 60 | 60 | - | - | - | - | - | - | - | - | - | - |
| N-REN CORP (ST.PAUL AM) | | | | | | | | | | | | | | | | | |
| PINE BEND, MINN | CLS | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| E.DUB.,IL(MAP-REN) | OPR | - | - | - | 238 | 238 | 238 | 238 | 238 | 238 | 238 | 238 | 238 | 238 | 238 | 238 | 238 |
| N-REN CORP | | | | | | | | | | | | | | | | | |
| CARLSBAD(HOBBS),NM | OPR | - | - | - | - | - | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 |
| OCCIDENTAL AG.CHEM. | | | | | | | | | | | | | | | | | |
| TAFT,LA. | OPR | - | - | - | - | - | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| LATHROP,CALIF. | IDL | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | - | - | - | - | - | - | - | - |
| | IDL | - | - | - | - | 40 | 40 | 40 | 40 | - | - | - | - | - | - | - | - |
| PLAINVIEW, TEXAS | IDL | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | - | - | - | - | - | - | - | - |
| OLIN CORPORATION | | | | | | | | | | | | | | | | | |
| LAKE CHARLES,LA. | OPR | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 | 490 |
| | CLS | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PENNSALT CHEMICALS | | | | | | | | | | | | | | | | | |
| WYANDOTTE,MICH. | CLS | 34 | 34 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PORTLAND,OREGON | OPR | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| PHILLIPS PAC CHEM | | | | | | | | | | | | | | | | | |
| KENNEWICK,WASH. | OPR | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 |
| PHILLIPS PETROLEUM | | | | | | | | | | | | | | | | | |
| BEATRICE,NEB. | OPR | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| ETTER,TEXAS | CLS | 210 | 210 | 210 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PASADENA,TEXAS | CLS | 230 | 230 | 230 | 230 | 230 | 230 | - | - | - | - | - | - | - | - | - | - |
| PPG INDUSTRIES | | | | | | | | | | | | | | | | | |
| NATRIUM,W.V. | OPR | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| REICHHOLD CHEMICALS | | | | | | | | | | | | | | | | | |
| ST.HELENS,OREGON | OPR | - | - | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| RESERVE OIL & GAS | | | | | | | | | | | | | | | | | |
| HANFORD,CALIF. | SLD | 21 | 21 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| COMPANY AND LOCATION | PLANT STATUS | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | IDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (THOUSAND SHORT TONS MATERIAL) | | | | | | | | | | | | | | | |
| USA | | | | | | | | | | | | | | | | | |
| ROHM & HAAS | | | | | | | | | | | | | | | | | |
| DEER PARK,TEXAS | CLS | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | - | - | - | - | - | - | - | - |
| SHELL CHEMICAL CO. | | | | | | | | | | | | | | | | | |
| ST.HELENS,OREGON | CLS | 90 | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PITTSBURG,CALIF. | CLS | 110 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| VENTURA,CALIF. | CLS | 105 | 105 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | CLS | 60 | 60 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| J.R.SIMPLOT | | | | | | | | | | | | | | | | | |
| POCATELLO,IDAHO | EXP | 54 | 54 | 54 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 | 108 |
| SOUTHWEST NITROCHEM | | | | | | | | | | | | | | | | | |
| CHANDLER,ARIZONA | SLD | 40 | 40 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| SUN OIL COMPANY | | | | | | | | | | | | | | | | | |
| MARCUS HOOK,PENN | CLS | 133 | 133 | 133 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| SWIFT CHEMICAL (ESMARK) | | | | | | | | | | | | | | | | | |
| BEAUMONT,TEXAS | IDL | - | - | - | - | - | 300 | 300 | 300 | - | - | - | - | - | - | - | - |
| TENNECO CHEMICAL | | | | | | | | | | | | | | | | | |
| HOUSTON,TEXAS | IDL | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | - | - | - | - | - | - | - | - |
| TENN.VALLEY AUTH. | | | | | | | | | | | | | | | | | |
| MUSCLE SHOALS,AL | CLS | 45 | 45 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OPR | - | - | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| TERRA CHEMICALS | | | | | | | | | | | | | | | | | |
| PORT NEAL,IOWA | OPR | - | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| TEXACO,INC. | | | | | | | | | | | | | | | | | |
| LOCKPORT,INDIANA | CLS | 77 | 77 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| TIPPERARY CORP. | | | | | | | | | | | | | | | | | |
| LOVINGTON,N.M. | CLS | - | - | - | - | 34 | 34 | 34 | - | - | - | - | - | - | - | - | - |
| | CLS | - | - | - | - | - | 66 | 66 | - | - | - | - | - | - | - | - | - |
| TRIAD CHEMICAL | | | | | | | | | | | | | | | | | |
| DONALDS'LLE,LA. | OPR | - | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 | 340 |
| UNION CARBIDE CO | | | | | | | | | | | | | | | | | |
| TEXAS CITY,TEXAS | CLS | 88 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| UNION OIL CO.(COLLIER) | | | | | | | | | | | | | | | | | |
| KENAI,ALASKA | OPR | - | 510 | 510 | 510 | 510 | 510 | 510 | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 | 1020 |
| BREA,CALIFORNIA | EXP | 260 | 260 | 260 | 280 | 280 | 280 | 280 | 280 | 280 | 280 | 280 | 280 | 280 | 280 | 280 | 280 |
| | CLS | 120 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U.S.IND.CHEMICALS | | | | | | | | | | | | | | | | | |
| TUSCOLA,ILL. | CLS | 80 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| USA PETROCHEM CORP | | | | | | | | | | | | | | | | | |
| VENTURA,CALIFORNIA | CLS | - | - | - | - | 60 | 60 | 60 | 60 | - | - | - | - | - | - | - | - |
| U.S.S.AGRI-CHEMICALS | | | | | | | | | | | | | | | | | |
| CLAIRTON,PA. | OPR | - | - | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 |
| CRYSTAL CITY,MO. | CLS | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CHEROKEE,ALABAMA | OPR | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 | 177 |
| GENEVA,UTAH | OPR | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| VALLEY NIT.PRODUCERS | | | | | | | | | | | | | | | | | |
| EL CENTRO,CALIF. | OPR | - | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 | 210 |
| HELM,CALIFORNIA | CLS | 176 | 176 | 176 | 176 | 176 | 176 | 176 | 176 | - | - | - | - | - | - | - | - |
| CHANDLER,ARIZ. | IDL | - | - | - | 33 | 33 | 33 | 33 | 33 | - | - | - | - | - | - | - | - |
| HERCULES,CALIFORNI | IDL | - | - | - | - | - | - | 70 | 70 | - | - | - | - | - | - | - | - |
| VISTRON CORPORATION | | | | | | | | | | | | | | | | | |
| LIMA,OHIO | CLS | 136 | 136 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| COMPANY AND LOCATION | PLANT STATUS | 1967 | 1970 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | IDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (THOUSAND SHORT TONS MATERIAL) | | | | | | | | | | | | | | | |
| USA | | | | | | | | | | | | | | | | | |
| VISTRON CORPORATION | | | | | | | | | | | | | | | | | |
| LIMA,OHIO | EXP | - | - | 450 | 450 | 450 | 450 | 475 | 475 | 475 | 475 | 475 | 475 | 475 | 475 | 475 | 475 |
| VULCAN MATERIALS | | | | | | | | | | | | | | | | | |
| WICHITA,KANSAS | CLS | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | - | - | - | - | - | - | - | - |
| | CLS | - | - | - | - | - | 12 | 12 | 12 | - | - | - | - | - | - | - | - |
| WYCON CHEMICAL CO. | | | | | | | | | | | | | | | | | |
| CHEYENNE,WYO. | OPR | 33 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 | 167 |
| TOTAL USA | | 13306 | 16887 | 17372 | 17220 | 18391 | 19033 | 21555 | 22027 | 20367 | 20832 | 20832 | 20832 | 20832 | 20832 | 20832 | 21240 |
| CANADA | | | | | | | | | | | | | | | | | |
| BEKER INDUSTRIES | | | | | | | | | | | | | | | | | |
| SARNIA, ONTARIO | IDL | - | - | - | - | 170 | 170 | 170 | - | - | - | - | - | - | - | - | - |
| CANADIAN IND.,LTD. | | | | | | | | | | | | | | | | | |
| COURTRIGHT,ONT. | EXP | 340 | 340 | 340 | 340 | 340 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| MILLHAVEN,ONT. | CLS | 66 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CANADIAN FERT.LTD. | | | | | | | | | | | | | | | | | |
| MEDICINE HAT,ALT | OPR | - | - | - | - | - | - | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 |
| COMINCO,LTD. | | | | | | | | | | | | | | | | | |
| CALGARY,ALTA. | OPR | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| TRAIL,B.C. | OPR | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | CLS | 85 | 85 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CARSELAND,ALTA. | OPR | - | - | - | - | - | - | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| CYANAMID OF CANADA | | | | | | | | | | | | | | | | | |
| WELLAND,ONT. | OPR | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| DOW CHEM.OF CANADA | | | | | | | | | | | | | | | | | |
| SARNIA,ONTARIO | CLS | 140 | 140 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ESSO CHEMICALS | | | | | | | | | | | | | | | | | |
| REDWATER,ALBERTA | EXP | - | 210 | 210 | 210 | 210 | 210 | 210 | 260 | 260 | 260 | 260 | 260 | 260 | 260 | 260 | 260 |
| GENSTAR CHEMICAL | | | | | | | | | | | | | | | | | |
| MAITLAND,ONTARIO | CLS | 37 | 37 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | OPR | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 | 88 |
| N.W. NITRO CHEMICALS | | | | | | | | | | | | | | | | | |
| MEDICINE HAT,ALTA | SLD | 66 | 66 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| SHERRITT-GORDON MINE | | | | | | | | | | | | | | | | | |
| FT. SASKATCH,ALT | OPR | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| J.R. SIMPLOT CO. | | | | | | | | | | | | | | | | | |
| BRANDON,MANITOBA | OPR | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 |
| WESTERN COOP FERTILIZER | | | | | | | | | | | | | | | | | |
| CALGARY,ALBERTA | OPR | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| MEDICINE HAT,ALTA. | OPR | - | - | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| TOTAL CANADA | | 1607 | 1751 | 1489 | 1489 | 1659 | 1719 | 2919 | 2799 | 2799 | 2799 | 2799 | 2799 | 2799 | 2799 | 2799 | 2799 |
| N AMERICA | | 14913 | | 18861 | | 20050 | | 24474 | | 23166 | | 23631 | | 23631 | | 23631 | |
| | | | 18638 | | 18709 | | 20752 | | 24826 | | 23631 | | 23631 | | 23631 | | 24039 |

# APPENDIX D

## ANALYSIS OF THE OCCIDENTAL-U.S.S.R. AGREEMENTS BY THE GENERAL COUNSEL'S OFFICE

## The Occidental-U.S.S.R. Ammonia Agreements

Ammonia imports from the Soviet Union by Occidental are pursuant to a series of bilateral agreements between Occidental Petroleum Corp. and the Ministry of Foreign Trade of the U.S.S.R. The agreements are of two types--the so-called "technical agreements," which require Occidental to assist the Soviets in building and financing about 900 million dollars' worth of ammonia plants and related facilities, and the "fertilizer agreements," which cover the intended sale by Occidental to the U.S.S.R. of superphosphoric acid and the sale by the U.S.S.R. to Occidental of ammonia, urea, and potash. The agreements, which cover the period 1978-97, collectively constitute a form of barter arrangement, since the parties intend the Soviet imports of superphosphoric acid to equal in value the U.S. imports of ammonia, urea, and potash. The U.S. imports would include 900 million dollars' worth of ammonia, the proceeds of which would be used to repay the $900 million in loans (including interest) borrowed by the Soviets to build their ammonia plants and facilities.

The agreements are discussed in further detail below. The discussion will concentrate on the fertilizer agreements.

### The parties involved

Occidental Petroleum is a California corporation headquartered in Los Angeles. It is a large multinational corporation involved primarily in extractive industries and in the refinement and marketing of extracted products, i.e., in the exploration for and production of oil and gas, the mining of coal and phosphate, and the manufacture of numerous chemical products, including chemical fertilizers made from ammonia and phosphate. At the close of 1978, Occidental had 79 subsidiaries, including 21 foreign subsidiaries, all but three of which were directly or indirectly wholly owned by Occidental. In 1978, Occidental had total sales of $6.25 billion and assets of $4.6 billion.

Occidental's fertilizer operations, including the importation and marketing of Soviet ammonia, urea, and potash, and the mining, refining, and marketing of phosphate and phosphate fertilizers, are handled by its Hooker Chemical Corp. subsidiary and Hooker's subsidiaries (Hooker has 30 subsidiaries and sub-subsidiaries).

The Ministry of Foreign Trade of the U.S.S.R. is an agency of the Soviet Government.

### The agreements

In general.--Commencing in April 1973, Occidental entered into a series of agreements with the U.S.S.R. which, as amended from time to time, provide for (1) the furnishing by Occidental to the U.S.S.R. of technology, design, construction supervision services, and equipment for ammonia and superphosphoric acid port storage and ammonia pipeline facilities presently under

construction by the U.S.S.R., and (2) the sale by Occidental to the U.S.S.R. of superphosphoric acid and the purchase by Occidental from the U.S.S.R. of ammonia, urea, and potash during the 20-year period 1978-97 in certain specified quantities. The first group of agreements are generally referred to as the "technical agreements" and the second group as the "fertilizer agreements."

The technical agreements have now, for the most part, been complied with. Occidental has substantially discharged its responsibilities thereunder with respect to technology, design, and equipment delivery, and the construction supervision services are expected to be completed in 1980. The technical agreements provide for gross payments to Occidental of $165 million in the aggregate, and Occidental has stated that the technical agreements have been profitable in each year since 1974.

The first shipments under the fertilizer agreements took place in 1978. The agreements call for Occidental to ship to the U.S.S.R. in the years 1980-97 1 million metric tons 1/ annually of superphosphoric acid, and to ship lesser quantities in 1978 and 1979 (10,000 and 480,000 metric tons, respectively). Occidental is to purchase from the U.S.S.R. (1) pursuant to a 20-year agreement, 1.5 million metric tons of ammonia, 1.0 million metric tons of urea, and 1.0 million metric tons of potash during each of the years 1980-97, and lesser amounts in 1978 and 1979 (only urea was to have been purchased in 1978 under the 20-year agreement), and (2) pursuant to a 10-year agreement an additional 350,000 metric tons of ammonia in 1978, 510,000 metric tons in 1979, 350,000 metric tons annually in 1980 and 1981, and 600,000 metric tons annually in 1982-97. The respective quantities are set forth more clearly in the following tabulation:

(Thousands of metric tons)

| Item | 1978 | 1979 | Each of the years 1980 and 1981 | Each of the years 1982-87 | Each of the years 1988-97 |
|---|---|---|---|---|---|
| Sales to U.S.S.R.: | | | | | |
| Superphosphoric acid | 10 | 480 | 1,000 | 1,000 | 1,000 |
| Purchases from U.S.S.R.: | | | | | |
| Ammonia pursuant to a 10-year agreement | 350 | 510 | 350 | 600 | - |
| Pursuant to a 20-year agreement | - | 440 | 1,500 | 1,500 | 1,500 |
| Total ammonia | 350 | 950 | 1,850 | 2,100 | 1,500 |
| Urea | 23 | 473 | 1,000 | 1,000 | 1,000 |
| Potash | - | 830 | 1,000 | 1,000 | 1,000 |

Source: Form 10-K of Occidental Petroleum Corp. supplied to the Securities and Exchange Commission for the fiscal year ended Dec. 31, 1978, at p. 28.

1/ All quantities specified in the agreements were in metric tons which are equivalent to 1.1 short tons. All data reported in the report are in terms of short tons.

Occidental has shipped only a minor amount of its U.S.S.R. urea to the United States and has not yet shipped any potash to the United States. Occidental has announced that it intends to sell most of the U.S.S.R. urea and potash in foreign markets.

The fertilizer agreements are constructed with the idea that the value of the superphosphoric acid sold by Occidental to the U.S.S.R. over the entire 20-year period should not exceed the value of Occidental's purchases of ammonia, urea, and potash during the period. The agreements provide that, at the request of one of the parties, they are to meet from time to time in order to work out an arrangement for meeting this objective.

Occidental's purchases of up to 600,000 metric tons of ammonia annually under the 10-year agreement, i.e., through 1987, are for the purpose of enabling the U.S.S.R. to repay, with the sales proceeds, $900 million (including interest) borrowed by the U.S.S.R. from the Export-Import Bank of the United States and a group of U.S. and foreign banks to construct the various fertilizer facilities in the U.S.S.R., including the port storage and pipeline facilities to which the technical agreements relate. Occidental is permitted to purchase up to an additional 400,000 metric tons of ammonia annually under the 10-year agreement in order to satisfy this objective.

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* * * * * * *

| Year | Quantity (metric tons) | Price c.i.f. |
|---|---|---|
| 1979---------- | *** | *** |
| 1980---------- | *** | *** |
| 1981---------- | *** | *** |

* * * * * * *

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* * * * * * *

* * * * * * *

| Year | Quantities 1/ (metric tons) | Price f.o.b. Port of * * * |
|---|---|---|
| 1979---------- | *** | *** |
| 1980---------- | *** | *** |
| 1981---------- | *** | *** |

1/ Figures are approximate.

* * * * * * *

James J. Galvin, president of the Agricultural Products Group of Hooker Chemical Corp., a subsidiary of Occidental, testified at the Commission's hearing that Occidental does not have long-term fixed price agreements with the U.S.S.R. 1/ He said that Occidental, prior to negotiating a price with the Soviets, first negotiates with its customers, obtains letters of intent from them, and then with such letters of intent negotiates prices and quantities with the Soviets. 2/ He said that none of Occidental's customer contracts run for periods longer than the particular contract with the U.S.S.R. 3/

1/ Transcript of the hearing, pp. 532-33.
2/ Id., p. 533.
3/ Id., pp. 533-34.

Library Cataloging Data

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Report to the President on investigation no. TA-406-5, under section 406 of the Trade act of 1974. Washington, 1979.

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