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

Report to the President on Investigation No. TA-406-6, Under Section 406 of the Trade Act of 1974

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UNITED STATES INTERNATIONAL TRADE COMMISSION

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Note.--The whole of the Commission's report to the President may not be made pbulic 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
April 11, 1980

To the President:

In accordance with section 406(a) of the Trade Act of 1974 (19 U.S.C. 2436(a)), 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-406-6) 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 is 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 on January 28, 1980, following the receipt on January 18, 1980, of a request from the President to institute an investigation. The President made the request pursuant to section 406(c) of the Trade Act, having found under that section that there are reasonable grounds to believe that market disruption exists with respect to such anhydrous ammonia the product of the U.S.S.R. The President also found, pursuant to section 406(c), that emergency action was necessary and took action, under sections 202 and 203 of the Trade Act, limiting the quantity of such anhydrous ammonia the product of the U.S.S.R. which may enter the United States during the period January 24, 1980, to January 24, 1981, to 1,000,000 short tons (Proclamation 4714 of January 18, 1980, published in the Federal Register of January 21, 1980 (45 FR 3875)). The Commission held a public hearing on this matter in Washington, D.C. on March 3, 1980. Notice of the institution of the investigation and of the public hearing was published in the Federal Register of February 4, 1980 (45 FR 7645).

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.

DETERMINATION OF THE COMMISSION

On the basis of the investigation, the Commission (Chairman Bedell and Commissioner Moore dissenting) determines, with respect to imports of anyhdrous ammonia the product of the U.S.S.R., provided for in items 417.22 and 480.65 of the TSUS, that market disruption does not exist with respect to an article produced by a domestic industry.

STATEMENT OF REASONS OF COMMISSIONER PAULA STERN
AND VICE-CHAIRMAN BILL ALBERGER

On the basis of the 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.).

Background

The U. S. International Trade Commission (Commission) conducted the present investigation at the request of the President. On January 18, 1980, the President announced that pursuant to Section 406(c) of the Trade Act, he found "reasonable grounds to believe" that market disruption existed with respect to imports of Soviet ammonia. 2/ In conjunction with this finding, the President imposed an interim quota limiting imports of ammonia from the U.S.S.R. to 1 million short tons for the year beginning January 24, 1980. This emergency action, taken as if the Commission had made an affirmative determination, will cease to apply on the day on which the present negative determination is submitted to the President. 3/

This is the second Section 406 investigation which the Commission has conducted within the last half year of imports on Soviet ammonia. On October 11, 1979, the Commission found by a three-to-two majority that market disruption existed. We strongly dissented from that determination. 4/

1/ 19 U.S.C. 2436.
2/ Presidential Proclamation No. 4714, 45 F.R. 3875 (1980).
3/ 19 U.S.C. 2436(c)(1).
4/ United States International Trade Commission, Anhydrous Ammonia from the U.S.S.R.: Report to the President on Investigation No. TA-406-5 . . ., USITC Publication 1006, October 1979 (Report).

On December 11, 1979, the President announced that the provision of the relief recommended by the majority was "not in the national economic interest" and, therefore, he was not proclaiming such relief. 5/

In initiating the second investigation on January 18, 1980, the President stated that "recent events have altered the international economic conditions" under which he had acted on December 11, 1979.

The present determination by the Commission has been made on a de novo basis and takes into account all the information before the Commission. In the previous investigation, data were not available beyond the first half of 1979. The present investigation benefits from data for the full year of 1979 as well as information and predictions based on changes in international economic conditions. We have carefully reviewed our previous determination and reconsidered our findings and have reached the same conclusion: market disruption does not exist with respect to imports of anhydrous ammonia from the U.S.S.R.

The product and the domestic industry

We found no new issues regarding the product and the domestic industry. In 1979, ammonia was produced in the United States by 51 companies operating at 79 locations throughout the country. The petitioners in the previous investigation accounted for 48 percent of domestic production in 1979. Two of them were also major importers from their facilities in Canada and Trinidad.

5/ 44 F.R. 71809 (1979).

Rapidly increasing imports 6/

Occidental Petroleum Corp. ships virtually all of its imports of Soviet ammonia to 10 customers in the United States. These customers purchase a fixed amount each year over the length of their contracts, running from 1 to 10 years. U.S. imports from the U.S.S.R. reached 777,000 short tons in 1979 (less than the 1 million short tons anticipated during the last investigation) and, in the absence of restrictions, are expected to increase to 1.5 million tons in 1980 and 2 million tons in 1981.

Imports from other important foreign sources changed slightly in volume from 1978 to 1979. Imports from Canada increased 16,000 short tons to 533,000 in 1979; imports from Trinidad increased 56,000 short tons to 332,000 in 1979; and imports from Mexico fell 40,000 short tons to 309,000 in 1979. The ratio of all imports to total consumption climbed from 8 percent in 1978 to 10 percent in 1979. The Soviet Union has become the largest single foreign supplier of this product to the United States.

During the last 2 years, Soviet ammonia increased its share of the domestic market from 2 percent in 1978 to 4 percent in 1979, one point below the market share expected for 1979 at the time we made our previous determination. Publicly announced targets for imports from the U.S.S.R. have not yet been met in any year. As we indicated in the previous investigation, these imports minimally meet the standard for rapidly increasing imports of section 406.

6/ We find the framework and substance of our joint views in the previous case, No. TA-406-5, remain valid and have not repeated ourselves here. For the sake of brevity, we have merely updated previous data and noted changed conditions. We incorporate our previous opinion by reference. See "Statement of Reasons for the Determination of Commissioners Paula Stern and Bill Alberger" in Report, pp. 13-43.

Material injury

We have examined anew all the relevant economic indicators through 1979 to assess the present health of the domestic industry. Our examination shows that the ammonia industry in the United States--which had been experiencing difficulties since mid-1975, well before Soviet imports began to enter the United States--was rapidly recovering at a time when Soviet imports were increasing to their highest levels. There are many indications that 1980 will be a fine year for this industry.

In 1979 capacity utilization rose to 89 percent, 3 percentage points higher than reported in the first half of 1979 and a full 12 points higher than in 1978. With new plants coming on stream and the closure of outmoded ones, the larger, newer, more efficient plants now account for 56 percent of total capacity. Capacity for 1980 is greater than in 1979.

The dramatic decline in profitability of domestic ammonia operations from 1976 to 1978 has reversed itself. The ratio of net operating profit to total sales rose from 1 percent in 1978 to 5 percent in 1979. Because previous data showed a net loss for the first half of 1979, we know that the second half of 1979 must have been quite profitable to pull the full year profit figure up to 5 percent.

Employment declined 10 percent in 1979 compared with that in 1978, but is up slightly from the first half year of 1979. Since U. S. production increased more than one million tons to a recordbreaking 18.1 million short tons in 1979, any decline in employment in this industry reflects rising productivity, made possible by newer, more efficient facilities. Shipments reached record high levels in 1979, and inventories continued to decline through all of 1979.

In the previous investigation, we found material injury that resulted from causes other than imports from the U.S.S.R. In this case, however, we do not believe material injury exists, but we will carry our discussion through the causation test for the sake of clarifying all issues.

Threat of material injury

We have already observed that during the last half of 1979 the domestic ammonia industry exceeded on virtually all counts the expectations we formed in the previous case. (These expectations were based on developments clearly underway in the first half and the best available predictions.) The strong recovery that was predicted is well underway; Occidental has not inaugurated a policy of underselling domestic ammonia; prices have increased rapidly to increasingly profitable levels.

It is on the question of threat that the altered international economic conditions cited by the President have direct bearing. Barely two weeks after the President rejected the remedy that the then Commission majority had recommended in the previous case, Soviet troops invaded Afghanistan. In partial response, the President made two decisions which altered the environment of the ammonia market. On January 4, 1980, he announced that the United States would limit grain exports to the U.S.S.R., and on February 25, 1980, he ordered an embargo on the exportation of domestic phosphates to the U.S.S.R. Because production of the crops in question, wheat and corn, accounts for a significant portion of domestic fertilizer demand, and because Occidental in effect pays for imported Soviet ammonia with phosphate exports (e.g., superphosphoric acid), both these events had a significant bearing on the domestic ammonia industry.

The impact of these two announcements on the ammonia industry could have been direct and/or indirect. Direct effects are those which operate in the first instance in the ammonia market itself. Indirect effects include those which operate in the first instance in other markets linked in some fashion to the ammonia industry. We here considered both the direct effects of the phosphate embargo as it relates to the U.S.S.R.'s willingness to supply ammonia and the indirect effects of the grain embargo.

The U.S. Government embargo on phosphate exports has not, according to Occidental, affected the ability or desire of the Soviet Union to meet its delivery commitments for ammonia. Nor has a private boycott of all U.S.S.R. vessels and cargo initiated by the International Longshoreman's Association (ILA) on January 9, 1980. On February 1, 1980, ILA longshoremen in Jacksonville, Florida, obeyed a court injunction against the boycott, and Occidental reports that no phosphate shipments or ammonia deliveries have been delayed. 7/ Therefore, we have to assume that ammonia imports from the U.S.S.R. will continue at approximately the levels projected, while recognizing that they have consistently fallen short of projected levels.

As for the indirect effects of the grain embargo, nearly 17 million short tons of wheat and corn contracted to be sold to the U.S.S.R. before October 1980 will not be shipped to the U.S.S.R. To offset the impact of this embargo on the U.S. agricultural sector, the Government has offered to assume the contractual obligations for approximately 4 million short tons of wheat and 11 million short tons of corn. The Department of Agriculture (Agriculture) will take delivery of all of the wheat and place it in reserve to be used only for

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7/ Accompanying staff report, pp. A-27 and A-28.

food assistance programs. The balance between supply and demand for wheat thus will not change as a result of the embargo. For corn, Agriculture has revised the farmer-owned reserve system to eliminate most of the embargoed corn from the market. 8/

Further offsetting developments in the grain markets include the purchase by Mexico of 1 million short tons of corn originally destined for the U.S.S.R. and poorer-than-expected harvests in Brazil, which will force it to purchase increased quantities of grain. At present, corn export projections for 1980 by Agriculture are larger than those made in December 1979, in spite of the embargo. 9/

The best measure of the overall impact of all these phenomena on the total demand for corn can be found in an analysis of corn prices. In December 1979, Agriculture forecast that farmers would receive an average of $2.25 to $2.55 per bushel of corn in the 1979/80 crop year. In March 1980, Agriculture projected that such prices would be between $2.30 and $2.50. The range has narrowed, but the average is unchanged despite the embargo.

On February 29, 1980, the Secretary of Agriculture stated that "farm output and prices are near levels expected before the suspension." 10/ Agriculture has accordingly dropped plans for a paid land-diversion program for the 1980 crops of wheat and corn. A post-embargo survey of farmers conducted in January 1980 indicated that 5 to 6 percent more acres of corn will be cultivated in 1980 than in 1979. 11/ Forecasts by Chase Econometrics support those of Agriculture. 12/

8/ See accompanying staff report, p. A-25 for details.
9/ Accompanying staff report, p. A-26.
10/ Ibid.
11/ Ibid.
12/ Chase Econometrics, Fertilizer Model Forecasts, Feb. 18, 1980, pp. 11-14.

Thus, the derived demand for ammonia in wheat and corn cultivation will not be negatively impacted. In fact, demand for ammonia in 1980 should grow another 4 percent at a time when its price has already rapidly increased. With all indicators showing positive trends for the industry during a period of increasing imports from the U.S.S.R., there is clearly no threat of material injury to the domestic producers of anhydrous ammonia.

Significant cause

We have not been able to find any credible shred of evidence that would link Soviet imports to any material injury that the domestic industry has experienced or may continue to experience.

Our previous examination showed that the significant causes of the injury the industry had encountered were to be found in increasing costs combined with overcapacity, which had led to fierce competition, declining prices, and the closure of older, less efficient plants. By the end of 1979, 8.0 million short tons of new capacity, representing 46 percent of total U.S. capacity in 1974, had been added since 1974, most of it coming on stream during 1977 and 1978. The rapid increase in natural gas feedstock prices continued in 1979 as the average price paid by U.S. ammonia producers reached $1.55 per 1,000 cubic feet by yearend, 22 percent higher than in 1978.

Since the last investigation, one additional plant has closed. However, confirming the closure pattern observed in the previous investigation, it was one of the older, smaller, reciprocating type using outmoded pre-1963 technology. Moreover, one new plant is opening this spring; it is a modern giant with a capacity of 400,000 short tons per year.

Previously, we were unable to link Occidental's sales of Soviet ammonia to any of the problems then encountered by the U.S. industry . Since then, Occidental Petroleum has added one new customer. As in most of the cases of the nine customers previously analyzed, there are good indications that price was not the main reason that this customer selected Occidental. We remain convinced that most, if not all, of Occidental's customers would have gone offshore for their ammonia purchases in the absence of Soviet ammonia from the U.S. market. Other foreign producers would have little trouble meeting the demand of Occidental's customers. The present investigation revealed plans for new plants in Canada and Trinidad 13/. Also, any Soviet ammonia excluded from the United States could be diverted to other markets. There it could directly displace U.S. exports or stimulate other offshore suppliers to fill the void created in the U.S. market by the imposition of quotas on Soviet ammonia.

There is no evidence of price suppression or depression due to the subject imports. Coinciding with the period of greatest expansion of imports from the U.S.S.R., gulf coast spot prices rose by 109 percent, from $78 in July 1978 to $163 in February 1980. 14/ This increase far exceeds the rise already noted in the price of natural gas, which accounts for two-thirds of the cost of producing ammonia. The present spot price for ammonia, if it persists, may provide the basis for the rapid return of this industry to historic levels of high profitability in 1980. The industry experienced

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13/ Staff Report, p. A-34.

14/ The announcement of the ILA boycott may have had some effect on January spot prices, but with the success of the court injunction of Feb. 1, 1980, any such effect should have quickly vanished.

difficulties prior to the introduction of imports from the U.S.S.R. and has recovered during the period of greatest market penetration by the subject imports. Clearly these imports are not a cause of injury to the domestic producers of ammonia.

Conclusion

We have had a rare opportunity in the present case to reexamine the issues, facts, and predictions of a previous determination in the light of additional data and changed international economic conditions. We have found that the positive trends and predictions we observed in our previous Statement of Reasons continued, and generally exceeded our expectations for the last half of 1979. We have again found that there are no indications whatsoever that imports of Soviet ammonia are a significant cause of material injury or the threat thereof to the domestic industry. The changed international circumstances have not brought about market disruption within the meaning of Section 406 of the Trade Act of 1974.

Opinion of Commissioner Michael Calhoun

On the basis of the record developed in the course of this investigation, I determine that market disruption as defined under Section 406 of the Trade Act of 1974 (hereinafter referred to as the Trade Act)[1] does not exist with respect to imports of anhydrous ammonia from the Union of Soviet Socialist Republics.

Discussion

The Product and the Domestic Industry

The nature of the product and the relevant domestic industry under investigation here were adequately described in the Views of Vice Chairman Alberger and Commissioner Stern in the investigation which was the predecessor to this one.[2] I shall treat the matters of the nature of product and the relevant industry in question by way of updating my colleagues' treatment in that investigation.

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

In 1979, ammonia was produced in the United States by 51 companies operating at 79 locations throughout the country. These producers vary in

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1/ 19 U.S.C. §2436.

2/ Anhydrous Ammonia From The U.S.S.R.: Report to the President on Investigation No. TA-406-5, . . ., USITC Publication 1006, October 1979, pp. 13-16. [Hereinafter Ammonia Report]

size from small chemical fertilizer producers to large, integrated, multinational oil and chemical corporations, with farmers' cooperatives being among the largest producers.

Ammonia producing plants may be classified into three general categories, using size and by 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 short tons yearly. The intermediate category 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 were petitioners in the previous ammonia investigation accounted for 48 percent of domestic production in 1979. Two of the petitioners, CF Industries, Incorporated, and W.R. Grace and Company, are also major importers by virtue of their ownership of foreign facilities.

Imports

A. The Occidental Petroleum Company--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

(hereinafter referred to as 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.[1] In exchange, Occidental originally committed itself under an exclusive licensing agreement to purchase and market approximately 2.3 million short tons of U.S.S.R. produced ammonia each year from 1978 through 1987 and 1.6 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 for U.S. consumption to ten customers in the United States. These customers have agreed to purchase a fixed amount each year over the length of their contracts which run from one to ten years. The purchases are made on a fixed-price basis with an automatic escalator clause. In most of the existing contracts the escalator is an amount of three to six percent per year applicable to shipments in the second and third years of the contract. Prices for subsequent years are subject to further negotiations.

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 and to 777 thousand short tons in 1979.[3] Without import restrictions, such imports are expected to increase to about 1.5 million short tons in 1980 and 2 million short tons in 1981.

1/ On February 25, 1980, the President ordered an embargo upon the exportation of U.S. origin phosphates to the U.S.S.R.

2/ The quantity of ammonia to be purchased has been subsequently revised. Appendix G of the Staff Report gives a detailed analysis of the agreements.

3/ Occidental Petroleum figures indicate that 832 thousand tons were imported in 1979.

B. Other Foreign Sources

The increasing trend in imports from the U.S.S.R. follows the general trend of increasing imports from some other countries. Imports from Canada increased irregularly from 93 thousand short tons in 1974 to 533 thousand short tons in 1979. Imports from Mexico similarly increased from 2 thousand short tons in 1974 to 309 thousand short tons in 1979. While imports from all countries quadrupled from 1974 to 1979, the ratio of all imports to apparent U.S. consumption was only 10 percent in 1979.

Statutory Framework

This investigation was conducted at the request of the President under Section 406(c) of the Trade Act[1] which, in turn, requires an investigation on the same basis as that provided for under Section 406(a).[2] Section 406(a)(1) directs that the Commission:

> [P]romptly make an investigation to determine, with respect to 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]

The term "communist country" is defined under Section 406(e)(7) to mean "any country dominated or controlled by Communism."[4] The term "market disruption" is defined under Section 406(e)(2) 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.

1/ 19 U.S.C. 2436(c)

2/ 19 U.S.C. 2436(a)

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

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

Section 406(a)(2) directs the Commission to notify directly concerned agencies, to hold public hearings, and also permits the Commission some flexibility in defining domestic industry.[1]

Communist Countries; Like and Directly Competitive Products

With respect to the requirements under Section 406(a)(1) that the imports under investigation must be products of a "communist country" and under Section 406(e)(2) that such imports must be "like or directly competitive with a domestically produced article", I embrace the views of my colleagues Vice Chairman Alberger and Commissioner Stern in their treatment of these two matters in the previous investigation of imports of Soviet ammonia.[2]

Market Disruption

But for the matter of whether an article is "like or directly competitive", reaching a determination on the question of market disruption under Section 406(a)(1) is obstructed by an overwhelming ambiguity as to the meaning of market disruption under Section 406(e)(2). The heart of the problem lies in the fact that the definition of market disruption under present law was not reported by either the House or the Senate nor was it part of the bills passed by either the House Committee on Ways and Means or the Senate Committee on Finance.

The policy underlying what is now Section 406, as expressed by both Houses of Congress, is to fashion an effective remedy for domestic industries

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1/ 19 U.S.C. 2436(a)(2)

2/ Anhydrous Ammonia From the U.S.S.R.: Report to the President on Investigation No. TA-406-5, . . ., USITC Publication 1006, October 1979, pp.19-21.

which are injured by imports from so-called "communist" countries. The House Report states:

> The purpose of section 405 is to provide more easily satisfied criteria for determining whether injury to domestic industries has resulted from imports from countries which are granted nondiscriminatory treatment under this title.[1]

The Senate Report states:

> The purpose of Section 406 is to provide an effective remedy against market disruption caused by imports from communist countries.[2]

But as a practical matter, we have little guidance as to the specific standards to apply in making determinations which would achieve this clear policy prescription. The bill, as reported by the House, had the same definition of market disruption as did the bill as introduced.[3] It provided in Section 406(c) that

> [M]arket disruption exists whenever imports of a like or directly competitive article are substantial, are increasing rapidly both absolutely and as a proportion of total domestic consumption, and are offered at prices substantially below those of comparable domestic articles.[4]

The bill as reported out of the Senate provided in Section 406 that

> Market disruption exists within a domestic industry whenever an article is being, or is likely to be, imported into the United States in such increased quantities as to be a significant cause of material injury, or the threat thereof, to such domestic industry.[5]

1/ Trade Reform Act of 1973: Report of the Committee on Ways and Means . . ., H. Rept. No. 93-571 (93rd Cong., 1st Sess.), 1973, p. 82 [Hereinafter House Report].

2/ Trade Reform Act of 1974: Report of the Committee on Finance . . ., S. Rept. 93-1298 (93rd Cong, 2nd Sess.), 1974, p. 210 [Hereinafter Senate Report].

3/ H.R. 10710, 93rd Cong., 1st Sess., 1973, p- 135 (as introduced).

4/ Ibid., p. 135 (as reported by the House).

5/ H.R. 10710, 93rd Cong., 2nd Sess., 1974, pp. 277-278 (as reported by Senate).

Thus, the House established a three criteria test requiring a showing that imports are (a) at "substantial levels", (b) "increasing rapidly" both in an absolute sense and in proportion to domestic consumption, and (c) being offered at prices substantially below those of the domestic articles in question. The Senate bill established a principally two step test requiring a showing that imports are coming in or are likely to come in (a) "in such increased quantities" and (b) so as to be a "significant cause" of "material injury" or "threat thereof".

The test we are required to apply under current law differs from these two preliminary formulations in several important respects. First and most striking, the articulation of the concept of market disruption which is controlling here is without any reference to the price or pricing practices addressed in the House bill. Second, the House requirement that the level of imports must be "substantial" in the first place has disappeared. As well, the open ended and variable Senate concept of the import level at which further inquiry would be triggered has given way to the prescription in the House bill. The House requirement was more rigid and, seemingly, more demanding in requiring that, irrespective of the measure of harm suffered by the domestic industry, imports must first be "increasing rapidly".

Fourth, present law permits measuring "increasing rapidly" either absolute or relatively. In contrast, no such provision was in the Senate bill and the House bill required a finding that increases have been absolute and in relation to domestic consumption.

In addition, the current test incorporates the Senate causality requirement that the import level identified as determinative must "be a significant cause" of the resulting harm. And finally, current law adopts the Senate standard that the import level identified as unacceptable have a significant nexus to a harm that is "material" or to such threatened harm. Consequently, the market disruption standard we are to apply in this and, indeed, all cases arising under Section 406 of the Trade Act, requires a determination from the House bill that imports (a) are "increasing rapidly", absolutely or relatively, and from the Senate bill (b) in so increasing, are a "significant cause" of "material injury" or "threat thereof".

In view of this amalgamated and patchwork standard, proper and precise application is sorely dependent upon those expressions of legislative intent incorporated in the respective reports of the House Ways and Means Committee and the Senate Committee on Finance, as the Conference Report is not helpful in this regard.[1] Unfortunately, the confusion and ambiguity arising from the inconsistencies between the versions of the bill passed by each House in addition to the inconsistencies between those versions and the language ultimately passed into law, carries, as well, into the effort to understand the legislative history. Caution is, therefore, warranted when looking to the respective Committee prints for purposes of clarification and amplification. Nonetheless, the Committee prints, however ambiguous, provided the only real direction available to us in applying the market disruption definition.

1/ The Conference Report is largely a technical recordation of the compromises reached in reconciling the differences in the bills reported by each House. There is little in the way of discussion that would shed light on reasons for one House yielding to the other. See Conference Report No. 93-1644 (93rd Cong., 2nd Sess.), 1974, p. 15.

Increasing Rapidly

Two of the only consistent features in the House and Senate definitions of market disruption are, as observed above, the underlying policy that this section is to afford the domestic industry improved opportunities for remedy in the face of injurious behavior by "communist" imports and that expanded levels of such imports is the action against which remedy could be given. Thus, the threshold question in finding market disruption is to determine that level of importation which is such that imports can be said to be "increasing rapidly", having in mind the underlying policy that this provision is to enhance the ability of a domestic industry to obtain relief.

The requirement in current law that imports from "communist" countries must be increasing rapidly comes from the House bill. But, the report of the Ways and Means Committee is silent as to what it envisioned in using the term. However, in using the criteria "in such increased quantities as to be...", the Finance Committee observed that it

> [R]ecognizes 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. In this regard, the Committee has taken into account the problems which East-West trade poses for certain sectors of the American economy. (Emphasis added.)[1]

1/ Senate Report 93-1298, (93rd Cong., 2nd Sess.), 1974, p. 210.

And further, the Committee observed that,

> 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.[1]

While I hasten to reiterate that the Committee is not, here, addressing the language "increasing rapidly", its views are, nevertheless, instructive in attempting to establish a standard for measuring that level of increased imports that may be found to be a siginficant cause of material injury or threat of material injury.

First, although the language used by each House, in this regard, is plainly different, both sets of language are formulated to achieve nearly identical objectives.[2] Therefore, in view of the peculiar circumstances of the legislative history, the Finance Committee's views on this matter should be read to the maximum reasonable extent to also color the meaning of "increasing rapidly". Second, the House language seems, overall, to be a more difficult test to meet than that in the Senate bill.[3]

1/ Senate Report, supra, p. 212.

2/ See p. 18.

3/ The House definition requires satisfaction of fairly stringent criteria placed on discrete factors: thus, the bill requires that import levels must be "substantial"; that the increase in imports must be "absolute" and "as a proportion of..."; and that prices must be "substantially below" all in addition to which imports must be rising "rapidly". See, H.R. 10710 (as reported by House), supra p. 35. The Senate language, however, calls for a sequential weighing of integrated factors: Imports must be "in such increased quantities as to be a significant cause of material injury or threat thereof." See, H.R. 10710 (as reported by Senate), supra p. 277-278.

Thus, having regard for the compelling reason to read the House language of "increasing rapidly", to be, to the maximum reasonable extent, consistent with the Finance Committee's perspective on its test and having regard for the House definition of market disruption being, overall, more restrictive than the Senate's, the Finance Committee's views well serve as a minimum standard for determining the meaning of "increasing rapidly" as used in Section 406(e).

In circumscribing the exercise of discretion to be used in determining that level of importation at which imports could be a cause of material injury, the Finance Committee observed that the circumstance to be addressed is that in which "communist" imports could "flood" the domestic market.[1] Consequently, as a minimum, then, the operative notion under Section 406(e) would seem to be "flood".

In common usage, "flood" is understood to mean "to cover or overwhelm... inundate, deluge".[2] Deluge implies "an irresistable rush of something"[3] and inundate suggests "to overhwelm by great numbers of superfluity of something; swamp."[4] By comparison, "rapidly" plainly denotes something entirely different, but its connotation fits well within the Finance Committee's view of the character of the importation in question. "Rapid" is understood to suggest that which is

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1/ Senate Report, supra, p. 210.

2/ Webster's Third New International Dictionary (Unabridged), 1971, p. 873.

3/ Ibid., p. 598.

4/ Ibid., p. 1188.

> [M]arked by a notably high rate of motion, activity, succession, or occurence: requiring notably little time: not slow or retarded... marked by abrupt action or decision without delay or hesitation.1

Clearly then, in view of all the various and complex considerations which proper interpretation of Section 406(e) requires, the most reasonable interpretation of increasing rapidly must be strongly colored by imports increasing, in an empirical sense, so as to suggest an inundation, a high rate of motion over a short time, an abrupt action.

There can be little question that Soviet imports of ammonia have been increasing steadily. In 1977 there were no Soviet imports. In 1978, Soviet imports represented 2 percent of domestic consumption. In 1979, they had captured 4 percent of consumption. In absolute terms, in 1978, Soviet imports amounted to some 315 thousand short tons and grew to 777 thousand short tons in 1979. Such a doubling in market share and more than doubling in absolute volume over a two year period is significant. To be sure, this increase is in contrast to the relatively static volume and market penetration of non-Soviet imported ammonia which have remained at approximately 1.1 million short tons over the past two years and at about 6 percent market penetration.

1/ Webster, supra, p. 1188.

But to find that this increase in the level of imports, however steady or significant, sufficiently touches upon a notion of inundation, abrupt action, or high rate over a short time in the sense of what appears to be a reasonable interpretation of "rapidly increasing" is not so clear. First, it cannot be ignored that Soviet ammonia is a new entrant to this market. Thus, the reference to a historical level of zero will necessarily make a rate of increase appear to be very significant in both absolute as well as relative terms. Successful new entrants into a market will often show marked increases in volume and even in market share from one year to the next in the initial years of the market entry without requiring a conclusion that such an increase is abrupt or inundating.[1]

In addition, since the thrust of what is meant by increasing rapidly reasonably includes a notion of high volume and short time, further note must be taken of the circumstance under which Soviet ammonia arrives into this country. The strategy used to market Soviet imports consists of entering into long-term, forward pricing contracts for a prescribed volume of ammonia. Testimony is on the record that Occidental's imports will never amount to the full 2.3 million short tons per year they have agreed to purchase from the U.S.S.R. Occidental negotiates with potential customers and obtains letters of intent to purchase specific quantities of ammonia at certain prices, then, in turn, agrees on terms with

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1/ In this connection, nothing in the legislative history suggests that either House intended its formulation of market disruption to deter the establishment of a respectable market share for imports from "communist countries". Indeed, the Senate Finance Committee observed that "a reasonable quantity of such materials could be imported from communist countries without market disruption". Senate Report, supra, p. 211.

the U.S.S.R. at fixed prices for specific periods of time. The initial contracts under which Occidental is presently selling the bulk of the Soviet ammonia are for periods of up to ten years with fixed prices during the first three years. The prices in the second and third years, 1979 and 1980, are subject in most cases, to escalation clauses agreed to in 1976-1977, which provide for price increases ranging from 3 percent to 6 percent per year.

Thus, in contrast to a circumstance in which there is an inundation of imports or a high rate of ammonia imports over a short time, we are faced here with new imports which have grown from a 2 percent market penetration in the first year of importation to a 4 percent market penetration in the second year. In absolute terms, we are dealing with rather modest levels of imports, 315 thousand short tons in 1978 and 777 thousand short tons in 1979, whose growth cannot be said to be unreasonable in the sense of the increasing rapidly as discussed above. Furthermore, contracts already secured for 1980 and 1981 do not reveal trends that radically differ from this pattern.[1]

1/ Information on future imports associated with existing contracts was submitted to the Commission in confidence.

Moreover, these are imports for which contracts were made years in advance, with prescribed volumes and predetermined prices. The contracts are known to the market place and, in most instances, are with domestic purchasers who formerly consumed captive ammonia. I am, therefore, unable to find that either under the guidance of the Senate Finance Committee language, or, indeed, on the very face of the language itself that, with regard to the question of present material injury, Soviet imports of ammonia are increasing rapidly.

Having, thus, disposed of the question of whether Soviet imports are increasing rapidly within the framework of material injury does not, in this case, necessarily resolve this question in the context of a significant cause of threat of material injury. This case presents the unique circumstance in which the importer has every intention, barring some unforeseen circumstance, of importing in the future at a predetermined level. While such an intention, though strongly expressed and strongly pursued, to me seems to be too speculative to have a bearing on a finding of increasing rapidly with respect to present injury, the special nature of the circumstances and procedures of the imports in this case do seem to raise this question as it goes to a finding of threat of material injury. Consequently, if imports were, in fact, to come in as intended by the importer, the question exists as to whether imports are increasing rapidly with a view to threat of material injury.

After two years of importation, after having achieved an importation level of over three quarters of a million short tons, and in view of contracts for future purchases, Soviet imports have well established themselves in this market and have established a sound base period against which to compare

growth. By its testimony, Occidental fully expects, absent unforeseen circumstances, that its imports of Soviet ammonia will, indeed, continue to grow. Occidental expects to import approximately 1.5 million short tons in 1980 and 2 million short tons in 1981. If the 1980 level is reached, this would be approximately 7 percent of the projected domestic consumption for 1980, an improvement of over 80 percent above that in 1979. Moreover, the growth from a 4 percent market share to possibly a 7.3 percent share, if achieved, would represent a one year advance in penetration nearly equal to that achieved in the first two years of importation. Such an expansion seems to well reflect the flavor of inundation and abrupt action contemplated under Section 406(e).

To compound this rather dramatic potential relative increase, the potential absolute growth in imports above that of the 1979 level, likewise, touches the concern implicit in the concept of increasing rapidly. Without reaching a conclusion as to the actual health of the domestic industry, 777 thousand short tons of ammonia is a significant order of magnitude. It is a level such that the potential impact on the domestic industry of an additional 700 thousand or so short tons is substantially different than the impact of that amount when there had been no previous imports. Thus, such an expected growth, in one year, from the 777 thousand short tons it took two years to reach to the 1.5 million short tons expected for 1980, if achieved, would be an absolute increase in imports also of an order and character that well falls within the color of abrupt action, high rate of motion requiring notably little time, and inundation.

Therefore, I find that imports of Soviet ammonia are increasing rapidly to the extent this consideration bears on the question of threat of material injury under Section 406(e).

Material Injury

Since I have concluded that Soviet imports of ammonia are not increasing rapidly with respect to present injury, it is not necessary for me to consider the question of whether the domestic industry is suffering material injury. Nevertheless, having reviewed the record on this matter, I join in the treatment and conclusion of my colleagues, Vice Chairman Alberger and Commissioner Stern, on the question of whether the domestic industry is, at all, suffering material injury in this case. However, I disassociate myself with that part of their views on this matter which may incorporate their belief, as expressed in the previous case,[1] that the Trade Agreements Act of 1979 is useful in understanding the meaning of "material injury" as it is used in Section 406(e) of the Trade Act of 1974.

Threat of Material Injury

Since I have found that Soviet ammonia imports are increasing rapidly with regard to considerations as to the presence of threat of material injury, it is necessary for me to reach a conclusion as to whether the domestic industry is, in fact, faced with this threat. In this connection, I, again, join in the treatment and conclusion of my colleagues, Vice Chairman Alberger and Commissioner Stern, on the question of whether the domestic industry is faced with a threat of material injury.

Overdependence

Testimony was offered in this case that the concept of "market disruption" under Section 406(e) incorporates a notion of "overdependence"

1/ Ammonia Report, supra,

in addition to that provided for on the face of this section. Support for this interpretation is largely based on language found in the Senate Finance Committee Report.[1] However, the completely confused origin of this provision, as I have discussed, obstructs an easy understanding of its meaning and intent. Thus, caution is warranted when relying on expressions of intent in the respective Committee reports even when such expressions go to language used in present law. But to look to the report of one Committee for support in advancing a theory not expressly provided for on the face of this section, nor in any of its prior forms, seems to go beyond the reasonable limits of statutory interpretation. Consequently, I find that Section 406(e) does not contemplate overdependence as a discrete theory to be considered in reaching a conclusion with regard to the existence of market disruption.[2]

1/ Senate Report, supra, pp. 210-211.

2/ Even if such a theory might be cognizable under Section 406(e), it cannot be ignored that it is the well established practice of this institution, founded both upon law and prudence, that in fulfilling its statutory obligations the Commission relies upon objective rather than subjective factors. The core of the objective factors that have been considered in discharge of the Commission's responsibilities overwhelmingly have to do with economic considerations. Nothing on the face of this section, in any of its prior forms, nor, indeed, in the legislative history, remotely suggests that Congress intended Section 406(e) as mandate for this body to stray from its usual practice. Thus, while from a trade policy or foreign policy perspective, it is worthy of concern that this country could be dependent upon the Soviet Union to satisfy as much as 10 percent of the domestic consumption of ammonia, action based upon such a concern, unsupported by reference to the traditional objective factors looked to by this institution, goes beyond this body's jurisdiction.

STATEMENT OF REASONS FOR THE AFFIRMATIVE DETERMINATION OF CHAIRMAN CATHERINE BEDELL AND COMMISSIONER GEORGE M. MOORE

This investigation is before the Commission as the result of a request by the President. The President stated that "there are reasonable grounds to believe" that imports of anhydrous ammonia (ammonia) from the U.S.S.R. are causing market disruption within the meaning of section 406 of the Trade Act of 1974. On January 28, 1980, the Commission instituted investigation No. TA-406-6 to determine whether imports of ammonia from the U.S.S.R. are causing such 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 competitve 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(a)(1), 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 1979, 51 companies operated ammonia plants at 79 locations with a total operating design capacity of 20.4 million short tons per year. In comparison, in 1978, there were 59 domestic firms at 93 locations with an operating design capacity of 22 million short tons producing ammonia. 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 farmer 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 condition." 1/ Although the term "increasing rapidly" is not statutorily defined, the Senate Finance Committee report on the Trade Act 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 in imports 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 amount 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 a nominal amount in 1976. More than 300,000 short tons was imported in 1978, and imports further increased to 777,000 short tons in 1979. Occidental has advised that without import restrictions imports will total about 1.5 million short tons in 1980 and 2 million short tons in 1981.

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 determination 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: Report to the President on Investigations Nos. TA-406-2, TA-406-3, and TA-406-4 . . ., USITC Publication 902, August 1978.

Imports of ammonia from the U.S.S.R. were equal to about 2 percent of domestic production in 1978 and increased to 4 percent in 1979; they will rise to a level almost equal to 12 percent of domestic production in 1981.

Considering historical trade levels and increases occurring during the most recent period of time, it is clear 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, which 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 explaining the difference between the causation standards of section 406 and section 201, the Finance Committee Report 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". . . . 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 these 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 in section 201.

The term "material injury, or threat thereof" is not defined in the statute. However, the statutory history indicates that the term 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 due in part to unused capacity resulting from the expansion of production facilities in the mid-1970's, and the increasing costs of natural gas.

In 1978, U.S. production of ammonia decreased from the 1977 level. In 1979 it increased only 2.7 percent above the level attained in 1977, the last year in which there were no U.S. imports of Soviet ammonia. At the same time, the U.S. producers' share of domestic consumption decreased by 4 percent from the 1977 share, despite a 9-percent increase in consumption.

U.S. ammonia productive capacity rose from 17.2 million short tons in 1974 to 22.0 million short tons in 1978, representing an increase of 28 percent. However, since 1978, when ammonia imports began to enter from the U.S.S.R., U.S. productive capacity has declined by 5.7 percent.

1/ U.S. Senate, op. cit., p. 212.

In 1978 and 1979, 31 U.S. ammonia-producing plants with a capacity of 3 million short tons were forced to close because their continued operation was unprofitable. The closing and idling of these ammonia plants was the single cause of the increase in domestic ammonia capacity utilization from 77 percent in 1978 to 89 percent in 1979. Seven of Occidental's 10 long-term contract customers have closed domestic ammonia-producing plants and replaced the output of these facilities with imported low-cost Soviet ammonia.

The number of production and related works engaged in producing ammonia in the United States increased steadily from 3,828 in 1974 to 4,744 in 1977. In 1978, the first year ammonia was imported by Occidental from the U.S.S.R., the number of such workers decreased to 4,610; the number decreased further, by 10 percent, to 4,137 in 1979. The number of hours such workers were employed followed the same trend, increasing steadily from 8.4 million hours in 1974 to 10.3 million hours in 1977 but subsequently dropping to 9.9 million hours in 1978 and 8.4 million hours in 1979.

Natural gas accounted for 64 percent of the cost of producing ammonia in 1978. The average price paid by U.S. ammonia producers for natural gas increased from $0.48 per 1,000 cubic feet in 1974 to $1.55 per 1,000 cubic feet in 1979. While the rising cost of natural gas contributes to the problems experienced by the domestic industry, low-priced imports from the U.S.S.R. threaten material injury to this industry, which is also faced with a severe cost-price squeeze. While natural gas cost $1.55 per 1,000 cubic feet on the average in 1979, 32 percent of the ammonia produced in the United States in 1979 used gas that cost more than $2.00 per 1,000 cubic feet. The cost of natural gas and, hence, the cost of ammonia production, will continue to increase and exacerbate the threat of material injury to ammonia producers from imports of Soviet ammonia.

Available profit-and-loss data show net operating profit from domestic ammonia operations declining from $316 million in 1976 to $149 million in 1977 and to $10 million in 1978. In 1979, the profit level increased to $68 million, which was 120 percent below the profit level of the domestic industry in 1977.

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, obligating the Soviet Union to supply increasing quantities of ammonia to Occidental for sale in the United States.

Occidental estimates that approximately 1.5 million tons of ammonia will be imported in 1980 and 2 million tons will be imported in 1981. Even if the Department of Agriculture's estimates of a 1.1-million-ton increase in ammonia consumption this year are accurate, the domestic industry is imminently threatened with the capture of most if not all of this increased consumption by Soviet imports.

The strategy used to market Soviet imports consists of entering into long-term forward-price 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 prices fixed for specific periods of time. The contracts under which Occidental sells to its customers are for periods up to 10 years at prices fixed for periods not exceeding 3 years. The prices in the second and third years are fixed except for nominal increases through escalation clauses ranging in most cases from 3 percent to 6 percent a 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, therefore, does not have to be responsive to the disciplines of the free-market economy in which the U.S. industry competes.

The prices at which the imported ammonia was sold in the first year of the contracts appear to have been comparable with U.S. market prices at the time these forward-price contracts were entered into. However, in 1980 and 1981, the price at the time of delivery, even with the application of a price-escalation clause, will be below U.S. market prices of domestically produced ammonia.

The forward pricing of Soviet ammonia serves to aggravate the cost-price squeeze with which the domestic industry is faced. U.S. producers which are confronted with rapidly increasing costs of natural gas are unable to compete with the long-term contracts made available by the U.S.S.R. Price of U.S.-produced ammonia have risen since 1979 to cover the escalating costs of ammonia production; the prices of ammonia from the Soviet Union have increased only slightly. Thus, the disparity in prices is greater today than in 1979, and consequently substantial sales will be lost to Soviet imports in 1980.

By reason 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 U.S. market to an unlimited extent. Apparent domestic consumption increased by approximately 500,000 short tons in 1978, or about 3 percent over that in 1977. In 1979, domestic consumption increased further by 1.2 million short tons, or by 7 percent. Imports from the U.S.S.R. supplied approximately 65 percent and 38 percent of this growth in 1978 and 1979, respectively. 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 substantially higher.

Soviet ammonia production capacity is scheduled to double between 1977 and 1982, increasing 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 60 percent greater than U.S. ammonia production capacity in 1982. This tremendous growth in Soviet productive capacity over a mere 5-year period does not appear to reflect either Soviet or world market needs and consequently poses a threat to the domestic industry.

In October 1978 a CIA report entitled Soviet Chemical Equipment Purchases from the West: Impact on Production and Foreign Trade predicted that Soviet exports of ammonia "will be an important destabilizing factor in world ammonia markets in the 1980's." This report further stated 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 dependence on the U.S.S.R. for a vital raw material. This was of particular concern to the Senate Finance Committee, which stated in its report that it "expects the Commission and the President to monitor carefully import 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 our highly efficient agricultural production is vital to our economy and to the free world, which is also the beneficiary of our agricultural efficiency.

Dependence on Soviet-produced and Soviet-supplied ammonia for a significant portion of our nitrogen requirements will place our agricultural and other national requirementts in a vulnerable position. Ammonia plants are

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1/ U.S. Senate, op cit. p. 211.

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.

Conclusion

Much has been said about the recent recovery of the domestic ammonia industry from the brink of serious injury. Yet this modest recovery, which has occurred only in the last 6 months, has not removed the threat of material injury. Ammonia imports from the U.S.S.R. in 1980 will be 100 percent greater than in 1979, and in 1981 they will be 150 percent greater. In the absence of U.S. Government restrictions, it is almost certain that imports from the U.S.S.R. will continue to increase rapidly in the years beyond 1981.

The 5-percentage-point improvement in the operating profit ratio of the domestic industry in 1979 and the 6-percent increase in production pale into insignificance when examined in the light of the dismal prospects for the future of this industry.

It is utter naivete to suggest that the domestic ammonia industry can compete in a price-sensitive market with the onslaught of Soviet imports whose low prices are guaranteed to drive U.S. purchasers away from domestically produced ammonia. The suggestion that the domestic industry can compete in the U.S. marketplace with Soviet imports which are certain to be offered for sale at prices which do not include the escalating costs of natural gas, labor, capital improvements, financing, environmental protection costs, and the like ignores the basic economic facts of life in the early years of this decade in our Nation.

It is inevitable that unrestricted imports of ammonia from the U.S.S.R. in the future will make the U.S. farmer more dependent on foreign sources for fertilizers. This fact makes more meaningful the admonition of the Senate Finance Committee when it stated that in proceedings of this nature it expected this Commission to prevent "imprudent dependence on a nonmarket economy for a vital material".

Therefore, on the basis of the foregoing, we have determined that the criteria of section 406 of the Trade Act of 1974 have been satisfied for an affirmative determination of market disruption.

SUMMARY

On January 18, 1980, the President requested that the U.S. International Trade Commission (Commission) conduct an investigation under section 406 of the Trade Act of 1974 concerning imports of anhydrous ammonia from the U.S.S.R. In response to this request, the Commission instituted investigation No. TA-406-6 on January 28, 1980. A public hearing in connection with this investigation was held on March 3, 1980.

This is the second investigation the Commission has conducted under section 406 concerning imports of ammonia from the U.S.S.R. In December 1979 the President rejected the Commission's recommendation to impose quotas on imports of ammonia from the U.S.S.R. One month later, however, the President announced that "recent events have altered the international economic conditions" and took emergency action to impose a 1-year quota. Developments since the Commission's previous determination in October 1979 include:

December 27, 1979-- U.S.S.R. troops invaded Afghanistan.

January 4, 1980---- The President announced the United States would limit grain exports to the U.S.S.R.

January 9, 1980---- The International Longshoremen's Association imposed a total boycott against trade with the U.S.S.R.

January 18, 1980--- The President imposed a quota on imports of ammonia from the U.S.S.R.

February 25, 1980-- The President ordered an embargo upon the exportation of U.S.-origin phosphates to the U.S.S.R.

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. The new plants were larger than the older plants and offered considerable economies of scale. Fifty-one companies produced 18.1 million short tons of ammonia at 79 locations in the United States in 1979.

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 2.3 million short tons each year for the first 10 years of the agreement. In addition, the U.S.S.R. agreed to purchase superphosphoric acid from Occidental.

Imports of ammonia from the U.S.S.R. increased from 0 short tons in 1977 to 315,000 short tons in 1978 and to 777,000 short tons in 1979. In 1979 imports from the U.S.S.R. accounted for 40 percent of total ammonia imports. Occidental has advised the Commission that except for import restrictions 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 20.8 million short tons in 1980. Capacity utilization decreased from 91 percent in 1974 to 77 percent in 1978 and subsequently increased to 89 percent in 1979.

Thirty-seven 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. Yearend 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 and 12 percent in 1979.

The number of production and related workers declined from 4,744 in 1977 to 4,610 in 1978 and 4,137 in 1979. Capital expenditures for ammonia-producing operations in the United States have also decreased, from $446 million in 1976 to $56 million in 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 $163 per short ton in February 1980.

With increasing costs and declining prices, profits on U.S. ammonia production operations decreased from $316 million in 1976 to $10 million in 1978. As prices recovered profits increased to $68 million in 1979.

INFORMATION OBTAINED IN THE INVESTIGATION

Introduction

Following the receipt of a request from the President, the Commission, on January 28, 1980, 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. 1/ 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 that the Commission submit its determination to the President within 3 months--in this case by April 18, 1980.

A public hearing in connection with this investigation was held in Washington, D.C., on March 3, 1980. 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 February 4, 1980 (45 F.R. 7645). 2/

This is the second investigation concerning imports of ammonia from the U.S.S.R. the Commission has conducted under section 406 of the Trade Act.

1/ A copy of the President's letter requesting the Commission to initiate an investigation is presented in app. A.

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

In October 1979 the Commission determined by a 3-2 vote that market disruption exists with respect to imports of ammonia from the U.S.S.R. In order to remedy this market disruption, the Commission recommended that the President impose a quota for 3 years duration on U.S. imports of ammonia from the U.S.S.R., 1/ as follows:

	Quantity (short tons)
1980----------	1,000,000
1981----------	1,100,000
1982----------	1,300,000

On December 11, 1979, the President, rejecting the Commission's recommendation, determined that "import relief is not in the national economic interest." One month later on January 18, 1980, however, the President announced that "recent events have altered the international economic conditions" and took emergency action under section 406(c) of the Trade Act to impose a 1-year quota of 1 million short tons on imports of ammonia from the U.S.S.R. 2/ At the same time the President requested that the Commission initiate a new investigation under section 406(a) of the Trade Act.

1/ A copy of the Commission's notice of determination and recommendations to the President is presented in app. C. The Commissioners' statements of reasons in this investigation together with the information obtained in the investigation are published in Anhydrous Ammonia From the U.S.S.R. ..., USITC Publication 1006, October 1979.

2/ Copies of the President's December 11, 1979 determination and his January 18, 1980 proclamation are presented in app. D.

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, $NH_3.H_2O$, 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.

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

End use	Percent
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 liquefied 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 liquefied 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/

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

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

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 and 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:

Figure 1.--Anhydrous ammonia: Maximum 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.

. . . 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 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 in the previous investigation and their individual share of total U.S. production in 1979 are listed below. In the aggregate, these firms accounted for 48 percent of U.S. production in 1979, 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	48.0

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

The Domestic Industry and the U.S. Market

In 1979, the U.S. domestic ammonia industry comprised 51 companies, operating ammonia plants at 79 locations, with a total operating design capacity of 20.4 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.

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

Most domestic ammonia plants are located in those States which have large supplies of natural gas. In 1979, 31 percent of the ammonia productive capacity was located in Louisiana, 10 percent, in Texas, and 11 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.

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

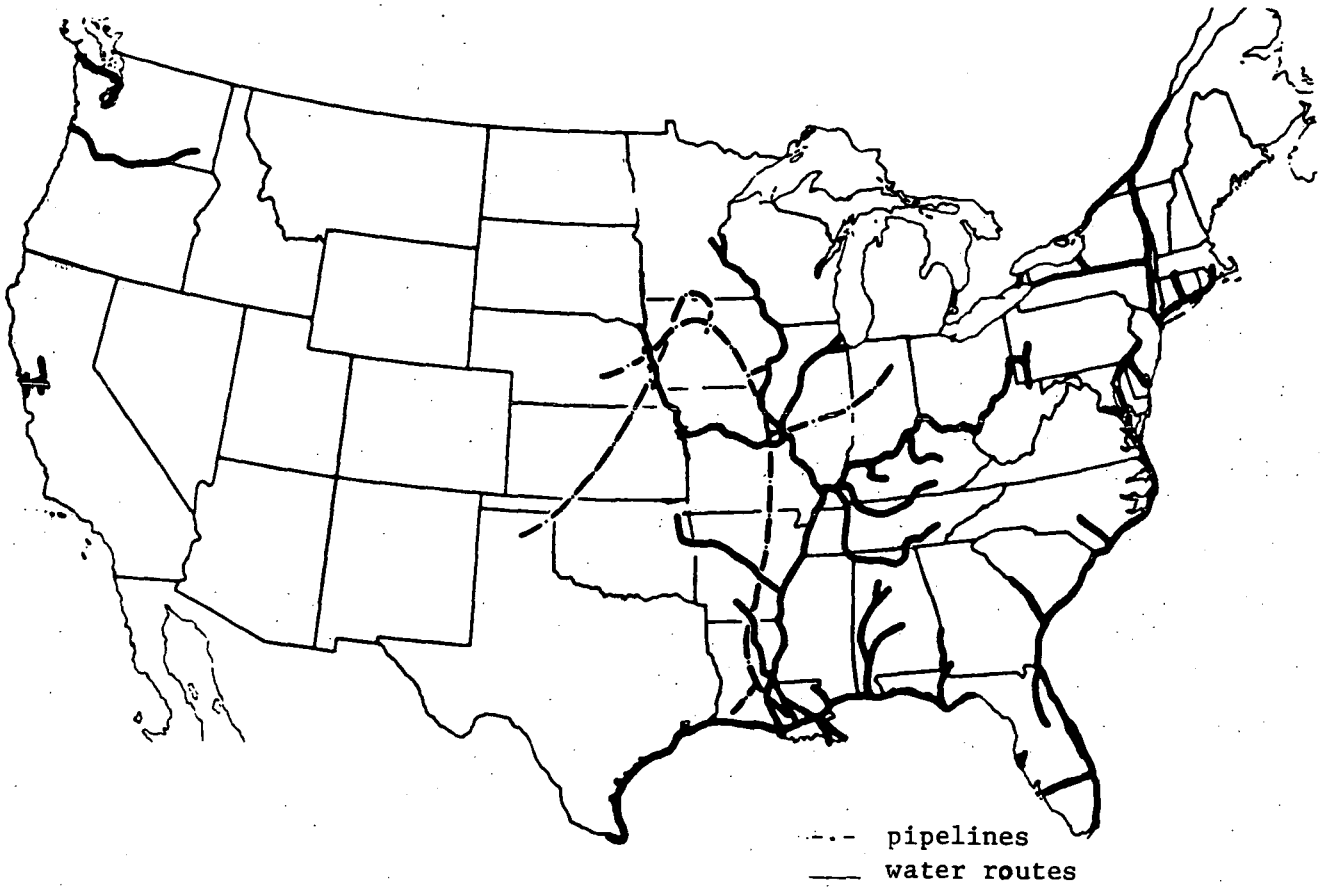
producers that use ammonia in the production of urea, ammonium nitrate, ammonium phosphates, ammonium sulfate, and other chemical fertilizers. Other industrial consumers include chemical plants that purchase ammonia to produce chemicals other than fertilizers.

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-miles-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 strategic 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

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



Source: The Tennessee Valley Authority.

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 tank cars have noninsulated 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.

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 6.4 percent ad valorem, the concession rate for least developed developing countries (LDDC's) is 2.8 percent ad valorem, and the column 2 rate of duty is 28 percent ad valorem. Imports under this item from designated beneficiary developing countries are eligible for duty-free treatment under the Generalized System of Preferences (GSP). 1/ When the final stage of

1/ Imports under item 417.22 from Mexico are not eligible for duty-free treatment under the GSP.

concessions on this item granted in the Tokyo round of trade negotiations becomes effective in 1987, 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. 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. Nearly 50 percent of its 1980 export commitment to Western Nations is earmarked for the U.S. market.

Industry sources, however, doubt that the U.S.S.R. met its 1979 production targets or that it filled 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 Severodonetsk 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 held in connection with investigation No. TA-406-5, 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

1/ See transcript of the hearing, p. 464.

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:

	Quantity (million 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 to 4 million short tons, as shown in the following tabulation:

Item	Quantity (million short tons)
Capacity	27-29
Production	22-24
U.S.S.R. consumption:	
Fertilizer uses	12-13
Nonfertilizer uses	3- 4
Total	15-17
Export commitments	3- 4
Waste	1

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

A detailed analysis of the Occidental-U.S.S.R. agreements by the General Counsel's office is presented in appendix G. 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 2.3 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. Chemico agreed to act as the prime contractor, supply technology, and supervise construction and startup 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 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,

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.

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 Occidental-U.S.S.R. agreement, the Eximbank conducted a study in the

spring of 1974, which concluded that

* * * * * * *

The Grain Embargo

On January 3, 1980, President Carter announced that nearly 17 million short tons of wheat and corn contracted to be sold to the U.S.S.R. before October 1980 would not be shipped. To offset the impact of this embargo upon the U.S. agricultural sector, the Government has offered to assume the contractual obligations for approximately 4 million short tons of wheat and 11 million short tons of corn. The U.S. Department of Agriculture will take delivery of all of the wheat and place it in a reserve to be used only for food assistance programs. Thus the supply-demand balance for wheat will not change as a result of the embargo. In addition, Agriculture will not permit corn which was once destined for the U.S.S.R. to be released back into the market until market prices exceed presuspension levels. Other measures announced by Agriculture include a revision of the farmer-owned reserve system to encourage farmers to place additional quantities of grain in reserve. Agriculture expects that most of the embargoed corn will be placed in farmer-owned reserves.

For the first 13 million short tons of corn entered into the farmer-owned reserve program after January 8, 1980, Agriculture will lend the farmer $2.10 per bushel interest free and will give the farmer 26.5 cents per bushel for a year of storage. In exchange the farmer agrees not to sell the corn until the

price is above $2.63 per bushel. After 3 years the farmer is free to sell his corn without price restriction. If, however, the price after 3 years is below the loan price, Agriculture will buy the corn from the farmer at $2.10 per bushel. When the farmer sells the corn, he redeems his interest free loan.

Other developments which will offset the impact of the grain embargo include the purchase by Mexico of 1 million short tons of corn once destined for the U.S.S.R. Lower than projected harvests in Brazil have also increased its import requirements. Record breaking quantities of corn will be exported this year, according to projections made by Agriculture. The projections of U.S. corn exports made in March 1980 are larger than the December 1979 projections, despite the grain embargo.

On February 29, 1980, the Secretary of Agriculture reported that the grain embargo has "not fundamentally altered the long-range supply-demand picture for U.S. agriculture." In addition, "farm output and prices are near levels expected before the suspension." In December 1979 Agriculture forecast that the average price received by farmers per bushel of corn for the 1979/80 crop year would be $2.25-$2.55. In March 1980 Agriculture projected such prices would be $2.30 to $2.50 per bushel. As a consequence, Agriculture will not institute a paid land diversion program for the 1980 crops of wheat and corn. A survey of farmers conducted by Agriculture in January 1980 after the announcement of the grain embargo indicated that 5 percent to 6 percent more acres of corn will be under cultivation in 1980 than in 1979.

The Phosphate Embargo

On February 25, 1980, the President ordered an embargo upon the exportation of U.S.-origin phosphates to the U.S.S.R. In its 20-year countertrade agreement with the U.S.S.R., Occidental agreed, among other

things, to purchase ammonia from the U.S.S.R. and, in exchange, to sell superphosphoric acid to the U.S.S.R.

The President's order was made following a review by an interagency committee which has been examining U.S. policy on exports to the U.S.S.R. in the wake of the Soviet invasion of Afghanistan. Earlier in February the Secretary of Commerce imposed an advance licensing requirement on U.S. exports of phosphates to the U.S.S.R., and also announced that no licenses would be issued until the completion of the interagency review. Previously, such exports were made under "general license," which does not require prior Commerce approval. Dr. Armand Hammer, Chairman of the Board and Chief Executive Officer of Occidental, stated at the hearing that he believes that the U.S.S.R. will continue to ship ammonia to the United States despite the embargo on the exportation of phosphates. 1/

The ILA Boycott

On January 9, 1980, the International Longshoremen's Association (ILA) initiated an "across the board" boycott of all U.S.S.R. vessels and cargo. The ILA controls the docks along the Atlantic and gulf coasts. Imports of ammonia from the U.S.S.R. are affected by the boycott. It is not clear how long the boycott will last or how effective it will be. Union representatives currently state that ILA members will not handle U.S.S.R. shipments until the U.S.S.R. withdraws from Afghanistan. Longshoremen in Jacksonville, Fla., however, obeyed a court injunction on February 1, 1980, and loaded three Norwegian phosphate carriers bound for the U.S.S.R. According to Occidental officials, no ammonia deliveries have been delayed by the ILA boycott.

1/ Transcript of the hearing, p. 91.

The International Longshoremen's and Warehousemen's Union controls the docks along the Pacific coast. According to a union spokesman, no boycott of U.S.S.R. shipments is currently under consideration. About one-fourth of the imports of ammonia from the U.S.S.R. are destined for the Pacific coast.

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).

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

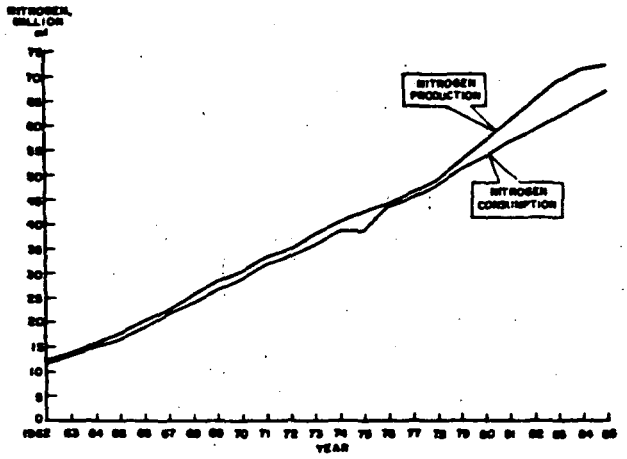
Region	1967	1970	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Indefinite 1/
North America:													
Canada	1,606	1,750	1,488	1,488	1,657	1,718	2,919	2,800	2,800	2,800	2,800	2,800	0
United States	13,301	16,879	17,367	17,217	18,387	19,028	21,548	22,021	20,360	20,825	20,825	20,825	409
Total	14,907	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 Tennessee Valley Authority.

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

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



Source: The Tennessee Valley Authority.

The Question of Rapidly Increasing Imports

U.S. imports of ammonia from all countries quadrupled from less than 0.5 million short tons in 1974 to 2.0 million short tons in 1979. In 1979 the U.S.S.R. accounted for 40 percent of the imports, followed by Canada, Trinidad, and Mexico, as shown in the following tabulation:

Source	Percent of total imports
U.S.S.R	40
Canada	27
Trinidad	17
Mexico	16
Total	100

Imports of ammonia from each of these countries have increased sharply since 1974. Imports from the U.S.S.R. increased from none in 1977 to 315,000 short tons in 1978 and to 777,000 short tons in 1979 (table 4).

According to its response to the Commission's questionnaire in the previous investigation, Occidental estimated it will import 1.5 million short tons of ammonia from the U.S.S.R. 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 4.--Anhydrous ammonia: U.S. imports for consumption, by principal sources, 1974-79

Source	1974	1975	1976	1977	1978	1979
	Quantity (1,000 short tons)					
U.S.S.R	0	0	18	0	1/ 315	2/ 777
Canada	93	118	254	632	517	533
Mexico	2	7	21	56	349	309
Netherlands Antilles	49	107	78	34	38	0
Trinidad	125	148	192	171	276	332
Venezuela	67	54	54	27	0	0
All other	121	374	112	158	21	0
Total	457	808	730	1,078	1,516	1,951
	Value (1,000 dollars)					
U.S.S.R	-	-	945	-	1/ 27,760	56,466
Canada	10,261	20,676	30,593	67,724	50,879	51,115
Mexico	482	1,536	787	3,551	24,898	25,523
Netherlands Antilles	2,859	12,417	9,465	3,339	4,310	-
Trinidad	5,423	9,359	13,301	11,917	23,979	33,024
Venezuela	13,049	6,652	4,305	2,206	-	-
All other	20,301	73,524	11,456	14,553	1,687	-
Total	52,375	124,164	70,852	103,290	133,513	166,128
	Unit value (per short ton)					
U.S.S.R	-	-	$53	-	1/ $88	$73
Canada	$110	$175	120	$107	98	96
Mexico	241	219	37	63	71	83
Netherlands Antilles	58	116	121	98	113	-
Trinidad	43	63	69	70	87	99
Venezuela	195	123	80	82	-	-
All other	168	197	102	92	80	-
Average	115	154	97	96	88	85

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

2/ According to testimony presented at the hearing, Occidental's records show it imported 832,000 short tons of ammonia in 1979.

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. By yearend the U.S.S.R. met 80 percent 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 1974-79 are shown in table 5.

Table 5.--Anhydrous ammonia: Ratios of U.S. imports from all sources and from the U.S.S.R. to apparent U.S. consumption, 1974-79

(In percent)

Year	Imports from--	
	All sources	U.S.S.R.
1974	3	0
1975	5	0
1976	4	1/
1977	6	0
1978	8	2
1979	10	4

1/ Less than 0.5 percent.

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 Co. (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.

***

Amoco Oil Co. and the Trinidadian Government plan to open two ammonia plants in Trinidad with a total of 600,000 tons of annual capacity in 1981 and 1982. 1/ 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.

Exxon Corp. plans to open a 660,000 short ton capacity ammonia plant in Alberta, Canada in mid-1983. According to company officials, this plant,

* * * * * * *

1/ Transcript of the hearing, p. 126.

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 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 1/

(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 2/	2,979	2,711	268

1/ 1979 figures not available.
2/ 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		

In 1979 Occidental became the largest U.S. importer of ammonia accounting for 40 percent of total imports.

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 20.8 million short tons in 1980, representing an increase of 20 percent in 7 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 5 percent to 20.8 million short tons in 1980.

U.S. production of ammonia increased steadily 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 decreased by 4 percent to 17.0 million short tons in 1978. A recordbreaking quantity of 18.1 million short tons was produced in 1979, representing an increase of 6 percent over the previous year (table 7). Producers reduced production in 1978, in part, to drawdown large inventory accumulation.

Table 7.--Anhydrous ammonia: U.S. production capacity, production, and capacity utilization, 1973-80

Year	Capacity	Production	Capacity Utilization
	1,000 short tons	1,000 short tons	Percent
1973	17,372	15,208	88
1974	17,220	15,733	91
1975	18,391	16,419	89
1976	19,033	16,716	88
1977	21,555	17,576	82
1978	22,027	16,967	77
1979	20,367	18,057	89
1980	20,765	-	-

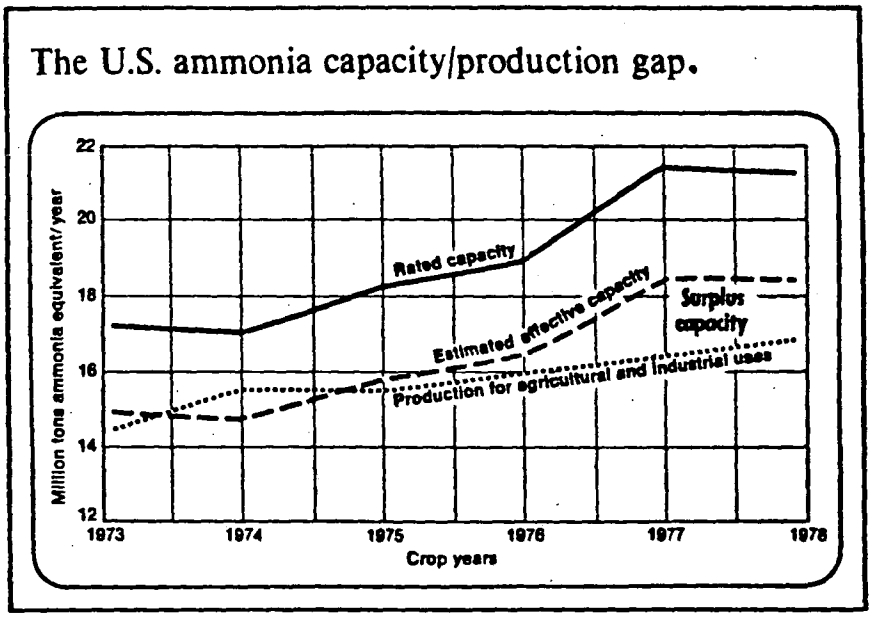
Source: The Tennessee Valley Authority, and official statistics of the U.S. Department of Commerce.

Utilization of U.S. productive capacity decreased steadily from 91 percent in 1974 to 77 percent in 1978 and then increased to 89 percent in 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. With the replacement of small reciprocating plants with large modern plants the maximum capacity utilization rate approaches 95 percent. In 1974 and 1975 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 19.5 million short tons in 1979, or by 21 percent (table 8). U.S. producers' share of U.S. consumption decreased irregularly from 97 percent in 1974 to 90 percent in 1979.

On February 18, 1980, Chase Econometrics completed a study, Fertilizer Model Forecasts, which, among other things, projects future ammonia production. 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 grain embargo, 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. Chase assumed that there would be no quota on imports from the U.S.S.R. In addition, Chase assumed that there would be a four million acre diversion program. On February 29, 1980, however, Agriculture announced that there would be no diversion program. Agricultural demand for ammonia, thus, may be stronger than Chase predicted. According to its analysis, Chase predicted that in

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, 1974-79

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	1,516	18,339	92
1979	1/	1/	2/ 17,592	1,951	19,543	90

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.

fertilizer year 1979/80 U.S. production would increase by 5.8 percent, or by 1 million short tons over 1978/79 production and that ending inventories would be 0.5 million short tons less than beginning inventories.

In December 1979 prior to the grain embargo Agriculture similarly projected a strong demand for ammonia in the United States. Agriculture predicted that in fertilizer year 1979/80 U.S. production would increase by 7.0 percent, or by 1.2 million short tons over 1978/79 production with no change in inventories (table 9). ***

Table 9.--Anhydrous ammonia: U.S. producers' beginning inventories, production, imports, consumption, exports, and producers' ending inventories, fertilizer years 1/ 1978/79 and 1979/80

(In millions of short tons)

Item	Actual 1978-79	1979-80 forecast	
		Chase	Agriculture
U.S. producers' beginning inventories 2/	2.4	2.1	2.1
Production	17.2	18.2	18.4
Imports 2/	2.8	2.8	2.8- 3.0
Total	22.4	23.0	23.2-23.5
Consumption 2/	17.5	18.4	18.0
Exports 2/	2.9	3.0	3.0- 3.3
U.S. producers' ending inventories 2/	2.1	1.6	2.1

1/ The fertilizer year begins July 1.
2/ Anhydrous ammonia equivalents of chemicals and fertilizers containing fixed nitrogen.

Source: Fertilizer Model Forecasts, Chase Econometrics, Feb. 18, 1980; and 1980 Fertilizer Situation, U.S. Department of Agriculture, Dec. 13, 1979.

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

In its forecast Chase also projected that U.S. production would increase an additional 3.5 percent from the 1979/80 fertilizer year to the 1980/81 fertilizer year.

At the Commission's hearing Schnittker Associates on behalf of the petitioners presented its projections of U.S. consumption and production of ammonia. Schnittker forecast that with the grain embargo U.S. consumption of nitrogenous fertilizers would increase by 4.9 percent from the 1978/79 fertilizer year to the 1979/80 fertilizer year, and U.S. production would increase by 880,000 short tons or by 5.0 percent during the same period.

Swaps

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. 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 10, 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 10.--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. 49 firms reported, which accounted for 95 percent of U.S. production in 1978.

U.S. plant expansions and closings

Since 1974, a total of 34 U.S. plants began operating and 13 expanded production capabilities, adding 8.0 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 the fertilizer year 1974/75 when ammonia prices were high and shortages were predicted until the end of the century.

Of the new plants which have begun operating since 1976, 12 are 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 56 percent of capacity in 1980 (table 11).

Since 1976, however, when the predictions of continued ammonia shortages were not borne out, 3.7 million short tons of U.S. production capacity have

been idled or closed (table 12). In 1979 alone, 26 plants with a total of 2.6 million short tons of capacity were idled or closed. Since 1976, the number of small production facilities with annual capacities of 200,000 short tons or less declined by 27, from 67 plants to 40 plants.

Table 11.--Anhydrous ammonia: U.S. production capacity, by plant sizes, 1974-80

Item	1974	1975	1976	1977	1978	1979	1980
Plants with less than 200,000 tons yearly capacity:							
Number	55	60	67	67	62	41	40
Total yearly capacity million short tons	5.0	5.3	5.6	5.4	5.2	4.0	4.0
Share of total U.S. capacity-----percent	29	29	29	25	24	20	19
Plants with 200,000-340,000 tons yearly capacity:							
Number	26	25	25	24	23	21	20
Total yearly capacity million short tons	7.3	7.0	6.9	6.6	6.4	5.5	5.2
Share of total U.S. capacity-----percent	42	38	36	31	29	27	25
Plants with more than 340,000 tons yearly capacity:							
Number	11	14	15	21	24	25	27
Total yearly capacity million short tons	4.9	6.1	6.5	9.5	10.4	10.9	11.7
Share of total U.S. capacity-----percent	28	33	34	44	47	53	56
All U.S. plants:							
Number	92	99	107	112	109	87	87
Total yearly capacity million short tons	17.2	18.4	19.0	21.5	22.0	20.4	20.8
Share of total U.S. capacity-----percent	100	100	100	100	100	100	100

Source: Compiled from statistics of the Tennessee Valley Authority.

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

Table 12.--Anhydrous ammonia: Changes in U.S. production capacity, 1974-80

(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	946	2,606	-1,660
1980	413	15	398

Source: The 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 the

spring of 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 older, and 17 plants are 15 years old or older.

Of the U.S. plants that have been closed or idled since 1977, 31 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 13).

Table 13.--Anhydrous ammonia: Number of U.S. plants closed or idled, by yearly capacities, 1977-80

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
1980	1	0
Total	31	6

Source: The Tennessee Valley Authority.

In addition, 33 of the closed plants utilized reciprocating compressors while only 4 utilized centrifugal compressors, as shown in the following tabulation:

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

Year	Reciprocating plants closed or idled	Centrifugal plants closed
1977	5	0
1978	4	1
1979	23	3
1980	1	0
Total	33	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.--Firms frequently cited more than 1 reason for closing their plants.

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 table 14.

Table 14.--Anhydrous ammonia: U.S. production lost to natural gas curtailments, fertilizer years 1974-79

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

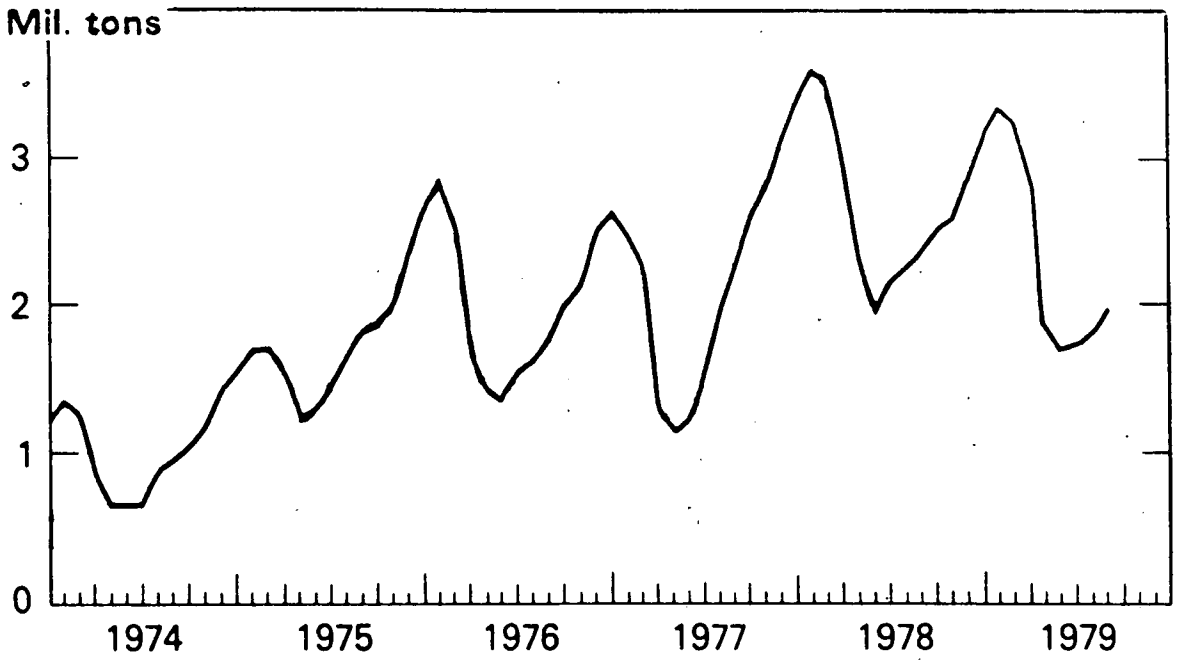
Source: The Fertilizer Institute.

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 15, 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, and 2.2 million short tons in 1979.

Figure 6.--U.S. fertilizer manufacturers' inventories of nitrogenous fertilizers, 1/ 1974-79.



1/ Does not include area.

Source: U.S. Department of Agriculture.

Table 15.--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	2,163

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 following tabulation, increased from 12.6 percent in 1975 to 15.8 percent in 1977, and subsequently decreased to 14.7 percent in 1978 and 12.0 percent in 1979. Inventories as of Dec. 31--

	Percent of annual U.S. production
1975	12.6
1976	13.5
1977	15.8
1978	14.7
1979	12.0

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 4,137 in 1979, representing a decrease of 10 percent. 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 and 8.4 million in 1979 (table 16). The decline in employment can in part be attributed to the closing of the older reciprocating plants which are more labor intensive than the newer plants.

Table 16.--Average number of U.S. production and related workers engaged in the production of anhydrous ammonia and the hours such workers were employed, 1974-79

Year	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
1979	4,137	8,368

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 1979, only $56 million was spent by U.S. producers on capital expenditures, as shown in table 17. 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 17.--Anhydrous ammonia: U.S. producers' capital expenditures, 1975-79

(In millions of dollars)

Year	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	1/	1/	1/	56

1/ Not available.

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 79 percent of U.S. production in 1979, 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.

Table 18.--Profit-and-loss experience of 35 U.S. anhydrous ammonia producers on their anhydrous ammonia production operations, 1976-79

Year	Open market sales	Intracompany transfers	Total	Cost of goods sold	Gross profit	Administrative and selling expenses	Net operating profit before taxes	Ratio of net operating profit to total sales
	Million 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
1979	857	638	1,495	1,332	163	95	68	5

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

Net operating profit 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 increased to $68 million in 1979. The ratio of net operating profits to total sales declined from 28 percent in 1976 to 1 percent in 1978 and subsequently increased to 5 percent in 1979, as shown in table 18.

Sixteen firms in 1976 reported net operating margins of more than 30 percent. In 1979 only 1 firm reported such high margins. The number of firms reporting losses increased from 2 firms in 1976 to 12 in 1979, as shown in table 19.

Table 19.--Anhydrous ammonia: Distribution of 35 U.S. producers by net operating margins, 1976-79

(Number of firms)

Year	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
1979	1	3	8	11	12

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, Inc., 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,

1/ George C. Sweeney, op. cit., and Farm Chemicals, March 1979.

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 to 10 percent by 1980/81. The cost per ton of annual installed capacity has similarly increased, from *** , as shown in table 20.

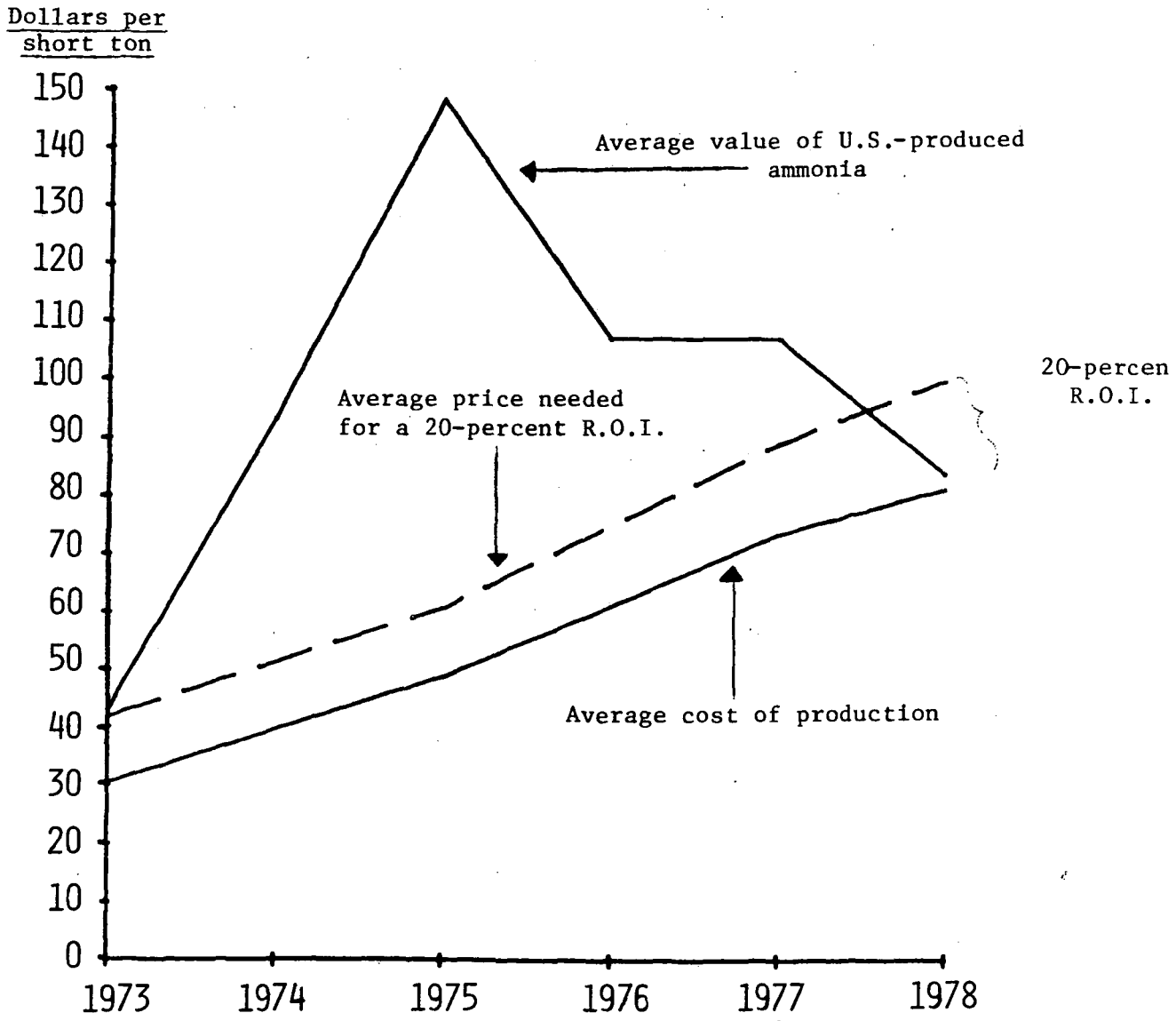
Table 20.--Anhydrous ammonia: U.S. plant capital costs and costs per ton of annual installed capacities, 1974-79

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 turnkey plant with an annual capacity of 400 thousand short tons. Does not include costs associated with storage and shipping terminals, site acquisition, or buildings other than control buildings.

Source: Pullman Kellogg.

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 previous 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 4.0 percent in 1979. Based on an estimated 5 percent annual growth rate in U.S. consumption of ammonia during the years 1980 and 1981 and based on Occidental's estimates concerning its imports in each of those years, this ratio will increase to *** 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	0
1978	1.7
1979	4.0
1980	1/ ***
1981	1/ ***

1/ Estimated.

Overexpansion of the U.S. industry

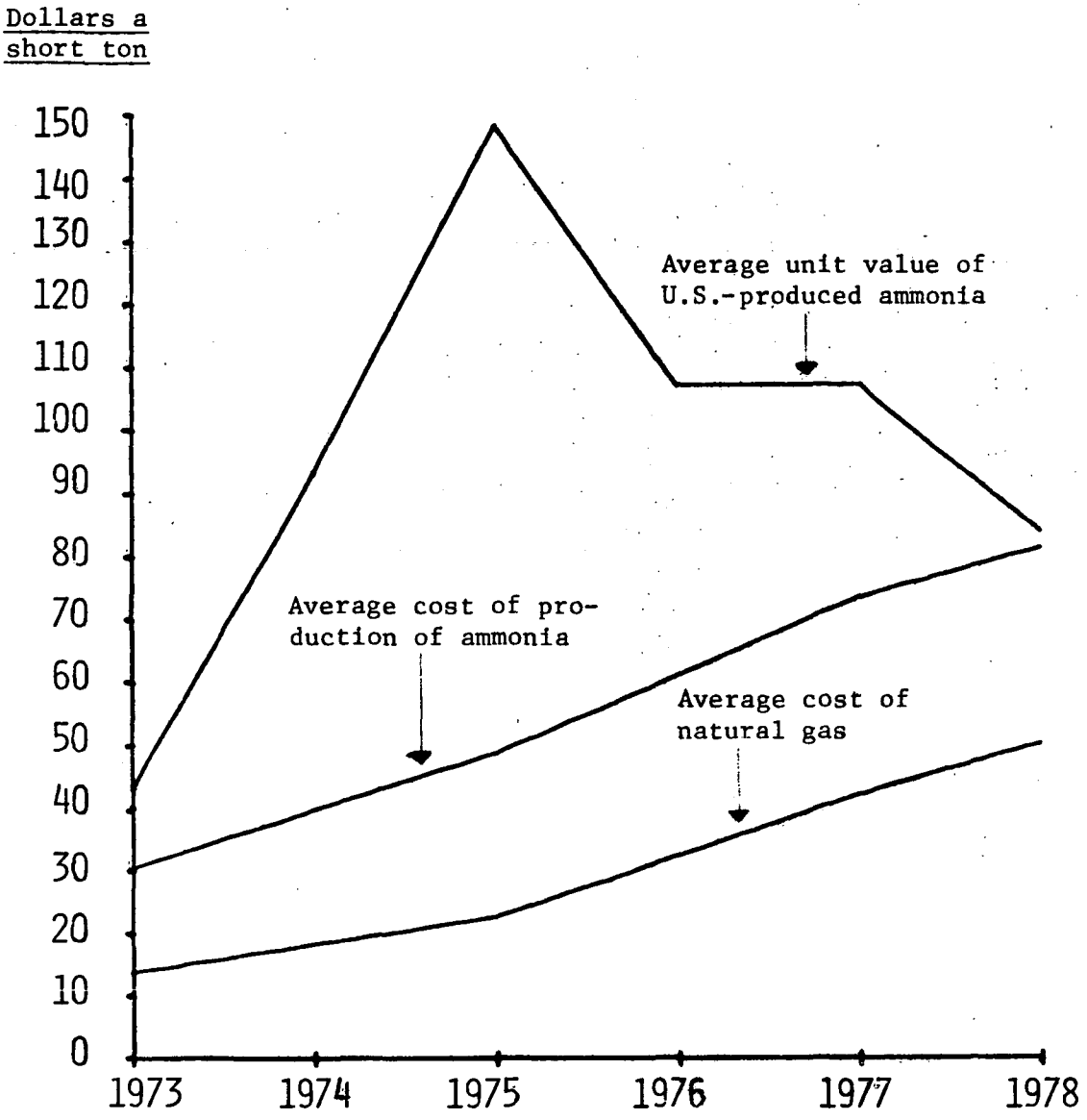
The issue of overexpansion regarding the U.S. industry is discussed in the sections of this report on U.S. capacity, production, consumption, and U.S. plant expansions and closings.

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 more than tripled from $0.48 in 1974 to $1.55 in 1979, as shown in the following tabulation:

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.

	Average cost (1,000 cubic feet)
1974	$0.48
1975	.65
1976	.94
1977	1.15
1978	1.27
1979	1.55

The increase in the price of natural gas is linked to the sharp increase in the 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 1979, only 8 percent of the ammonia produced in the United States used natural gas priced under $0.50, while 32 percent of the natural gas used was priced over $2.00 for 1,000 cubic feet (table 21).

Table 21.--Anhydrous ammonia: Cost of natural gas to U.S. ammonia producers, by percent of production, 1974-79 1/

(In percent)

Cost per 1,000 cubic feet	1974	1975	1976	1977	1978	1979
Less than $0.50	61	39	15	10	8	8
$0.50-$0.99	37	46	41	22	16	17
$1.00-$1.49	-	13	33	44	28	6
$1.50-$1.99	2	2	10	22	37	38
More than $1.99	-	-	-	2	11	32

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

1974	84
1975	89
1976	92
1977	92
1978	95
1979	97

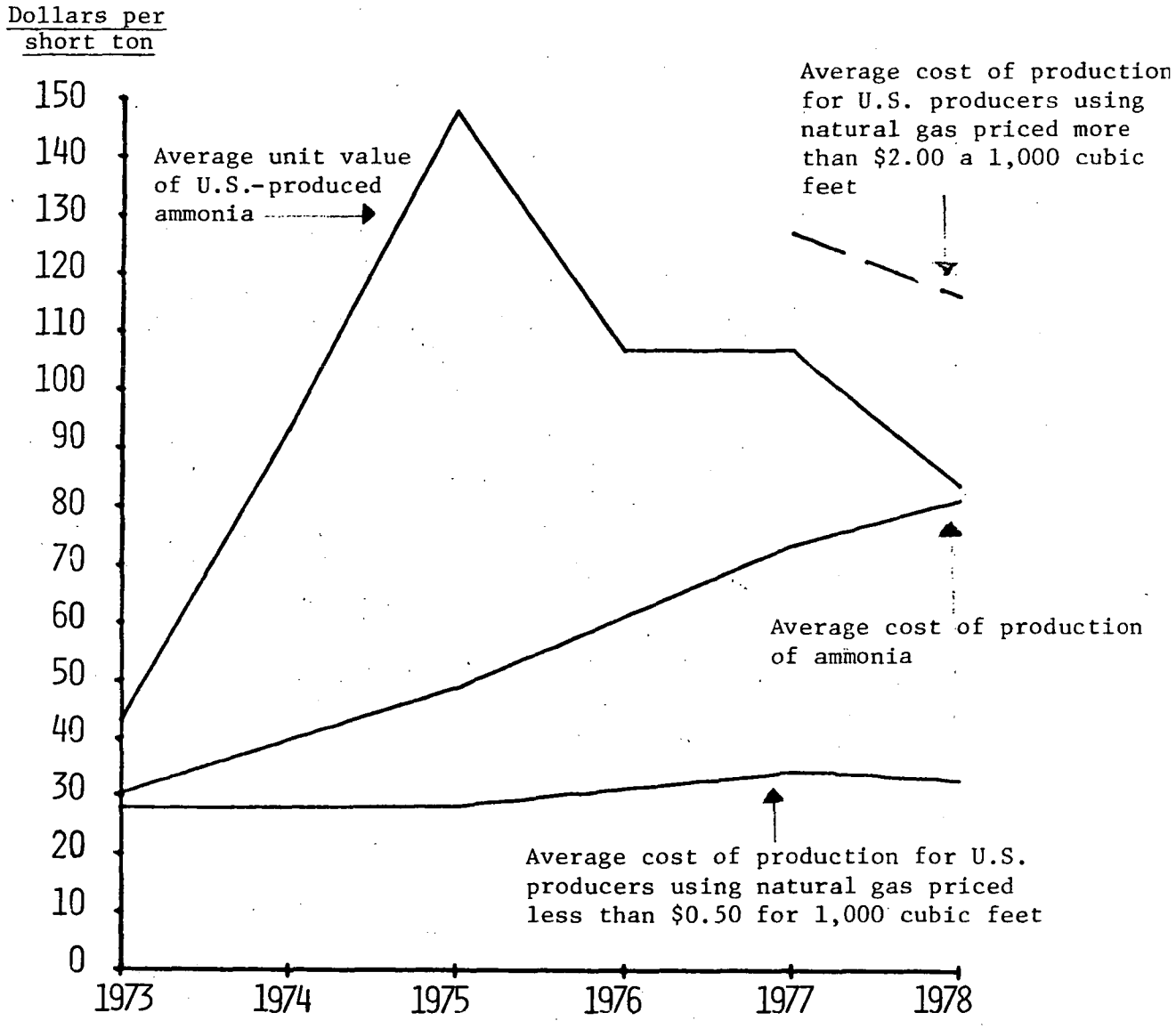
Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

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 1979 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 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.

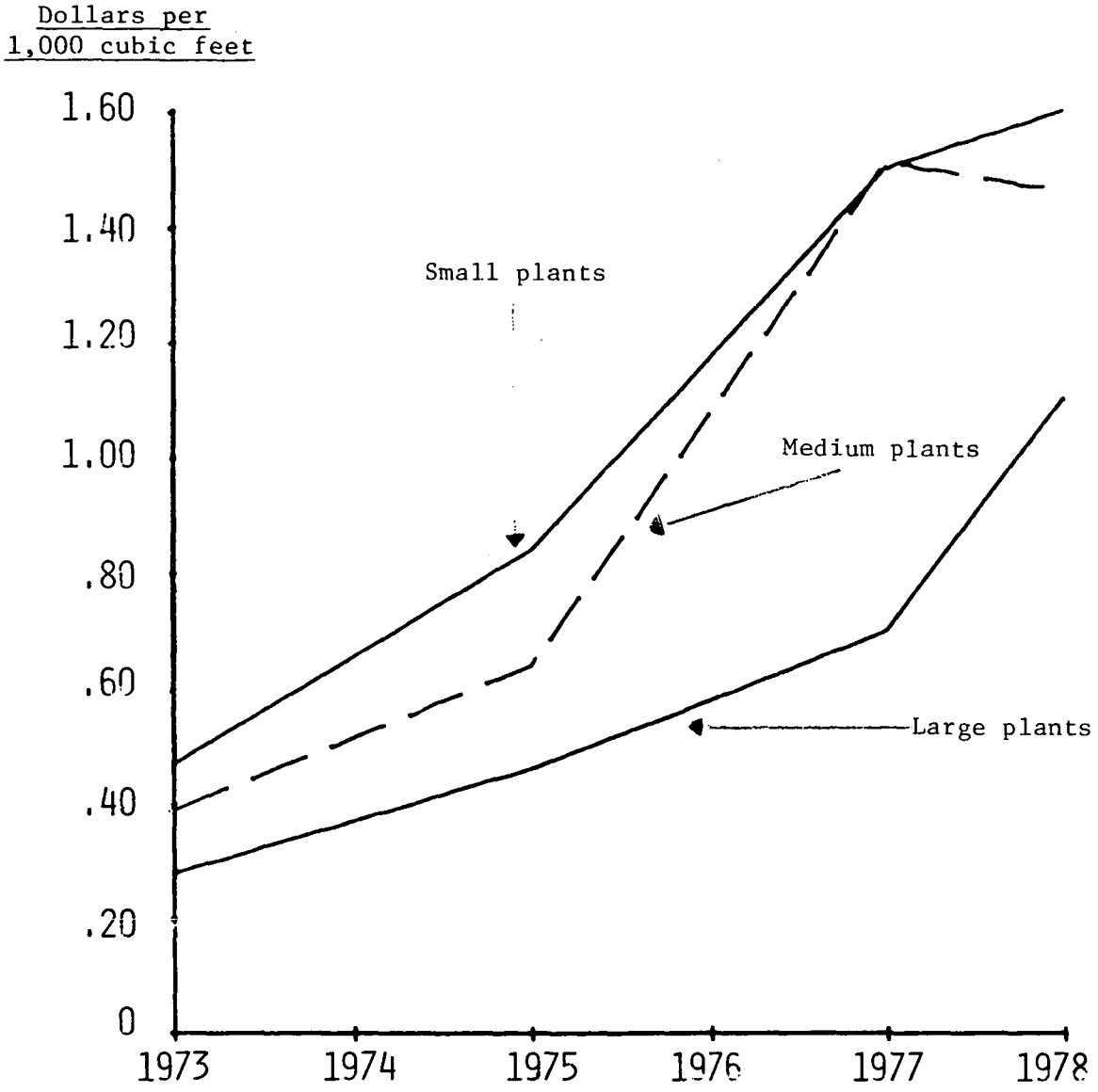
While the amount of natural gas used to produce a ton of ammonia is approximately the same for all sizes of U.S. production facilities, most of the small plants use more expensive natural gas than the large plants (figure 10). In addition, the other costs of production, e.g., electricity, overhead, and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

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.

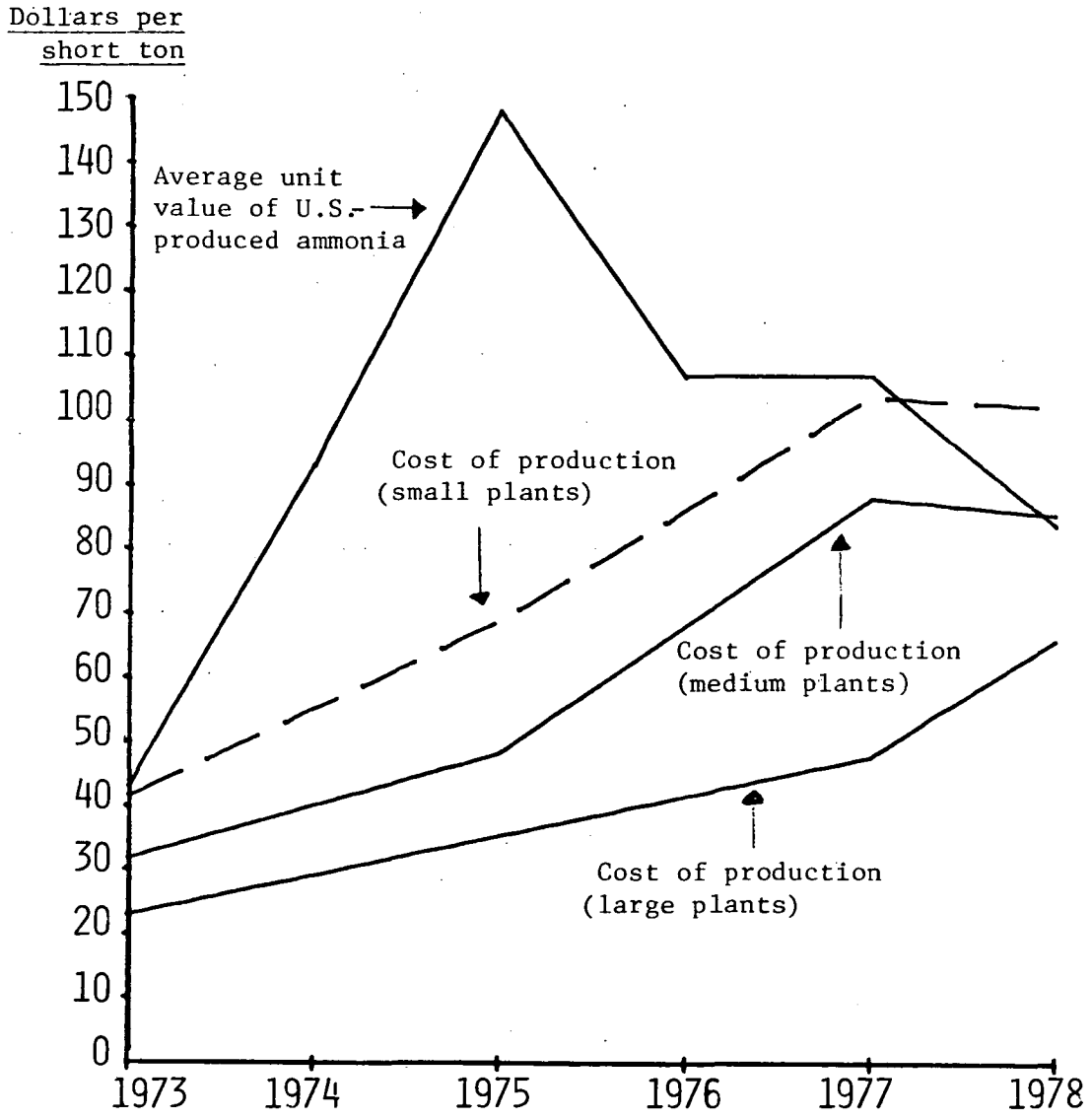
Figure 10.--Average cost of natural gas, by sizes of U.S. ammonia production facilities, 1973-78.



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.

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 22, would be $124 and $130 a short ton if the plants are operated at 85 percent and 70 percent of capacity, respectively.

At the public hearing in investigation No. TA 406-5, 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 22.--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. Ammonia prices reached their nadir at about $78 per ton in the summer of 1978. Spot prices have subsequently increased to about $132 per ton in December 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. on 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.

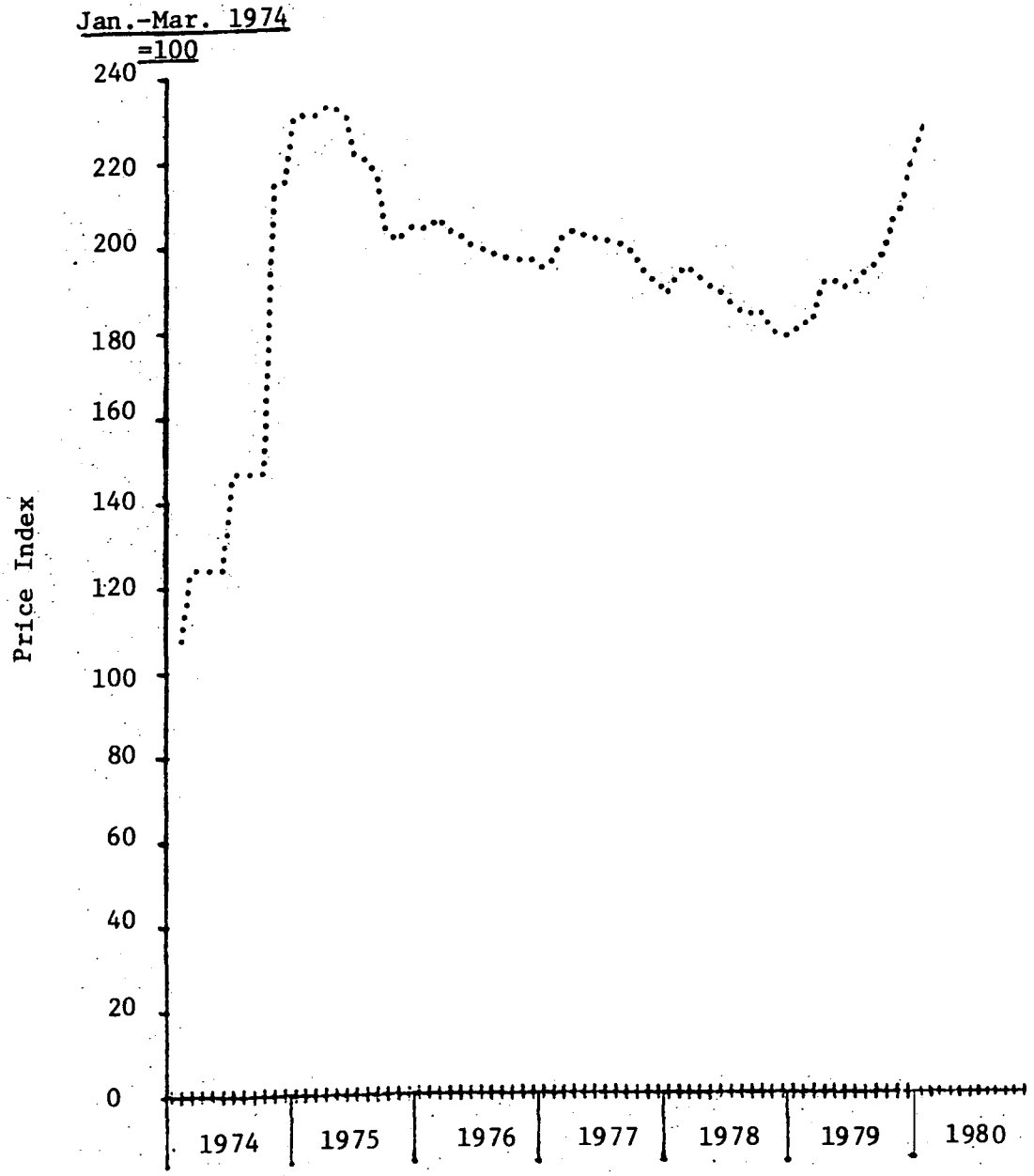
From January 7, 1980, to February 18, 1980, U.S. gulf coast spot prices, as reported by Green Markets, rose from $128-$132 per short ton to $158-$163 per short ton. U.S. producers attribute this sharp increase to the ILA boycott which they allege has prevented Occidental from importing ammonia from the U.S.S.R. According to Occidental officials, however, its ammonia deliveries are on schedule; no ammonia deliveries have been delayed by the ILA boycott. Between January 9, 1980 and March 15, 1980, the effective date of the ILA boycott, 87,000 short tons of Soviet ammonia (3 shiploads) have been offloaded at east coast and gulf coast ports which are organized by the ILA.

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, a fertilizer trade publication that 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.

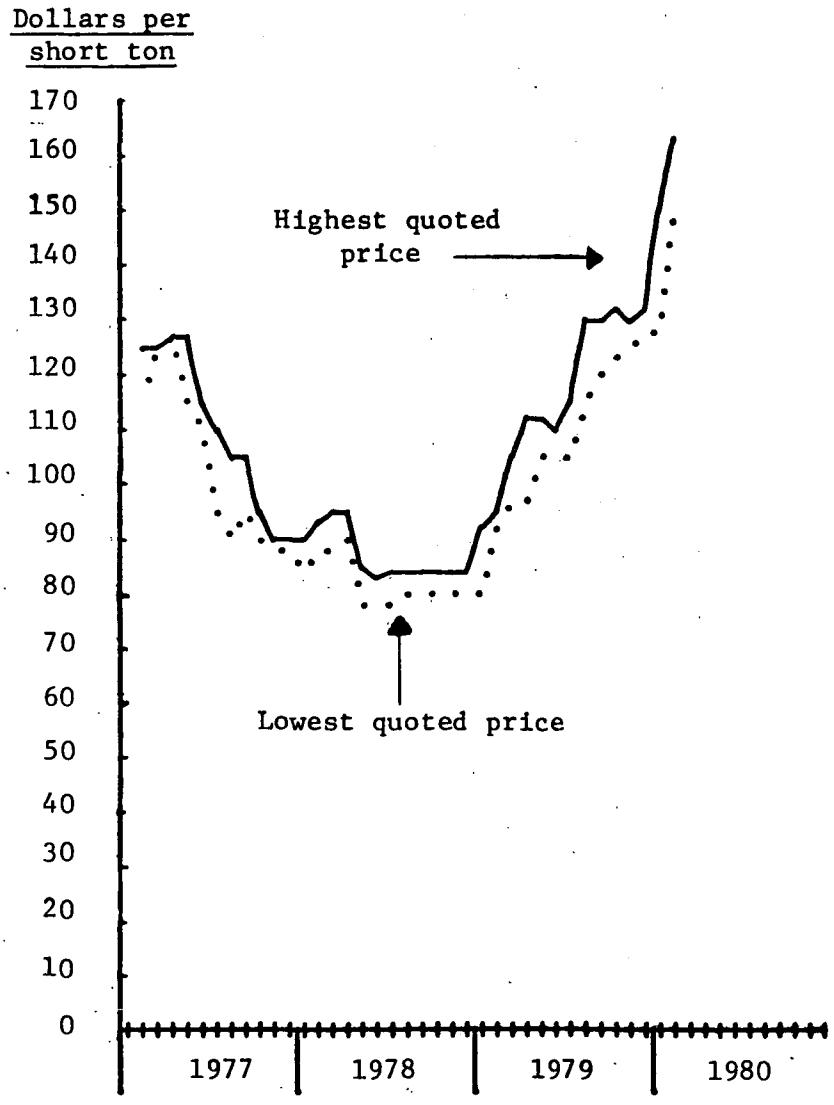
In its questionnaire sent to all U.S. ammonia producers, the Commission requested pricing information from U.S. producers concerning their long-term contracts to customers which purchase ammonia for use in upgrading ammonia into more complex chemicals. From the questionnaire responses, the Commission 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

Figure 12.--Anhydrous ammonia: U.S. producers wholesale price index, by months, January 1974-February 1980.



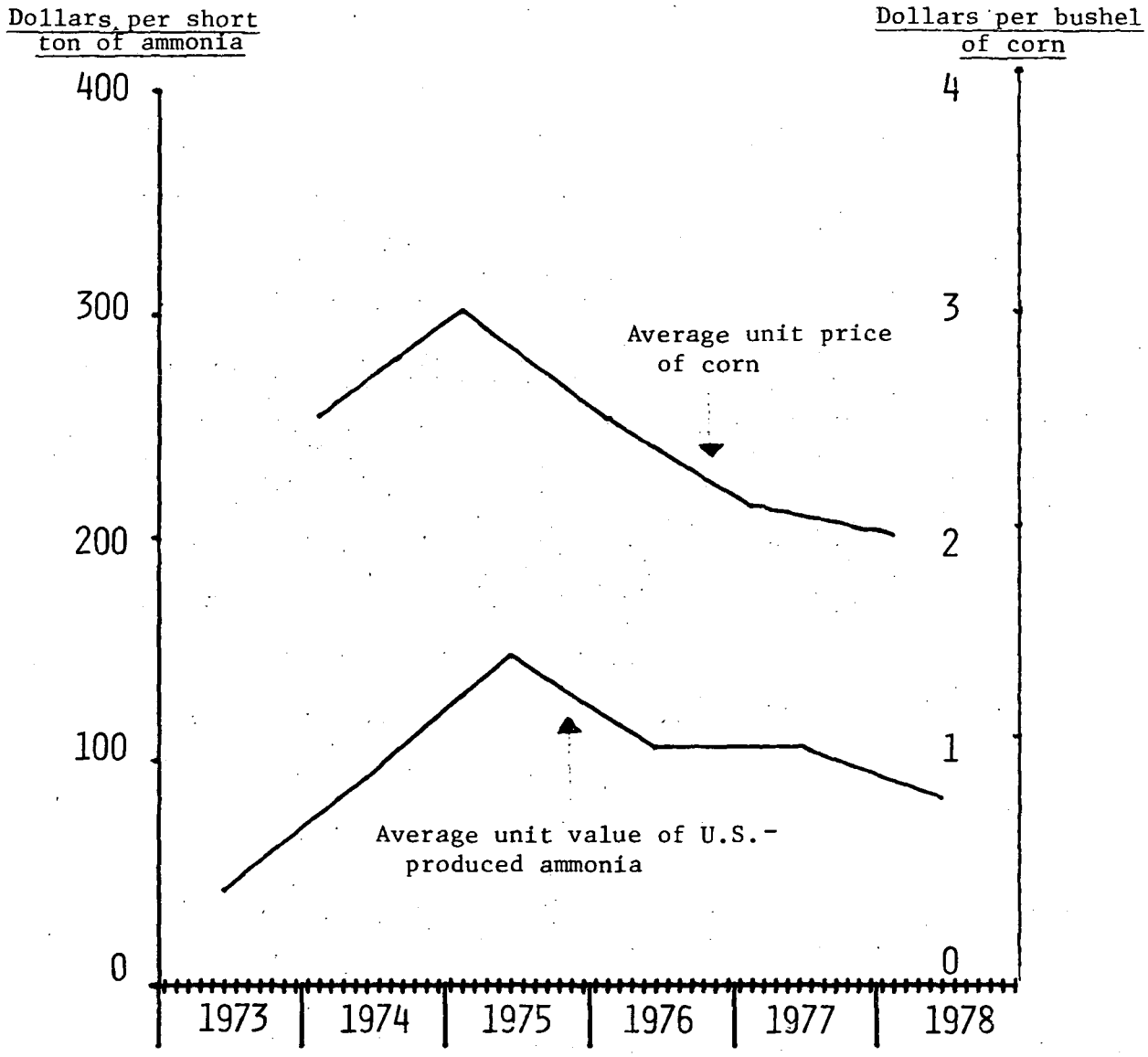
Source: Bureau of Labor Statistics.

Figure 13.--Anhydrous ammonia: Spot prices, f.o.b., U.S. Gulf Coast, February 1977-February 1980.



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.

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 its February 18, 1980 study, Chase predicted that the U.S. gulf coast spot price of ammonia will increase from $106 per short ton in April-June 1979 to $155 in April-June 1980, representing an increase of 46 percent. The April-June spot price, according to Chase, will rise another 20 percent to $186 per short ton in 1981 (table 23). In making these projections, Chase assumed that there would be a 4 million acre diversion program in 1980. However, on February 29, 1980, Agriculture announced there would be no diversion program. Thus, agricultural demand for ammonia and consequently ammonia prices may be higher than Chase projected.

Table 23.--Anhydrous ammonia: U.S. gulf coast projected spot prices, by quarters, January 1980-June 1981

(Per short ton)

Period	Spot price
1980:	
January-March	$149
April-June	155
July-September	150
October-December	165
1981:	
January-March	175
April-June	186

Source: Fertilizer Model Forecasts, Chase Econometrics, Feb. 18, 1980.

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 10 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 10 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 10 U.S. firms which purchase U.S.S.R. ammonia from Occidental on a contract basis are shown in the following list. Seven of these firms are U.S. producers of ammonia. All seven 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 one million short tons.

* * * * * * *

The closed and idled plants owned by the other six producers are relatively small reciprocating plants, with the largest having an annual capacity of *** short tons.

Firm	Producer
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***
***	***

APPENDIX A

THE PRESIDENT'S LETTER

THE WHITE HOUSE

WASHINGTON

January 18, 1980

Dear Madam Chairman:

Pursuant to section 406(c) of the Trade Act of 1974, I have today found that there are reasonable grounds to believe that market disruption exists with respect to imports of anhydrous ammonia, provided for in items 417.22 and 480.65 of the Tariff Schedules of the United States, from the Union of Soviet Socialist Republics. I therefore request that you initiate an investigation on such articles under section 406(a) of the Trade Act of 1974.

Sincerely,

Jimmy Carter

The Honorable Catherine M. Bedell
Chairman
International Trade Commission
Washington, D.C. 20436

APPENDIX B

THE COMMISSION'S NOTICE OF INVESTIGATION AND HEARING

INTERNATIONAL TRADE COMMISSION

[TA-406-6]

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

Investigation instituted. Following receipt on January 18, 1980, of a request from the President (reproduced below), the U.S. International Trade Commission on January 28, 1980, instituted an investigation under section 406(a) of the Trade Act of 1974 (19 U.S.C. 2436(a)) 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 is the product of the Union of Soviet Socialist Republics (U.S.S.R.), whether market disruption exists with respect to an article produced by a domestic industry. Section 406(e)(2) of the Trade Act defines market disruption to exist 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."

The President made the request pursuant to section 406(c) of the Trade Act, having found under that section that there are reasonable grounds to believe that market disruption exists with respect to such anhydrous ammonia the product of the U.S.S.R. The President also found, pursuant to section 406(c), that emergency action was necessary and took action, under sections 202 and 203 of the Trade Act, limiting the quantity of such anhydrous ammonia the product of the U.S.S.R. which may enter the United States during the period January 24, 1980, to January 24, 1981, to 1,000,000 short tons (Proclamation 4714 of January 18, 1980, published in the Federal Register of January 21, 1980 (45 FR 3875)).

The text of the President's letter to the Commission is as follows—

January 18, 1980

The Honorable Catherine M. Bedell,
Chairman, International Trade Commission, Washington, D.C. 20436.

Dear Madam Chairman: Pursuant to section 406(c) of the Trade Act of 1974, I have today found that there are reasonable grounds to believe that market disruption exists with respect to imports to anhydrous ammonia, provided for in items 417.22 and 480.65 of the Tariff Schedules of the United States, from the Union of Soviet Socialist Republics. I therefore request that you initiate an investigation on such articles under section 406(a) of the Trade Act of 1974.

Sincerely,

Jimmy Carter.

Public hearing. A public hearing in connection with this investigation will be held in Washington, D.C., at 10:00 a.m., e.s.t., on Monday, March 3, 1980. 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 to the Commission not later than 5:00 p.m., Tuesday, February 19, 1980.

A prehearing conference in connection with this investigation will be held in Washington, D.C., at 9:30 a.m., e.s.t., on Thursday, February 21, 1980, in Room 117, U.S. International Trade Commission Building, 701 E Street, NW.

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, March 10, 1980.

Issued: January 30, 1980.

By order of the Commission.

Kenneth R. Mason,
Secretary.

[FR Doc. 80-3309 Filed 2-1-80; 8:45 am]

BILLING CODE 7020-02-M

APPENDIX C

THE COMMISSION'S PREVIOUS AMMONIA DETERMINATION

[TA-406-5]

Anhydrous Ammonia From the U.S.S.R.; Report to the President

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 FR 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.

By order of the Commission.

Issued: October 11, 1979.

Kenneth R. Mason,
Secretary.

[FR Doc. 79-32828 Filed 10-23-79; 8:45 am]
BILLING CODE 7020-02-M

APPENDIX D

THE PRESIDENT'S DECEMBER 11, 1979, AND JANUARY 18, 1980, AMMONIA DETERMINATIONS

Federal Register / Vol. 44, No. 240 / Wednesday, December 12, 1979 / Presidential Documents 71009

Presidential Documents

Determination Under Section 406 and 202 of the Trade Act of 1974; Anhydrous Ammonia From the Union of Soviet Socialist Republics

Memorandum for the Special Representative for Trade Negotiations

Pursuant to section 406(b) and 202 of the Trade Act of 1974 (P.L. 93-618, 88 Stat. 1978), I have determined the action I will take with respect to the report of the United States International Trade Commission (USITC), transmitted to me on October 12, 1979, concerning the results of its investigation of a petition for import injury filed on behalf of 12 U.S. producers and one U.S. distributor of anhydrous ammonia provided for under items 417.22 and 480.65 of the Tariff Schedules of the United States (TSUS).

After considering all relevant aspects of the case, including those considerations set forth in section 202(c) of the Trade Act of 1974, I have determined that provision of import relief is not in the national economic interest for the following reasons:

1. Anticipated conditions in the U.S. and overseas markets for anhydrous ammonia do not warrant import relief at this time. The industry is currently operating at 86 percent of capacity and should continue to operate at comparable levels, prices are sharply higher and expected to continue rising, and strong market conditions are projected for the current and next marketing years. Given anticipated growth in demand for grains and other crops, it is critical that farmers have access to sufficient fertilizer supplies at reasonable prices.

2. Relief would not limit the growth in U.S. imports of anhydrous ammonia but will merely shift the source of foreign supplies from the Soviets to other low-cost producers. Thus, the domestic industry would realize little benefit from relief and relief would be unlikely to promote industry adjustment.

You should request the U.S. International Trade Commission to issue a factual report on overall market conditions for ammonia as prescribed under section 332 of the Tariff Act of 1930. This report should be prepared on an annual basis, beginning in November 1980, until further notice. I would plan to have these reports discussed with appropriate Soviet officials through existing channels.

This determination is to be published in the Federal Register.

Jimmy Carter

THE WHITE HOUSE,
Washington, December 11, 1979.

[FR Doc. 79-38295
Filed 12-11-79; 12:10 pm]
Billing code 3195-01-M

Federal Register
Vol. 45, No. 14
Monday, January 21, 1980

Presidential Documents

Title 3—
The President

Proclamation 4714 of January 18, 1980

Temporary Duty Increase on the Importation Into the United States of Certain Anhydrous Ammonia From the Union of Soviet Socialist Republics

By the President of the United States of America

A Proclamation

1. Pursuant to sections 406(c), 202, and 203 of the Trade Act of 1974 (the Trade Act) (19 U.S.C. 2436(c), 2252 and 2253), I hereby find that there are reasonable grounds to believe, with respect to imports of anhydrous ammonia from the Union of Soviet Socialist Republics (U.S.S.R.) provided for in items 417.22 and 480.65 of the Tariff Schedules of the United States (TSUS), that market disruption exists with respect to articles produced by a domestic industry and that emergency action is necessary.

2. Recent events have altered the international economic conditions under which I made my determination that it was not in the national interest to impose import relief on anhydrous ammonia from the U.S.S.R. as recommended by the United States International Trade Commission (USITC) on October 11, 1979. However, the factual basis upon which USITC made its determination of market disruption still exists.

NOW, THEREFORE, I, JIMMY CARTER, President of the United States of America, acting under the authority vested in me by the Constitution and the statutes of the United States, including sections 604, 406(c), 202 and 203 of the Trade Act (19 U.S.C. 2483, 2436(c), 2252, and 2253), do proclaim that—

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

(2) This proclamation shall be effective as to articles entered, or withdrawn from warehouse, for consumption on or after the third day following the date of publication of this Proclamation in the Federal Register and shall remain in effect for one year unless the period of its effectiveness is earlier expressly suspended, modified or terminated, but in any event not longer than authorized by section 406(c) of the Trade Act.

(3) The Commissioner of Customs shall take such action as the U.S. Trade Representative shall direct in the implementation and administration of the import relief herein proclaimed.

IN WITNESS WHEREOF, I have hereunto set my hand this eighteenth day of January in the year of our Lord nineteen hundred and eighty, and of the Independence of the United States of America the two hundred and fourth.

Jimmy Carter

ANNEX

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

Item	Articles	Quota Quantity (in short tons)
	"Whenever the aggregate quantity of anhydrous ammonia specified below for item 923.10, the product of the Union of Soviet Socialist Republics (U.S.S.R.), has been entered during the period January 24, 1980 to January 24, 1981, no anhydrous ammonia in such item, the product of such country, may be entered during the remainder of such period:	
923.10	Anhydrous ammonia, provided for in items 417.22 and 480.65.....	1,000,000"

[FR Doc. 80-2087
Filed 1-18-80; 2:44 pm]
Billing code 3195-01-M

APPENDIX E

AMMONIA PRODUCTION PROCESS

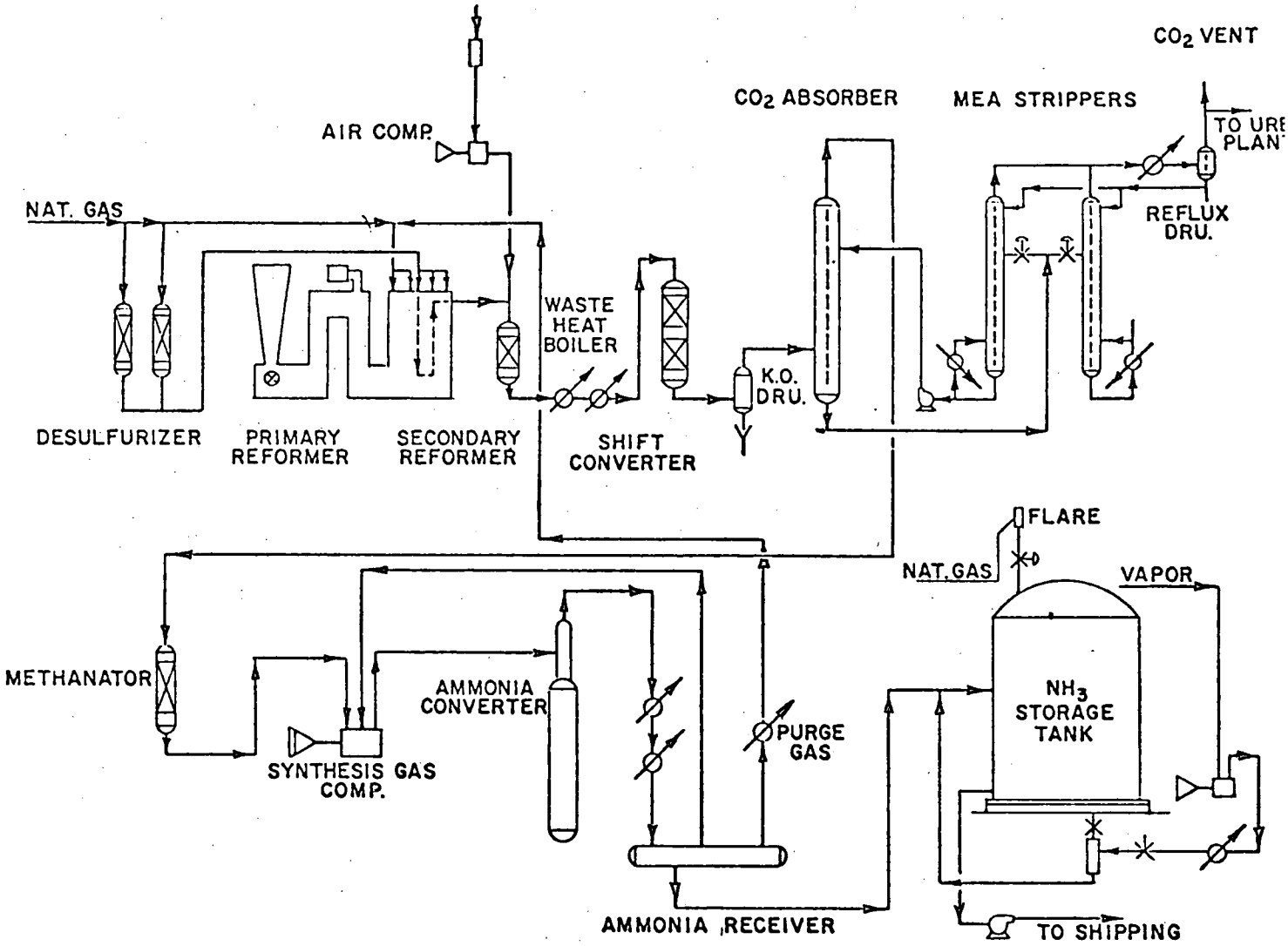
A flow diagram of a typical ammonia plant's production process is presented in figure E-1.

In a typical large ammonia plant, natural gas feedstock is compressed, if necessary, from 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 degrees 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 degrees 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 degrees F. The second-stage shift conversion is carried out over a copper oxide, zinc oxide, aluminum oxide catalyst at a temperature of about 500 degrees F.

Figure E-1.--Ammonia production process.



Source: Agrico Chemical Co.

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 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 degrees 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 degrees to 20 degrees 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 F

U.S. PRODUCTION FACILITIES

WORLD FERTILIZER CAPACITY

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

AMMONIA 01/14/80

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, AR	EXP	340	340	390	390	407	407	407	407	407	407	407	407	407	407	407	407
DONALDSONVILLE, LA	EXP	-	340	400	400	434	434	468	468	468	468	468	468	468	468	468	468
VERDIGRIS, OK	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, FL	OPR	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
ALLIED CHEMICAL CORP																	
LAPLATTE, NE	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, AR	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, TX	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, AZ	IDL	15	15	15	15	15	15	15	15	15	-	-	-	-	-	-	-
APPLE RIVER CHEMICAL																	
EAST DUBUQUE, IL	SLD	230	230	230	-	-	-	-	-	-	-	-	-	-	-	-	-
ARKLA CHEM.CORP.																	
HELENA, AR	SLD	210	210	210	-	-	-	-	-	-	-	-	-	-	-	-	-
ATLAS CHEMICAL (TYLER)																	
JOPLIN, MO	OPR	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
BEKER INDUSTRIES																	
CONDA, ID	OPR	-	-	-	-	100	100	100	100	100	100	100	100	100	100	100	100
CARLSBAD, NM	IDL	-	-	-	-	-	210	210	-	-	-	-	-	-	-	-	-
BORDEN CHEM CO.																	
GEISMAR, LA	EXP	-	340	340	340	340	340	340	340	340	353	353	353	353	353	353	353
SAN JACINTO, TX	CLS	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CALUMET NITROGEN																	
HAMMOND, IN	CLS	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CAMEX, INC.																	
BORGER, TX	EXP	-	340	400	400	400	400	400	400	400	400	400	400	400	400	400	400
CAR-REN																	
COLUMBUS, MS	OPR	-	-	-	-	-	-	68	68	68	68	68	68	68	68	68	68
CF INDUSTRIES,INC.																	
DONALDSONVILLE, 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, NE	OPR	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
TERRE HAUTE, IN	OPR	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

(THOUSAND SHORT TONS MATERIAL)

COMPANY AND LOCATION	PLANT STATUS	1967	1970	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	IDF
USA																	
CF INDUSTRIES,INC.																	
TUNIS-AHOSKIE, NC	OPR	-	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
TYNER, TN	OPR	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
CHEMICALS,INC.--IMCC																	
BARTOW, FL	CLS	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CHEVRON CHEMICAL CO.																	
PASCAGOULA, MS	OPR	-	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510
RICHMOND, CA	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, CA	EXP	-	-	4	20	20	20	20	20	20	20	20	20	20	20	20	20
CITIES SERVICE																	
LAKE CHARLES, LA	CLS	140	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TAMPA, FL	SLD	120	120	120	-	-	-	-	-	-	-	-	-	-	-	-	-
COLUMBIA NITROGEN																	
AUGUSTA, GA	CLS	122	122	122	122	122	122	122	122	-	-	-	-	-	-	-	-
	OPR	-	-	-	-	-	-	-	-	510	510	510	510	510	510	510	510
DIAMOND SHAMROCK																	
DEER PARK, TX	CLS	35	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DUMAS, TX	OPR	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160
DOW CHEMICAL CO.																	
FREEPORT, TX	OPR	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
MIDLAND, MI	CLS	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PLAQUEMINE, LA	CLS	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PITTSBURG, CA	CLS	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E.I.DUPONT DE NEMOUR																	
BEAUMONT, TX	OPR	-	340	340	340	340	340	340	340	340	340	340	340	340	340	340	340
BELLE, WV	CLS	-	340	340	340	340	340	340	340	-	-	-	-	-	-	-	-
	CLS	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GIBBSTOWN, NJ	CLS	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VICTORIA, TX	OPR	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
DUVAL CORP(OXY)																	
HANFORD, CA	IDL	-	-	21	21	21	21	21	21	-	-	-	-	-	-	-	-
	IDL	-	-	-	-	21	21	21	21	-	-	-	-	-	-	-	-
EL PASO PRODUCTS																	
ODESSA, TX	OPR	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
	CLS	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXXON CORP.																	
TROUP, TX	IDF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	340
FARMLAND INDUSTRIES																	
FORT DODGE, IA	OPR	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
DODGE CITY, KS	OPR	-	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
PLAINVIEW, TX	CLS	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HASTINGS, NE	OPR	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
ENID, OK	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																	
NIAGARA, NY	OPR	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85

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																	
FIRST MISS CORP(AMPRO)																	
DONALDSONVILLE, LA	PLN	-	-	-	-	-	-	-	-	-	400	400	400	400	400	400	400
FMC CORPORATION																	
S. CHARLESTON, WV	OPR	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
GARDINIER																	
TAMPA, FL	OPR	-	-	-	120	120	120	120	120	120	120	120	120	120	120	120	120
HELENA, AR	SLD	-	-	-	210	210	210	210	-	-	-	-	-	-	-	-	-
GEORGIA NITROGEN																	
GORDON, GA	SLD	-	-	-	-	-	34	-	-	-	-	-	-	-	-	-	-
GEORGIA PACIFIC																	
PLAQUEMINE, LA	OPR	-	-	-	-	-	-	-	-	196	196	196	196	196	196	196	196
GOODPASTURE,INC.																	
DIMMITT, TX	IDL	31	31	31	31	31	31	31	31	-	-	-	-	-	-	-	-
	OPR	-	-	-	-	-	40	40	40	40	40	40	40	40	40	40	40
GRACE AND EBASCO																	
BASKETT, KY	IDF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	408
GRACE-OKLA.NITROGEN																	
WOODWARD, OK	OPR	-	-	-	-	-	-	-	400	400	400	400	400	400	400	400	400
W.R.GRACE & CO.																	
WOODSTOCK, TN	CLS	275	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	OPR	-	-	340	340	340	340	340	340	340	340	340	340	340	340	340	340
BIG SPRINGS, TX	IDL	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-
GREEN VALLEY CHEMICAL																	
CRESTON, IA	OPR	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
GULF OIL CORPORATION																	
PITTSBURG, KS	CLS	189	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HENDERSON, KY	CLS	107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VICKSBURG, MS	CLS	81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HAWKEYE CHEM(GETTY)																	
CLINTON, IA	OPR	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
HERCULES, INC.																	
HERCULES, CA	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, WA	OPR	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
IMEX,INC.																	
GORDON, GA	IDF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	-	-
PRYOR, OK	IDF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	105
KETONA CHEMICAL CORP																	
KETONA, AL	CLS	51	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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.																	
YAZOO CITY, MS	EXP	340	340	340	340	340	393	393	393	393	393	393	393	393	393	393	393
	CLS	113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PASCAGOULA, MS	OPR	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
MOBIL CHEMICAL CO.																	
BEAUMONT, TX	SLD	300	300	300	300	300	-	-	-	-	-	-	-	-	-	-	-
MONSANTO COMPANY																	
EL DORADO, AR	CLS	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MUSCATINE, IA	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, OK	SLD	105	105	105	105	105	105	105	105	-	-	-	-	-	-	-	-
KERENS, TX	CLS	96	96	96	96	96	96	96	96	-	-	-	-	-	-	-	-
	CLS	-	-	-	-	-	-	19	19	-	-	-	-	-	-	-	-
NITRIN,INC.																	
CORDOVA, IL	CLS	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NORTHERN CHEM.IND.																	
SEARSPORT, ME	CLS	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-REN CORP(CHEROKEE N)																	
PRYOR, OK	EXP	55	55	55	55	55	94	94	94	94	94	94	94	94	94	94	94
N-REN CORP (FARM NAT)																	
PLAINVIEW, TX	CLS	-	-	-	60	60	60	-	-	-	-	-	-	-	-	-	-
N-REN CORP (ST.PAUL AM)																	
PINE BEND, MN	CLS	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EAST DUBUQUE, IL	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.																	
YAFT, LA	OPR	-	-	-	-	-	90	90	90	90	90	90	90	90	90	90	90
LATHROP, CA	IDL	120	120	120	120	120	120	120	120	-	-	-	-	-	-	-	-
	IDL	-	-	-	-	40	40	40	40	-	-	-	-	-	-	-	-
PLAINVIEW, TX	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, MI	CLS	34	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PORTLAND, OR	OPR	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
PHILLIPS PAC CHEM																	
KENNEWICK, WA	OPR	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155
PHILLIPS PETROLEUM																	
BEATRICE, NE	OPR	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
ETTER, TX	CLS	210	210	210	-	-	-	-	-	-	-	-	-	-	-	-	-
PASADENA, TX	CLS	230	230	230	230	230	230	-	-	-	-	-	-	-	-	-	-
PPG INDUSTRIES																	
NATRIUM, WV	OPR	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
REICHHOLD CHEMICALS																	
ST HELENS, OR	OPR	-	-	90	90	90	90	90	90	90	90	90	90	90	90	90	90

TVA - 01/14/80 WORLD FERTILIZER CAPACITY AMMONIA

(THOUSAND SHORT TONS MATERIAL)

COMPANY AND LOCATION	PLANT STATUS	1967	1970	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	IDF
USA																	
RESERVE OIL & GAS																	
HANFORD, CA	SLD	21	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROHM & HAAS																	
DEER PARK, TX	CLS	45	45	45	45	45	45	45	45	-	-	-	-	-	-	-	-
SHELL CHEMICAL CO.																	
ST HELENS, OR	CLS	90	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PITTSBURG, CA	CLS	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VENTURA, CA	CLS	105	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CLS	60	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J.R.SIMPLOT																	
POCATELLO, ID	EXP	54	54	54	108	108	108	108	108	108	108	108	108	108	108	108	108
SOUTHWEST NITROCHEM																	
CHANDLER, AZ	SLD	40	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SUN OIL COMPANY																	
MARCUS HOOK, PA	CLS	133	133	133	-	-	-	-	-	-	-	-	-	-	-	-	-
SWIFT CHEMICAL (ESMARK)																	
BEAUMONT, TX	IDL	-	-	-	-	-	300	300	300	-	-	-	-	-	-	-	-
TENNECO CHEMICAL																	
HOUSTON, TX	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, IA	OPR	-	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
TEXACO,INC.																	
LOCKPORT, IN	CLS	77	77	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TIPPERARY CORP.																	
LOVINGTON, NM	CLS	-	-	-	-	34	34	34	-	-	-	-	-	-	-	-	-
	CLS	-	-	-	-	-	66	66	-	-	-	-	-	-	-	-	-
TRIAD CHEMICAL																	
DONALDSONVILLE, LA	OPR	-	340	340	340	340	340	340	340	340	340	340	340	340	340	340	340
UNION CARBIDE CO																	
TEXAS CITY, TX	CLS	88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UNION OIL CO.(COLLIER)																	
KENAI, AK	OPR	-	510	510	510	510	510	510	1020	1020	1020	1020	1020	1020	1020	1020	1020
BREA, CA	EXP	260	260	260	280	280	280	280	280	280	280	280	280	280	280	280	280
	CLS	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U.S.IND.CHEMICALS																	
TUSCOLA, IL	CLS	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USA PETROCHEM CORP																	
VENTURA, CA	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, AL	OPR	177	177	177	177	177	177	177	177	177	177	177	177	177	177	177	177
GENEVA, UT	OPR	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
VALLEY NIT.PRODUCERS																	
EL CENTRO, CA	OPR	-	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
HELM, CA	CLS	176	176	176	176	176	176	176	176	-	-	-	-	-	-	-	-
CHANDLER, AZ	IDL	-	-	-	33	33	33	33	33	-	-	-	-	-	-	-	-

TVA - 01/14/80 WORLD FERTILIZER CAPACITY AMMONIA

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																	
VALLEY NIT.PRODUCERS																	
HERCULES, CA	IDL	-	-	-	-	-	-	70	70	-	-	-	-	-	-	-	-
VISTRON CORPORATION																	
LIMA, OH	CLS	136	136	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	EXP	-	-	450	450	450	450	475	475	475	475	475	475	475	475	475	475
VULCAN MATERIALS																	
WICHITA, KS	CLS	23	23	23	23	23	23	23	23	-	-	-	-	-	-	-	-
	CLS	-	-	-	-	-	12	12	12	-	-	-	-	-	-	-	-
WYCON CHEMICAL CO.																	
CHEYENNE, WY	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	20765	20765	20765	20765	20765	20765	21652
CANADA																	
BEKER INDUSTRIES																	
SARNIA, ONT	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, ALTA	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, BC	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, ONT	CLS	140	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ESSO CHEMICALS																	
REDWATER, ALTA	EXP	-	210	210	210	210	210	210	260	260	260	260	260	260	260	260	260
ALBERTA	PLN	-	-	-	-	-	-	-	-	-	-	-	-	-	375	375	375
GENSTAR CHEMICAL																	
MAITLAND, ONT	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, ALTA	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, ALTA	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	3174	3174	3174
N AMERICA		14913		18861		20050		24474		23166		23564		23564		23939	
			18638		18709		20752		24826		23564		23564		23939		24826

APPENDIX G

ANALYSIS OF THE OCCIDENTAL-U.S.S.R. AGREEMENTS BY THE GENERAL COUNSEL'S OFFICE, SEPTEMBER 1979

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 3 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 identified 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, respec- tively). 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 (thousand 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 --------	***	***

* * * * * * *

Year	Quantities 1/ (metric tons)	Price f.o.b. Port of Yuzhny
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 previous hearing, pp. 532-33.
2/ Id., p. 533.
3/ Id., pp. 533-34.

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3. Russia--Commerce--United States.
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