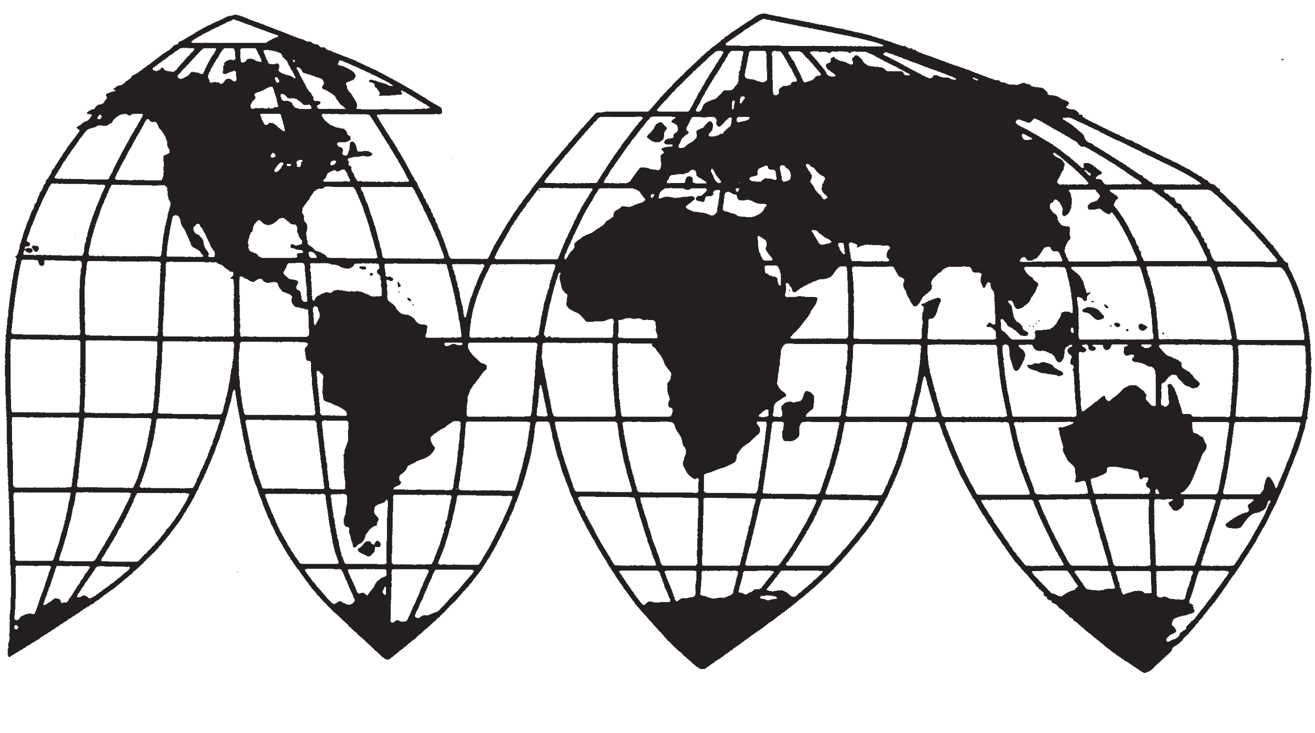
Ammonium Nitrate: A Comparative Analysis of Factors Affecting Global Trade

Investigation No. 332-393

Publication 3135 **October 1998**

U.S. International Trade Commission



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U.S. International Trade Commission

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ABSTRACT

On April 27, 1998, at the request of the Committee on Finance, United States Senate (Committee),[1] the U.S. International Trade Commission (Commission) instituted investigation No. 332-393, *Ammonium Nitrate: A Comparative Analysis of Factors Affecting Global Trade*, under section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)) for the purpose of providing a comparative analysis of factors affecting global trade in ammonium nitrate (AN), with special emphasis on the industries in the United States, the European Union (EU), and Russia. The Commission was requested to provide its report to the Senate Finance Committee by October 2, 1998.

The product of interest to the Committee is ammonium nitrate (AN) in solid form, fertilizer-grade, for use in agricultural applications. Most solid, fertilizer-grade AN is applied to eight row crops[2] and to pastures and forage crops. AN is considered to be relatively quick acting since it is already in a nitrate form used most readily by plants.

The United States, the EU, and Russia are major world producers and consumers of AN. In the United States, production of solid fertilizer-grade AN increased during 1993-97 from 2.0 million metric tons to 2.4 million metric tons, or by 20 percent; U.S. consumption increased during the same period from 2.3 million metric tons to 2.9 million metric tons, or by 26 percent. U.S. production capacity for solid AN remained relatively constant during 1993-1996, amounting to about 2.3 million metric tons product, before increasing to 2.4 million metric tons in 1997 and 2.6 million metric tons in 1998. The major sources of U.S. imports of solid, fertilizer-grade AN in 1997 were Canada, the Netherlands, and Russia. During 1987-93, the import-to-consumption ratio decreased irregularly from 16.7 percent to 13.6 percent, reaching a low of 10.5 percent in 1990. After increasing during 1993-94 to 18.7 percent, the ratio again decreased on an irregular basis to 17.8 percent in 1997 (after reaching a high of 20.7 percent in 1995). The Russian imports alone accounted for 3.1 percent of U.S. consumption in 1994, their first year of entry, increasing to 6.9 percent in 1997.

Natural gas, the basic feedstock for ammonia, accounts for a major share of the cost of producing AN and other nitrogenous fertilizers. Natural gas represents about 30-50 percent of AN production costs. According to estimates provided by consultants, the cost of producing solid, fertilizer-grade AN in the United States, the EU, and Russia is $98 per metric ton AN, $102 per metric ton, and $65 per metric ton, respectively. A more extensive discussion of market factors is provided in the report. Government policies in the United States, the EU, and Russia that affect the pricing of natural gas, as well as the production and consumption of AN, are also discussed in more detail.

Public notice of the investigation, reproduced in appendix B, was posted in the Office of the Secretary, U.S. International Trade Commission, Washington, DC, 20436 and published in the *Federal Register* (63 F.R. 25069) of May 6, 1998. A public hearing was held on June 16, 1998, in Washington, DC.[3] Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under other statutory authority covering the same or similar subject matter.

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[1] The request from the Senate Committee on Finance is reproduced in full in appendix A.
[2] The eight row crops are corn, soybeans, wheat, cotton, barley, sorghum, oats, and rice.
[3] A list of witnesses who testified at the hearing is included in appendix C.

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Executive Summary

On April 3, 1998, the U.S. International Trade Commission (Commission) received a request from the Committee on Finance of the United States Senate to conduct an investigation under section 332(g) of the Tariff Act of 1930 (19 U.S.C. 1332(g)) for the purpose of providing a comparative analysis of factors affecting global trade in ammonium nitrate (AN), with special emphasis on the industries in the United States, the European Union (EU), and Russia. The Committee requested that the Commission provide the following information, to the extent that information is available, with data presented for the most recent 5-year period, except as noted--

(1) an overview of the world AN market, including an examination of consumption (for the most recent 10-year period), import, and export trends. Information on future consumption in the major markets should also be provided;
(2) industry profiles of the principal manufacturers and traders, their pattern of ownership and investment, including the extent to which government programs may affect production and may impede trade in AN between the specified countries. Examples of such programs would be farm policies, industrial policies, economic policies, trade policies, other governmental measures that may affect the cost of raw materials and transportation, and others as appropriate;
(3) an overview of the AN production process, with information on costs of production, including those of its major raw material components, and the principal sources of these feedstocks; and
(4) information on trends in domestic and export prices of AN.

In its letter to the Commission, the Committee stated that the United States is a major producer and consumer of nitrogenous fertilizers, including AN and urea. It indicated that U.S. producers of AN have concerns about competitive conditions affecting their industry, including increased imports of AN from Russia. According to the Committee, U.S. producers believe that these increased imports from Russia are the indirect result of the EU's imposition of an antidumping order in 1995 on EU imports of Russian AN. The Committee also noted that U.S. producers are concerned about additional AN imports from Russia as a result of the EU's recent institution of a review of the original antidumping order.

Product Coverage and Production Inputs

- Solid, fertilizer-grade AN, the product of interest to the Committee, is a nitrogen-based--or nitrogenous--fertilizer produced by reacting ammonia with nitric acid. Ammonia, in addition to being used as a nitrogenous fertilizer itself, is the raw material used to manufacture most synthetic nitrogenous fertilizers. Natural gas, the basic feedstock for ammonia, accounts for a major share of the cost of producing AN and other nitrogenous fertilizers. Natural gas represents about 70-80 percent of ammonia production costs and, in turn, about 30-50 percent of AN production costs.

- Nitrogenous fertilizers are among the most widely used fertilizers in the world. In the United States, nitrogenous fertilizers accounted for 50-55 percent of all the fertilizer used in 1997. The amount of nitrogen in the soil is an important determinant of crop yield. Since crops like corn and wheat consume large quantities of nitrogen from the soil, nitrogen must be restored to the soil for optimum crop yield.

  Solid, fertilizer-grade AN accounted for about 9 percent of U.S. nitrogenous fertilizer consumption in 1997, compared with 7.5 percent in 1993 and 7.9 percent in 1988. Several nitrogenous fertilizers may be substituted for solid AN in direct application as a fertilizer, including anhydrous ammonia (32 percent of 1997 nitrogenous fertilizer consumption), UAN solutions (about 20-24 percent), and urea (14 percent). Calcium ammonium nitrate (CAN) may also be substituted for AN, but its use in the United States is reportedly limited to California and, therefore, accounted for a negligible portion of U.S. nitrogenous fertilizer consumption in 1997.

Summary of Principal Findings [4]

Industry/market overview

- In the United States, prices for solid, fertilizer-grade AN generally trended upward during the time period July-December 1993 through mid-1996 before declining moderately in 1997 and more significantly in January-June 1998, generally to levels near those of 1993-94. Reported reasons for the decline include the impact of new capacity for AN and UAN (potential substitutes for each other) in the United States; the effect of imports on the spot market; growing U.S. inventories of wheat and corn, primarily attributable to decreased exports to certain Asian countries, which, in turn, have dampened U.S. consumption of AN; and the impact of the Chinese ban on imports of certain nitrogenous fertilizers. China is a major world consumer of nitrogenous fertilizers and the closing of this market to non-Chinese sources is considered to have depressed nitrogenous fertilizer prices in general, largely because of the interrelated nature of many of these products (i.e., as inputs or potential substitutes for the others). Chinese imports of nitrogenous fertilizers accounted for about 7 percent of worldwide consumption of nitrogenous fertilizers in fertilizer year 1996/97. The broader world nitrogenous fertilizer market, including solid, fertilizer-grade AN in the United States, is also affected by increased ammonia and urea capacity in the United States and Trinidad and Tobago.

- Russian input suppliers' reluctance to take firm action against late and nonpaying customers, and their willingness to make special payment arrangements, may enable some less-efficient firms to remain in business that would not be able to do so under a strict market economy. For example, RAO GazProm, the main supplier of natural gas in Russia, has been reluctant to deny services to nonpaying firms in all sectors, although it has recently taken steps against several companies. Also, the railroad monopoly has provided services that are not firmly based on costs. In regard to AN specifically, although U.S. industry representatives have suggested that Russian producers have not paid for natural gas or rail transport, such information was not substantiated during field work. However, they have reportedly benefitted from natural gas pricing and rail rates available to all sectors of the economy, as well as from tolling arrangements with the natural gas company.

Economic/Government policies

- During 1993-98, there was a decrease in Russian harvested acreage and grain and oilseed production, resulting in a decrease in domestic fertilizer use and an increase in Russian fertilizer exports. Moreover, Government support to the Russian agricultural sector has been reduced in recent years by the overall budget problems of the Russian Federal Government. Agricultural production is not expected to increase

[4] Assessments of the medium- to long-term effects of the most recent economic changes in Russia, notably the August 17, 1998, ruble devaluation and other economic policy changes that occurred during or around this time, are beyond the scope of this report. Most of the data obtained by the Commission for this investigation were collected prior to the August devaluation and the other significant changes in the Russian economy that have occurred since that time.

in the near future. Several significant changes reportedly would have to occur before farm production and fertilizer use could be expected to increase substantially, including land reform, greater restructuring of previous state farms, and further development of the overall Russian food production and distribution system. However, despite its many institutional problems, Russia is believed to possess the potential to increase its grain production significantly.

- Government macroeconomic policies, including those policies affecting natural gas availability and pricing, have had a significant impact on the business climate in each of the AN producing regions under consideration. In the United States, the natural gas industry has been gradually deregulated since the mid-1980s, generally resulting in increased competition and lower, albeit fluctuating, prices to consumers. Competition exists in both the supply and distribution segments of the U.S. natural gas industry. The lowest natural gas prices are near points of supply, such as in the Gulf Coast States, and in Western States that import low-cost natural gas from Canada. Serving customers distant from the production source adds costs associated with shipping, storage, and handling (compression).

  Deregulation has lagged in Europe except in the United Kingdom (UK), where the process is well advanced. Although European natural gas prices are generally higher than U.S. prices, European prices are expected to decrease as deregulation proceeds and as lower-cost production from the North Sea becomes available. In Russia, price regulation has kept natural gas prices low. GazProm is in the process of changing its pricing policy to more closely reflect production and transportation costs.

  Separately, barter is a dominant feature of the Russian economy, accounting for a substantial portion of transactions for all goods. Because goods are not as liquid as cash, in-kind payments are often greater than cash payments for equivalent goods and services. As part of an effort reportedly intended to transition Russia from a barter economy to a cash economy, legislation was implemented that allows Russian industrial consumers throughout the economy who pay GazProm in advance in cash for natural gas to receive reduced rates as long as the rates are above GazProm's cost of production. According to Russian sources, only a small percentage of Russian firms in all sectors can qualify for the discounts.

- Producers of AN in the United States and in much of Europe have benefitted from relatively stable financial policies over the past 10 years that have held inflation rates to low levels which, in turn, facilitated business planning and access to capital. For example, most AN plants in the United States, primarily built in the 1970s, have been modernized and retrofitted. In contrast, Russia has experienced high inflation and an uncertain business climate, preventing mature capital markets from emerging to replace the state investment capability of the former Soviet Union. As a result, many Russian AN producers have slowed investments in retrofitting and modernization programs. Exceptions include JSC Acron, which characterizes itself as the largest producer of AN in Russia, and some of the other exporting producers.

- Government regulations, including those covering environmental concerns, have tended to increase the cost of producing AN in the United States and the EU. Costs include additional employees and equipment necessary to ensure compliance. Equipment needed to comply with environmental regulations can be expensive. For example, prill tower scrubbers can cost $5-6 million apiece. Russian firms have generally not been subject to these types of regulations, inasmuch as there are no specific environmental or worker safety regulations that apply to AN producers in Russia.

Production costs

- Solid, fertilizer-grade AN produced in Russia is essentially the same as that produced in the United States and the EU in terms of nitrogen content. Moreover, the production technologies used are similar, although the production facilities in Russia reportedly have not been as well-maintained or retrofitted to the same degree as those in the United States and the EU. According to consultants, the estimated 1998 cash cost to produce AN in Russia, the United States, and the EU was $65 per metric ton, $98, and $102, respectively. These costs are based on estimated natural gas costs of $1.30 per million Btu in Russia (this price includes a 20 percent discount from the posted Russian natural gas price), $2.20 per million Btu in the United States, and $2.50 per million Btu in the EU.

Market share

- A review of market share trends compared the shares of the U.S. market, in terms of quantity, for solid, fertilizer-grade AN held by the Russian and EU AN industries with those held by the U.S. industry and other foreign suppliers during 1993-97. The U.S. producers' share of the U.S. market decreased from about 86.4 percent to about 81.3 percent during 1993-94, before increasing slightly during 1994-97 to about 82.2 percent. In comparison, the Russian share of the U.S. market increased during 1993-97 from zero to 7 percent. The EU share of the U.S. market during these years rose from about 3.4 percent to about 6 percent in 1996 before falling to about 3.5 percent in 1997. During the first half of 1998, U.S. imports from both Russia and the Netherlands, the major EU supplier, declined by 44 percent and 17 percent, respectively, compared with the same time period in 1997.

  Russian AN first entered the U.S. market in 1994 and accounted for about 3.1 percent of the U.S. market in that year. During 1994-97, the share of the U.S. market held by imports from Russia increased by almost 4 percentage points, to about 6.9 percent, versus a decline in the EU share of almost 1 percentage point to 3.5 percent. During 1994-97, the shares of the U.S. market held by foreign suppliers other than Russia and the EU countries also shifted in terms of percentage points, including: Canada (a net increase of 0.5, assuming 50 percent of imports by quantity are fertilizer-grade); Egypt (a net decrease of 2.2); Cyprus (-1.1); Mexico (-1); Norway (-0.3); Poland (+0.4); and Estonia (-0.2). Several suppliers active in the 1994 market were found to be no longer involved in the 1997 market (Egypt, Cyprus, Mexico, and Estonia).

  A similar review of the shares of the EU market held by EU producers and foreign suppliers found that the EU market for solid, fertilizer-grade AN increased from 4,864,000 metric tons to 6,392,000 million metric tons during 1993-97. However, the share of the market held by EU producers during these years decreased from 68 percent to 60 percent. In comparison, the Russian share of the EU market increased from 4.8 percent to 14 percent. The U.S. industry exports minimal amounts of solid, fertilizer-grade AN.

Outlook

- The outlook for the U.S., EU, and Russian industries producing solid, fertilizer-grade AN is uncertain based on existing market dynamics. The decline in worldwide nitrogenous fertilizer prices, including those of AN, is expected to continue, at least in the near future. While the exact effect of import prices on U.S. prices has not been ascertained, AN price decreases in the United States through the first half of 1998 may have made the U.S. market for AN less attractive to exporting nations, and may have contributed to the decline in U.S. import levels from the Netherlands and from Russia during that time. The issuance of an antidumping order in 1998 imposing a specific duty on EU imports of AN from

Russia has reportedly made that market "unprofitable" for Russian producers. However, the pressure for Russian producers to export may be ameliorated if very significant actions occur and reforms are undertaken, including improvement in domestic Russian consumption levels to the point of providing a viable market option for domestic AN producers, the expansion of currency-based trade in Russia at the expense of the currently widespread barter and countertrade economy, and, especially given recent events, improvement in the Russian economy as a whole.

World Market Overview[5]

- World consumption of nitrogenous fertilizers, including AN and products generally substitutable for AN, has fluctuated widely in the past 10 years. After rising from 75.8 million metric tons nitrogen (N) in fertilizer year[6] 1987/88 to 79.5 million metric tons N in 1988/89, total world consumption fell continuously to a low of just under 72.5 million metric tons N in 1994/95, and then rose to a record high 82.6 million metric tons N in 1996/97.

  More specifically, world consumption of solid AN declined by 33 percent, from 9.9 million to 6.6 million metric tons N, during 1987/88-1993/94. World consumption then rebounded by 20 percent during 1993/94-1996/97 to 7.9 million metric tons N. The decline during 1987/88-1993/94 may be primarily attributable to decreased AN consumption in the Soviet Union (followed by Russia and the other new independent states (NIS)) and the EU.

- The United States, Russia, and the EU together accounted for about 46-51 percent of world consumption of solid AN in 1997. China and Poland (each about 5 percent) were also significant AN consumers. World imports accounted for about 18 percent of world consumption in 1997.

- In 1997, the United States, the EU, and Russia were the leading world producers of solid AN (fertilizer- and explosive-grade), accounting for a combined total of between 47-53 percent of world production. In terms of exports, usually solid, fertilizer-grade AN, Russia accounted for about 42 percent of the world total. In contrast, the United States exports only minimal amounts of solid AN. Within the EU, the Netherlands provided 9 percent of world exports of solid AN and France accounted for 6 percent.

- The EU accounted for approximately 46 percent of world imports of solid AN in 1997, with France (14 percent) and the UK (13 percent) accounting for the majority. Other Western European countries accounted for about 20 percent of total world imports. U.S. imports of AN (7 percent of the world total) were primarily solid, fertilizer-grade product, with some explosive-grade material obtained from Canada. Major sources for U.S. imports of fertilizer-grade AN in 1997 were Canada (about 38 percent of total such imports), Russia (38 percent), and the Netherlands (17 percent). Other importing regions included the Middle East (about 9 percent), Latin America (about 8 percent), and Asia (about 8 percent; China alone accounted for 5 percent of the world total). Russia imports minimal amounts of AN.

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[5] Selected information on the AN industries in the United States, the EU, and Russia is presented in a tabulation at the end of this Executive Summary.

[6] A fertilizer year runs from July 1 of one year through June 30 of the next year.

U.S. Ammonium Nitrate Industry

- The U.S. nitrogenous fertilizer industry shows a high degree of vertical integration, with many firms processing purchased natural gas into ammonia. Firms with such capabilities account for 60 percent of U.S. production of solid, fertilizer-grade AN. The remainder is produced from purchased ammonia. Many firms in the nitrogenous fertilizer industry produce AN and other nitrogenous fertilizers at the same production site.

- In the United States, about half of the AN solution produced is used to produce solid AN with the balance used to produce UAN. Of the 13 producers of solid AN in the United States, 3 make only explosive-grade AN; the other 10 firms produce solid, fertilizer-grade AN in 11 plants, with some of these firms also making explosive-grade AN and/or other nitrogenous fertilizer products. Two of the 10 firms are foreign-owned and account for about 14 percent of total U.S. production capacity for AN. Geographically, the AN industry is concentrated in Mississippi, Florida, Georgia, and Alabama, which account for a combined 60 percent of U.S. production of solid, fertilizer-grade AN. Firms in these States have ready access to major shipping ports and natural gas supplies. The rest of the industry's output occurs in the Southwest (17 percent), the Midwest (12 percent), and the West (11 percent). Several U.S. companies manufacture AN solution for use in producing UAN solutions without producing solid AN.

- U.S. production of solid fertilizer-grade AN grew by an annual average of 4.2 percent during 1993-96, to 2.3 million metric tons, according to official statistics of the U.S. Department of Commerce (DOC). On the basis of preliminary DOC data for 1997, production is estimated to have grown by 4 percent, to 2.4 million tons. U.S. production capacity for solid fertilizer-grade AN remained relatively stable during 1993-96 at about 2.3 million metric tons before increasing to 2.4 million metric tons in 1997 and 2.6 million in 1998. The 1998 increase reflects capacity expansions by three domestic producers for solid, fertilizer-grade AN that were scheduled to come onstream in 1998. Capacity utilization rose from 87 percent in 1993 to an estimated 99 percent in 1997. Shortages of domestically produced AN have reportedly occurred, most recently in January-June 1998. The shortages prior to 1998 reportedly prompted several U.S. producers and consumers at the wholesale and retail levels to purchase imported AN.

- Virtually all U.S. imports of AN are in solid form mainly because of the added cost of shipping the water contained in aqueous AN solutions.[7] Industry sources also report that fertilizer-grade AN accounts for all imports except those from Canada, which are believed to be roughly equally divided between fertilizer-grade and explosives-grade AN.

- From July-December 1993 to January-June 1997, U.S. demand for nitrogenous fertilizers grew, supply grew at a slower pace, and prices rose. In addition, global demand for U.S. agricultural commodities, including grain and meat products, was strong. In 1996 and early 1997, U.S. prices for solid, fertilizer-grade AN rose to between $175 and $209 per metric ton, f.o.b., with the average unit value of imports of solid, fertilizer-grade AN from Russia and the EU peaking at roughly $141-143 per metric ton, c.i.f., in 1996. AN prices in the United States subsequently fell to between $143 and $206 per metric ton, f.o.b.,

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[7] U.S. imports of AN are reported under Harmonized Tariff Schedule (HTS) subheading 3102.30, "Ammonium nitrate, whether or not in aqueous solution."

in January-June 1998, the lowest prices since 1994. During January-June 1998, the c.i.f. unit values for U.S. imports from Russia and the Netherlands were $94 and $82 per metric ton, respectively.

EU Ammonium Nitrate Industry

- The AN industry in the EU underwent significant restructuring in the early 1990s, as firms modernized facilities, reduced production capacity and employment, and streamlined distribution channels. During 1992-93, production of solid AN declined from 5.3 million to 4.6 million metric tons. The industry restructuring enabled the industry to increase capacity utilization rates, reduce average unit costs, and expand output during 1994-97 to 5.1 million metric tons. These improvements also enabled the EU industry to adapt to changes in market conditions that followed the Common Agricultural Policy (CAP) reform of 1992.

- The EU industry produces mainly fertilizer-grade AN (85-90 percent of total solid AN production). The industry's production capacity for high- and low-density AN is 8.8 million metric tons a year. The industry is concentrated in France, the United Kingdom, Spain, and the Netherlands. The AN facilities in the United Kingdom are owned entirely by foreign investors; about 35 to 40 percent of the AN production capacity in France is foreign-owned. The EU industry is also concentrated on a company basis, with 4 firms accounting for about 70 percent of the capacity.

- EU producers of solid, fertilizer-grade AN have experienced a decline in the cost of natural gas in recent years, based on benchmark prices in the United Kingdom. The decline is partly attributable to cost reductions in offshore pipeline construction and North Sea gas through technological developments, small continental shelf gas field development in the United Kingdom, and re-negotiation of gas prices under the continental EU gas supply agreements. A recently completed "interconnector" gas pipeline, scheduled to open in October 1998, will allow generally lower cost natural gas to flow from the United Kingdom to continental Europe and may further influence market forces and increase public pressure toward gas market liberalization in continental Europe.

Russian Ammonium Nitrate Industry

- The AN industry in Russia consists of 12 firms and is largely domestically owned, although some foreign investment has entered the industry since the privatization of many of the enterprises during 1992-93. The Russian government is also a shareholder in several of the privatized firms.

- Russian AN production capacity, primarily focused towards solid, fertilizer-grade AN, declined during the 1990s, from 10.0 million metric tons in 1990 to 9.8 million metric tons in 1995 to between 8.7 million and 8.9 million metric tons in 1997. Capacity utilization fluctuated widely during these years, falling from about 73 percent in 1990-91 to a low of about 42 percent in 1994, before rising irregularly to about 60 percent in 1997. Russian AN production fell irregularly from 6.3 million metric tons in 1992 to about 5.0 million metric tons in 1997. The decline in AN production is largely attributable to a decrease in Russian fertilizer usage, weakening world demand for AN, and China's import ban on certain nitrogenous fertilizers in April 1997.

- Russian consumption of AN, primarily solid, fertilizer-grade product, fell to sharply lower levels during the 1990s. During 1989-91, consumption declined from 8.5 million to 7.1 million metric tons. After the dissolution of the Soviet Union in December 1991, AN consumption continued declining, reaching

2.0 million tons in 1994. Russian consumption then increased during 1994-97 to 2.7 million tons in 1997. Russian consumption accounted for a declining share of Russian production of solid, fertilizer-grade AN, from 100 percent in 1989-90 to about 41 percent in 1996, before rebounding to 54 percent in 1997. As a result of the decline in Russian demand for AN, Russian AN producers that are in fairly close proximity to a port are exporting some output to markets around the world, including the United States. Although the exact number of companies exporting has not been ascertained, the Russian companies believed to be exporting account for almost 40 percent of total Russian production capacity.

- A major factor affecting the Russian AN industry is the low purchasing power of the agricultural sector in Russia. Government assistance to agriculture has been greatly reduced in recent years. Moreover, programs administered by the banking sector that were intended to provide credit to the agricultural sector have not worked well, reportedly because of the attractiveness of loans with higher rates that can be granted to other sectors of the economy. Additionally, prices of fertilizers in Russia have increased since the dissolution of the Soviet Union and many large collective farms, formerly state-owned but now nominally privatized, are reportedly insolvent and, therefore, unable to buy agricultural inputs. With reduced Government assistance, farmers have had difficulty purchasing needed inputs such as fertilizer.

- In anticipation of eventual improvement in the Russian fertilizer market and given changes in export markets, Russian fertilizer producers are seeking to diversify their product mix for domestic and/or export sales. These producers plan to produce more multinutrient fertilizers for the Russian domestic market and calcium ammonium nitrate for export to Europe. A factor that is said to intensify this effort to maintain profitable products is a Russian taxation regulation that stipulates that product, intended for domestic consumption or export, including AN, cannot be sold below production cost. If products are sold below this level, companies are reportedly penalized by the State Committee on Taxation.

- The price of natural gas in Russia in April 1998, as set by the Russian government, was $1.58 per million Btu's delivered. Some Russian AN producers, however, as well as natural gas consumers in other sectors, are eligible for certain discounts on their natural gas, provided they meet certain conditions. For example, in an effort reportedly intended to transition Russia from a barter economy to a cash economy, legislation was implemented that would allow discounts for natural gas consumers in all sectors who pay in cash and who either have no outstanding debt with GazProm or who have made arrangements to reduce or eliminate their arrearages within a certain time period. In 1997, the discounts offered were up to 40 percent on their natural gas purchase, provided the reduced prices were not less than actual production costs. This discount was increased in 1998 to 50 percent. GazProm has expressed concern that the 50-percent reduction may put the price of natural gas below its production cost.

  In 1997, only a small percentage of the Russian economy could meet the requirements of the discount, and the discounts actually given were prorated by the degree of advance payment. An evaluation of the program found that 131 enterprises in Russia took advantage of this discount in 1997, although none qualified for the full 40-percent discount. Five of these firms were AN producers, which qualified for discounts of 15-18 percent.

Government Policies Affecting the Ammonium Nitrate Industry

Trade and economic policies

- The general rate of duty for U.S. imports of solid, fertilizer-grade AN is "free." The EU has a tariff rate of 6.8 percent on imports of AN from countries outside the EU who are members of the World Trade Organization. The United Kingdom issued an antidumping order in 1994 against imports of AN from Lithuania and Russia, which restricted the quantity of imports from these two countries into the United Kingdom. In 1995, the European Commission imposed an EU-wide variable duty on imports of AN from Russia (i.e., the difference between ECU 102.9 per ton and the net c.i.f. price at an EU border before customs clearance), which was then replaced by an EU-wide specific duty of ECU 26.3 per ton in 1998.[8] The UK order against Russian imports was terminated in 1995 simultaneously with the issuance of the EU-wide order.

Industry-specific policies

- Natural gas was largely deregulated in the United States in the mid-1980s. U.S. prices at the wellhead and for the industrial consumer have been relatively stable, but have responded to supply and demand factors, such as proximity to production points and weather anomalies. Deregulation in the EU has been mainly limited to the United Kingdom, where natural gas prices are currently lower than those in continental Europe. Although continental European natural gas remains regulated with higher average prices than those in the United States, there are some lower-price regions, such as parts of the Netherlands. GazProm is a very large privatized company in which the Russian government, as of early 1998, held approximately 40 percent of the shares. GazProm is a significant exporter of natural gas to countries of the former Soviet Union and to Europe. The Russian Government sets prices for natural gas, as well as for electricity.

Agricultural policies

- Agricultural policies have affected the levels of agricultural production and, in turn, consumption of AN, in the United States and the EU. Past farm legislation in the United States limited the planted acreage and type of crops planted. The U.S. Federal Agricultural Improvement and Reform (FAIR) Act of 1996 removed the link between income support and farm prices by phasing out contract payments over a 7-year period. This Act also eliminated acreage restrictions and deficiency payments and gave the farmer discretion to choose crop type and to bring previously idled land back into production. The increased total acreage in major U.S. field crops following the FAIR Act was primarily a result of higher prices for the crops, combined with the effects of the commodity program changes that increased planting flexibility, according to USDA.[9] Reforms to the European Common Agricultural Policy in 1996 maintained set-aside requirements but at reduced levels, resulting in increased consumption of AN as more arable land was allowed to be planted once again. Similarly, government support for grain production has continued

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[8] The product under consideration in the EU investigation was "ammonium nitrate, which is a fertilizer produced in prill or granular form, containing between 33 and 35 percent nitrogen plant nutrient." (Council Regulation (EC) No. 2022/95, *Official Journal of the European Communities,* 23/8/95, p. No. L 198/2.)

[9] Planted acreage is one of the most important factors determining AN consumption. Other factors include crop mix (some crops are more nitrogen intensive than others), soil, climate, technology, weather, Government programs, and commodity and fertilizer prices.

at reduced levels. Although overall government involvement has decreased in the United States and somewhat in Europe, changes have been gradual.

- The Soviet Union provided large quantities of AN and other agricultural supplies directly to state cooperative farms. This contributed to a large, but reportedly inefficient, use of agricultural inputs, including fertilizers. After the dissolution of the Soviet Union, the transition of Russia's economy resulted in a reduction in the government's budget for the purchase of agricultural inputs, which resulted, in turn, in reduced Russian domestic consumption of AN. Current reforms to improve agricultural efficiency are incomplete, and there are presently very few options, such as available credit, to finance purchase of agricultural inputs in Russia. Private marketing of agricultural inputs is not yet well established.

Regulatory/environmental policies

- U.S. federal and state environmental regulators have moved to reduce fertilizer application, particularly that application leading to groundwater contamination from nitrate infiltration. Farm input controls are aimed mainly at use levels of fertilizer and pesticides, while nutrient management plans, required in 16 States, regulate the use of such substance as nitrates (and hence nitrate fertilizers) usually in areas affected by groundwater contamination. In the EU, the Nitrate Directive intended to reduce the level of nitrates in coastal and inland waters has had little apparent effect on EU grain and oilseed production or on commercial fertilizer sales.

- In the United States, AN and inputs into its production (nitric acid and ammonia) are classified as hazardous materials, and federal and state regulations govern their transport and storage. Environmental regulations restrict air and water emissions and the disposal of solid waste that result from the production of these substances. Process management standards must also be met to ensure worker safety. In the EU, AN production is affected by regulations regarding health and safety, storage, transport, and atmospheric and water emissions. There are also chemical composition, packaging, and labeling requirements. These requirements vary from country to country, but EU-wide regulations are being phased in for most areas. These regulations increase the production cost of AN. In Russia, there are apparently no environmental and worker safety regulations applicable to the AN industry, although the Russian AN industry has, in some instances, reportedly adopted environmentally-aware production practices.

A comparison of selected information on the U.S., the EU, and Russian ammonium nitrate industries is provided in the following table:

Table E-1.
Solid, fertilizer-grade ammonium nitrate: selected information.

Market features	The United States	The EU	Russia
Nitrogenous product(s) most consumed in fertilizer applications in region	Ammonia, UAN, NPKs, urea, and AN	AN is second only to CAN as the nitrogenous fertilizer product of choice in the EU. However, nitrogen vehicle selection varies by the consuming country.	Mostly AN with some ammonia, complex fertilizers, ammonium sulphate, etc.
Number of firms in industry	13 produce solid AN; 10 produce solid, fertilizer-grade AN	About 70 percent of EU production capacity is held by 4 companies	12
AN production capacity (metric tons per year (mtpy)); capacity utilization, 1997	2.4 million mtpy; 99%	8.8 million mtpy; 65% -- 2.3 million mtpy UK; 85% -- 2.7 million mtpy France; 70%	8.74-8.87 million mtpy; 60%
Level of technology	High	High	Medium, varying by company.[10] In recent years, several Russian nitrogenous fertilizer producers, including Acron, have been investing in plant and technology upgrades.
Primary feedstock type; 1997 feedstock price ($ per MMBtu)	Natural gas; $2.23 per MMBtu (wellhead)	Natural gas; $2.00 per MMBtu — UK; about $3.57 per MMBtu – France	Natural gas (some naphtha); about $1.58 per MMBtu delivered (before discounts).
Level of domestic ownership	Primarily domestic with some outside investment (Canadian)	Significant foreign investment; primarily foreign-owned in the United Kingdom; approximately 35-40% foreign direct investment in France; and about half foreign-owned in the Netherlands	Primarily domestic with some outside investment

[10] The European Fertilizer Manufacturers Association (EFMA) characterizes the level of Russian technology in its nitrogenous fertilizer industry as needing to be “revamped.” EFMA, “Factors of Competitiveness: Comparison of the Competitiveness of the Nitrogen Fertilizer Industry in the Main Producing Regions.” Mr. Kantor of JSC Acron, a Russian AN producer, stated that with regard to the Russian fertilizer industry as a whole, “the majority of Russian producers operate obsolete plants and lack a diversified product range.” (“Spearheading Russia’s Revival,” p. 35.)

Table E-1.
Solid, fertilizer-grade ammonium nitrate: selected information (cont'd)

Market features	The United States	The EU	Russia
Share of world imports; share of world exports, (percent), 1997	7% imports; U.S. exports of AN are minor, about 30,000 metric tons	EU: 30% imports; about 19% exports France: 14% imports; 6% exports UK: 13% imports; less than 4% exports	Russia imports practically no AN; 42% exports
Production (metric tons (mt), import (mt), export (mt), and consumption levels (mt) of solid, fertilizer-grade AN in 1997	2.4 million mt production.; 515,000 mt imports (netted for the portion of Canadian exports believed to be explosive-grade product); about 30,000 mt exports; 2.9 million mt consumption	5.2 million mt production (UK–1.8 million mt; France-1.8 million mt); 2.5 million mt imports (UK-713,000 mt; France-687,000 mt); 1.0 million mt exports (UK-91,000 mt; France-350,000 mt); 6.4 million mt consumption (UK-2.3 million mt; France-2.2 million mt)	5.0 million mt production; 15,000 mt imports; 2.4 million mt exports; 2.7 million mt consumption
Proximity to domestic and export markets (usually close to domestic markets, the variation is largely seen in regard to export markets.)	Close for domestic; minimal exports.	Close for domestic; moderately close for primary intra-EU markets.	Close for domestic; moderately close to distant for export markets

CHAPTER I
INTRODUCTION

Purpose and Scope of Study

On April 3, 1998, the Commission received a letter from the Senate Committee on Finance requesting that the Commission conduct an investigation under section 332(g) of the Tariff Act of 1930 for the purpose of providing a comparative analysis of factors affecting global trade in ammonium nitrate (AN), with special emphasis on the industries in the United States, the European Union (EU), and Russia. The Commission was requested to provide its report within 6 months of receipt of this letter, or by October 2, 1998.

In this report, the Commission, as requested by the Committee in its letter, provides the following information for the most recent 5-year period, except as noted, to the extent that such information is available:

(1) an overview of the world ammonium nitrate (AN) market, including examination of consumption (for the most recent 10-year period), import and export trends, with special emphasis on the industries in the United States, the EU, and Russia;

(2) industry profiles of the principal manufacturers and traders, their pattern of ownership and investment, including the extent to which government programs may affect production and may impede trade in AN between the specified countries (examples of such programs would be farm policies, industrial policies, economic policies, trade policies, other government measures that may affect the cost of raw materials and transportation, and others as appropriate);

(3) an overview of the AN production process, with information on costs of production, including those of its major raw material components, and the principal sources of these feedstocks; and

(4) information on trends in domestic and export prices of AN.

In its request letter the Committee noted that the United States is a major producer and consumer of nitrogenous fertilizers, including AN and urea. The Committee stated that it has recently come to its attention that U.S. producers of AN have concerns about competitive conditions affecting their industry, including increased imports of AN from Russia. According to the letter from the Committee, the U.S. producers believe that these increased imports are the indirect result of the EU's imposition of an antidumping order in 1995 on EU imports of AN from Russia. The letter states that the U.S. producers are concerned about additional imports of Russian AN into the United States as a result of the EU's recent institution of a review of its original antidumping order on such EU imports from Russia.

Product Coverage

The product of interest to the Committee is ammonium nitrate[1] (AN) in solid form, fertilizer-grade, for use in agricultural applications.[2] AN, a nitrogenous fertilizer, is produced by reacting ammonia with nitric acid. Ammonia, in addition to being used as a nitrogenous fertilizer itself, is the raw material used to manufacture most synthetic nitrogenous fertilizers.[3]

Fertilizers are applied to acreage to supply nutrients to crops and other plants.[4] Fertilizers are grouped by the nutrient provided. The three primary fertilizer nutrients are fixed[5] nitrogen (N), water-soluble phosphorus (P), and water-soluble potassium (K). The level of nitrogen in the soil, compared with other nutrients, ranks among the most important determinants of crop yield. Since crops like corn and wheat consume large quantities of nitrogen from the soil, nitrogen must be restored to the soil for optimum crop yield.

Nitrogenous fertilizers are the most widely used in the United States, accounting for approximately 50-55 percent of the total quantity of U.S. fertilizer consumption. AN, in turn, accounted for about 9 percent of total nitrogenous fertilizer consumed in the United States in 1997. Most direct-application,[6] solid, fertilizer-grade AN is applied to eight row crops[7] and to pastures and forage crops. AN is also the preferred nutrient for "no-till" planting.[8] AN is considered to be relatively quick acting since it is already in a nitrate form used most readily by plants.

In addition to ammonium nitrate, other common nitrogenous fertilizers include anhydrous ammonia, urea, a nitrogen solution of urea and ammonium nitrate (UAN), calcium ammonium nitrate (CAN), and ammonium sulfate (AS). These products are generally called single-nutrient fertilizers.[9] Use of any of these products, including AN, depends on conditions such as the crop planted, soil and weather conditions, regional farming practices, and relative prices of the nitrogenous products. The substitutability of any of these products for AN will be discussed in more detail in Chapter II.

AN is manufactured as a solution which is then either used directly to manufacture UAN or concentrated and either prilled or granulated to produce a solid product. In the United States, about 50 percent of the AN solution produced is used to manufacture AN in solid form; the remainder is used directly in the production of UAN solutions. Solid ammonium nitrate is produced and marketed either as

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[1] The chemical nomenclature for AN is NH_4NO_3.

[2] Several forms of AN are discussed in this report, including AN in solution, solid AN, and fertilizer-grade and explosive-grade AN. To the extent possible, efforts will be made to distinguish which form of the product is being discussed at any time throughout the report.

[3] IFDC, *Study of Imposing Controls On, or Rendering Inert, Fertilizer Chemicals Used to Manufacture Explosive Materials*, Mar. 28, 1997, p. 1-2.

[4] Depending on the crop, the climate, and the fertilizing schedule, fertilizer may be applied prior to, during, or after planting.

[5] "Fixed" means that the nitrogen is distributed as a chemical combination.

[6] Direct -application fertilizer is fertilizer applied directly on the soil or on crops.

[7] Corn, soybeans, wheat, cotton, barley, sorghum, oats, and rice.

[8] "No-till" planting is that in which there is no plowing. Seed is "drilled in" over the prior crop.

[9] Examples of dual-nutrient nitrogenous fertilizers include monoammonium phosphate (MAP) and diammonium phosphate (DAP); NPKs are multinutrient fertilizers containing nitrogen, phosphorus, and potassium.

granules[10] (used for fertilizer applications, including bulk-blending) or as high- or low-density prills.[11] High-density prills are primarily used for direct-application fertilizer use. Low-density prills, which are porous enough for the addition of fuel oil, are used as explosives.[12] Of the solid product produced in the United States, approximately 60 percent, by weight, is used to make solid AN for fertilizers and the remaining 40 percent is used to make explosive-grade AN.

Study Approach and Organization

The Commission obtained information from a variety of sources.[13] Commission staff conducted telephone and field interviews to obtain first-hand information about the AN industry. These interviews, conducted in the United States, the EU, and Russia, were with representatives of domestic and foreign companies producing natural gas, ammonia, and ammonium nitrate; with representatives of principal trade associations; with representatives of U.S. and foreign governments; and with representatives of major private and governmental research groups. A literature search of industry and government publications was also conducted. Commission staff obtained information from submissions from interested parties and from a public hearing held at the Commission on June 16, 1998 (see appendix C).

Sources of data used in this report include, but are not limited to, government organizations, consulting groups, trade organizations, individual companies, and research groups. In some cases, especially when official statistics were not available, data from several sources are presented for illustrative purposes.

This first chapter of the report provides background information on the study and information concerning the methodology used to develop the information presented, as well as a brief description of the product covered by the request from the Senate Finance Committee. The rest of Chapter I provides an overview of the production processes used to manufacture ammonium nitrate. Chapter II provides a world market overview for ammonium nitrate, with a discussion of the substitutability of other nitrogenous fertilizers for AN and vice versa. Chapters III, IV, and V present industry and market profiles for the U.S., EU, and Russian industries, respectively. Production levels and trade levels for AN in each industry, and pricing trends for AN and its inputs (ammonia and nitric acid, as well as natural gas), are included. Country- or regional-specific government policies affecting the production and consumption of ammonium nitrate and its inputs, including natural gas, are also discussed in Chapters III-V.

Chapter VI summarizes the major findings of the report. The chapter presents a comparison of key features of the ammonium nitrate industries under consideration (e.g., industry-specific data, input costs, prices, and government policies) in a tabular format. In addition to an overview of the factors affecting the industries in each of the three producer areas, the chapter presents estimated production costs for AN in the United States, the EU, and Russia, with information on the production costs of its inputs (i.e., ammonia and

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[10] Hot AN solution is sprayed onto smaller AN particles to make uniform, rounded particles.

[11] Hollow spherical or tear-shaped particles.

[12] According to industry sources, low-density prills are not shipped or used for agricultural uses since the Oklahoma City bombing because of concerns regarding their security and their resultant availability for use as explosives. (USITC fieldwork at several domestic producers, May 19-22, 1998).

[13] Assessments of the medium- to long-term effects of the most recent economic changes in Russia, notably the August 17, 1998 ruble devaluation and other economic policy changes that occurred during or around this time, are beyond the scope of this report. Most of the data obtained by the Commission for this investigation were collected prior to the August devaluation and the other significant changes in the Russian economy that have occurred since that time.

nitric acid) for the United States. In the discussion regarding estimated U.S. production costs for AN, three production cost estimates, obtained from independent sources, are presented to provide a better perspective of the potential range, which, in turn, depends on the operating conditions of a given plant. The cash costs of AN production in the United States are then compared with those in the EU and Russia.[14] Finally, a review of market share trends is included in which the share of the market held by domestic industry and foreign suppliers in both the U.S. and EU markets is examined for the period 1993-97.[15] A glossary is presented in appendix D.

Production Processes for Ammonium Nitrate

AN is produced by reacting ammonia (chemical nomenclature NH_3) with nitric acid (HNO_3). Although many U.S. AN producers are vertically integrated and buy natural gas to produce their own ammonia and, in turn, their own nitric acid, some producers purchase ammonia for the production process.[16] Nitric acid is generally formed on the domestic AN producer's facilities from the reaction of ammonia with oxygen and (in a second reaction) with steam.[17]

Ammonia is generally formed through the reaction of natural gas (methane, or CH_4, is the principal component of natural gas) with steam, creating hydrogen and carbon monoxide (CO) (see figure 1-1).[18] The carbon monoxide is then reacted with steam and ambient air via a carbon dioxide (CO_2) shift conversion to form additional hydrogen. The resulting co-product CO_2 is cleaned, or scrubbed, from the process. The hydrogen is then reacted with nitrogen, the latter either preseparated from air or obtained by using ambient compressed air, to form ammonia.[19]

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[14] This comparison of production among the 3 major producer industries does not include depreciation or capital costs or costs related to regulatory barriers.

[15] The U.S. industry exports minimal amounts of AN and, therefore, was not examined as a foreign supplier to the EU. A similar analysis of the Russian market was not prepared because Russia imports minimal amounts of AN.

[16] Every domestic AN producer reportedly manufactures nitric acid. (USITC fieldwork at several domestic producers, May 19-22, 1998.)

[17] The AN produced in the EU and Russia is essentially the same in terms of nitrogen content as that produced in the United States and the production technology, licensed from leading engineering companies, is basically the same. Russian production units were of similar design to that in the United States and the EU when they were installed (mostly from the 1950s to the 1970s), but, reportedly, have not been as well-maintained and have not been continuously improved as in the United States and in the EU.

[18] In addition to natural gas, other sources of hydrogen are light naphthas and other streams from petroleum refineries and petrochemical plants. From 1913, when synthetic ammonia was first produced, until around World War II, coal was the major raw material for ammonia.

[19] The chemical reactions discussed above are as follows: (1) $CH_4 + H_2O = 3H_2 + CO$; (2) $CO + H_2O = H_2 + CO_2$; and (3) $3H_2 + N_2 = 2NH_3$. Iron and nickel catalysts (with other metals) are used to stimulate the reactions. Continued improvement of these catalysts, along with replacement of piston compressors with rotary compressors, continued improvements in heat-transfer efficiency, and decreases in operating pressure have all contributed to reductions in the cost of producing ammonia.

(Figure 1-1 is not included in the electronic version.)

Ammonia is then converted to nitric acid in a succession of chemical reactions that involve use of a catalyst, usually a platinum-rhodium-palladium alloy in the form of a woven wire mesh.[20] The ammonia is first reacted with oxygen to produce nitric oxide (NO) which, in turn, is reacted with additional oxygen to form nitrogen dioxide (NO_2). The nitrogen dioxide is then converted to nitric acid through the addition of steam.[21]

Ammonia is reacted with the nitric acid in a neutralization reaction to produce AN as a solution, or in liquid form (see figure 1-2). In this reaction, the addition of gaseous ammonia to nitric acid of a concentration of 50-65 percent (in water) at atmospheric pressure generates sufficient heat of reaction to evaporate enough of the water to give a final concentration of approximately 83-87 percent AN.[22] Each ton of 100 percent AN produced in solution requires about 0.21 tons of ammonia and 0.81 tons of 100 percent nitric acid. This is equivalent to an average net quantity of about 0.45 tons of total ammonia required per ton of 100 percent AN (in original solution).

The AN solution is used to manufacture solid, fertilizer-grade AN.[23] When producing solid AN, the goal is to produce a uniformly-sized, abrasion- and crush-resistant, free-flowing solid possessing good storage properties. This involves either granulating or prilling the liquid ammonium nitrate produced. In the granulation process, hot (about 375ºF), liquid, concentrated AN is layered in onion-skin fashion on small seed particles by spraying a 99-percent slurry or solution onto a rolling bed of solid particles in a rotating drum (the Spherodizer granulation process, originally introduced in the 1970s).[24] The resulting granules have a moisture content of about 0.1 percent, have higher crushing strength than prills, and are less likely to break down (i.e., crumble) in storage and handling.

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[20] When the mesh wears out, usually after approximately 2,000 hours, depending on the daily production rate, the precious metals are recovered and then reused. In some recently developed catalysts, less expensive metals such as cobalt are replacing some of the platinum.

[21] The chemical reactions described above are as follows: (1) $4NH_3 + 5O_2 = 4NO + 6H_2O$; (2) $2NO + O_2 = 2NO_2$; and (3) $3NO_2 + H_2O = 2HNO_3 + NO$.

[22] Heat release in the reactor has to be carefully controlled. It is undesirable to let the contents of the reactor actually boil, because although it will drive off water as steam, which is desirable, it increases the risk of ammonia and nitric acid losses by volatilization and entrainment. Second, AN tends to decompose and even to explode at elevated temperatures. Several reaction mechanisms are involved, all of them exothermic, and the heat of reaction causes an increase in temperature which increases the rate of decomposition-- "thermal runaway." Ultimately, above 260ºC, other more violent and highly exothermic decomposition reactions take place and, particularly in an enclosed space, an explosion may occur. Proper control of the conditions and heat balance in the neutralization section is thus paramount, and it is the goal of making the best possible use of this heat that has largely shaped the technology of AN synthesis processes in recent years. As one example, Mississippi Chemical, faced with the difficulty and expense of removing AN fumes, nitric acid mist, and ammonia vapor from off-gases, decided that it would be better to avoid their formation in the first place. During the 1970s, a new low-emission reactor design was developed. The advantages of this reactor design were that there is no need for expensive scrubbing and consequently no weak AN solutions to concentrate.

[23] In some instances, depending on the manufacturer, only part of the liquid AN produced is solidified. For example, companies that produce UAN solution in addition to solid, fertilizer-grade AN will use some of the liquid AN produced to manufacture the UAN solution. Some companies produce AN solution for use in producing UAN solutions without producing solid AN.

[24] Another process is the fluid-bed granulation process developed by Nedelandse Stikstof Maatschappiz. In this process, the seed particles enter the baffled granulator chamber and are continuously coated with droplets of AN. The largest granules immersed in the fluidized layer settle and flow out of the bottom of the granulator.

(Figure 1-2 is not included in the electronic version.)

In the prilling process for solid, fertilizer-grade AN, the hot AN solution, concentrated by evaporation to about 99.0-99.5 percent AN,[25] is combined with activated clay, diatomaceous earth,[26] various stabilizing agents added prior to prilling, and proprietary mixtures (such as one based on boric acid mixed with diammonium phosphate and ammonium sulfate). The resulting mixture is fed into the top of a prilling tower where it drops or is sprayed into a current of cool air that dries the falling AN drops, forming individual solid prills. The prills are then collected at the bottom of the tower, further cooled, and coated with an anticaking conditioner to prevent caking and to make them more easily blendable with other fertilizers and more capable of uniform spreading on the ground.[27]

Anticaking conditioners historically used were fine powders such as clay, talc, and chalk, as well as petroleum oils and waxes to reduce dusting. In recent years a number of proprietary anticaking agents have entered the market, including the following:[28]

Agent	Type	Company
Lilamin	Fatty amines with special additives	Nobel Industries (Sweden)
Fluidiram	Cationic surfactants based on fatty amines	CECA SA (France)
Petro AG Special	Surfactant	Desoto Inc. (United States)
Galoryl	Alkyl-aryl sulphonates (anionic surfactants)	CFPI (France)

Other additives are incorporated as part of the production process to increase the stability, strength, and hardness of the AN, and as phase change stabilizers.[29] Possible additives include magnesium oxide (MgO), which reacts with the free nitric acid to form magnesium nitrate,[30] and, more recently, aluminum sulfate.

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[25] The concentration of the original hot, liquid AN determines if the resulting prilled product will be high density (i.e., fertilizer-grade product) or low density (i.e., explosive-grade product). High-density prills are generally made from liquid AN concentrated to about 99.0-99.5 percent AN. In contrast, low-density prills are generally produced from a solution concentrated to 95 percent. Some of the water in the 95 percent solution remains in the prill when it is solidified. Removal of that water by additional drying leaves a low-density prill that has a porous structure that aids in the retention of the added fuel oil. (*Study of Imposing Controls On, or Rendering Inert, Fertilizer Chemicals Used to Manufacture Explosive Materials*, p. 1-6.)

[26] Diatomaceous earth contains or consists of diatoms or their fossils. Diatoms are any plant of the *Diatomaceae*. (*Webster's New Universal Unabridged Dictionary*, Deluxe 2nd edition, 1979, p. 505.)

[27] Ammonium nitrate is hygroscopic and will readily absorb moisture from the air. This moisture, along with plastic deformation occurring from pressure, can result in the fertilizer particles binding together and becoming unable to be uniformly spread.

[28] "The Latest in Fertilizer Cake Prevention," *Fertilizer Finishing, Nitrogen Magazine*, Sept./Oct. 1990.

[29] "Pure AN occurs in different crystal forms in different temperature ranges. As the ambient temperature changes, the AN shifts to the crystal structure most stable at the new temperature. The most important shift occurs at 32.2ºC (90ºF)." Repeated phase changes weaken the product. (IFDC, *Study of Imposing Controls On, or Rendering Inert, Fertilizer Chemicals Used to Manufacture Explosive Materials,* p. 1-7; USITC fieldwork at several domestic producers, May 19-22, 1998.)

[30] In addition to strengthening the AN, these additives also affect the temperature at which the finished AN goes through a phase change. Each additive affects the temperature a little differently. MgO, for example, will increase the temperature at which the phase change occurs to 95ºF or higher, thereby potentially reducing the number of times the product has to undergo this structural change. The finished product can undergo this structural change any time the temperature rises to this level, even while warehoused or in transport.

Some U.S. ammonia plants were built in the 1950s, but many more were constructed in the 1970s and a few in later years. They now number more than 40 and their average age considerably exceeds 20 years, though, on average, their latest revamping (i.e., modernizing and retrofitting) was about 5 years ago. U.S. nitric acid plants are newer, with many built in the 1980s and 1990s. Most AN plants in the United States, primarily built in the 1970s, have been modernized and retrofitted.[31]

Product Substitutability

Several different nitrogenous fertilizers, each with its own advantages and disadvantages, may be substituted for AN as a source of agricultural nitrogen depending upon the intended crop, soil assay, climatic conditions, regulatory factors, and relative product prices. When multiple products can fill specific application needs, price is a major factor in differentiating use of the separate products. Other important factors determining substitutability are the intended application and the temperature at which the product is applied. The low volatility of AN makes it competitive with ammonia, urea, and UAN solution, particularly in warmer climates.[32] Conversely, in cooler climates, solid fertilizer-grade AN product competes less favorably with direct application ammonia, UAN solutions, solid urea, and NPK bulk blends. For example, although AN and UAN can be used interchangeably on some product applications such as grass (especially weedy broadleaf grass), the solid product is preferred if the temperature is hot so as to avoid burning the grass.

Anhydrous ammonia, which contains 82.2 percent nitrogen, has the highest nitrogen content of all of the nitrogen fertilizers, and, per unit of nitrogen, is the lowest-cost nitrogen fertilizer. However, as a matter of practicality and cost effectiveness, ammonia is not generally a nitrogen source of choice for agricultural application because of its physical characteristics. At ambient temperature and atmospheric pressure, ammonia is a toxic gas; storage and distribution are expensive because ammonia must either be cooled to a liquid by refrigeration or stored and transported in high-pressure containers; application is expensive because special plows are required that inject the ammonia, as a gas, deep in the soil; and soil conditions must be such that ammonia will be retained until it is nitrified by soil microorganisms. In addition, ammonia cannot be blended with other solid fertilizers for broadcast distribution.

Urea has the highest nitrogen content of the solid nitrogen fertilizers (46.6 percent), is safe to store, and is easy to handle. It also has a transportation advantage in that it can be shipped, or back-hauled, in the same vessels used to transport bulk cargoes, such as grain. Solid urea offers high nitrogen content, storage, and blending advantages with the disadvantages of the relatively slower rate of conversion of available nitrogen to nitrate in the soil (slower fertilizing effect) and the potential inclusion in the product of possible manufacturing impurities (such as biuret) that could damage the crop.[33]

Solid AN contains 34 percent nitrogen and is marketed as prills and granules that look very much like urea. Solid AN offers a relatively high assay of nitrogen in nitrate form and may be blended with other

[31] According to information provided by industry sources and "Production Cost Surveys for the Year Ended December 31, 1997" of The Fertilizer Institute, 1998, p. 1.

[32] AN is considered less volatile than the other products in hotter weather in that it will not evaporate or dissipate as a result of the heat, thereby decreasing the amount of nitrogen actually applied.

[33] USITC, *Industry and Trade Summary: Fertilizers*, pub. No. 3082, March 1998, pp. 3-4.

solid fertilizers for broadcast.[34] Moreover, AN is considered to be relatively quick acting since it is already in a nitrate form used most readily by plants. However it is very hygroscopic and can present a fire or explosion hazard if contaminated with organic matter or not stored properly.

Nitrogen solutions are aqueous mixtures, usually of urea and AN (UAN), with a temperature sensitive nitrogen content that can range from 28 to 32 percent. UAN solutions are easy to handle (simply by pumping), can be more uniformly applied to the soil than solid fertilizers, can be metered into irrigation water to provide nitrogen to growing crops, are less costly than ammonia to transport and store, and direct production from urea and AN reactor solutions eliminates prilling or granulating costs. However, lower UAN nitrogen content increases shipping costs per unit nitrogen and different equipment is required for application than is used for solid fertilizers.

CAN offers nitrogen in nitrate form, may be blended with other solid fertilizers, and does not present an explosion hazard. The latter property makes it favored in certain EU countries, such as Ireland, where AN use is banned because of concerns about explosion hazards. In the United States, the use of CAN is reportedly limited to applications in California because of the crops grown there and the soil content. The added calcium carbonate, which reduces the potential for explosion, results in the reduced nitrogen content (26 percent). Most consumers in the United States prefer AN's higher nitrogen content.

Finally, AS is particularly useful for certain sulfur deficient soils. It may be blended for broadcast with other solid fertilizer nutrients.

[34] In practice, the liquid form of AN is used primarily to produce urea-ammonium nitrate (UAN) aqueous fertilizer solutions.

CHAPTER II
WORLD MARKET FACTORS

World consumption of nitrogenous fertilizers, including AN and products generally substitutable for AN, has fluctuated widely in the past 10 years. After rising from 75.8 million metric tons in terms of nitrogen content (N)[1] in fertilizer year[2] 1987/88 to 79.5 million metric tons N in 1988/89, total world consumption fell continuously to a low of just under 72.5 million metric tons N in 1994/95 and then rose to a record high 82.6 million metric tons N in 1996/97, the latest year for which such data are available (table 2-1).

More specifically, world consumption of solid AN declined by 33 percent, from 9.9 million to 6.6 million metric tons N, during 1987/88-1993/94. World AN consumption then rebounded by 20 percent to 7.9 million metric tons N during 1993/94-1996/97. The decline in world consumption during 1987/88-1993/94 may be primarily attributable to decreased AN consumption in the Soviet Union (followed by Russia and the other NIS) and the EU.

The decline in consumption of nitrogenous fertilizers in Russia and the other new independent states (NIS),[3] as reflected in the aggregated data presented for the region in table 2-1, accelerated following the dissolution of the Soviet Union in 1991. As shown in table 2-1 under the heading "NIS," consumption of nitrogenous fertilizers in that region had begun to decline before the dissolution of the Soviet Union. During fertilizer years 1991/92 through 1995/96, consumption declined by about 66 percent before rebounding somewhat in 1996/97. The 1996/97 level of 2.9 million metric tons N represents about one-fourth of the consumption level 10 years earlier.

AN is the primary vehicle used for nitrogen delivery to agriculture in Russia. The 1991 dissolution of the Soviet Union left agricultural consumers insolvent, with an insufficient domestic agricultural support budget, ineffective federal aid, no government promotion of domestic demand, high interest rates for commercial credit, and a destroyed fertilizer distribution network.[4] AN consumption in the Soviet Union (followed by Russia and the NIS) decreased by an average annual rate of approximately 12 percent during 1987/88-1994/95, from 4.2 million metric tons N to 1.7 million metric tons N, before increasing again to 1.9 million metric tons N in 1996/97.

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[1] As with other fertilizers, data for AN can be reported in terms of either tons of product or the nutrient content. When compiling data for multiple, disparate nitrogenous fertilizers, for example, data are generally expressed in terms of the nutrient content to aid in direct comparison because of the varying nitrogen content of the individual products. In the case of ammonium nitrate, which is 34 percent nitrogen, the nutrient content would be 34 percent of the total product tonnage. As such, 100,000 metric tons of product would be expressed as 34,000 metric tons N.

[2] A fertilizer year runs from July 1 of one year through June 30 of the next year.

[3] The Soviet Union was dissolved in December 1991. The Russian Federation (Russia) is the largest (in terms of geographic size, population, and economic output) of the successors of the Soviet Union. References to the successor states of the Soviet Union will be as new independent states (NIS).

[4] Kantor, *The Russian Nitrogen Industry,* (paper presented at the IFA Production and International Trade Committee Meeting, Warsaw, Poland, Oct. 14-15, 1997), p. 2.

Table 2-1
Consumption: Selected nitrogenous fertilizers, world, United States, EU, NIS, Asia, China, India, other Asia, and all other, fertilizer years[1] 1987/88-1996/97

Year	AS (21% N)	Urea (47% N)	AN (34% N)	CAN (26% N)	Ammonia[2] (82% N)	UAN[2] (30% N)	Other N fertilizers[3]	Total nitrogen
	1,000 metric tons N							
World:								
1987/88	3,028	27,174	9,885	4,452	5,292	4,159	21,796	75,785
1988/89	2,995	29,560	9,733	4,538	5,273	4,609	22,806	79,513
1989/90	2,938	29,913	8,871	4,247	4,935	4,692	23,289	78,885
1990/91	2,775	29,575	8,265	4,055	5,171	4,343	22,941	77,126
1991/92	2,632	29,905	7,435	3,705	5,183	4,204	22,403	75,473
1992/93	2,532	31,044	6,779	3,828	4,440	3,859	21,281	73,762
1993/94	2,420	30,153	6,596	3,823	5,052	3,802	20,651	72,498
1994/95	2,422	30,951	6,770	3,704	4,123	3,794	20,690	72,455
1995/96	2,515	34,435	7,515	3,569	4,649	4,014	21,878	78,593
1996/97	2,531	36,543	7,868	3,563	4,688	4,097	23,355	82,646
United States:								
1987/88	143	1,387	544	-	3,422	1,966	2,074	9,536
1988/89	156	1,408	584	-	3,530	1,908	2,024	9,610
1989/90	167	1,557	547	-	3,522	2,105	2,151	10,048
1990/91	157	1,432	569	-	3,816	2,146	2,120	10,239
1991/92	172	1,476	588	-	3,724	2,252	2,174	10,385
1992/93	166	1,633	590	-	3,256	2,429	2,261	10,335
1993/94	181	1,677	607	-	4,116	2,543	2,346	11,469
1994/95	191	1,679	581	-	3,309	2,514	2,358	10,632
1995/96	200	1,631	646	-	3,694	2,643	2,348	11,161
1996/97	223	1,618	598	-	3,652	2,651	2,443	11,185
EU:								
1987/88	451	1,530	2,117	2,825	187	749	3,313	11,171
1988/89	437	1,440	2,087	2,944	184	727	3,324	11,143
1989/90	438	1,443	2,071	2,721	144	886	3,239	10,954
1990/91	278	1,294	2,020	2,651	118	828	3,005	10,191
1991/92	279	1,342	1,957	2,499	121	918	2,769	9,883
1992/93	237	1,150	1,406	2,645	32	850	2,725	9,044
1993/94	230	1,191	1,506	2,591	37	872	2,734	9,160
1994/95	274	1,104	1,779	2,512	36	938	2,908	9,552
1995/96	218	1,130	1,956	2,437	65	1,012	2,806	9,623
1996/97	233	1,163	2,017	2,353	66	1,104	2,793	9,729
NIS:								
1987/88	397	2,617	4,200	-	1,033	1,012	2,528	11,787
1988/89	405	2,300	3,900	-	897	1,523	2,562	11,587
1989/90	350	1,994	3,179	-	551	1,300	2,544	9,918
1990/91	300	1,700	2,878	-	500	1,000	2,360	8,738
1991/92	250	1,745	2,578	-	500	800	1,905	7,778
1992/93	302	1,077	2,264	-	350	431	917	5,341
1993/94	190	800	1,830	-	100	200	825	3,945
1994/95	149	529	1,674	-	-	150	137	2,639
1995/96	163	436	1,785	-	-	150	98	2,632
1996/97	118	595	1,927	-	-	150	95	2,885

Table 2-1--Continued
Consumption: Selected nitrogenous fertilizers, world, United States, EU, NIS, Asia, China, India, other Asia, and all other, fertilizer years[1] 1987/88-1996/97

Year	AS (21% N)	Urea (47% N)	AN (34% N)	CAN (26% N)	Ammonia[2] (82% N)	UAN[2] (30% N)	Other N fertilizers[3]	Total nitrogen
	1,000 metric tons N							
Asia:								
1987/88	902	16,432	689	224	-	51	10,724	29,016
1988/89	936	19,075	679	222	-	53	11,632	32,596
1989/90	943	19,325	657	196	-	-	12,096	33,216
1990/91	1,024	20,132	775	189	-	-	12,382	34,501
1991/92	1,004	20,641	667	181	59	-	12,839	35,393
1992/93	933	22,174	712	220	50	-	12,567	36,656
1993/94	943	21,157	666	223	30	-	11,918	34,937
1994/95	941	22,370	725	206	39	-	12,580	36,861
1995/96	983	26,065	922	216	46	-	13,981	42,213
1996/97	980	27,431	944	188	41	-	15,231	44,815
China:								
1987/88	118	6,955	620	-	-	51	8,780	16,524
1988/89	120	8,166	600	-	-	53	9,720	18,209
1989/90	119	8,280	575	-	-	-	9,569	18,542
1990/91	138	8,632	690	-	-	-	9,773	19,233
1991/92	122	8,718	577	-	59	-	10,153	19,629
1992/93	125	9,345	581	-	50	-	9,915	20,016
1993/94	117	7,763	544	-	30	-	9,214	17,668
1994/95	114	8,243	646	-	39	-	9,774	18,816
1995/96	131	11,238	836	-	46	-	11,184	23,435
1996/97	124	12,007	858	-	41	-	12,402	25,432
India:								
1987/88	112	4,697	-	109	-	-	785	5,703
1988/89	126	5,776	-	122	-	-	1,134	7,158
1989/90	122	5,686	-	105	-	-	1,238	7,151
1990/91	114	6,073	-	103	-	-	1,276	7,566
1991/92	100	6,442	-	100	-	-	1,404	8,046
1992/93	118	6,857	-	139	-	-	1,314	8,427
1993/94	122	7,273	-	157	-	-	1,227	8,779
1994/95	113	7,877	-	127	-	-	1,390	9,507
1995/96	121	8,238	-	112	-	-	1,352	9,823
1996/97	135	8,751	-	99	-	-	1,332	10,316
Other Asia:								
1987/88	672	4,780	69	115	-	-	1,159	6,789
1988/89	690	5,133	79	100	-	-	778	7,229
1989/90	702	5,359	82	91	-	-	1,289	7,523
1990/91	772	5,427	85	86	-	-	1,333	7,702
1991/92	782	5,481	90	81	-	-	1,282	7,718
1992/93	690	5,972	131	81	-	-	1,342	8,216
1993/94	704	6,121	122	66	-	-	1,477	8,490
1994/95	714	6,250	79	79	-	-	1,416	8,538
1995/96	731	6,589	86	104	-	-	1,445	8,955
1996/97	721	6,673	86	89	-	-	1,498	9,067

Table 2-1--Continued

Consumption: Selected nitrogenous fertilizers, world, United States, EU, NIS, Asia, China, India, other Asia, and all other, fertilizer years[1] 1987/88-1996/97

Year	AS (21% N)	Urea (47% N)	AN (34% N)	CAN (26% N)	Ammonia[2] (82% N)	UAN[2] (30% N)	Other N fertilizers[3]	Total nitrogen
	1,000 metric tons N							
All Other:								
1987/88	1,135	5,208	2,335	1,403	650	381	3,157	14,275
1988/89	1,061	5,337	2,483	1,372	662	398	3,264	14,577
1989/90	1,040	5,594	2,417	1,330	718	401	3,259	14,749
1990/91	1,016	5,017	2,023	1,215	737	369	3,074	13,457
1991/92	927	4,701	1,645	1,025	779	234	2,716	12,034
1992/93	894	5,010	1,807	963	752	149	2,811	12,386
1993/94	876	5,328	1,987	1,009	769	187	2,828	12,987
1994/95	867	5,269	2,011	986	739	192	2,707	12,771
1995/96	951	5,173	2,206	916	844	209	2,645	12,964
1996/97	977	5,736	2,382	1,022	929	192	2,793	14,032

[1] A fertilizer year runs from July 1 of one year through June 30 of the next.

[2] Direct-application ammonia and UAN. The statistics presented for the other products may include other uses in addition to direct application.

[3] Includes other straight nitrogen fertilizers, nitrogen content of ammonium phosphates, other NP, NK, and NPK compounds.

Source: IFADATA Statistics: Nitrogen-Phosphate-Potash (1973/74-1973 to 1996/97-1996) June 1998.

EU consumption of AN declined by an annual average of about 7 percent from 1987/88 to 1992/93, from 2.1 million metric tons N to 1.4 million metric tons N. The decline was primarily attributable to increased environmental restrictions and restructuring in the AN industry.[5] EU consumption of AN then increased by an annual average of about 10 percent from 1992/93 to 1996/97, from 1.4 million metric tons N to 2.0 million metric tons N. The presence of imports from Russia in the EU market is believed to be at least partially responsible for the upturn in AN consumption in the EU during 1992/93-1996/97.[6] Moreover, by 1996, world grain prices increased and EU set-aside requirements were reduced,[7] resulting in increased planting and, therefore, increased consumption of nitrogenous fertilizer.

World consumption for total nitrogen fertilizer is expected to continue to increase with world population growth. The supply of nitrogenous fertilizers is expected to increase first through increased capacity utilization and expansions in major consuming regions. The world supply of natural gas, the basic raw material for these fertilizers, is plentiful and, thus, further development of the nitrogenous fertilizer industry is considered likely as world market demand increases.

Ammonia dominated world nitrogenous fertilizer production and domestic shipments in 1997 (table 2-2 and in figure 2-1). Ammonia is a key input for all further downstream nitrogenous fertilizer production as well as a fertilizer itself (see figure 2-2). Although urea production was less than half that of ammonia in terms of quantity, urea commanded a comparable share of world nitrogenous fertilizer trade in 1997. World production of solid AN was approximately one-tenth that of ammonia and world trade was about one-fifth of ammonia trade levels.[8] Production levels of CAN and AS were each less than one-twentieth of ammonia production and both about one-fifth of ammonia trade levels. These product data show the dominance of ammonia and urea with regard to world production, world domestic shipments, and world trade in nitrogenous fertilizers in 1997.[9]

World production data in 1997 for nitrogenous fertilizers place the United States and Russia among the leading world producers of ammonia, urea, AN, and AS.[10] In terms of AN alone, the United States, the EU, and Russia were the leading world producers of solid AN in 1997 (see figure 2-3).[11] In total, the United States accounted for 14 percent of world ammonia production, 7 percent of world urea production, 22 percent of world solid AN production,[12] and 16 percent of world AS production.[13] Russian production

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[5] USITC fieldwork in Europe, June 22-July 7, 1998.

[6] Ibid.

[7] Ibid.

[8] Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

[9] Ibid.

[10] Ibid. For more a detailed discussion on a product and country basis, please see appendix F.

[11] IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997*, various pages.

[12] Ibid. Although IFA members are requested to report solid AN only, the U.S. statistics may include AN used in UAN synthesis. AN figures may also include quantities used for explosives.

[13] According to IFA's *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics,1997*, U.S. production of AN amounted to about 7.4 million metric tons product. According to official statistics of the U.S. Department of Commerce, U.S. production of AN in all forms in 1997 (including solid and UAN solution) amounted to about 7.5 million metric tons product (see table 3-2 in this report). If official production statistics of the U.S. Department of Commerce for all solid AN (fertilizer- and explosive-grade) are used, the U.S. share of worldwide production of solid AN is about 13 percent, compared with about 17 percent for the EU and Russia.

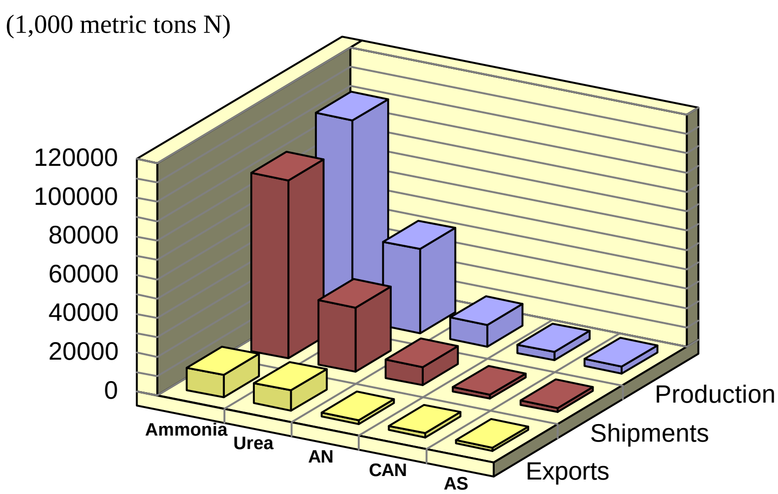
Table 2-2
World production, domestic shipments, and exports of certain fertilizers, 1997

Source	Ammonia[1]	Urea	Ammonium nitrate	Calcium ammonium nitrate	Ammonium sulfate
	-------------------------------1,000 metric tons N	*---------------------------------*			
World production	103,135	43,412	11,334	4,151	3,608
World domestic shipments	91,865	33,178	9,416	2,142	2,103
World exports	11,351	10,262	1,954	1,997	1,511

[1] About 95 percent of the ammonia produced worldwide is used directly as a fertilizer and to manufacture downstream fertilizer products. Of this total, about 5 percent is used directly on crops as a fertilizer.

Source: Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

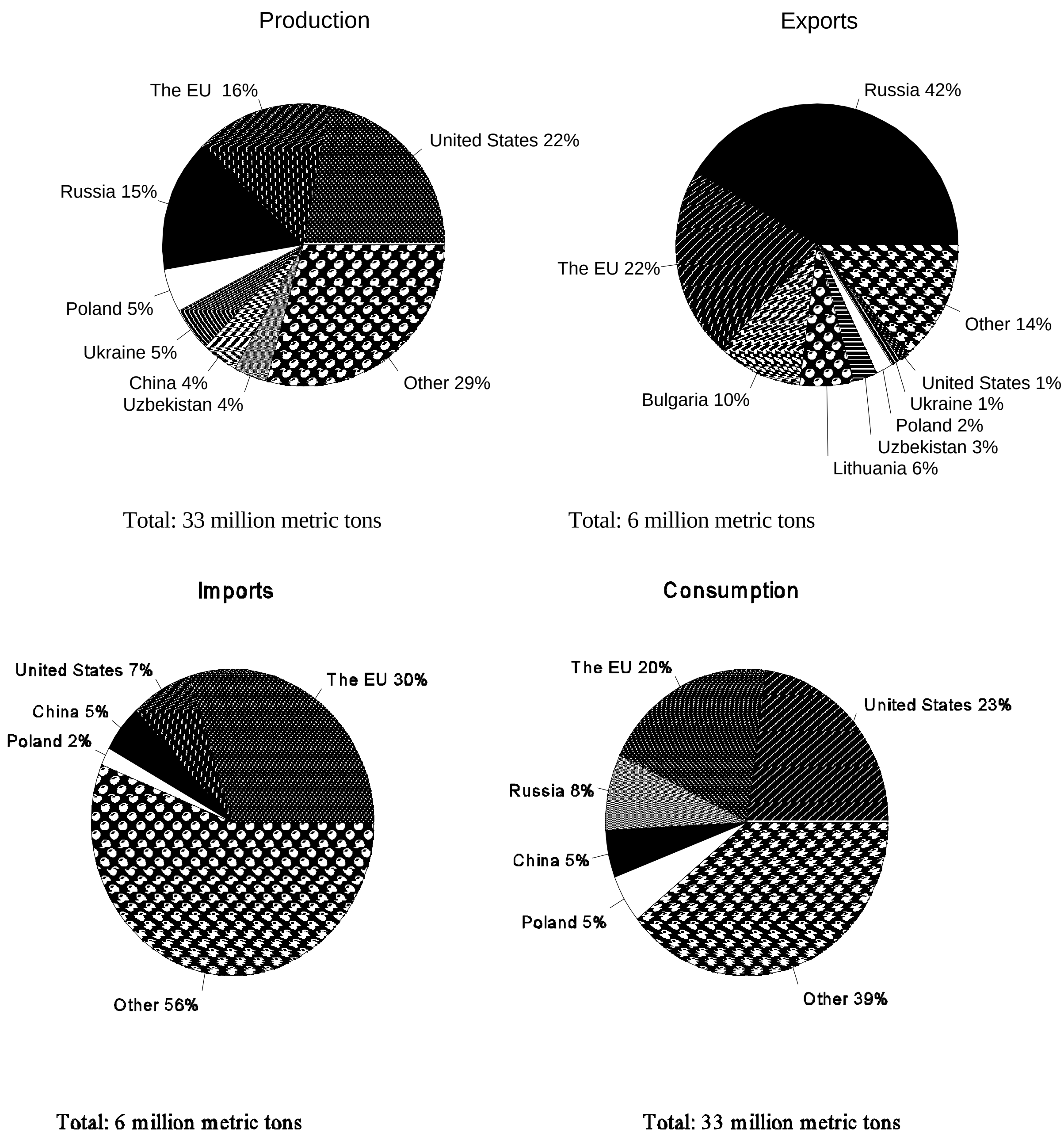
Figure 2-1.
Certain Fertilizers: World Data, 1997



Source: Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

(Figure 2-2 is not included in the electronic version.)

Figure 2-3
World production, trade, and consumption of solid AN, by percent, 1997



Source: Derived from IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997*.

for the same nitrogenous fertilizers was calculated as: ammonia (7 percent of the world total), urea (3 percent), AN (15 percent), and AS (7 percent). Within the EU, France and the Netherlands each accounted for 2 percent of world ammonia production; the United Kingdom and France accounted for 6 and 5 percent, respectively, of world production of solid AN; Belgium, Germany, and the Netherlands accounted for about 16 percent of world production of AS; and the Netherlands, Belgium, Germany, and Spain accounted for almost half of world production of CAN.

In 1997, Russia dominated world nitrogenous fertilizer exports, accounting for 22 percent of world ammonia exports, 12 percent of world urea exports, 42 percent of world AN exports (solid), and 12 percent of world AS exports. In contrast, the U.S. industry exports minimal amounts of AN. In the EU, the major AN exporting countries were the Netherlands (9 percent), France (6 percent), and Belgium (6 percent). In addition, the Netherlands provided 5 percent of world ammonia exports and 9 percent of world AS exports. The EU provided over 70 percent of world CAN exports and about 28 percent of world AS exports.[14]

The United States and the EU were major importers of world nitrogenous fertilizer in 1997.[15] The United States was the principal world importer of ammonia (31 percent), with significant amounts also imported by the United Kingdom, France, and Spain (4 percent each). U.S. imports of AN in 1997 (7 percent of the world total) were primarily solid, fertilizer-grade product, with some explosive-grade material obtained from Canada.[16] In contrast, Russia imports minimal amounts of AN. Countries of the EU together accounted for approximately 46 percent of 1997 world AN imports. Major importers within the EU were France (14 percent) and the United Kingdom (13 percent). Other AN importing regions included the Middle East (about 9 percent), Latin America (about 8 percent), and Asia (about 8 percent; China alone accounted for 5 percent of the world total). With respect to urea, only the Netherlands (8 percent) and Italy (4 percent) of the EU were significant importers.

With regard to world consumption of nitrogenous fertilizers in 1997,[17] China, the United States, and India together accounted for over 50 percent of ammonia consumption and nearly 58 percent of urea consumption. The United States, the EU, and Russia accounted for about 51 percent of world consumption of solid AN in 1997.[18] Major consuming countries were the United States, 23 percent; Russia, 8 percent; the United Kingdom, 7 percent; and France, 7 percent. China (5 percent) and Poland (5 percent) were also significant AN consumers in 1997. Consumption of CAN occurred primarily in countries of the EU (51 percent).

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[14] Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

[15] Ibid.

[16] Industry sources estimate that fertilizer-grade AN accounts for about 50 percent of U.S. imports of AN from Canada, with explosive-grade product representing the remainder.

[17] Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

[18] IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997*, various pages.

CHAPTER III
THE U.S. AMMONIUM NITRATE INDUSTRY

U.S. Industry Profile

As noted earlier, the United States is one of the leading world producers of AN, accounting for 22 percent of global production in 1997.[1] Thirteen companies produce solid AN in the United States. Ten of these manufacture AN for fertilizer use, although they may also produce explosive-grade AN. Several of these firms also produce urea-ammonium nitrate (UAN) solutions, from AN solution, and other nitrogenous fertilizers.[2] About 86 percent of the solid, fertilizer-grade AN production capacity in the United States in 1997 was owned by 8 domestic firms. Canadian-based Agrium and PCS Nitrogen accounted for the remainder. Although there is no other known foreign ownership in the U.S. solid, fertilizer-grade AN industry, two EU firms own three explosive-grade AN plants in the United States.

Of the 10 firms producing solid, fertilizer-grade AN in the United States, 6 have been part of the U.S. industry since prior to an industry restructuring in the mid-1980s. The exceptions, LaRoche Industries, Wil-Gro, Agrium and PCS Nitrogen are more recent entrants (about 1987 for LaRoche and Wil-Gro, just after the industry restructuring, and 1995 and 1997 for Agrium and PCS Nitrogen, respectively).

The energy crisis of the 1970s and resultant inflationary pressures led to a global recession by mid-1981, throwing the U.S. fertilizer industry into an unprecedented downturn which did not improve significantly until 1987. The United States became a net importer of nitrogenous fertilizers during 1970-75, in part because of competition from other countries having abundant supplies of more economically priced natural gas feedstock, especially for the production of the large-volume commodities ammonia and urea.

The ammonium nitrate industry itself entered into a period of industry restructuring and capacity rationalization during 1980-86 in line with a significant downturn in U.S. demand for fertilizer-grade AN. As fertilizer consumption declined generally, higher-analysis nitrogenous fertilizers[3] became more cost effective than AN and, as such, were more often substituted for AN. U.S. ammonium nitrate fertilizer-grade production in all forms (i.e., liquid and solid) fell from 6.9 million metric tons in 1980 to a low of 4.2 million tons in 1986, or by 39 percent. Net imports and overall industrial demand, however, remained at relatively constant levels. Fertilizer- and explosive-grade ammonium nitrate demand turned up after 1986 because of several factors, including increased planted acreage for food and feed grains (fertilizer-grade product) and increased mining activity (industrial-grade). By 1989, a reasonably firm balance between supply and demand was achieved. Between 1980-89, total U.S. ammonium nitrate capacity fell about 2.1 million metric tons, or 21 percent, to 7.7 million tons, and with total production rising to about 7.2 million tons, U.S. capacity utilization approached 94 percent. Thus, industry restructuring and consolidation resulted in a smaller, but more cost effective, U.S. ammonium nitrate industry.

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[1] IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997*.

[2] Several U.S. companies manufacture AN for use in producing UAN solutions without producing solid AN.

[3] Examples of higher-analysis nitrogenous fertilizers include urea, ammonium phosphates, and multinutrient bulk blends containing urea, ammonium phosphates, and potash.

A significant restructuring and consolidation move in the U.S. ammonium nitrate industry in the late 1980s was the formation of Fertilizer Industries (Arcadian) by the Sterling Group and Unicorn Venture Funds in 1989. The conglomerate's purchases of five major U.S. nitrogenous fertilizer producers between May and November 1989 reportedly resulted in the formation of the leading producer of nitrogenous fertilizer solutions and the second leading ammonia producer in the United States at that time. At the time of formation, Arcadian's annual production capabilities were reported to be 1.9 million metric tons of ammonia; 2.6 million metric tons of nitrogen solution; 0.7 million tons of solid ammonium nitrate; 0.7 million tons of urea; and 0.2 million tons of wet-process phosphoric acid.

Subsequent to the completion of industry restructuring, the U.S. solid, fertilizer-grade AN industry operated in an environment of reasonably balanced production and production capacity into the mid-1990s, with few significant changes in industry ownership, structure, or capacity levels. Of note was Mississippi Chemical's announcement of a major reorganization effective June 28, 1994, in which its traditional fertilizer cooperative system had been discontinued in favor of a publicly traded company. In late 1993 and early 1994, Mississippi Chemical and El Dorado Chemical each considered plans for major new solid fertilizer-grade ammonium nitrate and nitric acid capacity to come onstream about 1998. In 1995, Agrium bought Cominco's plant at Homestead, NE, through a leveraged buy-out and, in 1997, PCS Nitrogen purchased Arcadian.

Company structure varies throughout the U.S. industry. Some firms are vertically integrated, buying natural gas[4] to produce captive ammonia, which is then used for the downstream production of AN. Many of these companies obtain their natural gas supplies from multiple suppliers via interstate pipelines.[5] Other U.S. producers are less vertically integrated, obtaining merchant ammonia by rail, refrigerated barge, or through large pipelines running south to north from the U.S. Gulf States and Oklahoma to the Midwest, or to the East from the large port at Tampa, FL. Producers having captive ammonia facilities generally enjoy cost advantages when ammonia prices (heavily influenced by natural gas costs as well as demand factors) are at a premium on the open market; conversely, purchasers of ammonia can benefit when ammonia prices are lower.[6] It is estimated that about 60 percent of U.S. production of fertilizer-grade AN is produced from captive ammonia, with the remainder produced from purchased ammonia.[7]

Many of the AN plants in the United States date to the 1970s. No new "grass roots" plants (i.e., started from the ground up) have been brought onstream in the United States in recent years. The existing AN production facilities, however, have been retrofitted and modernized, including the addition and/or modernization of nitric acid and ammonia units on the facilities. For example, some of the nitric acid units are relatively recent additions, with some added in the 1980s and 1990s. Most U.S. ammonia production

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[4] Since natural gas is a necessary feedstock for AN production, the U.S. industry benefits from large domestic reserves. As of December 31, 1996, the United States held about 3 percent of the world's reserves of natural gas, or about 166,474 cubic feet. "Worldwide Production," *Oil & Gas Journal*, Dec. 29, 1997, pp. 38-39.

[5] The ability to purchase from multiple suppliers (the result of gas deregulation in the early 1990s) has reportedly allowed for more competitive natural gas pricing.

[6] Written submission from LaRoche Industries, dated June 3, 1998, p. 1.

[7] Of the companies that appeared at the Commission's hearing, Mississippi Chemical purchases natural gas as a feedstock, whereas El Dorado Chemical purchases ammonia feedstock. According to a representative of El Dorado, purchased ammonia had been more cost effective for El Dorado during 10 of the past 15 years. (USITC fieldwork in the United States, May 19-22, 1998.) LaRoche noted that it both produces and purchases ammonia for its AN production. (Written submission from LaRoche Industries, dated June 3, 1998, p. 1.)

units/plants date to the 1970s, with some from the 1950s and at least one from the early 1980s. Overall, the industry is characterized as being "capital-intensive."[8]

Geographically, approximately 60 percent of solid fertilizer-grade AN production capacity is located in Mississippi, Florida, Georgia, and Alabama, near natural gas sources and the primary markets for AN. The remaining U.S. production is in the Southwest (about 17 percent), in the Midwest (about 12 percent), and in the West (about 11 percent).

Solid fertilizer AN production capacity by producer and location and total U.S. ammonium nitrate melt capacity in all forms (i.e., liquid and solid fertilizer-grade and explosive-grade product) are shown in table 3-1. Figure 3-1 shows changes in production capacity during 1980-98.

Currently, Mississippi Chemical Corporation accounts for about one-third, or 860,000 metric tons per year, of total U.S. production capacity for solid, fertilizer-grade material (2.6 million metric tons per year) at its facility in Yazoo City, MS (the production capacity for solid product is about 79 percent of the company's total AN production capacity of 1,088,400 metric tons).[9] Other companies producing solid, fertilizer-grade product include LaRoche Industries (solid, fertilizer-grade AN accounted for about 29 percent of its AN production capacity); Canadian-owned PCS Nitrogen (about 8 percent of the company's AN capacity); Nitram and Air Products (about 98 percent and 92 percent, respectively); El Dorado Chemical (about 50 percent); Wil-Gro Fertilizer (about 51 percent); Canadian-owned Agrium (100 percent); Unocal (about 70 percent); and Coastal Chem (about 19 percent).[10] As reflected in table 3-1, new solid fertilizer capacity coming onstream in 1998 includes that of Mississippi Chemical, El Dorado Chemical, and LaRoche Industries.

Industry capacity utilization rates rose from 88 percent of capacity in 1994 to 97 percent during 1995-96, before approaching 100 percent of industry capacity in 1997 (table 3-1). This increase is indicative of tight supply during 1994-97.[11] If production, trade, and consumption levels were to remain the same in 1998 as in 1997, capacity utilization levels could decline by about 10 percent given the new capacity coming onstream.

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[8] Mississippi Chemical states that "ours is an industry -- it's a capital intensive industry -- in which we have to operate year round in order for the economics to work." (Commission hearing transcript, June 16, 1998, p. 15.)

[9] Includes a 180,000 metric ton per year expansion scheduled to be phased-in during 1998.

[10] *Worldwide Ammonium Nitrate and Calcium Ammonium Nitrate Capacity Listing by Plant*, International Fertilizer Development Center (IFDC), Muscle Shoals, AL, pp. 36-40.

[11] Sales of AN solid reported by Mississippi Chemical in the firm's 1996/97 Annual Report, and 1997/98 Quarterly Report, translate to capacity utilization rates of 100 percent in both years. However, Mississippi Chemical stated recently that, "By not being willing to constantly meet the low prices of the Russian product, the U.S. ammonium nitrate industry has had to periodically reduce operating levels because of increasing Russian imports into the U.S. market. For example, since 1995, and in 1996, in particular, Mississippi Chemical had excess production capacity of AN available, which, in the absence of Russian imports, could have supplied the domestic market. We unilaterally made the decision to reduce operations, thinking that might help clear up the problem. It did not." Commission hearing transcript, June 16, 1998, p. 17.

Table 3-1
Ammonium nitrate: U.S. solid fertilizer-grade capacity and total U.S. melt capacity, 1993-2000.

Company[1]	1993	1994	1995	1996	1997	1998	1999	2000
	----------------(1,000 metric tons per year product)----------------------							
Mississippi Chemical:								
Yazoo City, MS	680	680	680	680	720	860	860	860
LaRoche Industries:								
Cherokee, AL	100	100	100	100	120	130	130	130
Crystal City, MO	120	120	120	120	120	120	120	120
Nitram:								
Tampa, Fl	255	255	255	255	255	255	255	255
El Dorado Chemical:								
El Dorado, AR	220	220	220	220	220	270	270	270
Unocal:								
Kennewick, WA	230	230	230	230	230	230	230	230
Wil-Gro:								
Prior, OK	120	120	120	120	140	140	140	140
Agrium:								
Homestead, NE	170	180	185	190	190	190	190	190
PCS Nitrogen:								
Augusta, GA	140	140	140	140	140	140	140	140
Air Products:								
Pace Junction, FL[2]	200	200	200	200	200	200	200	200
Coastal Chem:								
Cheyenne, WY	80	80	80	80	80	80	80	80
Total United States	2,315	2,325	2,330	2,335	2,415	2,615	2,615	2,615
Capacity utilization[3] (percent)	87	88	97	97	[4]99	[5]88	([6])	([6])
Total AN melt capacity[7]	8,430	8,514	8,630	8,882	9,237	9,851	9,851	9,851

[1] Capacity for several companies verified through direct contacts, annual reports and 10-K disclosures.

[2] Mississippi Chemical announced the closure of the Air Products Pace, Florida, ammonium nitrate facility September 5, 1995, due to market conditions. Air Products resumed production of ammonium nitrate on February 12, 1996. (*Green Markets*, Pike & Fisher, Mar. 11, 1996). Another source attributed the closing to "high ammonia prices." (*Worldwide Ammonium Nitrate and Calcium Ammonium Nitrate Capacity Listing by Plant*, International Fertilizer Development Center (IFDC), Muscle Shoals, AL, pp. 36.)

[3] Defined as reported production as a percent of capacity. (Production data from official statistics of the U.S. Department of Commerce.)

[4] Estimated by Commission staff based on preliminary production data of the U.S. Department of Commerce.

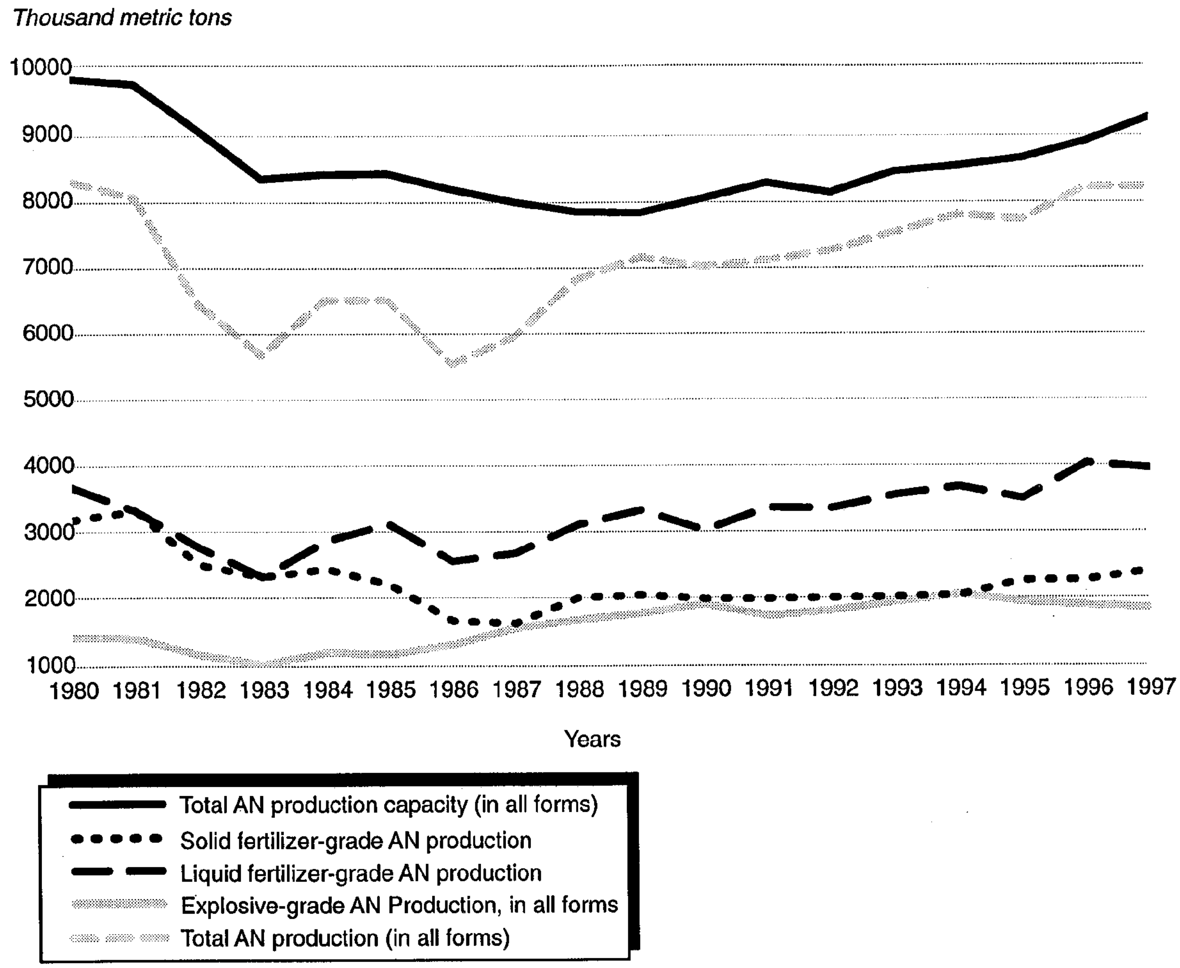
[5] Estimated by Commission staff from reported company capacities and projected production based on 1996 and 1997 volumes.

[6] Not available.

[7] Total U.S. ammonium nitrate capacity for product in all forms (solids and liquids), including high-density, solid fertilizer-grade; low density solid explosive-grade; UAN; and other solutions.

Sources: *North America Fertilizer Capacity*, International Fertilizer Development Center (IFDC), Muscle Shoals, AL, Feb. 1998, USITC fieldwork in the United States, May 19-22, 1998, and information provided by industry sources.

Figure 3-1
U.S. ammonium nitrate production and capacity, 1980-97 (thousand metric tons product)



Source: Compiled from official statistics of the U.S. Department of Commerce and from data obtained from IFDC.

Production and Consumption

Table 3-2 shows U.S. production of AN as a solid and in solution as UAN and other products. As noted earlier, some companies use AN solution directly in the manufacture of UAN solutions in addition to, or in lieu of, producing solid AN. The data in table 3-2 provide an indication of the relative magnitudes of U.S. production streams for the solution and solid product. According to official statistics of the U.S. Department of Commerce, U.S. production of solid, fertilizer-grade AN increased during 1993-96 by an average of 4.2 percent a year, from 2.0 million to about 2.3 million metric tons (see table 3-3). In 1997, according to estimates based on preliminary Department of Commerce statistics, production increased to about 2.4 million metric tons per year, or by about the same rate.[12] Data on U.S. production, trade, and apparent consumption for all solid AN (i.e., fertilizer- and explosive-grade) produced during 1987-97 are provided in table 3-4.

Table 3-2
Ammonium nitrate product forms produced in the United States, 1993-97

Production	1993	1994	1995	1996	1997[2]
	-------------------(*1,000 metric tons*[1])---------------------				
Solid:					
Fertilizer grade[3]	2,019	2,042	2,265	2,273	2,404
Explosive grade	[4]1,407	[4]1,488	1,439	1,411	1,406
Subtotal	3,426	3,530	3,704	3,684	3,810
Solution:					
UAN[5]	3,307	3,103	3,167	3,806	2,556
Other[6]	779	1,140	830	698	1,126
Subtotal	4,086	4,243	3,997	4,504	3,682
Total production[7]	7,512	7,773	7,701	8,188	7,492

[1] All data expressed as 100 percent AN product.
[2] Preliminary data reported by the U.S. Department of Commerce together with Commission estimates for solid product.
[3] Includes high-density granular and prilled AN.
[4] Commission estimates on 100 percent dry solids content basis based on U.S. Department of Commerce change in survey methodology beginning in 1995.
[5] Urea-ammonium nitrate solutions (28-32 percent nitrogen).
[6] Includes other AN fertilizer solutions, and liquid suspensions, gels and slurries of industrial-grade liquors for use in manufacturing explosive products.
[7] U.S. total production of AN stated as 100 percent dry solids.

Source: Official statistics of the U.S. Department of Commerce Annual and Quarterly Current Industrial Reports Series, MA28B and MQ28B, *Fertilizer Materials*.

[12] Current Industrial Reports, Annual and Quarterly Report on Fertilizer Materials, M28B.

Table 3-3
Solid fertilizer-grade ammonium nitrate in prilled and granular forms: U.S. production, exports of domestic merchandise, imports for consumption, apparent consumption, and ratio of imports to consumption, 1987-97

Year	U.S. production[1]	U.S. exports[2]	U.S. imports[3]	Apparent U.S. consumption[4]	Ratio of imports to consumption[5]
	-------------------*1,000 metric tons product*			------------------------	*Percent*
1987	1,623	233	278	1,668	16.7
1988	2,011	58	267	2,220	12.0
1989	2,054	90	240	2,204	10.9
1990	1,991	30	230	2,191	10.5
1991	1,989	30	250	2,209	11.3
1992	2,007	30	240	2,217	10.8
1993	2,019	45	310	2,284	13.6
1994	2,042	40	461	2,463	18.7
1995	2,265	65	[6]575	2,775	20.7
1996	2,273	45	520	2,748	18.9
1997	2,404	30	515	2,889	17.8

[1] Sum of dry granular and prilled fertilizer-grade product as reported by the U.S. Department of Commerce in annual and quarterly series MA28B, and MQ28B, *Fertilizer Materials*.

[2] Fertilizer-grade AN data were reported for 1987-88. After 1988, the data reported were for total exports of AN. Estimates for 1989-97 exports are based on the reported breakouts in 1987-88 in which fertilizer-grade AN accounted for about 70 percent of the total. Industry sources state that U.S. exports of solid, fertilizer-grade AN are minimal.

[3] Industry sources estimate that about 50 percent of the imports from Canada are fertilizer-grade product. U.S. imports of AN are reported under Harmonized Tariff Schedule (HTS) subheading 3102.30, "Ammonium nitrate, whether or not in aqueous solution." This HTS classification does not distinguish between imports in solid form or in aqueous solution, nor does it differentiate between fertilizer-grade and explosive-grade AN. However, most, if not all, of the imports under this subheading are in solid form, primarily because of the additional expense associated with shipping aqueous solution. Moreover, U.S. industry sources believe that imports from all countries except Canada are fertilizer-grade AN. Imports netted for estimated explosive-grade material (about 50 percent of Canadian tonnage), 1989-97.

[4] Calculated, based on production and trade data shown above.

[5] Estimated.

[6] Official U.S. Department of Commerce statistics corrected for errata.

Source: Official statistics of the U.S. Department of Commerce, except as noted.

Table 3-4

Solid ammonium nitrate in prilled and granular forms for all applications: U.S. production, exports of domestic merchandise, imports for consumption, apparent consumption, and ratio of imports to consumption, 1987-97

Year	U.S. production[1]	U.S. exports	U.S. imports[2]	Apparent U.S. consumption[3]	Ratio of imports to consumption
	Thousand metric tons product				Percent
1987	3,065	267	343	3,141	10.9
1988	3,225	82	358	3,501	10.2
1989	3,338	132	411	3,617	11.4
1990	3,370	42	406	3,734	10.9
1991	3,239	41	421	3,619	11.6
1992	3,322	40	443	3,726	11.9
1993	[4]3,426	66	485	3,845	12.6
1994	[4]3,530	55	612	4,087	15.0
1995	3,704	90	[5]754	4,368	17.3
1996	3,684	62	718	4,340	16.5
1997	[6]3,810	47	708	4,471	15.8

[1] Sum of dry granular and prilled fertilizer-grade product and explosive-grade product as reported separately by the U.S. Department of Commerce in citations below.

[2] U.S. imports of AN, as reported under Harmonized Tariff Schedule (HTS) subheading 3102.30, “Ammonium nitrate, whether or not in aqueous solution.” For practical purposes, most, if not all, of the imports under this subheading are in solid form, primarily because of the additional expense associated with shipping aqueous solution. U.S. imports of solid AN that enter under this heading, however, are not differentiated as to either fertilizer-grade material or explosive-grade material.

[3] Calculated, based on production and trade data shown above.

[4] Production data for 1993 and 1994 adjusted by Commission staff to reflect a new format established by the U.S. Department of Commerce in 1995 which called for reporting dry low-density explosive-grade prills only. Explosive-grade water gels, slurries, and emulsions, which were previously reported in this category, were moved to the nitrogen solution category. There are no liquid forms reported for high-density fertilizer-grade material.

[5] Official U.S. Department of Commerce statistics corrected for errata.

[6] Production estimated by Commission staff based on preliminary data reported by the U.S. Department of Commerce in the Quarterly Current Industrial report, series MQ28B, Fertilizer Materials.

Note.--Figures may not add to totals shown because of rounding.

Source: Official statistics of the U.S. Department of Commerce, except as noted.

Mississippi Chemical submitted U.S. production data that differ from that provided by the U.S. Department of Commerce. According to Mississippi Chemical, annual U.S. production and consumption of solid, fertilizer-grade AN were as follows (in millions of metric tons):[13]

	1990	1991	1992	1993	1994	1995	1996	1997
Production	1.99	1.99	2.00	2.02	2.04	1.93	1.90	2.03
Consumption	2.42	2.41	2.45	2.50	2.66	2.69	2.63	2.74

As noted in table 3-4, apparent U.S. consumption of all solid AN in 1997 amounted to 4.5 million metric tons. The import-to-consumption ratio for all solid AN was about 16 percent in 1997, with imports from Russia accounting for about 4 percent of consumption and those from the EU accounting for about 2 percent. For fertilizer-grade solid AN, which accounts for 60 percent of total consumption, roughly 3 million metric tons product, or 1 million metric tons nitrogen (N), the Russian and EU imports accounted for a higher share of consumption, or about 7 percent and 4 percent, respectively, on a product basis. Most Russian AN entering the United States is said to be imported by trading companies. Although some domestic AN producers have in the past bought imported product directly, it is not considered a common practice.[14]

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[13] Mississippi Chemical written submission, dated June 30, 1998, Appendix 11. According to a representative of Mississippi Chemical, in a telephone conversation with Commission staff on August 7, 1998, the data were “adjusted by Mississippi Chemical to reflect their experience in the marketplace.” In a followup fax to Commission staff, dated August 27, 1998, it was noted that the data were calculated as follows:

“A number of data sources were used by Mississippi Chemical (MCC) to make estimates for the U.S. ammonium nitrate industry. These included the U.S. Department of Commerce ‘M28B’ reports, the U.S. Department of Census trade statistics, The Fertilizer Institute’s ‘Fertilizer Record,’ Blue, Johnson & Associate’s ‘The Sheet,’ T.R.A.D.E. Inc.’s trade intelligence reports and Mississippi Chemical’s internal estimates and more.

The M28B was used as the primary data source for estimating U.S. production and consumption of fertilizer-grade AN (high-density). Production data for calendar years 1990 to 1994 were accepted as published in the M28B report. However, beginning in 1995, while the published M28B number for total ammonium nitrate production was believed reasonable, the breakdown between the two ammonium nitrate grades (high and low-density) was believed to be wrong. Since the published number for low-density ammonium nitrate production for calendar year 1994 was the last year that the M28B data seemed reasonable, the 1994 low-density number, adjusted downward by 50,000 tons, was used to estimate the non-fertilizer production for each of the succeeding years. The downward adjustment represented the belief that non-fertilizer consumption declined somewhat from the peak year in 1994. This low-density estimate was then subtracted from the M28B published number for total production for each of the years 1995 to 97 to estimate the fertilizer (high-density) number.

Estimating U.S. domestic consumption of ammonium nitrate for fertilizers involved combining the estimates for high-density production (calculated above) with ammonium nitrate import data published by the U.S. Department of Census. This approach assumes that all imports were fertilizer grade. MCC recognizes that about half of the ammonium nitrate imports from Canada may be non-fertilizer grade (low-density), but, for the purposes of this report, this difference was considered insignificant. For this same reason, exports of ammonium nitrate from the U.S. were ignored in this calculation of consumption.”

When asked about this situation, a representative of the U.S. Department of Commerce (DOC) stated that there have been no revisions to the data published by DOC during 1994-96. The production data published by DOC reflect responses by U.S. companies to a mandatory annual reporting program.

[14] USITC fieldwork in the United States, May 19-22, 1998. According to the Committee for a Competitive AN Market, “some U.S. producers themselves stock AN from Russia to ensure that they can meet demand.” (Trade Partnership written submission, dated June 30, 1998, p. 1. The Trade Partnership represents the Committee for a Competitive AN Market, a coalition of about 30 members representing U.S. farmers, AN retailers, wholesalers/distributors, traders/importers, and others.)

Industry producers of solid fertilizer-grade material for the most part sell product wholesale directly to downstream distributors, with some selling product directly at the retail level. The business is seasonal, with heavy movement to the farmer during the spring planting season, followed by fill-up or inventory buildup programs during the summer, fall, and winter months.[15]

As noted earlier, depending on the application conditions, the low volatility of AN makes it competitive with ammonia, urea, and UAN solution, particularly in warmer climates.[16] Conversely, in cooler climates, solid fertilizer-grade AN product competes less favorably with direct application ammonia, UAN solutions, solid urea, and NPK bulk blends. As noted earlier, the use of CAN in the United States is limited to California, primarily because of the types of crops grown there and the soil content. Consumers in the rest of the United States, however, prefer AN because of its higher nitrogen content. Table 3-5 shows nitrogen consumption in the United States by form during 1988-97.

Table 3-5
U.S. nitrogenous fertilizer consumption by product form, 1988-97

	Single nutrient[1]--									
	Ammonia--			Ammonium--		Nitrogen		Sub-	Bulk	
Year[2]	Anhydrous	Aqua	Urea	Nitrate	Sulfate	solutions[3]	Other[4]	total	blends[5]	Total
	-------------(1,000 metric tons N)-------------									
1988 . .	3,422	86	1,387	544	143	1,966	31	7,580	1,957	9,536
1989 . .	3,440	91	1,408	584	156	1,843	124	7,647	1,963	9,610
1990 . .	3,447	74	1,556	547	167	2,057	161	8,009	2,039	10,048
1991 . .	3,816	63	1,432	570	157	2,039	181	8,256	1,983	10,239
1992 . .	3,723	62	1,476	588	172	2,183	181	8,385	2,029	10,414
1993 . .	3,260	61	1,640	592	166	2,370	134	8,220	2,120	10,300
1994 . .	4,121	77	1,679	608	181	2,469	172	9,307	1,162	11,469
1995 . .	3,230	72	1,680	581	192	2,581	154	8,490	2,141	10,631
1996 . .	3,624	70	1,631	646	200	2,643	178	8,992	2,169	11,161
1997 . .	3,609	43	1,618	598	223	2,651	296	9,038	2,154	11,192

[1] Direct application nitrogenous fertilizer materials.
[2] Fertilizer years, July 1 of one year through June 30 of the next.
[3] Principally urea-ammonium nitrate (UAN) solutions.
[4] Includes other single nutrient nitrogenous fertilizer materials, all natural organics, and statistical discrepancies.
[5] Various combinations of nitrogen (N), phosphate (P), and potassium (K); N-P-K, N-P, and N-K.

Source: *Commercial Fertilizers*, prepared as a cooperative effort of the American Plant Food Control Officials (AAPFCO), University of Kentucky, and The Fertilizer Institute, Washington, DC.

Note: Figures may not add to totals shown because of rounding.

[15] Product is reportedly stored either on the plant site or off-site, or at the customer's storage facilities. Plant site or off-site storage reportedly allows for continuous plant production and the building of inventory. LaRoche Industries written submission, dated June 3, 1998, p. 3.

[16] AN is considered less volatile than the other products in hotter weather in that it will not evaporate or dissipate as a result of the heat, thereby decreasing the amount of nitrogen actually applied.

Direct application AN (i.e., product applied directly on crops) amounted to 1.8 million metric tons of product, or about 61 percent of the solid, fertilizer-grade AN consumed domestically. In terms of nitrogen content, direct application AN amounted to 0.6 million tons N (5 percent of total U.S. N fertilizer consumption); AN contained in nitrogen solutions accounted for about 2.7 million tons N, or 12 percent; and the remaining AN is used in multinutrient, or bulk NPK blends (5 percent).[17] Although AN and urea can be mixed in liquid form, they cannot be mixed as solids; the solid mixture results in both products absorbing water vapor from the air, forming a high viscosity agglomerate that cannot be blended or used for direct application.

Trends in U.S. consumption of fertilizer-grade AN during the past 10 years shows that direct application AN consumption has grown by 1 percent per year; AN in nitrogen solutions (principally UAN) by about 4 percent per year, and NPKs by about 1 percent per year. Thus, AN fertilizers in liquid form have dominated fertilizer-grade AN growth trends.

In the fertilizer year ending June 30, 1997,[18] solid, fertilizer-grade AN was used for direct application in 49 States and Puerto Rico, according to information published by the Association of American Plant Food Control Officials (AAPFCO).[19] As noted in table 3-6, in metric tons product versus the nutrient reported in table 3-5, U.S. consumption of AN for direct application fertilizer purposes is concentrated in the West North Central (Corn Belt), East South Central (Midsouth States), and West South Central (Midwest) regions of the country. The leading States in order of consumption levels were Missouri, Tennessee, Texas, Alabama, Kentucky, California, Mississippi, Georgia, and Louisiana, together accounting for 1.0 million tons product, or 56 percent of total consumption. Thus, AN consumption is generally concentrated more heavily in the South, Southwest, and Midwest.

The eleven State region in the lower Mississippi basin to the West and East of the Mississippi River,[20] which is also served by imported Russian and EU ammonium nitrate, accounts for 60-62 percent of total U.S. direct application of solid AN. The distribution is approximately equal west and east of the Mississippi River as shown by table 3-7.[21]

Fertilizer demand in the United States is considered “mature,” with demand primarily affected by planted acreage and application rates, which are, in turn, influenced by crop prices and weather.[22] In 1997-98, according to domestic AN producers, demand was reportedly delayed by El Niño and by AN

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[17] NPK bulk blends are solid, granular mixtures of products containing the desired nutrients (e.g., granular AN is typically blended with granular diammonium phosphate and granular potash).

[18] Fertilizer years run from July 1 to June 30.

[19] Commercial Fertilizers, 1997, AAPFCO, 1998.

[20] This region includes Louisiana, Arkansas, Missouri, Texas, Oklahoma, Mississippi, Tennessee, Kentucky, Alabama, Georgia, and Florida. Mississippi Chemical states that its main market region is a 10-state region (i.e., all of the states listed above except for Oklahoma). (Mississippi Chemical written submission, dated June 30, 1998, p. 16.) They note that “64 percent of U.S. ammonium nitrate consumption” is located in this region. (Commission hearing transcript, June 16, 1998, p. 13.)

[21] Mississippi Chemical estimates total consumption of direct application AN, plus mixtures in this region, to approximate about 1.8 million metric tons product, or roughly 68 percent of total U.S. solid AN consumption (Mississippi Chemical written submission, dated June 30, 1998, appendix 9).

[22] PCS Nitrogen Inc., annual report, 1997.

Table 3-6
U.S. direct application of solid ammonium nitrate fertilizer, 1987-97

Year	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Other	Total
		(thousands of metric tons product)									
1987 . .	3	15	206	91	265	341	265	212	129	0	1,526
1988 . .	3	21	176	79	294	335	376	168	132	1	1,585
1989 . .	6	24	188	71	321	391	426	191	118	0	1,737
1990 . .	3	29	168	65	318	406	359	174	94	0	1,612
1991 . .	3	26	176	71	318	453	397	147	82	1	1,674
1992 . .	3	29	191	62	350	459	353	153	121	0	1,721
1993 . .	3	21	159	65	350	441	347	229	126	3	1,744
1994 . .	3	24	185	71	329	488	344	209	138	3	1,794
1995 . .	3	21	156	73	357	415	299	251	137	1	1,713
1996 . .	3	20	167	73	401	457	345	279	161	0	1,906
1997 . .	2	20	160	86	409	406	308	196	174	2	1,763

Note.--New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont; Middle Atlantic: Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, West Virginia; South Atlantic: Florida, Georgia, North Carolina, South Carolina, Virginia; East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin; West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota; East South Central: Alabama, Kentucky, Mississippi, Tennessee; West South Central: Arkansas, Louisiana, Oklahoma, Texas; Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming; and Pacific: California, Oregon, Washington.

Source: *Commercial Fertilizers*, The Association of American Plant Food Control Officials; and *Chemical Economics Handbook*, SRI International, Menlo Park, CA.

Note: Figures may not add to totals shown because of rounding.

Table 3-7
U.S. ammonium nitrate fertilizer consumption--direct application[1]

Source	1995 Tons	1995 Percent[2]	1996 Tons	1996 Percent[2]	1997 Tons	1997 Percent[2]
	(1,000 metric tons product)					
West of Mississippi River:[3]						
Missouri	214	12	251	13	278	16
Texas	132	8	142	8	129	7
Oklahoma	66	4	66	3	67	4
Louisiana	58	3	63	3	62	3
Arkansas	45	3	73	4	51	3
Subtotal	515	30	595	31	587	33
East of Mississippi River:[3]						
Tennessee	147	9	153	8	142	8
Alabama	83	5	111	6	95	5
Kentucky	91	5	100	5	93	5
Mississippi	94	5	93	5	74	4
Georgia	70	4	73	4	71	4
Florida	24	2	31	2	31	2
Subtotal	509	30	561	29	506	29
Total West/East Mississippi:[3]	1,024	60	1,156	61	1,093	62
Other States	689	40	750	39	670	38
Total United States	1,713	100	1,906	100	1,763	100

[1] Fertilizer years ending June 30.
[2] Expressed as percent share of total U.S. ammonium nitrate direct application consumption. Individual percentages may not add to totals shown due to rounding.
[3] Eleven States bordering or contiguous to the Mississippi River most susceptible to competition from imports transported via barge from New Orleans, LA.

Source: *Commercial Fertilizers 1997*, AAPFCO/TFI.

Note: Figures may not add to totals shown because of rounding.

consumers' perceived expectations of price decreases.[23] The wetness caused by El Niño resulted in the delayed planting of fields across the country. When combined with expectations of price decreases and resulting delays in buying, demand reportedly peaked very quickly, according to domestic AN producers. This increased demand, when combined with a shortage of domestically-supplied product, resulted in increased consumption of imported product.[24] The producers stated that about 60 percent of fertilizer sales in 1998 occurred within a two-month period during the planting season instead of the more usual four-month period.[25]

AN consumers stated that the Southeast and Southwest "typically exhibit strong seasonal demand for nitrogen-based fertilizers" and that U.S. producers of such fertilizers, including U.S. ammonium nitrate producers, "often have been unable to fill all of this demand during the peak spring season . . . and that AN shortages develop virtually every spring."[26] They stated, "therefore, imported AN, particularly from Russia, has played an important and essential role in alleviating to some degree the severity of shortages that typically develop during peak seasons."[27] The consumers stated that "if imported AN were priced out of these markets, local farmers would have no choice but to buy the domestically-produced AN."[28]

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[23] USITC fieldwork in the United States, May 19-22, 1998. Mississippi Chemical states that "the mere fact of a Russian AN shipment heading for the United States depresses domestic prices long before it arrives." (Commission hearing transcript, June 16, 1998, p. 15; Mississippi Chemical written submission, dated June 30, 1998, p. 22.) Mississippi Chemical also notes that "Moreover, distributors in recent years, rather than buying product during the off-season and placing it in storage for the Spring sale season, are more likely to wait for Spring to avoid the risk of being undercut by cheap Russian material." (Commission hearing transcript, June 16, 1998, p. 12.)

[24] USITC fieldwork in the United States, May 19-22, 1998. Domestic producers stated that the delayed purchasing resulted in few customers buying AN to put it into storage for later use. Such storage on the part of consumers, a practice reportedly followed in previous years, alleviates storage needs by producers who manufacture AN all year. Other reasons cited by domestic AN producers for the reported short supply to customers when demand finally peaked in 1998 included a perception that customers were reluctant to buy domestically-supplied product available because of anticipation of lower-priced imported product; delays in purchasing by customers whose warehouses were reportedly full of other fertilizers whose prices were increasing; and logistical problems moving large amounts from warehouse to the customer.

[25] Ibid.

[26] The Trade Partnership, written submission, dated June 30, 1998, pp. 1 and 3. The Committee for a Competitive AN Market notes in the written submission that Mississippi Chemical "placed long-time customers on allocation, leaving many of them without any AN and creating 'hard feelings'." They note that this was not the first time that Mississippi Chemical had "placed customers on allocation due to an inability to supply them," however this period of allocation was reportedly the longest they have faced. (The Trade Partnership, written submission, dated June 30, 1998, p. 4.)

[27] Ibid. According to the Trade Partnership's written submission, "EDC's [El Dorado's] and MCC's [Mississippi Chemical's] suggestions that the shortages this spring were artificial – that product existed but was tied up in distribution – if true, actually points to a larger problem. MCC clings to rail rather than trucks as the preferred mode of transportation in certain areas of the country. The company apparently does not have ready alternative ways to supply their customers when rail bottlenecks develop." (The Trade Partnership, written submission, dated June 30, 1998, p. 4.)

[28] Ibid., p. 10. The consumers "fear that these U.S. producers would then use their market power to raise prices substantially." (The Trade Partnership, written submission, dated June 30, 1998, p. 10.)

Trade

The United States is an historical net importer of AN. U.S. imports of liquid and solid AN enter under a general rate of duty of "free" under Harmonized Tariff Schedule (HTS) subheading 3102.30, "Ammonium nitrate, whether or not in aqueous solution." U.S. domestic industry sources believe that most, if not all, of the imports under this subheading are in solid form, primarily because of the additional expense associated with shipping aqueous solution. In addition, the HTS subheading does not distinguish between fertilizer-grade and explosive-grade material. However, U.S. domestic industry representatives believe that imports from all countries except Canada consist of fertilizer-grade AN; reportedly, about 50 percent of U.S. imports from Canada may consist of low-density explosive-grade product. According to domestic industry sources, exports of U.S. ammonium nitrate are relatively small in terms of volume.[29] Imported and domestically-produced AN are considered to be equivalent in terms of nitrogen content. Quality differences, however, include the size of the granule or prill, its hardness, and the level of dust or "fines." Domestic industry sources note that imported product, originally said to be prone to caking and a higher level of fines, depending on the source, has generally improved in recent years.[30]

As shown in table 3-8, the top 3 suppliers of U.S. imports of solid, fertilizer-grade AN during 1994-97 were Canada, Russia, and the Netherlands.[31] Prior to 1994, there were no U.S. imports of AN from Russia, and the top 3 supplier countries were Canada, the Netherlands, and Norway. The volume of U.S. imports of all AN from Canada (including explosive-grade) increased irregularly during 1993-97 from 353,000 to 387,000 metric tons. U.S. imports from the Netherlands, presumed to be all fertilizer-grade material, also increased irregularly during these years, from 77,000 to 85,000 metric tons. In comparison, the volume of U.S. imports from Russia (also presumed to be all fertilizer-grade material) increased initially from 77,000 to 186,000 metric tons during 1994-95, before declining to 123,000 metric tons in 1996, and then increasing again to 198,000 metric tons in 1997. The volume of U.S. imports from Russia were down in the first half of 1998 by 44 percent, compared with the like period in 1997. Much of the overall increase in U.S. imports of solid, fertilizer-grade AN during these years can be attributed to fairly strong agricultural demand in the United States. Overall U.S. nitrogenous fertilizer demand increased irregularly during 1993-97 from about 10.3 million metric tons nitrogen to about 11.2 million metric tons nitrogen.

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[29] USITC fieldwork in the United States, May 19-22, 1998.

[30] Ibid.

[31] A representative of the Ministry of Foreign Economic Relations and Trade of the Russian Federation has stated to Commission staff that Russian data on Russian AN exports to the United States during 1994-97, obtained from the State Customs Committee of the Russian Federation, not only differ from U.S. data on U.S. imports of AN from Russia for the same period, but show a different trend. The data provided by the Russian government representative are as follows (in metric tons):

1994	1995	1996	1997
231,509	325,966	284,522	163,378

Commission staff has referred the matter to the Bureau of the Census. [Faxes to the Embassy of the United States of America, Moscow, Russia (dated July 16, 1998; forwarded to Commission staff on July 17, 1998) and to Commission staff (dated July 31, 1998) from Mr. Alexey N. Ruzhin, Deputy Department Head, Department for Regulation of External Economic Activities, the Ministry for Foreign Economic Relations and Trade of the Russian Federation.]

Table 3-8
Ammonium nitrate: U.S. imports by country,[1] 1992-97 and January-May 1997 and 1998

Country	1992	1993	1994	1995	1996	1997	January-June-- 1997	January-June-- 1998
	Quantity (1,000 metric tons product)[2]							
Canada	414	353	303	346	391	387	203	200
Russia[3]	0	0	77	[4]186	123	198	135	75
Netherlands	19	77	105	99	171	85	47	39
Poland	0	0	6	0	0	19	0	20
Belgium	0	0	0	0	0	15	0	11
Norway	10	32	10	0	0	4	0	0
Costa Rica	0	0	0	([5])	([5])	([5])	([5])	0
Japan	0	([5])	([5])	([5])	([5])	([5])	([5])	([5])
South Africa	0	0	([5])	([5])	([5])	([5])	([5])	([5])
United Kingdom	0	0	([5])	([5])	0	([5])	([5])	0
Austria	1	0	0	0	0	([5])	([5])	0
Venezuela	0	0	0	([5])	([5])	([5])	([5])	0
Trinidad & Tobago	0	0	0	0	0	([5])	([5])	0
Bulgaria	0	22	0	0	0	0	0	0
Ukraine	0	0	0	0	11	0	0	16
All other	0	5	105	121	15	0	0	0
Total	444	485	612	[4]754	718	708	386	360
	Value (1,000 dollars)							
Canada	48,779	41,327	36,433	49,539	58,967	62,282	33,006	31,800
Russia[3]	0	0	6,786	[4]18,298	15,153	19,952	15,165	5,873
Netherlands	1,542	6,270	9,227	11,605	22,524	10,593	6,001	2,978
Poland	0	0	415	0	0	1,576	0	1,590
Belgium	0	0	0	0	0	1,500	0	550
Norway	929	3,485	2,051	0	0	517	0	0
Costa Rica	0	0	0	5	70	86	86	6
Japan	0	1	6	20	5	39	13	15
South Africa	0	0	5	16	12	13	0	0
United Kingdom	0	0	2	4	0	11	4	0
Austria	101	0	0	0	0	10	10	0
Venezuela	0	0	0	52	52	7	7	0
Trinidad & Tobago	0	0	0	0	0	3	3	0
Bulgaria	0	2,296	0	0	0	0	0	0
Ukraine	0	0	0	0	1,243	0	0	1,180
All other	8	0	9,949	12,966	3,454	0	0	0
Total	51,360	53,379	64,873	[4]93,366	101,479	96,589	54,296	44,034

[1] Ammonium nitrate dry solid product containing 34 percent nitrogen by weight. Total imports for HTS 3102.30.

[2] Product tonnage consists of high density fertilizer-grade prilled and granular product, together with low density explosive-grade prills, in respective order of importance.

[3] As noted in an earlier footnote in the text, the Russian data for Russian AN exports to the United States provided by the Russian government representative are (in metric tons):

1994	1995	1996	1997
231,509	325,966	284,522	163,378

[4] Official U.S. Department of Commerce statistics corrected for errata.

[5] Negligible.

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

Note: Quantities may not add to totals because of rounding.

An examination of unit values of U.S. imports provides a measure of comparison among leading supplier countries. Table 3-9 shows the average unit value of total U.S. imports of AN during 1993-97 in terms of Customs value and c.i.f. unit value[32] and the approximate value of the associated insurance and freight. The volume of U.S. imports of AN, after remaining fairly stable for 1989-92, increased by 268,428 metric tons to 753,778 metric tons in 1995, or by 55 percent, before declining to 708,130 metric tons in 1997. The corresponding c.i.f. unit values of these imports increased during 1993-96 from $121 per metric ton to $153 per metric ton in 1996 (or by 26 percent) before declining to $147 in 1997.

Changes in trade with the EU, particularly the Netherlands, and Russia had a significant influence on U.S. imports. The volume of imports from the EU increased from 77,098 metric tons in 1993 to 170,877 metric tons in 1996 (or by 122 percent) before declining by almost 42 percent in 1997 to 100,023 metric tons. The c.i.f. unit value of the EU imports also increased through 1996, from $95 per metric ton to $143 (50 percent) before declining by 11 percent to $128 in 1997. The imports from Russia more than doubled in volume during 1994-97 from 77,120 metric tons to 198,098 metric tons, or by 157 percent; the trend in the Russian c.i.f. unit values, however, paralleled that of the EU, increasing through 1996 by 26 percent from $112 to $141 before declining by 16 percent to $118 in 1997. The c.i.f. unit values for both the EU and the Russian product were consistently below that of total product imported during 1994-97, ranging from a difference of about $10-22 for the EU product and $8-29 for the Russian product.[33]

During 1994-97, there was a cyclical trend between Russian and EU imported volume, with Russia higher than the EU in 1995 by 55 percent (185,564 metric tons vs. 119,576 metric tons) and in 1997 by 98 percent (198,098 tons versus 100,023). In comparison, EU volumes were higher than Russian volumes in 1994 and 1996, by 36 percent and 39 percent, respectively. In 1994 Russian c.i.f. unit values were $13 per ton above EU unit values, but in subsequent years (1995-97), EU c.i.f. unit values rose to about $10 per ton above Russian c.i.f. unit values. Import tonnage from both Russia and the Netherlands were down significantly in January-June 1998 compared to the same period a year ago.[34] The January-June c.i.f. unit value of AN imports from the Netherlands dipped below that of Russian AN imports for the first time, reaching a low of $82 per metric ton vs. $94 for Russian product.

U.S. ammonium nitrate import unit values, c.i.f. Russia and the Netherlands, have fluctuated relative to domestic prices. For example, as derived from data presented in the "Pricing and Cost Trends" section found later in this chapter, the spread between the wholesale domestic prices, f.o.b. Cornbelt and the average unit value of product imported from Russia during 1994-96 was relatively constant at about $45 per ton, but gradually widened by $5 per ton to about $50 in January-June 1998 (the domestic prices were consistently higher than the average unit values of the imports). The differential was even more dramatic for the Netherlands, with the spread widening by about $20 during the same period to $60.

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[32] The c.i.f.. import value is defined as: "The c.i.f. (cost, insurance, and freight) value represents the landed value at the first port of arrival. It is the sum of 'import charges' (i.e., the aggregate cost of all freight, insurance, and other charges, excluding U.S. import duties) plus 'customs value' (i.e., the value of imports as appraised by the U.S. Customs Service, defined as the price actually paid or payable for merchandise, excluding U.S. import duties, freight, insurance, and other charges) and therefore excludes U.S. import duties." (U.S. Department of Commerce)

[33] The c.i.f. unit value for the imports from Canada trended higher than the average level of all imports, perhaps reflecting the product mix of explosive- and fertilizer-grade AN.

[34] This might be attributable to declining prices in the U.S. market. Russian AN producer JSC Acron notes that "most recently, Acron shifted sales away from the U.S. market because of the decline in prices in that market, looking instead for more profitable markets." (JSC Acron written submission, dated July 17, 1998, p. 15.)

Table 3-9
Ammonium nitrate: U.S. imports by Customs and c.i.f. values, quantity, and unit value, 1993-97[1]

Source	1993	1994	1995	1996	1997
	Metric tons (1,000 metric tons)				
Quantity imported:					
Russia	0	77	[2]186	123	198
EU	77	105	111	171	100
Canada	353	303	346	391	387
Other	55	127	104	33	23
Total U.S. imports	485	612	[2]754	718	708
	Value (1,000 dollars)				
Customs:					
Russia	0	6,786	[2]18,298	15,153	19,952
EU	6,270	9,233	11,632	22,527	12,114
Canada	41,327	36,433	49,539	58,967	62,282
Other	5,782	12,421	13,034	4,832	2,241
Total U.S. imports	53,379	64,873	[2]93,366	101,479	96,589
C.I.F.:					
Russia	0	8,668	[2]22,691	17,396	23,381
EU	7,344	10,444	15,864	24,469	12,791
Canada	44,288	39,727	52,914	62,244	65,723
Other	6,843	15,197	14,322	5,720	2,282
Total U.S. imports	58,476	74,036	[2]105,781	109,824	104,176
	Unit value (dollars per ton)				
Customs:					
Russia	0	88	98	123	101
EU	81	88	105	132	121
Canada	117	120	143	151	161
Other	106	98	127	148	99
Total U.S. imports	110	106	124	141	136
C.I.F.:					
Russia	0	112	122	141	118
EU	95	99	130	143	128
Canada	125	131	153	159	170
Other	125	120	151	175	101
Total U.S. imports	121	121	140	153	147
Insurance and freight:					
Russia	0	24	23	18	17
EU	14	11	29	11	7
Canada	8	11	10	8	9
Other	19	22	22	27	2
Total U.S. imports	11	15	16	12	11

[1] Total imports under HTS 3102.30. About 50 percent of the product imported from Canada is said to be explosive-grade product.
[2] Official U.S. Department of Commerce statistics corrected for errata.

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

Note: Figures may not add to totals shown because of rounding.

Pricing and Cost Trends

Input Costs

AN production costs are sensitive to fluctuations in the price of natural gas, one of the primary feedstocks for ammonia (see table 3-10). With U.S. gas costs in the low $2 per million Btu range (MM Btu), for example, the costs of natural gas represented approximately 70-80 percent of the cost of producing ammonia[35] and about 30-50 percent of the cost of producing AN.[36]

Prices for U.S. nitrogenous fertilizer products in all forms increased between July-December 1993 and January-June 1997, mainly due to tightened supply, strong demand, and a substantial rise in merchant ammonia prices. For example, ammonia, f.o.b. Gulf, barge, New Orleans, increased in price from $120 per metric ton in 1993 to around $230 during July-December 1994.[37] Ammonia peaked at $260 in January-June 1995 and was still above $200 into January-June 1997. Conversely, the cost of producing ammonia remained relatively stable (table 3-10).

The increase in the price of ammonia resulted from a tight supply of the product. According to one source, the "tightness in supply of anhydrous ammonia that emerged in 1994 was a result of increased industrial usage as the U.S. economy grew, a net consolidation of the domestic capacity, and a disruption in supply coming from the former Soviet Union."[38] The wellhead price of natural gas generally declined as ammonia prices increased during 1993-95. Several domestic AN producers have noted that although the price of natural gas to consumers can vary depending on several factors, including location, the wellhead price is considered a good benchmark.

Ammonium Nitrate Prices

U.S. prices for fertilizer-grade AN rose without interruption from January-June 1993 to peak levels in January-June 1996,[39] and then fell moderately by January-June1997.[40] By January-June 1998, prices

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[35] Production Cost Surveys, weighted average costs for all U.S. plants surveyed, The Fertilizer Institute, Washington, DC, June 9, 1998. Mississippi Chemical Corporation, Form 10-K, for the fiscal year ended June 30, 1997, p. 8; USITC fieldwork at several domestic producers, May 19-22, 1998. A company's natural gas cost can include the market price for the product as well as a pipeline transport fee.

[36] Mississippi Chemical written submission, dated June 30, 1998, appendix 13. The amount could trend higher if purchased ammonia is used.

[37] Various issues of *Green Markets*, Pike & Fischer. The prices discussed in this section are either f.o.b. or delivered for a particular geographic region. According to a representative of *Green Markets*, f.o.b. can be defined as "free-on-board -- sales point." A definition appearing in *Green Markets* states "Prices listed on an F.O.B. basis are at the producer's plant gate, terminal or pipeline point." (*Green Markets*, Pike & Fischer, Inc., July 13, 1998, p. 5.) Delivered prices include transportation costs either from the producer's plant or warehouse. Changes in transportation costs, storage costs, or other such costs, can cause fluctuations in the delivered price vis-a-vis that of the imported product.

[38] ClimaChem Inc., Form S-4, *Registration Statement Under The Securities Act of 1933,* January 26, 1998, p. 26, and Form 10-Q, *Quarterly Report Pursuant to Section 13 or 15(d) of The Securities Exchange Act of 1934,* June 1, 1998, p. 20.

[39] Some decisions were made during that time to add additional U.S. production capacity for AN. (Mississippi Chemical Corp. annual report for fiscal year 1997 and quarterly reports for fiscal year 1998; CF Industries annual report, December 31, 1997, and PCS Nitrogen Inc. annual report 1997.)

[40] The business is seasonal, with heavy movement to the farmer during the spring planting season, followed by fill-up or inventory buildup programs during the summer, fall, and winter months.

Table 3-10
Major U.S. feedstock prices for ammonium nitrate production, 1993-98

Year	Natural gas prices-- Wellhead[1]	Natural gas prices-- To ammonia producers[2]	Anhydrous ammonia production costs[2]
	---Dollars per million Btu---		*Dollars per metric ton*
1993	2.04	2.11	117
1994	1.85	2.08	111
1995	1.55	1.62	96
1996	2.17	2.08	116
1997	2.23	2.22	116
1998	[3]1.84	([4])	([4])

[1] Energy Information Administration (EIA), National Energy Information Center, Department of Energy, Washington, DC.

[2] *Production Cost Surveys for the Year Ended Dec. 31, 1997*, The Fertilizer Institute, Washington, DC, June 9, 1998. The data shown are a weighted industry average. As noted in the preface of the survey report, the companies participating in the survey vary from year to year and, “generally, the larger the number of companies reporting, the more reliable are the data.” Moreover, according to the preface, although the data for the 1997 report were collected using procedures similar to those used in past years, the weighting procedure was modified that year to “more accurately reflect an average cost for each product.” (*Production Cost Surveys for the Year Ended Dec. 31, 1997*, preface.) Several AN producers have noted that although the price of natural gas to consumers can vary depending on several factors, including location, the wellhead price is considered a good benchmark.

[3] Estimated (January-April 1998 year-to-date). (EIA, Selected National Average Natural Gas Prices, 1991-97)

[4] Not available.

had fallen significantly, generally to levels near those of 1993-94. According to information obtained from *Green Markets*, U.S. ammonium nitrate f.o.b. prices, Southeast, declined by $27 per ton, or 15 percent, from $181 per ton during January-June 1997 to $154 during January-June 1998 (see table 3-11; in the table, “spring” is defined as January through June and “fall” is defined as July through December). Correspondingly, AN prices, f.o.b. Cornbelt, fell by $38 per ton, or 21 percent, from $182 per ton in January-June 1997 to $144 in January-June 1998.

Table 3-11
U.S. regional wholesale f.o.b. prices for fertilizer-grade ammonium nitrate, spring 1993-spring 1998

Source	South-east[1]	South Central[2]	Southern Plains[3]	Corn-belt[4]	Great Lakes[5]	Northern Plains[6]	California[7]	North-west[8]
				(dollars per metric ton product)				
1993								
Spring[9] . . .	142	148	147	150	159	149	172	144
Fall[10]	131	137	141	148	153	143	168	153
1994								
Spring	164	168	154	152	168	166	171	158
Fall	154	163	152	157	170	165	181	168
1995								
Spring	172	175	182	180	191	187	200	186
Fall	172	163	158	168	179	163	188	184
1996								
Spring	187	187	183	188	200	193	209	193
Fall	181	175	177	184	191	187	200	190
1997								
Spring	181	175	176	182	191	187	207	200
Fall	148	151	141	156	162	187	204	166
1998								
Spring	154	160	143	144	159	149	206	153

[1] Southeast (Florida, Georgia, South Carolina, North Carolina, Virginia).
[2] South Central (Alabama, Mississippi, Kentucky, Tennessee, Arkansas, Louisiana, East Texas).
[3] Southern Plains (West Texas, Oklahoma, Kansas, East New Mexico, East Colorado).
[4] Cornbelt (Ohio, Indiana, Illinois, Iowa, Missouri and Eastern Nebraska).
[5] Great Lakes (Michigan and Wisconsin).
[6] Northern Plains (Minnesota, North Dakota, South Dakota).
[7] California (California and Arizona).
[8] Northwest (Washington, Oregon, Idaho, Montana).
[9] Throughout this table, “spring” is defined as January through June.
[10] Throughout this table, “fall” is defined as July through December.

Source: *Chemical Economics Handbook* (CEH), SRI International (Menlo Park, CA); also, *Green Markets*, f.o.b. Cornbelt. CEH estimates based on various trade journals.

As noted earlier, prices for U.S. nitrogenous fertilizer products in all forms generally increased between July-December 1993 and January-June 1997 and were high during the 18-month period January 1996 through June 1997, when AN delivered prices in the Southeast and South Central regions were about $200 per metric ton, an increase of 15-20 percent relative to 1994 prices. AN prices f.o.b. Cornbelt reflected similar upward trends. Prices paid by farmers reported by the U.S. Department of Agriculture reflected increases for all nitrogenous fertilizer products during the same period (table 3-12). One component of the differential between f.o.b. prices in the Southeast and South Central regions and delivered prices is freight rates in the $10-20 per ton range, typical of information reported by the industry (see table 3-13).[41]

Table 3-12
Nitrogenous fertilizers: Average U.S. farm prices paid in April, 1990-98, by leading type

In April of year shown	Anhydrous ammonia (82% nitrogen)	Nitrogen solutions (30% nitrogen)	Urea (45-46% nitrogen)	Ammonium nitrate (34% nitrogen)	Ammonium sulfate (21% nitrogen)
	Dollars per metric ton				
1990	219	146	203	198	170
1991	231	152	234	203	166
1992	229	155	218	196	166
1993	235	151	223	205	173
1994	268	151	228	216	187
1995	364	186	293	246	201
1996	334	201	306	257	203
1997	334	176	283	250	204
1998	279	148	215	213	206

Source: USDA, ERS, based on USDA, NASS, Agricultural Prices, 1990-98. Data were converted from short tons to metric tons.

During the first half of 1997 to the first half of 1998, however, U.S. prices declined significantly for nitrogenous fertilizers that are substitutable for fertilizer-grade AN.[42] For example, after peaking in January-June 1995 at about $155 per ton, average prices for UAN solutions, f.o.b. Cornbelt, decreased by $31 per ton (22 percent) from $141 in January-June 1997 to $110 in January-June 1998. Prices for fertilizer-grade ammonia, f.o.b. barge, Gulf, New Orleans, fell $68 per ton (32 percent) during January-June 1997-January-June 1998 from $212 per ton to $144, and granular urea prices, f.o.b. Gulf, declined by about $48 per ton (26 percent) $187 to $139.[43]

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[41] USITC fieldwork in the United States, May 19-22, 1998. Variations between delivered and f.o.b. prices for AN can also include fluctuations in warehouse prices and other storage costs.

[42] "Ammonia, urea, and nitrogen solutions prices declined 23 percent, 13 percent, and 26 percent, respectively from the 1997 quarter reflecting the downward pressure on pricing which occurred in mid-1997 and carried over into 1998. Lower worldwide demand for urea and increased nitrogen production capacity created excess nitrogen supplies and caused prices to decline." (Terra Industries, form 10-Q, filed 8/12/98.)

[43] *Green Markets*, various issues.

Table 3-13
U.S. regional wholesale and delivered prices for fertilizer-grade ammonium nitrate and c.i.f. unit values for product imported into the United States from Russia and the Netherlands, spring 1993-spring 1998

	Southeast[1]--		South Central[2]--		Cornbelt[3]–		Imports (c.i.f. unit value)	
Year	F.o.b.	Delivered	F.o.b	Delivered	F.o.b	Delivered	Russia	Netherlands
				(dollars per metric ton)				
1993:								
Spring[4]	142	([5])	148	([5])	150	([5])	0	([5])
Fall[6]	131	([5])	137	([5])	148	([5])	0	([5])
Average . . .	137	([5])	143	([5])	149	([5])	0	95
1994:								
Spring	164	167	168	171	152	([5])	([5])	([5])
Fall	154	168	163	175	157	([5])	([5])	([5])
Average . . .	159	168	166	173	155	([5])	112	99
1995:								
Spring	172	185	175	191	180	([5])	([5])	([5])
Fall	172	181	163	182	168	([5])	([5])	([5])
Average . . .	172	183	169	186	174	([5])	122	132
1996:								
Spring	187	206	187	203	188	([5])	([5])	([5])
Fall	181	199	175	194	184	([5])	([5])	([5])
Average . . .	184	203	181	199	186	([5])	141	143
1997:								
Spring	181	200	175	193	182	([5])	([5])	([5])
Fall	148	175	151	([5])	156	([5])	([5])	([5])
Average . . .	165	187	163	([5])	169	([5])	118	132
1998:								
Spring	154	166	160	([5])	144	([5])	94	82

[1] Southeast (Florida, Georgia, South Carolina, North Carolina, Virginia).
[2] South Central (Alabama, Mississippi, Kentucky, Tennessee, Arkansas, Louisiana, East Texas).
[3] Cornbelt (Ohio, Indiana, Illinois, Iowa, Missouri, Eastern Nebraska).
[4] Throughout this table, “spring” is defined as January through June.
[5] Not available.
[6] Throughout this table, “fall” is defined as July through December.

Source: *Chemical Economics Handbook* (CEH), SRI International (Menlo Park, CA) (domestic prices; CEH estimates based on trade journals, including *Green Markets: Fertilizer Intelligence Weekly*, Pike and Fischer, Inc.); and U.S. Department of Commerce, Bureau of the Census (import prices).

Overall, the period of 1993-97 was characterized by a dynamic growth for U.S. nitrogenous fertilizer consumption and planted crop acreage, driven by rising global grain prices, during a period of near record low feed and food grain carryout inventories worldwide. U.S. ammonium nitrate producers have cited a trend of declining prices during the past 12 months as nitrogenous fertilizer prices tumbled in late 1997 through January-June 1998 from the peaks experienced in 1996 and early 1997.[44] Additionally, producers of solid, fertilizer-grade AN along the Mississippi River to the east and west have expressed concern that shipments of Russian AN into New Orleans may be an additional disruptive factor to the domestic AN market, purportedly resulting in lower domestic prices at a time when prices may already be set to decline again owing to new domestic capacity coming onstream that carries substantial capital outlays from decisions made back in 1994.[45] A general perception on the part of domestic producers with markets accessible to Mississippi River traffic is that Russian product sold quickly by traders via barge, or larger shipments pre-sold from Russian port destined for sites near the river, are disruptive practices that undercut marketing channels of domestic producers because they make large amounts of product available quickly. Domestic producers believe that shipments from the Netherlands, on the other hand, are marketed to consumers through more predictable channels, such as warehousing, and therefore are not considered as disruptive to the U.S. marketplace because they are considered to be disbursed in a more even manner.[46]

On the consumer side, a general perception is that during 1994-98, domestic AN product has been in short supply as evidenced by supply curtailments; with limited quantities for sale, required product volumes and reasonable prices could not be obtained from domestic sources. As a result, imports from Russia, the Netherlands and other EU countries have been considered necessary to satisfy demand for domestic consumers in a supply limited market.[47]

Although Russian and EU imports may have affected spot pricing during the heavy planting seasons between 1994 through January-June 1998, price reductions during this period could also be attributed to depressed nitrogenous fertilizer prices in general resulting from additional supplies of nitrogen fertilizers of all types available in international markets during 1997-98. The significant drop in international ammonia and downstream nitrogenous fertilizer prices during the past year (see figures 3-2 and 3-3), including U.S. ammonium nitrate pricing, has been attributed to several factors, including new AN and UAN capacity coming onstream in the United States; a decline in U.S. grain prices during the past year owing to increased grain stocks, exacerbated by the loss of key agricultural export markets as a result

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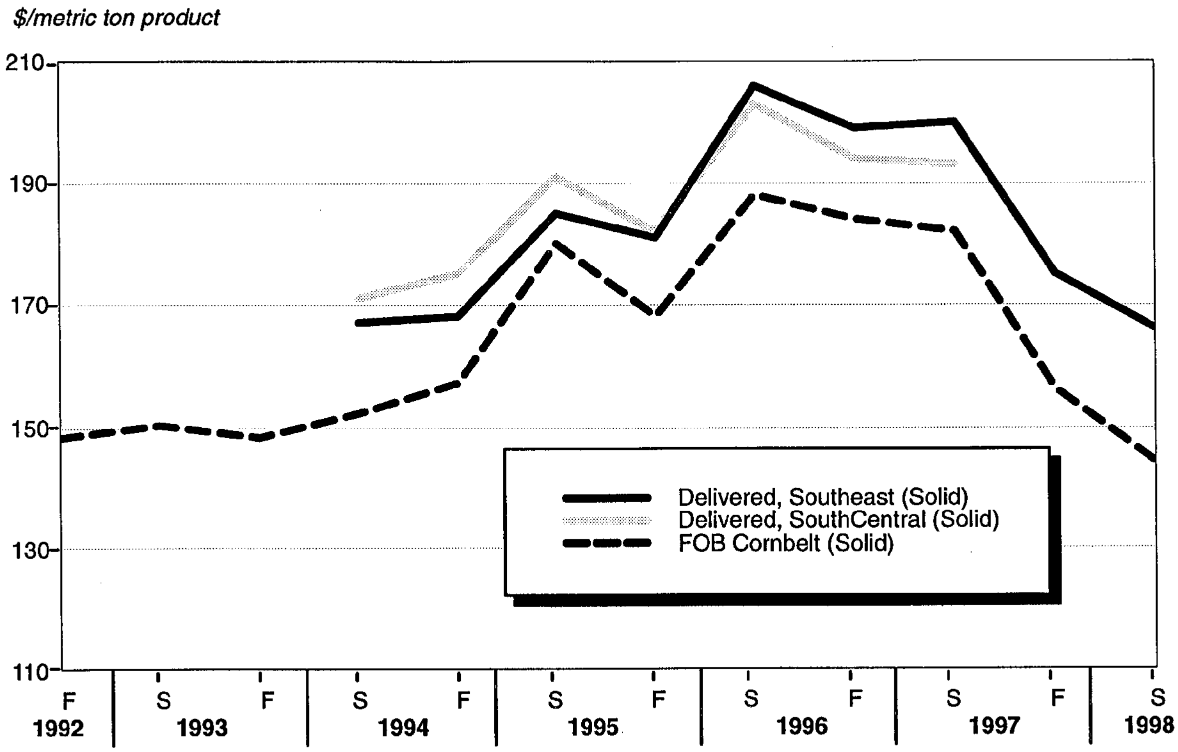
[44] For example, Mississippi Chemical reported that during the fiscal year ending June 30, 1998, the average price of AN declined 18 percent compared with fiscal 1996/97. AN sales volumes, however, increased 5.5 percent to 694,000 metric tons. (Mississippi Chemical, *Quarterly Report*, July 23, 1998, pp. 3 and 8.)

[45] Commission hearing transcript, June 16, 1998. PCS Nitrogen Inc. states that "over the last 4 years, the increase in Russian AN imports has negatively and unfairly impacted U.S. market prices for AN." PCS Nitrogen Inc. written submission, dated June 29, 1998, p. 1.

[46] Ibid. USITC fieldwork in the United States, May 19-22, 1998, and associated contacts with industry sources.

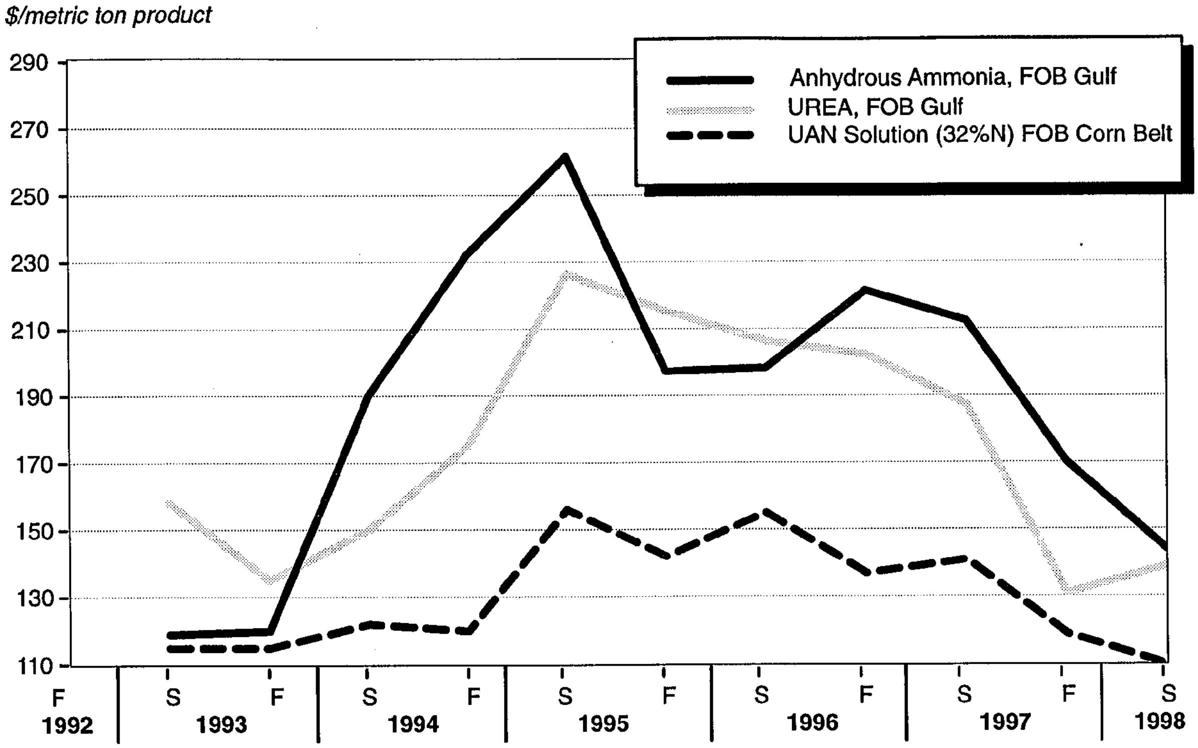
[47] Written submission from The Trade Partnership, dated June 30, 1998. USITC fieldwork in the United States, May 19-22, 1998, and July 1998.

Figure 3-2
U.S. ammonium nitrate price trends, 1992-98



Note.—S = Spring; F = Fall.
Source: *Green Markets*, Pike & Fischer.

Figure 3-3
U.S. Nitrogenous fertilizer price trends, 1993-98



Note.—S = Spring; F = Fall.
Source: *Green Markets*, Pike & Fischer.

of the Asian financial crisis; and increased availability of nitrogenous fertilizer available on international markets[48] because of the ripple effect precipitated by China's ban[49] on imports of certain nitrogenous fertilizers,[50] effective April 1997.[51] Chinese imports of nitrogenous fertilizer accounted for about 7 percent of worldwide consumption of nitrogenous fertilizers in fertilizer year 1996/97. Further compounding the current downward trend in prices was the prospect of an additional supply of ammonia on international markets because of a substantial amount of new production capacity for ammonia and urea recently brought onstream, or expected onstream during 1998-99, in the United States by CF Industries and Farmland, and in Trinidad (said to be intended principally for U.S. markets) by PCS Nitrogen, Norsk Hydro, and Farmland/Mississippi Chemical.

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[48] According to a source in Russia, world prices for nitrate fertilizers declined during the past year and a half because of "slumping demand" from major importers such as China. (Interfax International Ltd., "Leading Nitrate Fertilizer Producers Threaten Shutdown," *Chemical Review*, vol. III, issue 3(34), March 1998, p. 2.) VTI states that AN prices are "linked to supply and demand-driven world nitrogen prices (mainly urea), which have declined dramatically over the past 2 years." (International VTI Group, VTI Fertasco, Inc., written submission dated August 6, 1998, p. 2.)

[49] For more information see the following section on"Government Policies Affecting the U.S. Ammonium Nitrate Industry."

[50] Communication with Gary Liu, Commercial Assistant, U.S. Embassy, Beijing, China. According to information provided by Mr. Liu, the ban covers the following products: urea; ammonium nitrate; sodium nitrate; ammonium sulphate; calcium cyanamide; complexes and mixtures of ammonium sulphate and ammonium nitrate; mixtures of ammonium nitrate with calcium carbonate; complexes and mixtures of calcium and ammonium nitrate; mixtures of urea and ammonium nitrate; and other nitrogenous fertilizers.

The State Development Planning Commission is said to have implemented the ban through quotas, a 3-percent tariff, and an end to import subsidies that previously allowed higher priced imported urea to compete with lower-priced urea produced in China. Chinese Government agencies explained that China had over-imported nitrogenous fertilizers, especially urea, in 1995 and 1996, lowering consumption levels of domestically-produced products. During the 1990s, China made significant investments in building large urea plants. Several recently constructed plants had to shut down in 1995 and 1996, however, because of competition from imports. (Gary Liu, "Agrochemicals: Industry Sector Analysis," Commercial Section, U.S. Embassy, Beijing, China, 1998.)

Russian AN producer JSC Acron states, "China, for example, banned all imports of nitrogen fertilizers, including AN, in April 1997." (JSC Acron written submission, dated July 17, 1998, p. 12.) A Russian source notes that "Russian producers of nitrogen fertiliser will lose their chief export market because the Chinese government has decided to completely stop importing this type of fertiliser." (Interfax International Ltd., "Russian Nitrogen Fertiliser Exporters Loses Main Market," *Chemical Report*, vol. VIII, issue 7, July 1998, p. 4.) Russia is a major supplier of fertilizer to China. Approximately 60 percent of China's urea imports in 1997 were from Russia. The rest were from the Middle East and Ukraine, with smaller quantities from the United States.

Some domestic and international industry sources, however, have described the action only as a ban on urea, perhaps, as suggested by representatives of the U.S. industry, because that is the major product many countries trade with China. One industry source, for example, notes that "The [Chinese] ban on urea imports decided in April 1997 (in April for seaborne imports, in June for imports by railway from the former Soviet Union) had a significant impact on urea trade and a very significant impact on the international prices of urea." (Pierre Louis, "Fertilizers and Raw Materials Supply and Supply/Demand Balances," paper presented at 66th IFA Annual Conference in Toronto, Canada, May 11-14, 1998, p. 17). Various annual reports of U.S. fertilizer producers, including the annual and quarterly reports of Mississippi Chemical in 1997 and 1998, and the annual reports of CF Industries and PCS (the parent of PCS Nitrogen, Memphis, TN), also refer to a Chinese ban on urea.

[51] Statements published in annual and quarterly Reports of Mississippi Chemical in 1997 and 1998, and in annual reports of CF Industries and PCS (the parent of PCS Nitrogen, Memphis, TN).

Solid, fertilizer-grade AN is marketed on a spot basis. Typical marketing mechanisms for Russian product on the spot market involve unloading product from the vessel (4,535 to 18,140 metric ton quantities) onto 1,360 metric ton barges for shipment up the Mississippi River. Off-load fees are around $3.30 per metric ton and barge freight up the Mississippi as far as Memphis, TN, usually averages about $6.60-$8.80 per metric ton. Barges may be “fleeted,” or used for storage, at $150 per day ($3.30 per metric ton per month). Once the barge docks for unloading, the shipment may be direct transferred to truck or rail. Trucks are nominally 23 metric tons and hopper railcars are about 90 metric tons. Truck rates can vary anywhere from $1.50 per mile per load to upwards of $2.25 per mile per load, or between $6-$9 per ton per 100 miles, with rail trending toward the high side of truck rates at $9-$10 per ton per 100 miles. Thus, river transportation is the least costly, followed by truck and rail. If product is warehoused, there is an additional cost of $11-$17 per metric ton. Freight costs, in general, average about $22-$28 per metric ton for AN fertilizer delivered in a 300-400 mile radius of a plant or a port in the United States.[52]

Traditional market research points to evidence of prevailing tight domestic AN supply during 1994 through June 1997 as evidenced by capacity utilization rates gradually moving up out of the 80 percent range to the high 90 percent range, followed by declining prices for AN, especially during July 1997-April 1998. Even so, overall capacity utilization rates, especially by the dominant producers, appeared to still have averaged in the 90 percent range during the past 12 months. Rising prices, tight supply, and strong demand conditions brought increasing pressures on both producers and consumers to find surplus product on the market, including material imported from Russia and the Netherlands; conversely, as agricultural prices decreased between July-December 1997 and June 1998, many producers and buyers at wholesale as well as retail levels were under increasing pressure to look for lower-cost imported product. This is evidenced by reports of both domestic producer and consumer purchases of Russian product.[53] However, industry sources suggest that lower import prices can have an impact on spot market sales prices in the United States. According to Mississippi Chemical, “the mere presence of a Russian ammonium nitrate cargo heading for the United States depresses domestic prices long before it arrives.”[54]

According to domestic and Russian industry sources, U.S. trade firms typically purchase Russian ammonium nitrate product from Russian producers based on a fixed price delivered to port of export, after

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[52] USITC fieldwork in the United States, May 19-22, 1998

[53] Given the recent downward trend in AN pricing, it is important to compare the estimated unit values for Russian product against a relatively full range of historic prices rather than just against today’s lower prices. On an annual average basis, c.i.f. unit values for Russian product increased during 1994-96 from about $112 per metric ton to about $141 per metric ton, before declining to about $118 per metric ton in 1997 and to about $94 in January-June 1998. This trend generally parallels the trend in c.i.f. unit values for imported product during these years.

One of the respondents provided netback calculations in their written submission (Mississippi Chemical written submission, dated June 30, 1998). In a netback calculation, certain costs (e.g., transportation costs) are subtracted from the price of the product in the United States to obtain an estimate of the factory gate price in the originating country. The netback calculations of Russian product to plant gate in Russia provided by the respondents were apparently calculated on the basis of historically low import prices during July-December 1997 through January-June 1998. U.S. domestic industry prices also declined significantly during this time. These calculations would appear to be lower than those based on substantially higher Russian import unit value averages, c.i.f. New Orleans, between 1994 through July-December 1997.

[54] Commission hearing transcript, June 16, 1998, p. 15; Mississippi Chemical written submission, dated June 30, 1998, p. 22.

arrangement for financing through a broker.[55] By purchasing product at a fixed price with the intent to sell on the spot market, the trader assumes the financial risks associated with changes in market trends and prices that may occur by the time the bulk shipment is landed in New Orleans. Thus, product pricing and timing may determine the difference between making a profit, breaking even, or taking a loss on imported product, all of which have been reported by domestic and Russian sources to have occurred.[56] Selected large-volume shipments reportedly may be pre-sold under contract. Shipments from the EU, principally bulk product from the Netherlands, tend to be more evenly disbursed than the Russian product,[57] as Norsk Hydro ships product from a wholly-owned plant through its marketing subsidiary, Hydro Agri North America, Inc., in Tampa, FL, and San Francisco, CA.[58] The majority of these shipments are landed at New Orleans and San Francisco according to U.S. Department of Commerce statistics. During 1994-97, Russian unit values, c.i.f. New Orleans, averaged $124 per metric ton compared with $127 for the Netherlands, c.i.f. Freight rates to the United States, including insurance, have averaged about $21 for Russia, and $14 for the Netherlands. Freight rates, in general, have declined over time, perhaps indicative of improving backhaul volumes.

Outlook

The current situation and near-term outlook for the U.S. nitrogenous fertilizer and farm sectors is that both sectors are being affected by additional supplies of product and depressed prices after four solid years of growth.[59] U.S. nitrogenous fertilizer prices in all forms trended downwards for much of the current fertilizer year, ending June 30, 1998, and volumes were believed to be moderately lower (down by an estimated 2-3 percent) than that applied to last year's bumper crop.

Following four bumper crops in the United States during the past 5 years (fertilizer years 1993/94-97/98, est.) in which approximately 330 million acres were planted annually to the 16 major crops, domestic inventories of grain are building. In particular, wheat stocks grew from 75 days of supply in 1994, to an estimated 114 days by the end of the current marketing year.[60] Ending corn stocks, at a critically low 18 days of supply back in 1995, are expected to build to an estimated 63 days of supply by the end of the current marketing year. The situation has been exacerbated by the loss of key agricultural export markets as a result of the Asian financial crisis

Planted acreage of the 8 principal row crops[61] in the United States fluctuated with a 4 percent increase during 1993-98. During 1993-97, corn and wheat accounted for approximately 57-60 percent of the total planted acreage annually. The planted acreage for the 8 row crops increased from 247 million to 262 million

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[55] USITC fieldwork in the United States, May 19-22, 1998, and July 1998. Also, JSC Acron notes that it "usually knows the final destination of its product when it ships the product to St. Petersburg, but all of Acron's export sales, excluding those to other FSU countries, are made through unaffiliated trading companies. Thus, at the time that Acron delivers its shipments to the port or railhead, it transfers control of the merchandise to unrelated parties." (JSC Acron written submission, dated July 17, 1998, p. 13.)

[56] USITC fieldwork in the United States, May 19-22, 1998, and July 1998.

[57] USITC fieldwork in the United States, May 19-22, 1998; Commission hearing transcript, June 16, 1998, pp. 65-67.

[58] Ibid.

[59] Various sources, including Mississippi Chemical Corp. annual report for fiscal year 1997 and quarterly reports for fiscal year 1998; CF Industries annual report, December 31, 1997, and PCS Nitrogen Inc. annual report 1997.

[60] World Agricultural Supply and Demand Estimates, World Agricultural Outlook Board, July 10, 1998.

[61] Corn, wheat, soybeans, sorghum, barley, oats, rice, and upland cotton.

acres in 1996, and then declined to 257 million acres in 1998, as compiled from official statistics of the U.S. Department of Agriculture (USDA), and shown in the following tabulation (in millions of acres, except as noted):[62]

Year	Planted acreage of eight leading U.S. crops	Corn	Wheat
1993	247	73	72
1994	252	79	70
1995	245	71	69
1996	262	80	76
1997	261	80	71
1998	257	81	67

Peak acreage had previously occurred in 1981, when 297 million acres were planted, according to data of USDA. Hence in the long run, planted acreage is down, although there has been a modest 4 percent rise in such acreage amidst fluctuation since 1993.

Growth in U.S. nitrogenous fertilizer consumption followed the trend of crop acreage, and was generally robust between the fertilizer year ending June 30, 1993, and that ending June 30, 1997. During this period, U.S. nitrogenous fertilizer consumption moved upwards by about 9 percent, from 10.3 million metric tons N in 1993 to a high of 11.2 tons million metric tons N in the 1996/1997 fertilizer year. This increase, representing a growth rate of about 2 percent per year, generally paralleled average annual growth trends in consumption of nitrogenous fertilizers during the past 10 years. U.S. nitrogenous fertilizer consumption in fertilizer year 1997/98 was estimated at approximately 11.0 million metric tons nitrogen, representing a moderate decline from the 1996/97 fertilizer year.[63]

AN consumption depends on a variety of factors, including soil, climate, technology, weather, crop mix, Government programs, and commodity and fertilizer prices.[64] The most important factor is planted acreage. Crop mix affects the level of consumption because some crops, for example corn, are more nitrogen intensive than others.[65] During 1993-97, solid, fertilizer-grade for direct application grew by a modest 1 percent per year. All solid, fertilizer-grade AN, however, including product intended for bulk blending, increased by about 2-3 percent per year because of increasing trends in multinutrient bulk blend consumption containing AN, diammonium phosphate, and potash (NPKs), as well as increased use in no-till planting.

[62] Data provided by ERS, USDA by facsimile, June 18, 1998.

[63] The nitrogenous fertilizer consumption estimate for crop year 1997/98 was calculated from planted crop acreage distribution, and average application rates by crop (pounds N per acre), as reported by the U.S. Department of Agriculture's World Agricultural Outlook Board (August 1998) and by the USDA Economic Research Service (July 1998).

[64] USDA, ERS, *Agriculture Resources and Environmental Indicators, 1996-97*, July 1997, p. 100.

[65] The amount of AN applied to pasture is not accounted for in USDA statistics nor is it included among the data for the row crops listed above.

Beyond June 1998, the picture is clouded. Current conditions would appear to portend declines in planted crop acreage and nitrogenous fertilizer consumption during the 1998/99 fertilizer year, largely based on current and anticipated surpluses of food and feed grains projected by USDA[66] by the end of the 1998-99 marketing year[67] and on current economic events in Asia and other significant export markets for U.S. agricultural products. Additional factors affecting the magnitude of the anticipated decline would include larger carryout, or ending inventories, projected by USDA for wheat, corn, and soybeans harvested this fall, and sold or stored in marketing year 1998/99; and lower crop prices. The most recent significant decline in U.S. fertilizer consumption occurred during 1995-96, when nitrogen consumption in 1996 fell 7.3 percent compared to 1995, and a similar downward trend could materialize during the 1998/99 fertilizer year if conditions worsen. However, if China terminates its ban on imports of certain nitrogenous fertilizers,[68] this would help stabilize the fluctuations in the international nitrogen fertilizer industry. Should the Asian financial situation improve, then more moderate price changes may be expected.

Conversely, according to domestic industry sources,[69] it is possible that planted acreage and nitrogen fertilizer consumption in fertilizer year 1998-99 may remain near current levels because of a combination of factors, including provisions in the new farm bill (the Federal Agricultural Improvement and Reform (FAIR) Act of 1996 (P.L. 104-127)) which phase out price supports (for more information on the Act and its impact see the following section on"Government Policies Affecting the U.S. Ammonium Nitrate Industry"),[70] thus encouraging the farmer to plant, rather than idle, acreage, reportedly hedging profitability on volume in the face of declining prices. These industry sources also suggest that acreage currently

[66] For example, average farm prices for wheat have declined from $4.55 per bushel in the 1995-96 marketing year, to $3.38 per bushel in 1997-98, and are projected to decline to $2.75 per bushel in 1998-99. By July 18, 1998, the situation was perceived severe enough to prompt the President of the United States to order USDA to appropriate $250 million to buy 80 million bushels of wheat from U.S. farmers and distribute them to several countries in need, including Ethiopia, Sudan, Indonesia, North Korea, Eritrea, so as to reduce U.S. surpluses. (Presidential Documents, The President's Radio Address, Office of the Federal Register, Vol. 34, No. 30, July 18, 1998, pp. 1426-1427.)

[67] Marketing year 1998-99 refers to the period encompassing the harvest and subsequent marketing of the crop currently growing in the fields. The marketing year for wheat, barley, oats and rye, for example, runs from June 1, 1998, through May 31, 1999, whereas the marketing year for corn, sorghum, and soybeans runs from October 1, 1998, through September 30, 1999. These currently maturing crops were initially planted and fertilized during the previous 12-month period (July 1, 1997, through June 30, 1998, commonly referred to as "fertilizer year" 1997-98). *World Agricultural Supply and Demand Estimates*, World Agricultural Outlook Board, U.S. Dept. of Agriculture, Aug 12, 1998.

[68] As mentioned earlier when discussing the ban, Chinese Government agencies explained that China had over-imported nitrogenous fertilizers, especially urea, in 1995 and 1996, lowering consumption levels of domestically-produced products. During the 1990s, China made significant investments in building large urea plants. Several recently constructed plants had to shut down in 1995 and 1996, however, because of competition from imports.

[69] Douglas Associates, Florence, AL; CF Industries, Inc., Long Grove, IL; Mississippi Chemical Corp., Yazoo City, MS; and other major U.S. fertilizer manufactures and agricultural consultants as of August 1998.

[70] On August 12, 1998, the President signed the Emergency Farm Financial Relief Act which allows America's farmers to receive their entire year's worth of Farm Bill payments--worth more than $5 billion--in one early lump sum. These payments are reportedly for the purpose of promoting a smooth transition from the government price-support payment systems of past farm legislation, to the current farm bill which abolishes the price support system. (USDA Press Release No. 0332.98, 8/12/98.)

planted with oilseed crops may be converted to corn and other feedgrains, which consume more nitrogenous fertilizers, because of the additional supplies of oilseed crops currently available.[71]

In August 1998, USDA crop production estimates for the United States indicated that another bumper crop would be harvested in the coming marketing year 1998-99.[72] The harvest of feed grains (corn, sorghum, barley, and oats) was projected at 10.7 billion bushels, comparable to the 10.6 billion harvested in the previous year. Wheat production was projected to be constant at 2.5 billion bushels, and soybeans up slightly to 2.8 billion bushels compared to 2.7 billion bushels in the previous year. The rice harvest was expected to be relatively unchanged , while cotton production was expected to be down by 24 percent (14.3 million bales, compared to 18.8 million bales during the previous year). Planted acreage for the above crops was estimated at 257 million acres, compared to 261 million acres during the previous year, with the loss in acreage due principally to lower wheat acreage.

U.S. consumption of fertilizer-grade AN should follow similar trends as overall nitrogenous fertilizers. Although with the added value of niche markets like pasture and range, conservation tillage practices, and improvements in bulk blending, AN could possibly fare slightly better than average.

Government Policies Affecting the U.S. Ammonium Nitrate Industry

Trade and Economic Policies

Imports of AN[73] into the United States from countries with normal trade relations status enter free of duty. There have not been any antidumping or countervailing duty investigations on AN, although there have been some on related nitrogen fertilizer products. For example, the U.S. Department of Commerce (DOC) issued antidumping orders on solid urea from Germany, Romania, and the Soviet Union in July 1987.[74] There was also a countervailing duty investigation on anhydrous ammonia from Mexico, in which DOC made a negative final determination in June 1983. In the late 1970s, there were two market disruption investigations involving anhydrous ammonia from the Soviet Union. As a result of the first investigation, the Commission made an affirmative determination and recommended that quotas be placed on the subject imports,[75] but the President determined not to take action. Following the Soviet invasion of Afghanistan in late December 1979, the President imposed a quota on an emergency basis on imports of anhydrous ammonia from the Soviet Union and requested that the Commission conduct a new investigation. The

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[71] Douglas Associates, Florence, AL; CF Industries, Inc., Long Grove, IL; Mississippi Chemical Corp., Yazoo City, MS; and other major U.S. fertilizer manufactures and agricultural consultants as of August 1998.

[72] World Agricultural Supply and Demand Estimates, World Agricultural Outlook Board, U.S. Dept. of Agriculture, Aug. 12, 1998.

[73] U.S. imports of AN, whether or not in an aqueous solution (Harmonized Tariff Schedule (HTS) 3102.30.00), and U.S. imports of mixtures of AN with calcium carbonate or other inorganic nonfertilizing substances (HTS 3102.40.00) enter under a general rate of duty of "free.".

[74] Original antidumping orders were issued in July 1987 and divided as countries of the Soviet Union became independent. The following orders are still in effect: A-832-801 (Azerbaijan), A-822-801 (Belarus), A-447-801 (Estonia), A-833-801 (Georgia), A-428-605 (Germany), A-834-801 (Kazakhstan), A-449-801 (Latvia), A-451-801 (Lithuania), A-841-801 (Moldova), A-485-601 (Romania), A-821-801 (Russia), A-843-801 (Turkmenistan), A-823-801 (Ukraine), and A-844-801 (Uzbekistan).

[75] USITC, *Anhydrous Ammonia from the U.S.S.R.* (investigation no. TA-406-5), USITC publication 1006, Oct. 1979.

Commission made a negative determination in this new investigation, and the emergency action was terminated.[76]

Industry-specific Policies[77]

Direct U.S. government intervention in the AN sector has been minimal. There are no producer subsidies in the United States, and input markets are, for the most part, deregulated. Some environmental and worker safety laws are applicable to the industry.

Natural gas, as previously discussed, represents approximately 30-50 percent of the total production cost of AN; therefore, policies that affect natural gas can also affect the production of AN. Since the mid-1980s, various acts have resulted in gradual deregulation of wellhead prices and unbundling of the services of integrated natural gas transportation and sales companies. Deregulation has generally resulted in lower real prices to consumers; however prices fluctuate in response to supply and demand factors, such as proximity to production sources and weather anomalies.[78]

An important result of deregulation is that large customers are able to purchase natural gas off-system.[79] Many industrial users, such as electrical utilities and some producers of AN,[80] have taken advantage of this opportunity by securing an independent distribution system, which enables them to

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[76] USITC, *Anhydrous Ammonia from the U.S.S.R.* (investigation no. TA-406-6), USITC publication 1051, Apr. 1980.

[77] In addition to examining government policies in the regions under consideration, it should be noted that the government policies of other areas of the world can affect the AN industries in the United States, the European Union, and Russia. One major example is China's ban, issued in April 1997, on imports of certain nitrogenous fertilizers. China has been one of the world's largest buyers of nitrogenous fertilizer, particularly urea, on the international market. Approximately 60 percent of China's imports of urea in 1997 were from Russia. The rest was from the Middle East and the Ukraine with a very small quantity from the United States.

The Chinese Government controls production and distribution of fertilizers. Manufacturers cannot set their own price, even though the price of many inputs has increased. Chinese Government agencies explained that China had over-imported nitrogenous fertilizers, especially urea, in 1995 and 1996, lowering consumption levels of domestically-produced products. During the 1990s, China made significant investments in building large urea plants. Several recently constructed plants had to shut down in 1995 and 1996, however, because of competition from imports. According to the former Ministry of the Chemical Industry (recently changed to the State Petrochemical Industry Bureau), Chinese nitrogenous fertilizer manufacturers are capable of satisfying the local market. China has historically, however, imported about 22 percent of its nitrogen needs. China still imports phosphate and potassium fertilizers and diammonium phosphate because of its limited production capability in these areas. In 1997, for example, China also imported $967 million of diammonium phosphate from the United States. Chinese Government agencies have not indicated how long the import ban will be in effect, but its ninth 5-year plan puts forth the goal of attaining self-sufficiency in nitrogen fertilizers by year 2000. China projects its demand for nitrogen fertilizer to increase. (Communication with Gary Liu, Commercial Assistant, U.S. Embassy, Beijing, China; Gary Liu, "Agrochemicals: Industry Sector Analysis," Commercial Section, U.S. Embassy, Beijing, China, 1998.)

[78] Serving customers distant from the production source adds costs associated with shipping, storage, and handling (compression). (Energy Information Administration, *Natural Gas 1996: Issues and Trends*, p. 102.)

[79] "Off-system" refers to purchases outside of the local distribution system (i.e., from independent suppliers).

[80] Some producers of AN have pipelines direct to their plant. (USITC fieldwork to several domestic producers, May 19-22, 1998.)

purchase from multiple sources at the lowest cost. These off-system consumers pay less than those who purchase through local distribution systems because they are able to purchase natural gas and transportation services from competitive suppliers.

Different purchase options, such as choosing among competitive suppliers, are only now becoming available at the local distribution level. More competition at the local level can be expected to benefit industrial consumers and others that have remained on-system. However, these on-system industrial customers have continued to pay more than off-system customers. Table 3-14 lists real-dollar U.S. natural gas prices, in which prices under the heading electrical utilities are reflective of a sector that purchases primarily off-system.

The manufacture, storage, and transport of AN is subject to various state and federal laws and regulations.[81] A by-product of the laws and regulations, intended to protect human safety and the environment, is, however, increased AN production costs. Some examples of such laws follow.

The Research and Special Programs Administration of the U.S. Department of Transportation has identified nitric acid, anhydrous ammonia, and AN as hazardous materials. Due to this classification, the AN industry must comply with regulations under the Hazardous Materials Transportation Act when transporting these materials. The Resource Conservation and Recovery Act regulates the storage, treatment, and disposal of wastes that contain these hazardous materials. The amended 1990 Clean Air Act includes provisions to prevent the accidental release of certain chemicals into the air and to mitigate the consequences of such releases.[82] The Clean Air Act regulations apply to stationary sources capable of emitting more than threshold amounts of nitric acid, anhydrous ammonia, and aqua ammonia. Moreover, various degrees of risk assessment, prevention, and warning are required for different levels of users. The Comprehensive Environmental Response, Compensation, and Liability Act regulates the accidental release of reportable quantities of hazardous substances, including nitric acid and anhydrous ammonia, into the environment. OSHA's Process Safety Management standards are designed to prevent and minimize the consequences of the release of highly hazardous substances including nitric acid, anhydrous ammonium, and aqua ammonia. These regulations have resulted in companies devoting resources to develop and implement procedures to comply with these environmental and safety requirements.

[81] The Fertilizer Institute's *Fertilizer: Profile of a Regulated Industry*, 1996, provides a more complete overview of these numerous and complex regulations and was the source of the information in the following paragraph.

[82] For a discussion of the Clean Water Act, please see the "environmental controls" section in this chapter.

Table 3-14
Real-dollar average U.S. natural gas prices, 1988-97[1]

Year	Industrial on-system	Electric utilities
	-----------(Dollars per 1,000 cubic feet)------	
1988	3.85	3.04
1989	3.71	3.05
1990	3.52	2.86
1991	3.11	2.52
1992	3.19	2.65
1993	3.36	2.86
1994	3.26	2.44
1995	2.83	2.11
1996	3.49	2.74
1997	3.52	([2])

[1] Base year = 1997.
[2] Not available.

Source: EIA, *Monthly Energy Review*, (March 1998) (deflated by DOC's GDP chain-weighted price deflator).

Several producers of solid AN also make the low-density prilled product used in explosives. The Antitrust Division of the Department of Justice (DOJ) recently investigated one of these firms for price fixing and other anticompetitive practices. The firm pled guilty of conspiracy to fix prices in the sale of explosive-grade AN on May 30, 1997, and agreed to pay a fine of $1.5 million.[83]

Agricultural Policies

Past farm legislation limited both the number of planted acres and the type of crops that could be planted. Studies of farm fertilizer use suggest that the effect of previous legislation was indirectly to encourage program-participating farmers to use more fertilizer on planted acres than nonparticipating farmers in order to increase per-acre yields and take advantage of program support payments.[84]

The U.S. Government farm programs were significantly changed in 1996 with the passage of the Federal Agricultural Improvement and Reform (FAIR) Act of 1996 (P.L. 104-127). The FAIR Act was signed into law as a fundamental redesign of income and supply management programs for producers of wheat, corn, other grains, and cotton. In so doing, it expanded the market-oriented policies of the previous farm acts, and gradually reduced the Government influence through traditional commodity programs.[85] The Act provided fixed but declining payments to participating farmers,[86] and removed most planting restrictions

[83] DOJ, Press Release, No. 224, May 30, 1997.
[84] Marc Ribaudo and Robbin Shoemacher, "Effect of Feedgrain Program Participation on Chemical Use," *Agricultural and Economic Review*, October 1995.
[85] C. Edwin Young and Paul Westcott, USDA, ERS, *The 1996 U.S. Farm Act Increases Market Orientation*, August 1996, p. ii.
[86] Effective in year 2000, the dairy price support program will also be eliminated.

(except for those on conservation and environmental controls) for participating farmers cultivating, among others, the eight row crops that use large amounts of AN.[87] The Act gives farmers the flexibility to shift acreage to other crops and to bring previously idled acres into production. The Act also reauthorized a number of conservation programs such as the Conservation Reserve Program, the Great Plains Conservation Compliance, and the Wetland Reserve Program, which kept over 30 million unplanted acres in such programs and out of production. The reauthorization of these programs has likely muted the potential effects of the FAIR Act on planted acreage, and hence on the use of fertilizers, such as AN, that would have likely occurred without the reauthorization.

In 1996, USDA indicated that U.S. production of wheat, feed grains and soybeans over the 7 years covered by the Act would be similar to that under the previous law, but aggregate farm net income would be expected to be higher than would have occurred because government payments were higher under the FAIR Act.[88] However, the crop mix might be altered. Thus, on balance, there would be little effect on total planted acreage in the United States, and thus, little effect on fertilizer use.

There has been scant research on the FAIR Act to date because of the recent passage of the Act. However, different opinions exist as to its prospective impact. One journal article stressed the FAIR Act's reliance on a market approach to resource allocation and stated that the era of government management of primary crops appears to be over.[89] On the other hand, another researcher reported that close examination of the FAIR Act reveals that it is not revolutionary but continues reforms that began with the 1985 farm legislation and were extended by the 1990 farm bill.[90] Therefore, large changes in crop acreage and increases in income variability are not expected. In a simulation of the effects on Kansas farms from 1996 through 2002, average annual farm incomes increase but are also more variable with the FAIR Act than with previous legislation.[91]

Actual data for 1996 show a sharp increase of 17 million acres planted in the eight row crops. The increased total acreage in the major U.S. field crops following the FAIR Act was primarily a result of higher prices for the crops, combined with the effects of the commodity program changes mentioned above that increased planting flexibility, according to USDA.[92] The precise effects of the program changes are intermixed with those of the higher crop prices inducing farmers to plant more acreage starting in 1996.

The high 1996 corn prices at the farm gate may have had more influence on farmers' decisions to increase acreage planted to corn, and whether to increase fertilizer use, than the FAIR Act. Another factor unique to 1996 was particularly adverse weather that caused a significant reduction in that year's winter wheat crop, which was initially planted with normal amounts of fertilizers.[93] In the following spring, many farmers,

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[87] See USDA, ERS, *Provisions of the Federal Agriculture Improvement and Reform Act of 1996*, September 1996.

[88] Ibid., p. iv.

[89] Tweeten, Luther and Carl Zulauf, "Public Policy for Agriculture after Commodity Programs," *Review of Agricultural Economics*, 19(2), Fall-Winter 1997, pp. 263-280.

[90] Smith, Vincent H. and Joseph Glauber, "The Effects of 1996 Farm Legislation on Feed and Food Grains," *Contemporary Economic Policy*, 16(1), January 1998, pp. 69-71.

[91] Kastens, Terry L and Allen M. Featherstone, "Federal Agricultural Improvement and Reform Act of 1996: A Kansas Perspective," *Review of Agricultural Economics*, 19(2), Fall-Winter 1997, pp. 326-349.

[92] USDA, *USDA Baseline Projections*, February 1998, pp. 38-40; also Paul Westcott and Ed Young, "1996 Farm Act Sets Stage for Acreage Shifts," *Agricultural Outlook*, Sept. 1997, pp. 13-14.

[93] Ibid.

whose winter wheat failed, replanted corn and soybeans, and these acres were double counted as program acres. The net weather-induced result was that a considerable portion of the 1996 acreage increase of 17 million acres (and hence of the associated increased use of such fertilizers as AN) may simply have been the result of weather-induced replanting of failed wheat acreage, rather than the result of the new farm programs themselves.[94]

Environmental Controls

Excessive nitrogen in surface water can cause excessive algae growth and lead to a process of oxygen depletion called eutrophication. The Environmental Protection Agency (EPA) indicates that nutrient and chemical fertilizer pollution is the leading cause of water quality impairment in U.S. lakes and estuaries, and the third leading cause in rivers.[95] Nitrate concentration above 10 milligrams per liter in drinking water can cause illness in infants and may pose increased cancer risk to humans. For these reasons, U.S. regulators have moved to reduce fertilizer application, particularly those leading to nitrate infiltration into water.

The USDA and the EPA administer water quality programs that limit agricultural use of fertilizer. The FAIR Act of 1996 reauthorized a number of USDA-administered voluntary programs affecting farming, including the Agricultural Conservation Program, Colorado River Salinity Control Program, the Water Quality Program, the Conservation Compliance and Conservation Reserve Program, Wetland Reserve Program, and the Great Plains Conservation Program.[96] The EPA, which has both voluntary and mandatory programs affecting fertilizer use, administers the Clean Water Act Programs, the Coastal Nonpoint Pollution Control Programs, Safe Water Drinking Act, and the Comprehensive State Ground-Water Protection Program, among others.

Forty-four states have laws or programs to protect water quality through regulation of agricultural practices to limit agricultural nonpoint source pollution, which includes fertilizer runoff and ground-water infiltration.[97] State regulation is in response to the Clean Water Act and to chronic local problems of nitrates in ground water.[98] States use a variety of policy approaches, such as input controls, land use, and economic incentives, although some approaches are purely voluntary. Input controls are aimed mainly at use levels of fertilizer and pesticides, while nutrient management plans, required in 16 States, regulate the use of such substances as nitrates (and hence nitrate fertilizers) usually in areas affected by ground-water contamination.[99] Many states have fertilizer taxes that decrease fertilizer consumption. According to the USDA, most of these taxes are aimed primarily at generating tax revenue rather than at reducing fertilizer use.[100] In some areas, restrictions are placed on application of nitrogen and fertilizers in the fall or under certain weather conditions. Nitrate applied in the fall or when the crop intake is minimal has a greater potential to move from the soil into water, according to USDA.

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[94] Ibid.

[95] Economic Research Service (ERS), USDA, "Nutrient Management," *Agricultural Resources and Environmental Indicators, 1996-97*, July 1997, pp. 204-205.

[96] Economic Research Service (ERS), USDA, "Water Quality Programs," *Agricultural Resources and Environmental Indicators*, *1996-97*, July 1997, pp. 270-272.

[97] Ibid., p. 272.

[98] Ibid.

[99] Ibid., p. 111.

[100] Ibid., p. 273

CHAPTER IV
THE EUROPEAN UNION AMMONIUM NITRATE INDUSTRY

EU Industry Profile[1]

The EU, as an aggregate, is the world's second largest producer and consumer of fertilizer-grade AN, accounting for about 16 percent of world production and 20 percent of world consumption in 1997.[2] The widespread use of AN in the EU may be attributed to the rapid fertilizing effect realized from half the available nitrogen being in nitrate form, a particular advantage for the short growing season in northern EU latitudes, and the relative stability of AN prices versus those of certain competing products, such as urea.[3] Calcium ammonium nitrate (CAN) is also consumed in the EU. Within the EU, France, Greece, Italy, Spain, and the United Kingdom are the principal AN markets, and Austria, Belgium, Denmark, Finland, Germany, Ireland, the Netherlands, and Spain the principal CAN markets.[4]

Four countries (France, the United Kingdom, Spain, and the Netherlands) dominate the EU ammonium nitrate industry. These countries have both relative ease of access to natural gas production feedstock and significant agriculture which consumes AN fertilizer.

The EU ammonium nitrate industry is a part of a larger nitrogenous fertilizer industry which was restructured in the early 1990s. This process resulted in reduced production capacity, a downsized workforce, modernized plants, and streamlined channels of distribution and sales. These changes were undertaken to improve competitiveness and adapt to the changing supply/demand situation which followed the Common Agricultural Policy (CAP) reform of 1992.[5] As a result, AN capacity utilization in the EU improved and unit costs were reduced.

There is significant foreign direct investment in the AN industry in the EU. In the United Kingdom the AN industry is exclusively foreign owned. Terra Industries U.S.A. purchased ICI's United Kingdom fertilizer business in January 1998 and renamed the company Terra Nitrogen UK, Ltd.[6] Hydro Agri Europe (UK) is owned by Norsk Hydro (part state-owned; Norway); Kemira Agro UK Ltd's. parent company is Kemira Industries (part state-owned; Finland).[7] Norsk Hydro also owns AN production capacity in France, the

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[1] The AN discussed in this section is solid, fertilizer-grade product but can include low-density AN. As noted in the section, EU solid ammonium nitrate production principally supplies agriculture (85-90 percent) versus the industrial explosives market (10-15 percent). Relatively small amounts of low-density product are consumed in the EU.

[2] "A Cold Wind from the East," *Nitrogen*, No. 225, (Jan.-Feb. 1997) p. 18, and, The International Fertilizer Industry Association (IFA), *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics 1997*, p. 2.

[3] "A Cold Wind from the East," p. 18.

[4] Solid ammonium nitrate contaminated with organic matter can become unstable and explosive. Such a hazard was realized in a German explosion approximately 50 years ago. Although there has been no major accidental explosion involving ammonium nitrate for over 40 years, consumption of ammonium nitrate in many EU countries is reportedly limited to the lower nitrogen content CAN (e.g., Northern Ireland, primarily because of the potential for terrorist activities). As noted earlier, the added calcium carbonate in CAN reduces the potential for explosion. Statistics for AN and CAN are differentiated throughout the report.

[5] USITC fieldwork in the EU, June 22-July 7, 1998.

[6] International Fertilizer Development Center, *Worldwide Ammonium Nitrate and Calcium Ammonium Nitrate Capacity Listing by Plant*, (Feb. 1998), p. 35.

[7] USITC fieldwork in the EU, June 22-July 7, 1998.

Netherlands, and Sweden. Kemira Industries has further direct investment in AN production capacity in Belgium. About half of the Netherlands' industry is foreign owned.

The AN industry in the EU is considered to be directly comparable to the U.S. industry. Production facility relative age, technology, modernization, expansions, infrastructure, re-vamping, retrofitting schedules, and efficiency levels are virtually identical. Most EU ammonia capacity was built between 1965-75, nitric acid capacity between 1968-78, and ammonium nitrate capacity in the late 1970s-early 1980s.[8] There has been no grassroots investment to build completely new AN plants in the EU in recent years, and none is forecast through 2002. Rather, existing AN production facilities will continue to be retrofitted, modernized, modified and upgraded, including addition (or mothballing) and modernization of ammonia and nitric acid units to accommodate environmental legislation effluent and emission levels and increase energy efficiency and operating levels.[9]

AN production capacity in the EU is largely vertically integrated with captive ammonia and nitric acid capacity on site. Nitric acid is considered to be the limiting factor in AN production (fertilizer grade nitric acid is not sold on the merchant market in the EU).[10] Although some ammonia is purchased on the merchant market, ammonia largely moves through intra-company transfers. Therefore, if an AN producer in the EU is integrated with ammonia and nitric acid, natural gas accounts for most, if not all, of the company's variable costs.[11]

EU ammonium nitrate production gas feedstock sources depend on both country and company. Gas feedstock may be sourced from captive company production, the spot market, merchant market contract, state-owned monopoly, or a combination from among these sources.[12] The majority of continental European AN producers source gas through long-term contracts.[13] In the UK, gas de-regulation and privatization resulted in comparability between the UK domestic gas pipeline system and domestic gas pipelines in the United States. In France, a major portion of natural gas production and distribution is controlled by the public enterprise Gaz de France.[14]

Production/Shipments and Consumption

In the EU, total annual solid ammonium nitrate production capacity (both high and low density) of approximately 8.8 million metric tons is heavily concentrated in France, the United Kingdom, Spain, and the Netherlands.[15] As noted in the following tabulation, four companies account for approximately 70 percent of this capacity: Norsk Hydro, through its Hydro Agri subsidiaries, (23 percent); Grande Paroisse (18 percent); Kemira (15 percent); and Fertiberia (14 percent). Within each major producing country, the geographical distribution of domestic production capacity was determined by the regional product market, since relative

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[8] Ibid.

[9] Ibid.

[10] Ibid.

[11] Ibid.

[12] Ibid.

[13] Telephone conversation with Mr. Ben Van Spronsen, Directorate General-17 (natural gas), Commission of the European Communities, Aug. 25, 1998.

[14] USITC fieldwork in the EU, June 22-July 7, 1998.

[15] Production capacity for CAN is located in numerous EU countries, including Austria, Belgium, Denmark, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Sweden. CAN may be manufactured in AN production facilities. Certain producers manufacture both products using the same equipment.

production/end-user location affects delivered product cost.[16] For example, Grande Paroisse of France primarily supplies the north of France and northern Europe from production capacity in Rouen and supplies southern France and Spain from production capacity in Toulouse.[17] In the United Kingdom the nitrogen market is split between east (generally arable land) and west (grasslands and mixed farming). AN production capacity located at Billingham and Immingham in the northeast generally serves the eastern market and capacity located at Severnside and Chester serves the western market.[18]

Country	Capacity (1,000 metric tons per year product)
France	
Grand Paroisse	1,600
Hydro Agri France SA	885
Produits et Engrais Chimiques du Rhin SA	255
Total	2,740
United Kingdom	
Hydro Agri Europe	650
Terra Nitrogen UK	1,000
Kemira Agro UK	650
Total	2,300
Spain	
Fertiberia SL	1,240
Netherlands	
DSM Melamine BV	260
Hydro Agri Sluiskil BV	[1]360
Total	620

[1] Estimated.

Source: International Fertilizer Development Center, *Worldwide Ammonium Nitrate and Calcium Ammonium Nitrate Capacity Listing by Plant*, (February 1998).

EU solid ammonium nitrate production principally supplies agriculture (85-90 percent) versus the industrial explosives market (10-15 percent). AN production in the EU dropped significantly from 5.3 million metric tons in 1992 to 4.6 million metric tons in 1993. The decreased production of AN in 1993 may have been partially attributable to EU-wide industry restructuring and the CAP reform of 1992. Production levels then rebounded to 5.0 million in 1994 and 5.7 million metric tons in 1996, as AN producers responded to the extremely tight international nitrogen supply of 1994 and 1995 by increasing production. AN production then declined to 5.1 million metric tons in 1997, for an overall decrease of 2 percent during 1992-1997 (table 4-1). Continued high AN import levels during 1996, however, may have contributed to 1997 AN production declines in France, Spain, and the Netherlands.

[16] The European Fertilizer Manufacturers Association (EFMA), *The Fertilizer Industry of the European Union*, (June 1997), p. v.

[17] USITC fieldwork in the EU, June 22-July 7, 1998.

[18] Ibid.

Within the EU, AN consumption occurs largely in the United Kingdom (7 percent of 1997 world consumption), France (7 percent), Spain, and Greece (1 percent each) (appendix H).[19] AN consumption in

[19] Compiled from IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics 1997*.

Table 4-1.
Ammonium nitrate: European Union production,[1] domestic shipments,[1] imports,[2] exports,[2] apparent consumption,[3] and import/consumption ratio, 1992-97

Country	1992	1993	1994	1995	1996	1997
	(1,000 metric tons product)					
United Kingdom:						
Production	1591	1500	[4]1507	[4]1565	[4]1739	1805
Domestic shipments	1439	1331	[4]1333	[4]1449	[4]1449	1604
Imports	566	497	757	688	963	713
Exports	121	211	176	135	159	91
Apparent consumption	2005	1828	2090	2137	2412	2317
I/C ratio (percent)	28	27	36	32	40	31
France:						
Production	[4]1912	[4]1618	[4]1765	[4]1971	[4]2118	[4]1765
Domestic shipments	[4]1471	[4]1353	[4]1529	[4]1618	[4]1706	[4]1471
Imports	186	370	359	329	540	687
Exports	296	251	286	367	343	350
Apparent consumption	1657	1723	1888	1947	2246	2158
I/C ratio (percent)	11	22	19	17	24	32
Netherlands:						
Production	529	[4]500	611	[4]406	[4]647	[4]500
Domestic shipments	29	29	29	29	[4]29	[4]29
Imports	140	137	98	164	199	166
Exports	108	89	84	52	72	25
Apparent consumption	169	166	127	193	228	195
I/C ratio (percent)	83	83	77	85	87	85
Greece:						
Production	277	220	255	238	274	260
Domestic shipments	256	206	210	211	262	260
Imports	74	93	138	83	89	115
Exports	4	0	4	8	9	8
Apparent consumption	330	299	348	294	351	375
I/C ratio (percent)	22	31	40	28	25	31
Portugal:						
Production	275	190	166	257	269	260
Domestic shipments	256	190	166	230	267	257
Imports	7	4	8	9	10	16
Exports	29	4	3	2	1	3
Apparent consumption	263	194	174	239	279	273
I/C ratio (percent)	3	2	5	4	4	6
Spain:						
Production	288	179	245	153	270	201
Domestic shipments	264	177	236	160	256	206
Imports	139	91	152	235	254	123
Exports	126	18	24	26	29	15
Apparent consumption	403	268	388	395	510	329
I/C ratio (percent)	34	34	39	59	50	37

See footnotes at end of table.

Table 4-1--Continued
Ammonium nitrate: European Union production, domestic shipments, imports, exports, apparent consumption, and import/consumption ratio, 1992-97

Country	1992	1993	1994	1995	1996	1997
	----------------------------(*1,000 metric tons product*)--------------------------------					
Belgium:						
Production	221	118	221	206	235	176
Domestic shipments	([5])	([5])	([5])	([5])	([5])	([5])
Imports	57	70	66	94	109	116
Exports	146	162	227	208	235	220
Apparent consumption . .	57	70	66	94	109	116
I/C ratio (percent)	100	100	100	100	100	100
All other:						
Production	159	223	275	208	32	35
Domestic shipments	115	23	30	16	15	15
Imports	192	284	362	537	570	602
Exports	49	95	271	164	83	37
Apparent consumption . .	316	316	403	647	595	629
I/C ratio (percent).	61	90	90	83	96	96
Total European Union:						
Production	5252	4562	5061	5022	5729	5154
Domestic shipments	3839	3318	3544	3722	3994	3854
Imports	1361	1546	1940	2139	2736	2538
Exports	879	907	1075	961	931	749
Apparent consumption . .	5200	4864	5484	5861	6730	6392
I/C ratio (percent).	26	32	35	36	41	40

[1] The production and domestic shipments (home deliveries) statistics compiled in this table, originally presented in terms of nutrient content, were later converted to a product basis to allow comparison with statistics presented elsewhere in the report. Conversions took into account the indigenous, country specific, nitrogen content for production and domestic shipments, as follows: UK - 34.5 percent; France - 33.5 percent; the Netherlands - 33.5 percent; Greece - 34.0 percent; Portugal - 32.3 percent; Spain - 33.5 percent; and Belgium - not available (a factor of 34.0 percent was used). The indigenous nitrogen content for certain other countries exporting to the EU include: Bulgaria - 34.5 percent; Hungary - 34.0 percent; Poland - 34.5 percent; Romania - 33.5 percent; Croatia - 33.5 percent; Lithuania - 34.4 percent; Russia - 34.0 percent; and Egypt - 33.5 percent.

[2] Import and export data were compiled from data from the European Commission's statistical office, Eurostat.

[3] Calculated as domestic shipments plus imports.

[4] Estimated.

[5] Not available.

Source: Compiled from the International Fertilizer Industry Association, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics,* 1992-1997, except as noted.

Note: Figures may not add to totals shown because of rounding.

the EU declined from 5.2 million metric tons in 1992 to 4.9 million metric tons in 1993. As with production, AN consumption then rebounded during 1994-96 to reach 6.7 million metric tons, before decreasing to 6.4 million metric tons in 1997, for an overall increase of 23 percent during 1992-97 (table 4-1).

Stricter environmental legislation (less AN used) and increased CAP-imposed set-asides (less land fertilized) contributed to the AN consumption decline in the EU from 1992 to 1993.[20] AN consumption then increased during 1994-95 despite the tight international nitrogen supply. By 1996, with higher worldwide grain and oilseed prices and reductions in EU set-aside requirements, which allowed more arable land to be planted once again, consumption of AN in the EU continued its increase. A decline in consumption in 1997 followed the implementation of reforms and reductions required by the Uruguay Round Agreements and the implementation of steps to reduce farmer's agricultural expenditures and overproduction, especially in cereals.[21]

Although AN fertilizer requirements in the EU, including exports, can be met by regional capacity, imports play a major role. In the major AN importing countries of the EU (e.g., France and the United Kingdom), production and domestic shipment levels remained fairly stable during 1992-97 as AN import levels followed fluctuations in apparent consumption.[22]

AN is expected to remain a principal source of nitrogen for EU agricultural use. With respect to specific major AN producing and consuming countries in the EU, the United Kingdom is expected to retain AN as its principal source of nitrogen for the foreseeable future. However, France is expected to increase consumption of both urea and UAN solutions with a slight decrease in AN consumption. Although the Netherlands is both a major AN and CAN producer, CAN is, and is expected to remain, the nitrogen source of choice in the Netherlands for domestic use because of domestic production capacity and because of explosion concerns associated with AN contamination during handling, transport or storage.

Trade

The EU trade balance in AN deteriorated steadily during 1992-97, from negative 482,000 metric tons product in 1992 to negative 1.8 million metric tons product in 1997. However, a significant amount of EU ammonium nitrate trade occurs within the region itself (table 4-2). Both intra- and extra-EU imports increased irregularly during 1992-97. Intra-EU imports accounted for over 35 percent of total AN imports in the EU each year during the period 1992-97. More specifically, Belgium (23 percent; 8 percent), France (22 percent; 8 percent), the Netherlands (20 percent; 7 percent), Germany (15 percent, 6 percent), and the United Kingdom (9 percent; 3 percent) respectively accounted for 89 percent of intra-EU and 32 percent of total EU imports of AN in 1997 (table 4-3).[23] Extra-EU imports accounted for more

[20] Council Directive (No. 91/676/EEC). Also, USITC fieldwork in Europe, June 22-July 7, 1998. A "set-aside" is arable land that is not planted. Farmers are paid not to plant the "set-aside" land. For more information, see section in this chapter entitled, "Government Policies Affecting the European Union Ammonium Nitrate Industry."

[21] USITC fieldwork in the EU, June 22-July 7, 1998.

[22] Given the availability of statistics concerning home deliveries of AN in the EU (listed as domestic shipments in tables), EU apparent consumption is defined here as domestic shipments plus imports.

[23] Compiled and calculated from trade statistics from the European Commission's statistical office, Eurostat.

Table 4-2
Ammonium nitrate: Exporting countries and import country destination, 1997[1]

Exporting countries	Belgium	France	Germany[2]	Netherlands	Spain	Sweden	United Kingdom	Bulgaria	Hungary	Poland	Romania	Croatia	Lithuania	NIS	Egypt	1997
	----------	----------	----------	----------	----------	----------	(1,000 metric tons product)	----------	----------	----------	----------	----------	----------	----------	----------	
Destination:[3]																
Austria	-	0.9	-	-	-	-	-	-	-	-	43	-	-	-	-	44
Belgium	-	35	-	0.9	-	-	-	-	-	-	28	-	2	-	-	65
Denmark	-	-	-	-	-	-	7	-	-	-	-	-	31	5	-	43
Finland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
France	107	-	1	82	5	-	55	47	-	-	-	-	122	332	59	810
Germany	7	3	-	-	-	27	-	3	-	-	13	-	0.3	119	-	172
Greece	-	10	-	-	-	-	-	88	-	-	-	-	-	14	-	112
Ireland	-	0.3	-	-	-	-	-	4	-	-	3	-	-	26	-	34
Italy . . . . . . -	10	-	-	-	-	-	130	2	-	2	7	-	11	-	165	
Netherlands .	22	95	10	-	-	-	-	-	-	-	-	-	2	3	-	130
Portugal	-	7	-	-	7	-	-	-	-	-	-	-	-	-	-	14
Spain[4]	15	24	13	18	-	0.3	28	29	-	-	-	-	7	54	-	191
Sweden	-	2	-	-	-	-	-	-	-	11	-	-	48	41	-	101
United Kingdom . .	65	17	11	119	-	7	-	14	-	18	-	-	99	414	-	763
Total	216	204	35	220	12	34	90	316	2	29	89	7	311	1020	59	2644

[1] Statistics compiled for this table, originally presented in terms of nutrient content, were converted to a product basis for comparison with statistics presented elsewhere in the report. Conversions took into account the indigenous country specific AN nitrogen content for production, home deliveries (domestic shipments), and exports, as follows: Belgium - not available- a factor of 34.0 percent was used; France - 33.5 percent; Germany - an average of 34 percent (see footnote 2); the Netherlands - 33.5 percent; Spain - 33.5 percent; Sweden - 34.8 percent; UK - 34.5 percent; Bulgaria - 34.5 percent; Hungary - 34 percent; Poland - 34.5 percent; Romania - 33.5 percent; Croatia - 33.5 percent; Lithuania - 34.4 percent; Russia - 34.0 percent; and Egypt - 33.5 percent.

[2] AN is not produced in Germany nor is its use allowed in Germany. IFA sources cite these statistics as probable trans-shipments with Germany the probable port of declaration within the EU.

[3] Luxembourg, a member of the EU, does not produce, import, or export AN.

[4] Portugal's total AN exports in 1997 consisted of 1,000 metric tons nutrient to Spain. Spanish import totals for the year reflect these Portuguese imports.

Source: Compiled from International Fertilizer Industry Association, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics 1997*.

Note: Figures may not add to totals shown because of rounding.

Table 4-3
Ammonium nitrate: EU imports by source country, 1992-97

Source	1992	1993	1994	1995	1996	1997
	Quantity (1,000 metric tons product)					
NIS:						
Russia	19	234	307	592	958	863
Ukraine	-	16	34	6	61	40
All other NIS[1]	-	15	-	-	-	19
Subtotal	19	265	341	598	1,019	922
Lithuania	113	155	141	116	167	259
Bulgaria	75	57	152	301	291	230
Belgium	111	171	192	202	200	213
France	222	159	196	199	217	201
Netherlands	99	182	238	164	262	185
Germany	15	51	130	85	103	141
Poland	138	118	159	127	111	98
United Kingdom	62	166	160	88	132	82
Egypt	67	21	60	34	4	50
All other	440	201	171	226	230	157
Total	1,361	1,546	1,940	2,140	2,736	2,538
Intra EU-15	567	774	957	817	997	926
Extra EU-15	794	772	982	1,322	1,739	1,612
	Value (1,000 dollars)					
NIS:						
Russia	1,908	19,892	28,664	75,256	145,943	110,243
Ukraine	-	1,368	3,303	654	9,555	4,653
All other NIS[1]	-	1,355	-	-	-	2,264
Subtotal	1,908	22,615	31,947	75,910	155,498	117,160
Lithuania	12,133	15,396	15,951	16,876	27,471	34,113
Bulgaria	7,721	6,359	17,117	42,686	48,452	35,636
Belgium	15,684	17,198	21,503	31,060	30,727	26,684
France	38,652	25,233	29,985	33,918	37,953	36,202
Netherlands	13,307	18,558	27,020	21,261	38,046	20,200
Germany	2,261	5,292	14,398	15,657	18,027	21,111
Poland	16,602	12,396	18,399	19,370	17,775	13,039
United Kingdom	10,572	23,123	23,135	17,960	26,616	13,705
Egypt	10,233	3,714	8,620	6,178	1,058	7,995
All other	57,372	23,229	23,559	43684	45,931	29,302
Total	186,445	173,113	231,634	324,560	447,554	355,147
Intra EU-15	89,556	94,294	122,405	142,433	172,224	138,295
Extra EU-15	96,889	78,819	109,229	182,127	275,330	216,852

See footnotes at end of table.

Table 4-3--Continued
Ammonium nitrate: EU imports by source country, 1992-97

Source	1992	1993	1994	1995	1996	1997
	Unit value (dollars per ton)					
NIS:						
Russia	100.42	85.01	93.37	127.12	152.34	127.74
Ukraine	-	85.50	97.15	109.00	156.64	116.33
All other NIS[1]	-	90.33	-	-	-	119.16
Subtotal	100.42	85.34	93.69	126.94	152.60	127.07
Lithuania	107.37	99.33	113.13	145.48	164.50	131.71
Bulgaria	102.95	111.56	112.61	141.81	166.50	154.94
Belgium	141.30	100.57	111.99	153.76	153.64	125.28
France	174.11	158.70	152.98	170.44	174.90	180.11
Netherlands	134.41	101.97	113.53	129.64	145.21	109.19
Germany	150.73	103.76	110.75	184.20	175.02	149.72
Poland	120.30	105.05	115.72	152.52	160.14	133.05
United Kingdom	170.52	139.30	144.59	204.09	201.64	167.13
Egypt	152.73	176.86	143.67	181.71	264.50	159.90
All other	130.39	115.57	137.77	193.29	199.70	186.64
Total	136.99	111.97	119.40	151.66	163.58	139.93
Intra EU-15	157.95	121.83	127.90	174.34	172.74	149.35
Extra EU-15	122.03	102.10	111.23	137.77	158.33	134.52

[1] Georgia and Belarus.

Source: Compiled from trade statistics from the European Commission's statistical office, Eurostat.

Note: Figures may not add to totals shown because of rounding.

than 50 percent of total EU imports each year during the period. Specifically, Russia (54 percent; 34 percent), Lithuania (16 percent; 10 percent), Bulgaria (14 percent; 9 percent), and Poland (6 percent; 4 percent) held the largest shares of extra-EU imports and significant shares of total EU imports of AN in 1997. Taken together these countries accounted for 90 percent of extra- and 57 percent of total 1997 EU imports of AN.

After having been a net exporter of nitrogenous fertilizers during the 1960s, 1970s, and early 1980s, the EU became a net importer of nitrogenous fertilizers in the 1990s. This reversal may be partially attributed to nitrogenous fertilizer capacity reductions which resulted from industry re-structuring and partially to substantial increases in import levels from all sources.[24] With the December 1991 dissolution of the Soviet Union and the resultant indigenous economic instability, demand for AN fertilizer collapsed in Russia, and Russian companies sought additional markets. By 1992, AN imports from Russia and Lithuania had become a matter of concern in the United Kingdom[25] and an UK antidumping investigation was initiated shortly afterwards. UK imports of AN declined by a factor of almost 10 during 1994-95 (from about 210,000 metric tons to about 27,000), but then increased again to about 410,000 metric tons in 1996 and about 398,000 metric tons in 1997.[26] By 1995, AN imports from Russia and other NIS had penetrated other EU markets. An EU-wide antidumping investigation followed (for more information on this investigation and the subsequent review, see section in this chapter entitled, "Government Policies Affecting the European Union Ammonium Nitrate Industry").

Both intra-and extra-EU export quantities fluctuated during 1992-97, with intra-EU exports exhibiting an overall 24 percent decrease and extra-EU exports an overall 45 percent increase for the period. Intra-EU export market destinations accounted for over 75 percent of EU-exports (table 4-4). Specifically, France (28 percent; 22 percent), the Netherlands (20 percent; 16 percent), the United Kingdom (14 percent; 11 percent), Spain (11 percent; 9 percent), and Belgium (9 percent; 7 percent) taken together accounted for approximately 82 percent of intra-EU and 65 percent of total EU exports respectively during 1997. Extra-EU export destinations accounted for less than 20 percent of total EU exports during 1992-96, and 23 percent in 1997.

[24] EFMA, *The Fertilizer Industry of the European Union*, pp. 29-30.

[25] See table 5-4 in the Russian industry section for further information concerning Russian-EU trade.

[26] Data obtained from the State Customs Committee of the Russian Federation. For more information regarding these data, see the trade section in Chapter 5.

Table 4-4
Ammonium nitrate: EU export market destinations, 1992-97

Market	1992	1993	1994	1995	1996	1997
	Quantity (1,000 metric tons)					
France	320	312	339	279	273	163
Netherlands	111	112	77	122	152	118
United Kingdom	65	15	20	26	57	83
Spain	61	78	96	73	63	66
Belgium	71	52	48	41	43	52
Morocco	13	4	14	12	7	30
Peru	7	14	16	15	24	25
Australia	2	9	23	31	35	23
Chile	6	16	34	27	15	21
Italy	31	18	18	17	16	20
All other	192	277	390	318	246	148
Total	879	907	1,075	961	931	749
Intra EU-15	761	812	901	787	777	578
Extra Eu-15	118	95	174	174	153	171
	Value (1,000 dollars)					
France	39,354	38,096	38,448	41,332	47,551	22,951
Netherlands	12,352	11,265	7,806	15,077	17,567	12,862
United Kingdom	10, 152	2,908	3,202	4,306	8,869	12,147
Spain	7,805	10,496	10,810	10,974	10,867	10,272
Belgium	9,526	7,575	6,887	7,722	7,845	7,817
Morocco	2,430	945	3,000	3,044	1,845	6,767
Peru	1,705	3,542	3,360	3,266	5,038	6,109
Australia	493	1,384	4,113	6,366	6,920	7,177
Chile	1,244	3,381	7,068	5,996	3,634	5,543
Italy	7,072	4,067	4,044	4,455	4,130	4,298
All other	35,376	46,532	59,540	63,894	52,613	32,546
Total	127,581	123,376	148,314	166,402	166,879	128,489
Intra EU-15	100,419	101,376	110,384	122,771	128,054	84,649
Extra Eu-15	27,162	22,000	37,930	43,631	38,825	43,840
	Unit value (1,000 dollars)					
France	122.98	122.10	113.42	148.14	174.18	140.80
Netherlands	111.28	100.58	101.38	123.58	115.57	109.00
United Kingdom	156.18	193.87	160.10	165.62	155.60	146.35
Spain	127.95	134.56	112.60	150.33	172.49	155.64
Belgium	134.17	145.67	143.48	188.61	182.44	150.33
Morocco	186.92	236.25	214.29	253.67	163.57	225.57
Peru	243.57	253.00	219.00	215.07	209.92	244.36
Australia	246.50	153.78	178.83	205.35	197.71	312.04
Chile	207.33	211.31	207.88	222.07	242.27	263.95
Italy	228.13	225.94	224.67	262.06	258.23	214.90
All other	184.25	167.99	152.67	200.92	213.87	219.91
Total	145.14	136.03	137.97	173.16	179.25	171.55
Intra EU-15	131.96	124.85	122.51	156.00	164.81	146.45
Extra Eu-15	230.19	231.58	217.99	250.76	253.76	256.37

Source: Compiled from trade statistics from the European Commission’s statistical office, Eurostat.

Pricing and Cost Trends

Input Costs

Production of AN in the EU is largely vertically integrated with on-site ammonia and nitric acid production; therefore, variable natural gas feedstock prices are significant. Natural gas costs are estimated to account for approximately 45 percent of the cost of AN production within the EU. The primary indigenous EU gas suppliers are the UK and the Netherlands; however, neither the supply nor the market for natural gas is homogeneous in the EU.[27] For example, natural gas production and distribution are privatized in the United Kingdom,[28] are a virtual monopoly in France, and are state-controlled in Spain. Additionally, within each EU country, natural gas may also be purchased from several sources outside the EU, including North Africa, Norway, and the Russian natural gas company, GazProm.[29]

Natural gas prices in the United Kingdom decreased from $2.70 per million Btu to $2.05 per million Btu, or by 24 percent, from the first half of 1993 through the first half of 1996 (table 4-5). UK gas prices then increased to 2.91 per million Btu during the first half of 1997. The estimated June 1998 UK natural gas price was reported as $2.00 per million Btu, plus or minus $0.10.[30] French and Dutch gas prices both rose irregularly during 1993-97 and were significantly higher than comparable period UK gas prices.

Within the EU, the Netherlands was long considered the benchmark country of EU gas prices; however, the United Kingdom has since replaced the Netherlands as the benchmark country.[31] The break-up of British Gas, combined with a surplus of UK gas in existence since 1995,[32] contributed both to this replacement and to the 1993-96 decrease in UK gas prices. Gas price increases shown for the UK, France, and the Netherlands during second half 1996 and first half 1997 may be attributable to a very severe winter 1996-97. With 1990 taken as the base year for real gas prices, a generally downward trend occurred in the United Kingdom gas price index during 1990-96 (figure 4-1). However, continental European AN producers have more long-term gas contracts than do producers in the United Kingdom, therefore, price fluctuations in France and the Netherlands are not as wide.[33]

Many factors currently affect the EU gas market and prices: technological developments reduced North Sea gas extraction costs and offshore pipeline construction costs; UK continental shelf gas fields were developed; and many continental EU gas supply agreements were renegotiated.[34] Further benefits to

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[27] EFMA, *The Fertilizer Industry of the European Union*, p. 32.

[28] The United Kingdom's growing gas surplus and the need to improve regional economic competitiveness were significant factors in the privatization of gas and electric utilities during 1988-98. Full competition in UK gas supply occurred July 1998. Morten Frisch, "Developments in the European Gas Market, the View of an Independent Observer," (paper presented at the International Fertilizer Industry Association Production and International Trade Committee Meeting, Warsaw, Poland, Oct. 14-15, 1997), pp. 2-4.

[29] EFMA, *The Fertilizer Industry of the European Union*, p. 32.

[30] USITC fieldwork in the EU, June 22-July 7, 1998.

[31] Ibid.

[32] The UK entered a period of gas oversupply as a result of domestic purchasing practices.

[33] Telephone conversation with Mr. Ben Van Spronsen, Directorate General 17 (natural gas), Commission of the European Communities, Aug. 25, 1998.

[34] USITC fieldwork in the EU, June 22-July 7, 1998.

Table 4-5
Natural gas prices:[1] United Kingdom, France, and the Netherlands, January 1990 and January 1993-January 1998

Year	United Kingdom	France	Netherlands
	U.S. dollars per million Btu		
1990-1	2.71	3.53	3.98
1993-1	2.70	3.33	3.04
1993-2	2.66	3.13	2.96
1994-1	([2])	3.07	2.82
1994-2	([2])	3.18	3.20
1995-1	([2])	3.24	3.64
1995-2	2.52	3.53	4.10
1996-1	2.05	3.42	3.61
1996-2	2.07	3.54	3.97
1997-1	2.91	3.54	3.88
1997-2	([3])	3.33	3.34
1998-1	([3])	3.13	3.49

[1] Gas prices from Eurostat's industrial I 4-2 sector of high industrial usage (416,600 gigajoules and 330 days per year) and exclusive of taxes were converted from ECUs per gigajoule to US dollars per million Btu for presentation in this table. Fertilizer producers run equipment continuously, 24 hours per day, unless repair or retrofitting is required, or market conditions are such that production ceases for a set period to draw down inventory.
[2] Not available.
[3] Not available because of disclosure concerns.

Source: Compiled from *Eurostat Gas Prices 1990-97* and from statistics provided by the European Commission's statistical office, Eurostat.

(Fig. 4-1 is not included in the electronic version.)

UK industrial gas consumers, derived from gas price reductions since 1990, may influence market forces and public pressure for gas market liberalization in continental Europe.[35] In addition, a recently completed UK gas "interconnector" pipeline, due to open October 1998, is expected to allow generally less expensive UK gas to be distributed in continental Europe.[36]

Ammonium Nitrate Prices

EU domestically-produced AN product regulations dictate product sale and storage in 25 or 50 kg bags, 500-1,000 kg big bags, or 0.5, 1, 1.5, or 2 ton integrated bulk containers (IBC).[37] While bagging AN product serves as a prophylactic measure against organic matter contamination which might render AN product explosive, the cost of bagging adds an approximate 10-15 percent to the f.o.b. product price.[38] Bag size regulations and customer preference may also affect product price as small bags are incrementally more expensive than large bags or bulk product. Where bulk truck or rail transport is allowed, the bulk deliveries are bagged further along in the distribution channel. It is more cost-effective for the producer to have product bagging costs incurred ex-production site.[39] However, AN import and export shipments are allowed in either bulk or bagged form, depending on port, costs, and storage facilities.[40]

The majority of EU-produced AN product is in prilled form because of installed prill versus granulation capacity.[41] However, granular AN product globally commands a price premium over prilled product largely because of the strength and hardness of the resulting product. Product imported into the EU from extra-EU sources is almost exclusively in prilled form. Perceptions of inferior quality of certain imported prilled product may contribute to a lowered sale price of the product. Further, price differential convergence or divergence between domestically, or EU, produced prilled product and extra-EU source imported prilled product is not considered a factor in import volume.[42]

Transport costs also affect the delivered cost of AN within the EU. Road, rail, river, and sea transport, or, depending on the local infrastructure a combination from among these transport modes, are used to deliver AN product to the end-use farm.[43] However, the more direct the distribution channel, the less chance for product deterioration during handling and storage. UK AN producers deliver directly from the plant to farmers. French distribution channels feature inventory stored by bulk and bag storage co-op/distributor middlemen for seasonal delivery to farmers.[44] Such distribution chain differences between the UK and France make direct comparisons between bagged domestic-delivered farm prices of UK and French AN infeasible. However, the combination of AN handling, transport, and storage costs may represent approximately 20 percent of the end-use farm price of fertilizer.[45]

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[35] Ibid.
[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] For example, Hydro exports from Sluiskil, Netherlands, to Montreal, Canada, in bulk, then bags in Canada. Telephone conversation with Mr. Rubin Saigal, The S. Monk Corporation, Shelburne, VT, Aug. 27, 1998.
[41] All AN product from Norsk Hydro affiliated companies is granular. (USITC fieldwork in the EU, June 22-July 7, 1998.)
[42] USITC fieldwork in the EU, June 22-July 7, 1998
[43] EFMA, *The Fertilizer Industry of the European Union*, p. 8.
[44] USITC fieldwork in the EU, June 22-July 7, 1998.
[45] EFMA, *The Fertilizer Industry of the European Union*, p. 8.

UK AN domestic-delivered prices and imported c.i.f. Black Sea prices for prilled, bagged product were selected to represent EU market conditions over time (table 4-6).[46] Overall factors that may cause AN price shifts include supply availability, including less expensive imported product; phasing of purchases; consumer and distributor inventory levels; raw material prices; and end-user perception of domestically-produced vs. imported product price differentials.[47] Industry specific regional and regulatory factors may also influence AN price shifts.

Prices of UK domestic delivered AN fell from $228-233 per metric ton in the fourth quarter of 1990 to a low of $133-136 per metric ton in the third quarter of 1993. They rebounded during 1994 and 1995, then leveled off for four quarters, before rising in the fourth quarter of 1996 to their highest level since the first quarter of 1991.

The initial decline in UK domestically-produced AN prices may be partially attributable to product purchase incentives during a time of EU-wide industry restructuring, environmental restrictions,[48] and CAP-imposed set-asides. During 1994-95, UK AN domestic-delivered price increases reflected the tight international nitrogen market of the period. In May 1994, the UK imposed an antidumping order on imports of AN from Russia and Lithuania.[49] Although imported c.i.f. Black Sea prices for solid, fertilizer-grade AN also increased during 1994-95, the price gap between domestic and imported product widened. An EU-wide antidumping investigation was initiated June 1994, resulting in a September 1995 antidumping order imposing a variable duty. In 1998, a review of the original order was initiated, resulting in the imposition of a specific duty of ECU 26.3 ($28.89) per ton.[50]

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[46] The UK was chosen to be the least-cost representative of EU market conditions because of the privatized gas system, the most direct distribution system, and the lowest transportation costs.

[47] USITC fieldwork in the EU, June 22-July 7, 1998.

[48] For example, the Nitrate Directive (No. 91/676/EEC) limits fertilizer use to prevent water pollution from unused nitrate runoff. For more information, see section in this chapter entitled, "Government Policies Affecting the European Union Ammonium Nitrate Industry."

[49] The UK order against Russian imports was terminated in 1995 simultaneously with the issuance of an EU-wide order.

[50] For more information, see section in this chapter entitled, "Government Policies Affecting the European Union Ammonium Nitrate Industry."

Table 4-6
Ammonium nitrate: United Kingdom prices, prilled and bagged product, domestic delivered, and imported c.i.f. Black Sea prices, by quarters, January 1988-June 1998

Period		Domestic delivered	Imported c.i.f. Black Sea
		(*U.S. dollars per metric ton product*)	
1988:			
	January-March	181-214	([1])
	April- June	199-206	([1])
	July-September	201-206	([1])
	October-December	204-212	([1])
1989:	January-March	189-194	([1])
	April-June	186-194	([1])
	July-September	171-180	([1])
	October-December	171-181	([1])
1990:			
	January-March	206-222	([1])
	April-June	214-224	([1])
	July-September	216-222	([1])
	October-December	228-233	174-183
1991:			
	January-March	221-226	168-178
	April-June	208-215	168-178
	July-September	187-198	163-168
	October-December	178-187	138-153
1992:			
	January-March	157-165	121-136
	April-June	165-174	135-144
	July-September	157-166	109-133
	October-December	136-145	110-115
1993:			
	January-March	142-145	108-116
	April-June	136-142	111-118
	July-September	133-136	108-111
	October-December	142-144	113-116
1994:			
	January-March	158-166	130-134
	April-June	156-161	130-134
	July-September	163-164	136-141
	October-December	181-183	152-158
1995:	January-March	198-206	156-176
	April-June	188-191	150-175
	July-September	188-191	([1])
	October-December	206-212	181-186
1996:			
	January-March	206-214	180-185
	April-June	204-212	167-175
	July-September	206-209	164-172
	October-December	219-226	160-171
1997:			
	January-March	205-212	143-148
	April-June	200-208	131-137
	July-September	158-169	121-129
	October-December	160-167	119-126
1998:			
	January-March	166-176	124-134
	April-June	160-168	124-135

[1] Not available.

Source: Compiled from Fertecon, Limited, statistics.

The UK gas over-supply had lowered UK AN production input costs. Additionally, nitrogen producers globally had over-responded to the tight supply conditions of 1994-95. However a price response lagged the supply increase and AN domestic delivered prices continued firm during the first three quarters of 1996, then rose during the fourth quarter. Reductions in the EU set-aside requirements in 1996 had resulted in increased planting and, therefore, increased consumption of nitrogenous fertilizer. As AN consumption increased, so did the competition for market share with abundant, less-expensive imported product. By mid-1997, increased availability of solid, fertilizer-grade AN internationally, increased competition for market share, and lower gas prices contributed to downward AN price shifts. Prices of domestically-produced AN increased in the first quarter 1998, whereas Black Sea prices of imported AN increased during January-June 1998.

Outlook

While the restructuring and capacity reduction in the early 1990s resulted in a more balanced supply and demand situation for AN in the EU, the ten year forecast for AN consumption in the EU is a downward trend, primarily due to environmental constraints.[51] Additionally, increased reliance on satellite mapping to precisely determine soil and crop fertilization requirements may also lead to lower AN consumption.[52] Another factor, cited by EU industry sources as potentially furthering the 10-year downward trend forecast for EU consumption, is an anticipated decrease in EU imports of AN from Russia.[53]

Government Policies Affecting the European Union Ammonium Nitrate Industry

Trade and Economic Policies

Although the EU market for imports has been liberalized, tariffs and other restrictions still apply. The EU currently imposes a conventional-rate tariff, which applies to members of the World Trade Organization (WTO), of 6.8 percent on AN, whether or not in aqueous solution.[54] Certain developing countries have special agreements that entitle them to reduced rates or duty-free treatment. For example, EU imports of AN from signatories to the Lomé Convention[55] enter the EU duty-free.

There are certain non-tariff barriers that affect the quantity of imports into the EU. Because of AN-related explosions in Germany, German authorities imposed an upper limit of 28 percent nitrogen for AN

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[51] The European Fertilizer Manufacturers Association (EFMA), *The Fertilizer Industry of the European Union*, (June 1997), pp. 15-16. CAP 2000 requirements have not been factored into this forecast.

[52] USITC fieldwork in the EU, June 22-July 7, 1998.

[53] Ibid. Imported Russian AN is reportedly often sold directly from the import vessel into agricultural consumption areas, thus eliminating intermediary distribution costs. Agricultural consumers may, therefore, purchase and consume product when they otherwise might not have, simply because of product proximity and attractive price. Any decrease in EU imports of AN from Russia is expected to depend largely on domestic AN consumption levels within Russia. Russia imports very little AN. Therefore, if Russian demand for AN increases, more domestically-produced AN would be consumed internally, presumably decreasing the quantities available for export (assuming current capacity and capacity utilization levels remain unchanged).

[54] Telephone conversation with Melinda B. Stevenson, Senior Information Officer, Delegation of the European Commission, the European Union.

[55] Signatories of the Lomé Convention include 71 nations from the African, Caribbean, and Pacific regions and the 15 EU members.

sold in Germany. This effectively precludes AN from the German market since its nitrogen content is in the 33-34.5 percent range. German companies produce only CAN, which meets this requirement. AN from Russia and the other NIS may pass through Germany, but it is not sold there. Use of AN is also banned in Ireland. France requires imports of AN to be in small bags labeled 33.5 percent nitrogen. Domestic French producers can move the product in bulk without incurring the bagging cost.[56]

The United Kingdom issued an antidumping order in May 1994 against AN originating in Lithuania and Russia. This order limited the quantity of U.K. imports from each of those countries to 100,000 metric tons per year.[57] Imports from Russia, however, breached the order within the first year of its undertaking.[58] The UK order against Russian imports was terminated in 1995 simultaneously with the issuance of an EU-wide order, as described in the text below.[59]

In June of 1994, the European Commission (EC) began an antidumping investigation of community-wide imports of AN from Lithuania and Russia.[60] The EC considered Lithuania and Russia to be non-market economies and used cost information from a company in Poland to establish normal value.[61] The EC found dumping margins of 41.6 percent for imports from Russia and 27.4 percent for those from Lithuania. Russian requests to take its lower natural gas costs and greater plant efficiencies into account were denied for lack of precise data. Weighted-average prices of the subject imports were 13-16 percent less than comparable EU producers' prices. However, EU farmers perceived AN from Lithuania and Russia to be lower in quality than that produced in the European Union.[62]

According to the EC's investigative report, EU production of AN fell by one million tons between 1991/92 and 1993/94. The investigation established that EU producers were using less AN in blended compound fertilizers and that stocks had been reduced. The investigation also stated that the EU industry's production capacity was greater than market demand, which had contributed to higher than necessary fixed costs.[63] According to the report, other factors in addition to low-priced imports had also affected the condition of the EU industry.[64]

The EC determined in August of 1995 that the small volume of subject imports from Lithuania had only a minor impact and therefore terminated the proceeding against Lithuania. The EC concluded that, although other factors had played a role, dumped imports from Russia had caused material injury to the EU

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[56] USITC fieldwork in Europe, June 22-July 7, 1998.

[57] Commission Decision 94/293/EC of 13 April 1994.

[58] Council Regulation No. 663/98, *Official Journal of the European Communities*, 26 March 1998, p. L. 93/1.

[59] The U.K. restriction on Lithuania remains in place. Telephone conversation with Martin Payne, U.K. Department of Trade and Industry and EC Decision 95/345/EC.

[60] Council Regulation (EC) No. 2022/95, *Official Journal of the European Communities*, 23/8/95, pp. No L 198/1-L 198/14. As noted in the Council Regulation, the product under consideration in the EU investigation was "ammonium nitrate, which is a fertilizer produced in prill or granular form, containing between 33 and 35 percent nitrogen plant nutrient."

[61] The EU's Council of Ministers gave Russia the status of a market economy on April 27, 1998. This means that future antidumping actions can only be invoked against individual Russian producers that sell at less than fair value. Fertecon, *FSU Update*, May 1998, p.15.

[62] Council Regulation (EC) No. 2022/95, *Official Journal of the European Communities, 23/8/95, pp. No L 198/1-L 198/14.*

[63] Ibid.

[64] Ibid.

industry. The EC calculated a price for the Russian imports to remove the injury as follows: export price (ex-border) ECU 57.8 ($75.61) per ton; injury margin ECU 20.4 ($26.69) per ton; freight, insurance, etc. ECU 24.7 ($32.31), which totals to ECU 102.9 ($134.60) per ton. Thus, in August 1995, the EU issued a community-wide antidumping order on imports of AN from Russia. The order imposed a variable duty that was the difference between ECU 102.9 per ton and the net c.i.f. price at an EU border before customs clearance.

In April 1997, EFMA alleged that imposition of the variable rate duty had not led to sufficiently high AN prices and requested that the EC reexamine the case. No Russian producer or exporter of AN, or any related trading company, cooperated with EC authorities, which contributed to the reinvestigation exceeding its normal time period. The EC found that the resale price of Russian AN (to the first independent buyer after import) did not sufficiently reflect costs and profits and that the variable rate duty did not have the intended effect on resale price due to the absorption of antidumping measures. The EC imposed a specific duty of ECU 26.3 ($28.89) per ton,[65] which it stated would be more effective in revising resale prices and remedying the injurious effect of dumping. The EU has also issued temporary antidumping orders on mixtures of urea and AN in solution imported from Bulgaria and Poland.[66]

Industry-specific Policies

Direct government intervention in fertilizer production in the EU is reported to be minimal, although the fertilizer industry is subject to standard business, safety and environmental regulations. For example, under EU merger regulations,[67] Terra Industries of the United States was required to notify the EC of its proposed acquisition of the fertilizer business of Imperial Chemical Industries of the United Kingdom in November 1997. The EC found the proposal to be compatible with the merger regulations and did not oppose it.[68] However, the EC acted against the Greek government for aiding two Greek fertilizer companies controlled by the public sector. The EC found that the assistance contradicted Greece's announced total liberalization of the fertilizer market and that it allowed these companies to remain in business when conditions may have led to their exit from the market.[69]

British Gas was privatized in 1986 but retained the monopoly for piped gas to consumers in the UK. All suppliers are for-profit companies operating under licenses issued under the 1986 Gas Act. The 1995 Gas Act phases in additional competition through 1998. The Director General of Gas Supply grants licenses, promotes competition, settles disputes, and regulates prices through a price cap on British Gas.[70] Real prices to industrial and residential users dropped, respectively, by 46 and 9 percent between 1990 and 1996.[71] Currently natural gas availability is high and prices low in Great Britain, but a planned pipeline to the continent is expected to negate the British price advantage vis-a-vis continental producers.

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[65] Council Regulation No. 663/98, *Official Journal of the European Communities*, 26 March 1998.

[66] European Commission Bulletin 6, 1994, point 1.3.81.

[67] Article 4 of Council Regulation (EEC) no. 4064/89.

[68] European Commission, Case no. IV/M.1057 Terra/ICI, Article 6(1)(b) Non-opposition, Dec. 19, 1997.

[69] European Commission, *Competition Report 1996*, pp. 241-242. The companies involved were Protypos Ktimaki - Touristiki S.A. also known as Moretco and Nitrogen Fertilizers Industry also known as Aeval.

[70] European Commission, *Application de la Directive 93/13 aux Prestations de Service Public*, 1997, p. 62.

[71] Morton Frisch, "Developments in the European Gas Market, the View of an Independent Observer," paper from IFA Production and International Trade Committee Meeting, Oct. 1997.

Privatization and deregulation of the natural gas market have lagged in other EU countries. The German government owns 80 percent of its local and regional distribution system. Although prices are not directly controlled, local governments require suppliers, to whom they grant concessions, to provide continuous service at reasonable prices. Gaz de France, a public enterprise, is the major provider of natural gas services in France. The petroleum companies ELF and Total also distribute gas, and third party access (i.e., access by companies other than Gaz de France, Elf, and Total) is expected in the future. The Conseil de la Concurrence (Competition Board) and the Ministry of Industry regulate the natural gas industry. In Italy, municipal authorities grant concessions to companies and approve the terms of delivery of natural gas. The Spanish government grants concessions for natural gas services, and the Spanish National Gas Company is the main concession holder apart from local distributors. The Spanish Minister of Industry and Energy sets the prices for different categories of users.[72]

Compared to the U.S., the EU fertilizer industry faces a more highly regulated natural gas industry and relatively higher natural gas costs.[73] There are also considerable price differences among different regions. The least expensive natural gas in Europe, considering full supply costs,[74] is from the Groningen field in the Netherlands.[75] A reduction in North Sea gas resource costs, a reduction in offshore pipeline construction costs, and increased imports from Russia's GazProm have lowered overall EU natural gas prices somewhat.[76] Imports from GazProm are expected to increase as several arrangements between GazProm and European companies are implemented. It has been reported that GazProm will supply about a quarter of the European market for the next 15 to 20 years.[77]

The EU fertilizer industry is affected by regulations regarding health and safety, storage and transport of fertilizers, limits on atmospheric and water emissions, limits on noise, and treatment and disposal of wastes. EU regulations are progressively replacing the regulations of the individual member states. There are also legal requirements that the product contain the declared quantity and ratio of nutrients. In the case of AN, regulations concern granule or prill size, porosity, correct pH, low organic matter, chloride and copper contamination, and detonability. Other legislation concerns product classification, packaging, labeling, product liability, and consumer protection.[78]

Agricultural Policies

EU agriculture is supported by an extensive government program, the Common Agricultural Program (CAP), which includes direct payments to producers, price supports, and trade policies that affect imports and exports of agricultural products. This support system has contributed to intensive agricultural activities in the EU including intensive use of fertilizers including AN.

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[72] European Commission, *Application*, pp. 55-61.

[73] Although there is substantial government involvement in the Russian natural gas sector, Russian AN producers generally have lower natural gas costs than European AN producers. See discussion under the Russian section.

[74] "Full supply cost comprises production cost, transportation cost, and any associated transit fees to move the product to a neighboring country's border. It is a supply-cost concept and does not include any sales or excise taxes." International Energy Agency, *The IEA Natural Gas Security Study*, 1995, p. 59.

[75] Ibid., p. 56.

[76] EFMA, pp. 36-38.

[77] Mikhail Klasson, "GazProm's New Project," *Moscow Times*, no. 25, July 2-8, 1998, p. 7.

[78] EFMA, pp. 41-42.

CAP policy mechanisms include price supports for agricultural commodities, compensatory payments to producers based on fixed area and yields for eligible crops (grain, oilseeds, and protein crops) and on a fixed number of head for cattle and sheep and goats, as modified in the CAP reform in 1992.[79] As part of the 1992 reform (and reflected in the WTO agreement on agriculture), the EU required its farmers to set aside or reduce farm acreage in an effort to constrain surplus grain and oilseed production.

The harvested acreage of the leading grain and oilseed crops in the EU during 1993-98 rose from 37.2 million to 40.3 million hectares, as compiled from official statistics of U.S. Department of Agriculture (USDA):[80]

Year	EU harvested acreage (*Million hectares*)	EU production (*Million metric tons*)
1992	40.2	191
1993	37.2	187
1994	37.1	184
1995	37.7	188
1996	39.5	214
1997	40.5	218
1998	40.3	217

During the period, EU grain and oilseed production declined through 1994 and then rose irregularly through 1997 and is projected to reach 217 million metric tons in 1998.

After the CAP reforms of 1992, the EU harvested acreage dropped sharply in 1993 by 4.4 million hectares, as set-aside requirements and lower prices reduced planting and associated fertilizer use. The CAP was further reformed in 1995/96. The most important changes were lower EU assistance for grain exports and the establishment of minimum grain import levels under the market access provisions of the WTO.[81] The set-aside provisions affecting grain and oilseed production have been the main domestic policy tool, but the rate of set aside, which ranged from 5 to 15 percent of the crop acreage base, did not have a significant impact on grain and oilseed output.[82]

However, by 1996, with higher worldwide grain and oilseed prices, the EU reduced its set-aside requirements and acreage returned to close to the 1992 level of about 40 million hectares. EU grain and oilseed production rose by 26 million metric tons (14 percent) from 1995 to 1996. In 1998, EU agricultural

[79] ERS, USDA, "WTO Agricultural Support Disciplines and the Next Round," *International Agriculture and Trade Reports: Europe*, December 1997, p. 20.

[80] Source: USDA, FAS, *Grain: World Markets and Trade*, May 1998, p. 38; *Oilseeds: World Markets and Trade*, various issues; and FAS, USDA data provided by telephone, June 24, 1998. The oilseed data exclude flaxseed; grain and oilseed data for 1998 are estimated or projections.

[81] Office of the Chief Economist, USDA, "European Union," *USDA Agricultural Baseline Projection to 2007*, pp. 86-87.

[82] USDA, Ibid.(p. 87) calculates that the set aside rate would have to rise to 17.5 percent to eliminate the build up of surplus EU grain stocks and continued EU use of export subsidies. USDA, FAS, "Mounting Surpluses Spark EU Set-Aside Increase," *Grain: World Markets and Trade*, August 1998, p. 14.

ministers agreed to take 10 percent of the land used to grow grain or oilseeds out of production because of low grain prices and the build-up of stockpiles. Thus, while CAP policies have resulted in fluctuating planted acreage levels, and, in turn, related fertilizer use levels, the policies have apparently had little effect on acreage and resulting fertilizer use trends. However, some of the environmental regulations mentioned below may have reduced application of fertilizer and manure (a principal source of nitrogen in crops in the EU).

Environmental Policies

Within the EU, water pollution resulting from runoff from intensive agriculture is one of the most environmentally adverse consequences of the agricultural production practices under the CAP, with the primary pollutants being fertilizer and manure.[83] The EU's CAP-induced levels of agricultural activities resulted in environmental problems in populated areas of the EU and in eutrophication of EU inland and coastal waters.[84]

High economic returns from the CAP have encouraged farmers to apply rates of nutrients in excess of intake by crops, which leads to nitrate pollution. For example, the average EU farmer applied 142 pounds of nitrogen per acre (54 percent from fertilizers and 46 percent from manure) in 1990-91, as compared with 96 pounds of nitrogen for the average U.S. farmer in recent years.[85] Of the EU's 1990-91 nitrogen application, about 44 percent was "surplus" or unused by the crop, and hence available for runoff and environmental contamination.[86]

In 1991, the EU passed a Nitrate Directive (No. 91/676/EEC) in an effort to reduce nitrate levels in potable water to less than 50 milligrams per liter.[87] As part of the Directive, member states were required to designate areas vulnerable to water pollution from nitrates and to formulate and implement plans to protect these areas. The Directive attempted to promote usage levels of commercial fertilizer and manure that coincided with crop assimilation levels.[88] Past fertilizer application has often been about double the plants' nitrogen needs.

The Nitrate Directive has resulted in lower EU livestock production in certain locations through density restrictions on cattle, hogs, and poultry.[89] These restrictions affected mainly Belgium, Denmark, the

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[83] Julie Williamson, ERS, USDA, "CAP Reform Set-Aside: Environmental Friend or Foe," *International Agriculture and Trade Reports: Europe*, Sept. 1993, pp. 65-67.

[84] Eutrophication of inland and coastal waters occurs with increased organic and mineral nutrients lowering the level of oxygen in a body of water, making it less favorable for animal life. Nitrate pollution is the principal cause, especially in marine waters; phosphate pollution is a cause for fresh waters. See Stephen Haley, ERS, USDA, "Assessing Environmental and Agricultural Policy Linkages in the European Community," *Environmental Policies: Implications for Agricultural Trade*, (John Sullivan, editor), June 1994, pp. 102-112.

[85] F. M. Brouwer, F.E. Godeschalk, P.J. Hellegers, and H.J. Kelholt, *Mineral Balances at the Farm Level in the European Union*, Agricultural Economics Research Institute, the Hague, the Netherlands, Sept. 4, 1994, table 2.1. U.S. data are calculated from official statistics of the U.S. Department of Agriculture and AAPFCO, *Commercial Fertilizers*, Table 1, 1997.

[86] *Ibid*.

[87] Stephen Haley, ERS, USDA, Ibid., p. 104.

[88] Dale Leuck, ERS, USDA, "The EC Nitrate Directive and its Potential Effects on EC Livestock Production and Exports of Livestock Products," *Environmental Policies: Implications for Agricultural Trade*, June 1994, p. 98.

[89] Stephen Haley, ERS, USDA, Ibid., p. 108.

Netherlands, and the Bretagne Province of France.[90] The Directive has had little apparent effect on EU grain and oilseed production or on sales of commercial fertilizers.[91] The EU acreage set-aside requirements have had a much stronger effect on increasing or lowering commercial fertilizer use than has the Nitrate Directive.

[90] Source: Commission staff conversation with Dale Leuck, ERS, USDA, June 30, 1998.

[91] Hog production in Belgium, Denmark, France, Germany, and the Netherlands actually increased slightly during 1994-97 from 6,375,000 metric ton (carcass weight) to 6,531,000 tons or by 2 percent; hog inventories are up as well. Source: USDA, *World Agricultural Production*, March 1997, tables 30-31.

CHAPTER V
THE RUSSIAN AMMONIUM NITRATE INDUSTRY

Russian industry profile[1]

Russia and the other new independent states (NIS) of the former Soviet Union[2] possess the largest volume of known recoverable natural gas in the world and are significant producers of nitrogenous fertilizers.[3] The Russian nitrogenous fertilizer industry principally produces single nutrient nitrogenous fertilizers, such as AN and urea, with some production of dual nutrient, or complex nitrogenous fertilizers, such as monoammonium phosphate (MAP), diammonium phosphate (DAP), and NPKs.[4] The production, trade, and consumption data for AN presented in this chapter represent solid, fertilizer-grade AN.

AN accounted for about 35 percent of Russia's production of nitrogenous fertilizers in 1996-97.[5] As shown in the following figure, Russian ammonium nitrate production, as a share of all nitrogenous fertilizers produced in Russia, increased by 9 percentage points from 29 percent in 1990 to 38 percent in 1996, while the share accounted for by dual nutrient nitrogen (N) phosphorus (P) products, such as MAP and DAP, and complex NPK compound fertilizers, decreased by the same percentage points during the period (figure 5-1).

During the 1970s and early 1980s, construction of new nitrogenous fertilizer capacity was undertaken in the Soviet Union and other gas-rich regions of the world. AN capacity built in the Soviet Union during this period consisted primarily of large-scale plants of 450,000 metric tons per year which remain operational today. This capacity is heavily concentrated in Russia, followed by Ukraine and Uzbekistan.[6]

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[1] Much of the data used in this chapter was provided by the Russian Government and represents the most comprehensive data that the Commission was able to obtain. Individual company production data were provided in confidence by the Russian Government and were aggregated by Commission staff after their review, although the Commission was not able to contact each Russian company directly to discuss its data. The Commission also obtained and reviewed data from other sources, including the International Fertilizer Development Center, the International Fertilizer Industry Association, and Fertecon. Sources used in this chapter were not always in agreement and, where possible, data are presented from multiple sources for comparative purposes.

[2] The Soviet Union was dissolved in December 1991. The Russian Federation (Russia) is the largest (in terms of geographic size, population, and economic output) of the successors of the Soviet Union. References to the successor states of the Soviet Union will be as new independent states (NIS).

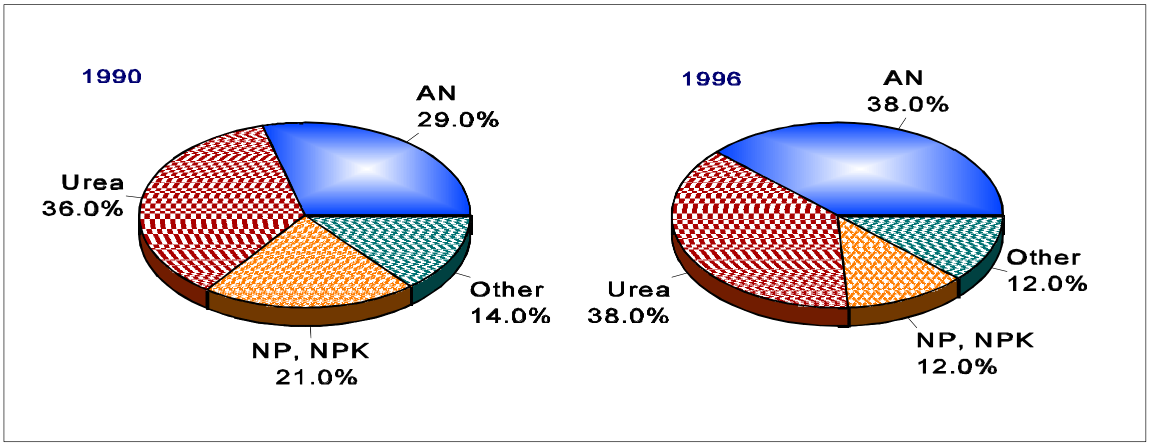
[3] In addition to Russia, other NIS that produce AN include Belarus, Georgia, Turkmenistan, Ukraine, and Uzbekistan. Russia, Ukraine, and Uzbekistan combined accounted for about 96 percent of NIS AN production in 1997; Russia alone accounted for about 54 percent of the total. Compiled from statistics of the International Fertilizer Industry Association (IFA).

[4] Viatcheslav Kantor, *The Russian Nitrogen Industry*, (paper presented at the IFA Production and International Trade Committee Meeting, Warsaw, Poland, Oct. 14-15, 1997), pp. 2-6.

[5] Marina Kamayeva, "Production of Mineral Fertilizers: Russia," *International Market Insight*, U.S. and Foreign Commercial Service and U.S. Department of State, July 2, 1998, p. 1.

[6] Russian production capacity for AN was approximately 8.7 million metric tons in 1997, compared with 2.8 million metric tons in Ukraine and 2.4 million metric tons in Uzbekistan. (IFDC, *Worldwide Ammonium Nitrate and Calcium Ammonium Nitrate Capacity Listing by Plant,* February 1998).

Fig. 5-1.
Russian fertilizer group production volumes, 1990 and 1996



Source: Reprinted with permission from Viatcheslav Kantor, ***The Russian Nitrogen Industry*** (paper presented at the IFA Production and International Trade Committee Meeting, Warsaw, Poland, Oct. 14-15, 1997), p. 2.

Twelve companies produce AN in Russia. Trade estimates indicate that total Russian AN production capacity for AN declined to between 8.74 million[7] and 8.87 million[8] metric tons (table 5-1) in 1997 from about 9.79 million metric tons in 1995 and about 10.0 million metric tons in 1990.[9] JSC[10] Acron characterizes itself as the largest AN producer in Russia.[11]

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[7] Data presented in the written submission of JSC Acron, dated July 17, 1998, p. 5. The source of the data was reported as the *World Fertilizer Plant List and Atlas*, British Sulphur Publishing.

[8] Fertecon, *Russian Ammonium Nitrate Production by Plant*, 1998, p. 1, and official Russian capacity statistics (current as of January 1, 1998) provided by the Ministry of the Economy, Russian Federation.

[9] Fertecon, *FSU Update*, June 1998, p. 5.

[10] Joint Stock Company (JSC). A JSC is defined as an open partnership. There are 2 types of JSC: AO (or "open") --- an organization that is publicly owned with a large number of shareholders and the ability to sell shares in the organization; or ZAO ("closed") -- Monsanto in Russia, which is wholly owned by Monsanto USA and which has no shares on the Russian stock exchange, for example, is a "closed," or ZAO, partnership. The Russian government can be a shareholder in a JSC, often holding about 30-40 percent of the company's shares.

[11] JSC Acron written submission, dated July 17, 1998, p. 5.

AN capacity utilization rates fell after the 1991 dissolution of the Soviet Union, with reported utilization rates of 68 percent in the NIS in 1992, 60 percent in 1993, and 44 percent in 1994.[12] In Russia, capacity utilization rates fluctuated during 1990-97, decreasing from 73 percent in 1990-91 to a low of 42 percent in 1994 and increasing irregularly thereafter to 60 percent in 1997.[13] Much of the decline was associated with decreased domestic consumption of fertilizers and a weakening in the world market for AN, including China's ban on imports of certain nitrogenous fertilizers in April 1997.[14] As noted in Table 5-1, nine of the 12 companies producing AN in Russia were reported to have capacity utilization rates greater than 50 percent in 1997 (with one, reportedly an exporting company, running at 106 percent); the remaining 4 had capacity utilization rates of between 12-29 percent.[15]

The different rates in capacity utilization are reportedly attributed primarily to the proximity of a producing company to a port. According to the written submission filed by JSC Acron, the "vast majority of Russian AN producers are located in the Russian heartland, prohibitively far from any port," with only 5 said to be located within 1,000 kilometers of a port.[16] The company notes in its written submission that the plants with the lowest capacity utilization rates are generally those located "far from any port," citing as examples JSC Angarsk Petrochemical (said to be approximately 4,300 kilometers from the port of Nakhodka) and JSC Minudobreniya -- Meluez (approximately 2,000 kilometers from the port of Novorossiysk). As such, according to the company, apparent unused capacity is not necessarily expected to be "available" for use in producing export-oriented product.[17] Another source notes that in the first quarter of 1998, production was cut back at several Russian facilities producing fertilizers, primarily those in Siberia. One example cited was the production of "less than 10,000 metric tons out of a capacity of 450,000 metric tons" at the Novomendeleyevsk AN plant.[18] One source noted that Russian nitrate fertilizer production was affected by numerous factors, including "volatility on foreign markets" and "the inability of domestic customers to pay for product."[19]

The Russian ammonium nitrate industry was privatized in 1992-93. There is some foreign investment in the industry. For example, VTI, a European-based trading company, is a shareholder in the JSC Azot - Nevinnomyssk production facility.[20] VTI states in its submission that foreign-owned shares account for about 7.1 percent of total shares held.[21] According to JSC Acron's written submission,

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[12] Fertecon, *The Ammonium Nitrate Industry in the Former Soviet Union* (London: October 1995), p.18.

[13] Ibid.; Fertecon, *Russian Ammonium Nitrate Production by Plant*, 1998, p. 1; and Fertecon, *FSU Update*, June 1998, p. 5.

[14] USITC fieldwork in Russia, June 22-July 2, 1998; JSC Acron written submission, dated July 17, 1998, p. 12.

[15] JSC Acron written submission, dated July 17, 1998, p. 12.

[16] Ibid., p. 9.

[17] Ibid., p. 10.

[18] "Russia -Fertilizer Production in First Quarter 1998: Data Shows Extent of Production Cutbacks, Notably at Siberian Plants," *FSU Update*, May 1998, p. 13.

[19] Interfax International Ltd., "Leading Russian Nitrate Fertilizer Producers Threaten Shutdown," *Chemical Review*, vol. III, issue 3(34), p. 2.

[20] "Tolling and Marketing Arrangements in the FSU," *FSU Update*, June 1998, p. 14; International VTI Group, VTI Fertasco, Inc., written submission dated August 6, 1998, p. 1.

[21] International VTI Group, VTI Fertasco, Inc., written submission dated August 6, 1998, p. 1. According to VTI's written submission, dated August 6, 1998, "the shareholders of Nevinnomyssk Azot are fragmented with no single controlling interest. Individuals own 18.34 percent and companies own 81.66 percent."

Table 5-1
Russian ammonium nitrate: Company, capacity, capacity utilization, location, start-up date, port, and transport distance to nearest port, 1997

Company	Capacity[1]	Capacity utilization	Location	Start-up date[2]	Port	Transport distance to port (km)
	1,000 metric tons per year product	*Percent*				
JSC Acron	900	57	Novgorod	1962; 1979; 1996	St. Petersburg	210
JSC Angarsk Petrochemical Co..	170	15	Angarsk	1962	Nahodka	4,300
JSC Azot – Novomoskovsk	1,125	56	Novomoskovsk	1961; 1973; 1973	St. Petersburg	940
JSC Azot – Berezniki	1,100	58	Berezniki	1975; 1984; 1987	St. Petersburg	1,880
JSC Azot – Kemerovo	900	29	Kemerovo	1980; 1982	St. Petersburg	4,700
JSC Azot – Cherepovets	450	61	Cherepovets	1987	St. Petersburg	500
JSC Dorogobuzh[3]	900	64	Dorogobuzh	1978; 1980	St. Petersburg	780
JSC Kirovo-Chepetsk Kimichesky Kombinat	900	106	Kirovo-Chepetsk	1978; 1982	St. Petersburg	1,360
JSC Minudobreniya – Meluez	450	12	Meleuz	1986	Novorossiysk	2,000
JSC Minudobreniya – Rossoh	520	63	Rossoh	1979	Novorossiysk	1,100
JSC Azot Nevinnomyssk	600	59	Nevinnomyssk	1972	Novorossiysk	450
JSC Novomendeleyvsk Chemical Plant	450	13	Mendeleyvsk	1989	St. Petersburg	1,600
ZAO Kuybyshevazot – Togliatti	400	78	Togliatti	1966	Novorossiysk	1,770
Total Russia	8,865					

[1] Total ammonium nitrate capacity for the company.
[2] Multiple dates indicate different start-up dates for multiple AN production facilities at the location.
[3] JSC Acron notes in its written submission, dated July 17, 1998, that it acquired a controlling block of shares (i.e., 52 percent) in JSC Dorogobuzh in 1994.

Source: International Fertilizer Development Center, *Worldwide Ammonium Nitrate and Calcium Ammonium Nitrate Capacity Listing by Plant* (February 1998); Fertecon, *The Ammonium Nitrate Industry in the Former Soviet Union,* (October 1995); Fertecon, *Russian Ammonium Nitrate Production by Plant*, 1998, p. 1, and official Russian capacity statistics (current as of January 1, 1998) provided by the Ministry of the Economy, Russian Federation.

Creditanstalt (Western Europe) and First Boston (United States) are included among its major investors.[22] In 1996, Rossiysky Credit Bank reported six Russian producers of nitrogenous fertilizers to be "excellent" investment opportunities because of steady production growth and because of their export potential: Acron (Novgorod); Minudobreniya (Perm); Azot Nevinnomyssk; Togliattiazot (Togliatti); Dorogobuzh (Smolensk); and Azot Novomoskovsk.[23] AN producers among these include Acron, Nevinnomyssk, Dorogobuzh, and Novomoskovsk. The Russian Government is also a shareholder in several of the companies.[24]

Several Russian producers of AN have reportedly initiated modernization and upgrade programs in their fertilizer production facilities in recent years. Acron, for example, invested more than $100 million in such efforts through 1997 and states that it plans to continue such investment in 1998.[25] According to Mr. Viatcheslav V. Kantor, the Chairman of the Coordinating Boards of the JSC Acron and JSC Dorogobuzh,[26] of the approximately $85 million invested during 1993-96, more than $60 million of this amount was "covered by the company's own means." Facility investments totaled about $45 million in 1997 and $190 million over the next few years.[27] As stated in the company's written submission, this investment was not intended to increase production capacity of any one product, but, instead "focused on improving the efficiency of its production processes that convert natural gas into ammonia and downstream products," including installation of computer systems and continuing efforts to decrease energy consumed in the ammonia process.[28] Mr. Kantor notes that other Russian AN producers are also upgrading their fertilizer production facilities.

Such upgrades also include efforts to make ammonia synthesis processes more efficient.[29] As an example, according to one source, Russian producers consume approximately 30-40 percent more natural gas per metric ton of ammonia produced than producers in the EU[30] (and, presumably, in the United States). A source in the Russian industry noted that natural gas is also used as a source of energy in the production of ammonia.[31] According to the industry source, whereas newer ammonia production processes consume about 7 gigacalories of energy per ton of ammonia, current Russian production processes expend approximately 11 gigacalories. Efforts are currently underway within the Russian industry to reduce the energy input for ammonia production to approximately 9 gigacalories of energy.[32] According to Mr. Kantor, improvements made at the Acron facility have decreased the amount of natural gas used in producing ammonia such that the JSC uses "about 15 percent less gas than the other Russian producers."[33]

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[22] JSC Acron written submission, dated July 17, 1998, p. 3.

[23] "Production of Mineral Fertilizers," p. 2.

[24] USITC fieldwork in Russia, June 22-July 2, 1998.

[25] JSC Acron written submission, dated July 17, 1998, p. 19.

[26] JSC Acron notes in its written submission that it acquired a controlling block of shares (i.e., 52 percent) in JSC Dorogobuzh in 1994 (dated July 17, 1998, p. 4).

[27] Kantor, *The Russian Nitrogen Industry*; "Production of Mineral Fertilizers," pp. 2-3.

[28] Ibid. The company has also invested in environmental controls.

[29] Ibid.

[30] EFMA, *The Fertilizer Industry of the European Union*, p. 41.

[31] USITC fieldwork in Russia, June 22-July 2, 1998. Several production facilities in the United States reportedly use co-generated electricity as an energy source.

[32] Ibid.

[33] "Spearheading Russia's Revival," *Fertilizer International*, No. 365, July/August 1998, p. 35.

Production/Shipments and Consumption[34]

Domestic fertilizer demand in Russia and the other NIS collapsed with the 1991 dissolution of the Soviet Union, with a similar decrease in fertilizer production. Moreover, according to one source, production costs for fertilizers have risen "noticeably" during the past 2 years because of "increased prices for gas and electricity, and also rising transportation tariffs," resulting in "an extremely unfavorable situation."[35]

In Russia, as in many of the other NIS, agricultural consumers became insolvent, the domestic agricultural support budget proved insufficient, federal aid proved ineffective, and the government was unable to stimulate domestic demand. Additionally, capacity utilization decreased, interest rates for commercial credits were high economy-wide, and the fertilizer distribution network collapsed.[36] Barter, already used in the Soviet Union, continued to replace many cash transactions for all goods.[37] As fertilizers had long been established as among the most profitable of Soviet-era export products, Russian fertilizer producers also looked to exports.[38]

In Russia, for example, according to official statistics of U.S. Department of Agriculture (USDA), the harvested acreage of the leading grain and oilseed crops fell by 14 percent from 60 million to 52 million hectares during 1993-98:[39]

Year	Russian harvested acreage	Russian grain and oilseed production
	(*Million hectares*)	(*Million metric tons*)
1991	59.3	88.0
1992	61.4	105.8
1993	60.5	98.1
1994	56.2	80.3
1995	56.0	65.4
1996	55.0	69.7
1997	55.4	88.3
1998	52.0	65.4

Russian grain and oilseed production declined by 31 percent during 1993-98 from 98 million metric tons to 68 million metric tons. Yields of grain per hectare rose and fell irregularly during 1993-98, in part because of weather, from 1.62 to 1.31 metric tons per harvested hectare; these yields were considerably below the yields

[34] Ammonium nitrate production in the Soviet Union was primarily designed to supply domestic agriculture, rather than for explosive use. Only about 10 percent of ammonium nitrate production in Russia and other NIS is explosive-grade product. Within Russia, production of explosive-grade product is reportedly limited to 2 production facilities. (Fertecon, *Russian Ammonium Nitrate Production by Plant*, p. 1.)

[35] Interfax International Ltd., "Russia Plans Company to Export Mineral Fertilizers," Chemical Report, vol. VII, issue 5(36), May 1998, p. 6.

[36] Kantor, *The Russian Nitrogen Industry*, pp. 2-6.

[37] USITC fieldwork in Russia, June 22-July 2, 1998.

[38] Kantor, *The Russian Nitrogen Industry*, pp. 2-6.

[39] USDA, FAS, *Grain: World Markets and Trade*, August 1998, p. 44; USDA, FAS, *Oilseeds Annual, Russia*, American Embassy, Moscow, various years. Data for 1998 are estimates or projections.

in the 1980s when farmers had better maintained machinery, inputs, and available fertilizer.[40] However, farmers have also reportedly been underreporting grain production since 1993 in order to hide production to be used on farms or for unregistered cash or barter sales, so these data might be somewhat understated.[41]

The levels of fertilizer delivered to and used by Russian agriculture also declined during this period, as shown in table 5-2 (1996 is the latest year for which data are available). In 1995-96, the application rate of fertilizer fell to 17 kilos per hectare, the lowest rate in modern Russian history; Russian fertilizer officials indicated that the application rate in 1997 was unlikely to increase from this low.[42] USDA indicated that in 1998 on-farm supplies of mineral fertilizers were down 30 percent from 1997, according to the Russian Ministry of Agriculture.[43]

Table 5-2
Mineral fertilizer in Russia: Deliveries to agriculture, and application rates, 1991-96

Year	Deliveries to agriculture: All fertilizer	Deliveries to agriculture: Nitrogen	Application rate of all fertilizer (on all crops sown)
	(1,000 tons nutrient)		*(Kilos per hectare)*
1991	10,102	3,967	80
1992	5,510	2,622	44
1993	3,721	2,083	46
1994	1,447	998	24
1995	1,507	995	17
1996	1,580	([1])	17

[1] Not available.

Source: USDA, ERS, *International Agriculture and Trade (New Independent States and the Baltics)*, May 28, 1997, table 45.

[40] USDA, FAS, *Grain and Feed Annual*, prepared by the American Embassy, Moscow, April 2, 1998, p. 4.
[41] Ibid.
[42] Ibid., p. 43.
[43] Mark Lindemann, USDA, FAS, "FSU Report: 1997/98 Grain Quality in Russia and Ukraine," *World Agriculture Production*, June 1998, p. 51.

The data for Russian AN production and domestic consumption for 1989-97 shown in the following tabulation were provided by the Ministry of the Economy of the Russian Federation.[44] Data for overall production, trade, and consumption for Russia and the other NIS are shown in table 5-3. When comparing the tabulation below and table 5-3, much of the difference between domestic production and consumption during 1994-97 appears to be accounted for by Russian exports of AN.[45]

	1989	1990	1991	1992	1993	1994	1995	1996	1997
	(1,000 metric tons)								
AN production	8,455.7	7,578.8	7,474.7	6,259.2	4,653.1	4,138.4	4,893.4	5,402.3	4,970.9
AN consumption	8,455.7	7,578.8	7,053.2	5,6l6.7	3,804.1	2,032.8	2,181.1	2,189.4	2,677.1

During the late 1980s/early 1990s, the Soviet Union, and then Russia and the other NIS, was the second largest consumer of fertilizers in the world after China. In Russia, ammonium nitrate is the predominant fertilizer used. During 1989-91, as noted in the previous tabulation, Russian consumption of AN decreased steadily from 8.5 million metric tons in 1989 to 7.6 million in 1990 and 7.1 million in 1991. Russian consumption then declined irregularly during 1992-97, decreasing from 5.6 million tons in 1992 to 2.2 million tons in 1996, or by 61 percent, before increasing to 2.7 million tons in 1997 (previous tabulation and table 5-3). This level of consumption accounted for a declining share of Russian production during 1989-97, declining from 100 percent in 1989-90 to about 94 percent during 1991 and continuing to decline to about 41 percent in 1996 before increasing again to about 53 percent in 1997.

The decline in Russian fertilizer consumption was due largely to reduced deliveries to agriculture. During the era of the Soviet Union, fertilizer was delivered at little or no cost to collective farms and co-ops, and was reportedly often used on farms in an economically inefficient manner.[46] Greater reliance on obtaining fertilizers through the market system has resulted in higher prices for fertilizers and government assistance for fertilizer procurement has been reduced since 1992.[47] Thus, farmers are using less commercial fertilizer, particularly on feed grain (barley) for which market prices were, and continue to remain, quite low. Exacerbating the situation, many large collective farms, although nominally privatized, have reportedly become insolvent and are unable to purchase any agricultural inputs, such as fertilizer, farm machinery, and chemicals.[48]

Where farm prices are high in Russia, such as for sunflowerseed that is largely exported, farmers are said to be able to obtain fertilizer through barter arrangements or share-cost agreements with exporters.[49] In addition, farmers have adjusted to the higher-priced fertilizer through farm practices

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[44] The data in the tabulation cannot be readily compared with the data in table 5-2 because the latter are in terms of nutrient so as to provide a nitrogen total for multiple, disparate nitrogen products.

[45] JSC Acron states that, because of the distance of many Russian AN producers from ports, it is unlikely that capacity not used for domestic production would automatically be available for the production of product intended for export. (JSC Acron written submission, dated July 17, 1998, p. 10.)

[46] Staff conversation with Roger Hoskins, USDA, ERS, Aug. 19, 1998.

[47] Ibid.; USITC fieldwork in Russia, June 22-July 2, 1998. For more information, see the section in this chapter entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry."

[48] Staff conversation with Roger Hoskins, USDA, ERS, Aug. 19, 1998.

[49] Ibid.

Table 5-3
Russia and other NIS ammonium nitrate: Production, domestic shipments, imports, exports, and apparent consumption, 1992-97

Source	1992	1993	1994	1995	1996	1997
	------	------	(1,000 metric tons product)	------	------	------
Russia:						
Production[1]	6,259	4,653	4,138	4,893	5,402	4,971
Domestic shipments[2]	([3])	([3])	2,017	2,179	2,183	2,662
Imports[4]	([3])	([3])	16	2	6	15
Exports[4]	([3])	([3])	2,106	2,712	3,218	2,402
Apparent consumption[5]	5,617	3,804	2,033	2,181	2,189	2,677
Uzbekistan:						
Production	2,005	1,789	1,365	1,492	1,614	1,482
Domestic shipments	[6]2,000	[6]1,789	[6]1,324	1,222	1,370	1,294
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	([3])	([3])	6	270	244	166
Apparent consumption[7]	[6]2,000	[6]1,789	[6]1,324	1,222	1,370	1,294
Ukraine:						
Production	2,516	1,599	1,501	1,179	1,458	1,585
Domestic shipments	2,493	1,594	1,326	1,139	1,316	1,585
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	7	([3])	175	40	143	35
Apparent consumption[7]	2,493	1,594	1,326	1,139	1,316	1,585
Lithuania:						
Production	341	352	289	314	365	474
Domestic shipments	103	85	19	83	121	56
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	238	268	271	231	243	320
Apparent consumption[7]	103	85	19	83	121	56
Turkmenistan:						
Production	190	[6]294	[6]294	[6]294	[6]294	[6]294
Domestic shipments	188	[6]294	[6]294	[6]294	[6]294	[6]294
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	([3])	([3])	([3])	([3])	([3])	([3])
Apparent consumption[7]	188	[6]294	[6]294	[6]294	[6]294	[6]294
Belarus:						
Production	182	251	174	224	197	220
Domestic shipments	182	251	174	224	75	220
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	([3])	([3])	([3])	([3])	114	([3])
Apparent consumption[7]	182	251	174	224	75	220
Georgia:						
Production	209	150	90	121	158	216
Domestic shipments	97	134	72	99	121	86
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	33	16	18	22	78	124
Apparent consumption[7]	97	134	72	99	121	86

See footnotes at end of table.

Table 5-3 – Continued
Russia and other NIS ammonium nitrate: Production, domestic shipments, imports, exports, and apparent consumption, 1992-97

Source	1992	1993	1994	1995	1996	1997
	(1,000 metric tons product)					
Kazakstan:						
Production	([3])	([3])	1	([3])	([3])	([3])
Domestic shipments	([3])	([3])	1	([3])	([3])	([3])
Imports	([3])	([3])	([3])	([3])	([3])	([3])
Exports	([3])	([3])	([3])	([3])	([3])	([3])
Apparent consumption[7]	([3])	([3])	1	([3])	([3])	([3])
Total Russia and other NIS:						
Production	11,702	9,088	7,852	8,517	9,488	9,242
Domestic shipments	10,680	7,951	5,227	5,240	5,480	6,197
Imports	([3])	([3])	16	2	6	15
Exports	278	284	2,576	3,275	4,040	3,047
Apparent consumption	[7]10,680	[7]7,951	5,242	5,242	5,486	6,212

[1] Official Russian statistics provided by the Ministry of Economy of the Russian Federation, the State Customs Committee of the Russian Federation, and the Ministry of Economy of the Russian Federation. Production data were also provided by the State Committee of the Russian Federation for Statistics (1994: 3638; 1995: 4096; and 1996: 4572, in 1,000 metric tons product).

[2] Domestic shipments obtained by subtracting imports from consumption.

[3] Not available.

[4] Official Russian statistics provided by the State Committee of the Russian Federation for Statistics.

[5] Official Russian statistics provided by the Ministry of Economy of the Russian Federation and the Ministry of Economy of the Russian Federation.

[6] Estimated.

[7] In the absence of import data, apparent consumption equals domestic shipments.

Source: Compiled from IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997,* and Fertecon Ltd., except as noted.

Note: Figures may not add to totals shown because of rounding.

designed to use fertilizer only on the more productive lands or to use manure. As a result, crop yields (of grain and oilseeds) have fluctuated because of weather, but not changed markedly since 1991 (for more information on Russian agricultural policy see the section in this chapter entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry"). Yields may ultimately decline if lower fertilizer application rates continue, but as yet this has not occurred.

A Government resolution reportedly intended to assist the agricultural sector, entitled "On Measures to Provide Agricultural Producers with Mineral Fertilizers and Chemical Means for Crop Protection in 1997," provided discounts of up to 15 percent to companies purchasing natural gas to manufacture AN intended for domestic consumption.[50]

A 1998 agricultural finance program, managed by 12 private Russian banks, has reportedly not met farmers' needs. Separately, ongoing private-sector financing assistance to farmers includes the granting of credit and inputs (fertilizers, pesticides, etc.) to farmers in the spring in return for grain harvested in the fall.[51] Mr. Kantor of Acron noted in a recent interview that Acron itself has created "special credit schemes and development of [its] own regional warehouse network," resulting in increased consumption in the Central Black-Soil Region of about 100-150 thousand metric tons of fertilizer in general.[52]

Trade

Prior to the dissolution of the Soviet Union, a significant portion of Soviet fertilizer exports went to other former Council for Mutual Economic Aid (CMEA)[53] countries.[54] During the late 1980s and early 1990s, as those countries began efforts to transition from non-market economies, exporters of AN in Russia and the other NIS sought alternative fertilizer export markets (table 5-4).

During 1991-94, the Russian Government authorized specific companies in various product sectors, including fertilizers, to export. The Ministry of Foreign Trade issued the export licenses and companies paid a nominal fee, mainly for administrative processing. A total of about 150-160 organizations in various sectors received permission to export during that period. In 1994, the associated State Committee was abolished and the right to export was automatically granted to any entity once exporters register for a license and obtain a passport of transaction from a Russian bank (for control of

[50] Resolution No. 166 of the Russian Government, dated February 14, 1997; VTI states in its written submission that "there have been government regulations in Russia designed specifically to increase domestic Russian consumption of AN. These regulations have affected pricing for domestic consumption and hopefully will increase Russian consumption for much needed agricultural inputs." (VTI written submission, dated Aug. 6, 1998, p. 3.)

[51] Such efforts are apparently being undertaken both by international organizations (e.g., Citizens' Network) and by multinational companies operating in Russia's agricultural sector (e.g., Monsanto and Cargill). (USITC fieldwork in Russia, June 22-July 2, 1998.)

[52] "Spearheading Russia's Revival," p. 33. Also JSC Acron written submission, dated July 17, 1998, p. 17.

[53] The CMEA was dissolved in 1991. At the time of its dissolution, CMEA included Bulgaria, the former, Czechoslovakia, Hungary, Poland, Romania, the Soviet Union, the 3 Baltic States, and 3 non-European members (Cuba, Mongolia, and Viet Nam).

[54] Fertecon, *The Ammonium Nitrate Industry in the Former Soviet Union*, p. 27.

Table 5-4
Ammonium nitrate exports for Russia and the other NIS: Selected destination countries, 1993-97

Destination	1993	1994	1995	1996	1997
	(1,000 metric tons product)				
United States	([1])	78	326	292	158
France	14	88	356	411	332
Germany	128	([1])	151	428	119
Spain	([1])	82	85	143	54
United Kingdom	177	167	26	478	414
Subtotal	319	337	619	1,460	919
Turkey	24	31	([1])	136	136
China	6	364	956	1,124	300
All other	134	511	1,206	1,084	1,126
World total	483	1,321	3,106	4,096	2,639

[1] Not available.

Source: Compiled from IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997,* and Fertecon.

Note: Figures may not add to totals shown because of rounding.

foreign currency). According to sources in Russia, many companies reportedly started exporting at this time, some to the United States.[55]

The United States became a market for Russian ammonium nitrate exports in 1994 just as the domestic Russian market reached bottom. China also became an increasingly important market for Russian AN exports in that year, followed by France in 1995 and Germany in 1996. Russian AN exports to countries other than the NIS increased from about 180,000 metric tons in 1990 to a high of 3.3 million tons in 1996 before decreasing to 1.9 million metric tons in 1997.[56] Two events that occurred in 1995 and 1997, however, had the potential to have a significant effect on Russian exports of AN. In August 1995, the EU issued a Community-wide variable-rate antidumping duty order on imports of AN from Russia.[57] After having increased from about 19,000 metric tons in 1992 to 592,000 metric tons in 1995, EU imports of AN from Russia increased to 658,000 metric tons in 1996 before declining to about 863,000 metric tons in 1997.[58] In April 1997, EFMA alleged that imposition of the variable rate duty had not led to sufficiently high AN prices and requested that the European Commission (EC) reexamine the case. The EC found that the resale price of Russian AN (to the first independent buyer after import) did not sufficiently reflect costs and profits and that the variable rate duty did not have the intended effect on resale price due to the absorption of antidumping

[55] USITC fieldwork in Russia, June 22-July 2, 1998.
[56] *FSU Update*, June 1998, p. 5.
[57] The variable rate duty was the difference between ECU 102.9 per ton and the net c.i.f. price at an EU border before customs clearance.
[58] Compiled from data obtained from the the European Commission's statistical office, Eurostat.

measures and, as such, imposed a specific duty of ECU 26.3 ($28.89) per ton.[59] The duty is said to make it "unprofitable" for Russian producers to export to the EU, reportedly resulting in Russia being "forced fully to stop export shipments of AN" to the EU.[60]

In April 1997, China issued a ban on imports of certain nitrogenous fertilizers, including urea, because, according to representatives of the Chinese Government, China had over imported nitrogenous fertilizers, especially urea, in 1995 and 1996, lowering the consumption levels of domestically-produced products.[61] Russia is a major supplier of fertilizer to China and, according to one source, China is the "chief export market" for Russian exports of nitrogenous fertilizers.[62] Russian exports of nitrogenous fertilizers, having declined by about 14 percent during 1996-97 to about 3.2 million metric tons, are expected to continue to decline because "China, the largest importer, plans to cut imports of urea and ammonium nitrate to a minimum by 2000."[63] As markets for exports of Russian AN become closed or restricted, Russian exporters would likely have to either expand remaining markets and/or find other markets.

In its written submission, Acron states that it is "the largest Russian exporter of AN to the United States" and "has so been for at least the past 3 years (including 1998 year to date)." The company notes that it is likely to remain the largest for the "foreseeable future." [64] One reason might be JSC Acron's export potential. According to JSC Acron, Russian AN producers who are in fairly close proximity to a port will be more likely to export than those further from ports.[65] However, as noted earlier, Acron stated that only 5 Russian AN producers are located within 1,000 kilometers of a port. Estimates from domestic and Russian sources vary, but 4 Russian companies (including Acron) reportedly export to the United States.[66]

In 1996, Acron reportedly exported 80-90 percent of its nitrogenous fertilizer production.[67] Acron's sales volume is said to have grown during 1994-96 from $130 million to $492 million, with an associated

[59] Council Regulation No. 663/98, *Official Journal of the European Communities*, 26 March 1998. For more information on both EC investigations, see the section on government policies in this chapter.

[60] The duty would "force Russian producers to lower their sales price by $35-38." "Leading Russian Nitrate Fertilizer Producers Threaten Shutdown," *Chemical Review*, p. 2. Also, "Russia Plans Company to Export Mineral Fertilizers," *Chemical Review*, p. 6.

[61] As noted earlier, Chinese Government officials noted that China had made significant investments in building large urea plants during the 1990s.

[62] Interfax International Ltd., "Russian Nitrogen Fertiliser Exporters Loses Main Market," *Chemical Report,* vol. III, issue 7, July 1998, p. 4. According to the article, "the Chinese Embassy in Moscow sent out an official letter stating that China would become self-sufficient in nitrogen fertiliser at lest until the end of this year, and perhaps to the year 2000."

[63] "Russian Mineral Fertlizer Market for 1997," *Chemical Report,* p. 6.

[64] JSC Acron written submission, dated July 17, 1998, p. 16.

[65] Ibid., p. 10.

[66] Sources contacted during Commission fieldwork in Russia estimated that 2 or 3 Russian producers exported (JSC Acron, JSC Azot Kirovo-Cherepovets, and JSC Angarsk Petrochemical Co.). According to other industry contacts, a fourth company, JSC Azot – Nevinnomyssk, also exports to the United States. In its written submission, Mississippi Chemical states that "at least 5 Russian producers engage in significant export activity . . .All of the 5 plants identified as significant exporters sell for export to the European Union. Only JSC Azot – Cherepovets apparently is not also currently exporting to the United States." (Mississippi Chemical written submission, dated June 30, 1998, pp. 4-5).

[67] "Production of Mineral Fertilizers," p. 2; "Tolling and Marketing Arrangements in the FSU," *FSU Update*, June 1998, p. 14.

increase in "balance profits" from $44 million to $58 million.[68] More than 80 percent of the company's net income in 1995 was said to be accounted for by fertilizer sales.[69]

Export markets for Russian AN other than the United States include countries in the EU, Asia, Africa, and Latin America. One industry source noted, for example, that major export markets for one Russian AN producer, in addition to the domestic market, reportedly include Turkey, Lebanon, Syria, Morocco, and Greece, but not the United States.[70] According to another U.S. source, another Russian AN producer has exported to numerous countries, including Canada and the United States, in addition to supplying the domestic market. The product intended for Canada was reportedly imported into the United States and brought north through the Mississippi River region for re-export to Canada.[71]

Acron stated in its written submission that its major export markets are currently the NIS, Asia, Africa, and Latin America. The company continued that whereas Asia and Africa are growth areas for its AN exports, "Acron's sales to the United States have been declining," reportedly because of the decline in the price of AN in the United States.[72] In a recently published interview, Mr. Kantor stated that, during 1996-97, over 50 percent of Acron's total exports of fertilizer was marketed in Asia; 12-17 percent was exported to Europe; 27-29 percent was sold to the NIS; 4-7 percent was exported to the United States; and the remainder was marketed in other countries.[73] As an example of an Asian growth area, Mr. Kantor said in the interview that despite China's recent ban on imports of certain nitrogenous fertilizers, Acron was able to increase its sales of other fertilizers to China.[74]

Some of the Russian export data, including that provided by the Russian government, are inconsistent. Data presented by two sources for 1994-97, however, are presented in the tabulation below to illustrate general trade levels (1,000 metric tons AN):

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[68] JSC Acron written submission, dated July 17, 1998, p. 18.

[69] "Tolling and Marketing Arrangements in the FSU," p. 14.

[70] USITC fieldwork in Russia, June 22-July 2, 1998.

[71] Staff telephone conversations with an industry representative, May 26, 1998, and July 14, 1998; VTI states in its written submission, dated August 6, 1998, that about 72 percent of the product exported from the Nevinnomyssk facility to the United States during 1996-97 was in liquid form (i.e., UAN solution) and the remaining 28 percent was in solid. In turn, 23 percent of the solid exports was "re-exported out of the United States by VTI" According to the submission, the Nevinnomyssk facility's exports of solid AN to the United States accounted for about 7 percent of its total exports.

[72] Acron notes, however, that "although the absolute volumes of AN shipments to the United States have declined, U.S. shipments as a share of Acron's total AN sales have fluctuated slightly because, as explained above, Acron's total sales of AN overall have declined steadily since 1996." (JSC Acron written submission, dated July 17, 1998, pp. 14-15.)

[73] "Spearheading Russia's Revival," p. 33.

[74] Ibid.

Destination[1]	1994	1995	1996	1997
EU	454	743	1,261	920
East Europe	478	112	0	101
Africa	0	125	14	46
Middle East/Asia	359	813	1,229	430
North America	107	225	138	155
Latin America	0	79	57	8
Other	373	737	572	206
Total	1,771	2,834	3,271	1,906

Destination[1]	1994	1995	1996	1997
England	210	27	410	398
Germany	19	151	572	117
France	125	358	364	326
United States	232	326	285	163
China	286	686	860	300
Other	1,234	1,164	722	990
Total	2,106	2,712	3,213	2,294

[1] The regional data are from Fertecon, *FSU Update*, June 1998, p. 6. The country data are from the State Customs Committee of the Russian Federation. Each source provided totals. The values for "other" were derived by subtracting the individual countries/regions from the total.

In anticipation of eventual improvement in the Russian fertilizer market, however, and given changes in export markets, Russian fertilizer producers are seeking to become more diversified in terms of the fertilizer products they produce and export. According to one producer, if a product is unprofitable, then a company should move to a more profitable product (e.g., urea, UAN, etc.).[75] Among other things, companies are looking at more production of NPKs for the domestic Russian market and more CAN for Europe.[76] One factor that is said to intensify this effort to maintain profitable products is a Russian regulation that stipulates that products, including exported products, cannot be sold below production cost. If products are sold below this level, companies are reportedly penalized by the State Committee on Taxation, which has the authority to audit a company to determine the actual cost of production.[77]

[75] JSC Acron written submission, dated July 17, 1998, pp. 2, 8, and 12.
[76] USITC fieldwork in Russia, June 22-July 2, 1998.
[77] Ibid.; also VTI written submission, dated August 6, 1998, p. 3.

Pricing and Cost Trends[78]

Input Costs

Prior to the 1992 partial liberalization of pricing, all pricing was regulated by the Government. Prices of natural gas, AN, and other products were set on the basis of recommendations by a price committee. The bases for the natural gas prices were prices paid for similar energy products during the Soviet 5-year national economic plans. During 1992, the Russian Government raised prices for petroleum and natural gas 3 times.[79] According to one source, the price increases -- to approximately $0.50 per million Btu -- were a "sharp" increase from the "low levels of the Soviet era."[80] Another price increase occurred in 1993.

Natural gas is considered under Russian law to be a natural monopoly.[81] After the 1992 partial price liberalization, price increases in the natural monopoly sector at first exceeded the average industrial inflation rate. From 1993-1995, a statistics committee in the Ministry of Economy set natural gas prices based on an inflation index. In 1995, natural gas prices were reportedly permitted to rise by only 33 percent, during which time industrial prices increased by 150 percent.[82] In 1995, the Federal Energy Commission (FEC), responsible for natural monopoly price regulations, was authorized to regulate gas prices, including prices for natural gas pipeline transport.[83] The regional governments are also involved in setting retail prices for natural gas.[84] GazProm's wholesale subsidiaries are said to supply directly about 20 percent of the retail gas market (mostly large industrial users).[85] Reportedly, some Russian AN producers may have their own pipelines and make wholesale purchases.[86]

Several presidential decrees, issued to encourage monetization of the economy or economic growth, have had the effect of overriding the price setting authority of the FEC and regional governments.[87] Natural gas prices were frozen in the fourth quarter of 1995. Then, in the first half of 1996, natural gas prices were indexed to 80 percent of the producer price index. The peg to the index was lifted after June 1996, but natural gas prices were frozen in October 1996. Since then, prices have reportedly remained the same,

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[78] Some Russian data, such as official prices for natural gas in Russia, are reportedly unavailable. As such, to the extent possible, data were obtained from numerous sources, at times including the Russian Government. In some cases, the information provided with the data didn't elaborate on the nature of the data provided. Moreover, currency fluctuations made comparisons more difficult (for more information, see the section in this chapter entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry").

[79] USITC fieldwork in Russia, June 22-July 2, 1998.

[80] Fertecon, "Natural Gas Costs in Russia," 1998, p. 1.

[81] The economic definition of a natural monopoly is when, over the relevant range of production, a single firm can produce an industry's aggregate output more cheaply than two or more firms. Russian legislation however defines natural monopolies as the electrical energy, natural gas, railroad, and telecommunication sectors. It is an open question whether the Russian natural monopolies are economic natural monopolies.

[82] B. Slay and V. Capelik, "The Struggle for Natural Monopoly Reform in Russia," *Post-Soviet Geography and Economics*, 1997, p. 399.

[83] USITC fieldwork in Russia, June 22-July 2, 1998.

[84] "The Struggle for Natural Monopoly Reform in Russia," p. 405.

[85] Ibid., p. 412.

[86] USITC fieldwork in Russia, June 22-July 2, 1998.

[87] Ibid.

although the index increased by about 15 percent, resulting in a relative decrease in the price of natural gas compared to other energy sources.[88]

In addition, territorial price differentiation was recently implemented. According to sources in Russia, six zones were established for the pricing regions, with the price of natural gas about 15 percent lower in producing areas and about 15 percent higher in consuming areas.[89] According to the decree, the minimum differential between the prices was 25 percent and the average prices for each region were based on "the actual average price of gas."[90] Information was not readily available in regard to the impact of the price zones on AN producers in Russia.

Table 5-5, derived from a recent IFA presentation, shows delivered natural gas prices for the spring and fall periods during 1992-98. As noted, the price of natural gas in Russia in April 1998, as set by the Russian Government, was U.S. $1.58 per million Btu delivered.[91]

One Russian source, when asked in 1998 about the average price of natural gas, responded that industrial consumers pay about 265 rubles for 1000 m^3 of natural gas (including the excise tax), plus a tariff of 29 rubles charged by local retailers plus the 20 percent VAT. This results in an average price for local industrial customers of about 305 rubles per 1000 m^3, or about $1.45 per million Btu,[92] of which, it is estimated, taxes (e.g., excise taxes, local taxes, VAT, etc.) account for about 60 percent of the price.[93] As in the United States, according to some Russian sources, industrial consumers can have their own pipelines connected to those of the regional natural gas distributors.[94]

Some Russian AN producers, however, as well as natural gas consumers in other sectors, are eligible for discounts on their natural gas, providing they meet certain conditions.[95] In an effort reportedly intended to transition Russia from a barter economy to a cash economy, legislation was implemented that allowed consumers in all sectors who paid in cash for natural gas and who either had no outstanding

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[88] Ibid.

[89] Ibid.

[90] Government Resolution No. 987, August 7, 1997. (G. S. Ustyuzhanin, "On Regulation in the Gas Industry," *FEC Journal*, November 1997.)

[91] Ibid., p. 25. This price varies, however, as a result of pricing zone, end user (e.g., residential or industry), certain conditional industrial discounts, and fluctuations in the exchange rate of the ruble.

[92] The final price to industrial consumers, however, is then reportedly modified further by local authorities (e.g., local natural gas retailers could add another 20 percent to the total).

[93] USITC fieldwork in Russia, June 22-July 2, 1998.

[94] Residential consumers are said to pay less, or about 165 rubles for 1000 m^3 (excluding excise taxes), plus an additional 20 percent VAT charge, for a total of about $0.94 per million Btu. This trend towards lower pricing for residential natural gas, reportedly a "social factor inherited from the former system and low salary level," is expected to be reversed as salaries and the economy improve. Efforts are underway to end the cross-subsidization of the residential price by industrial consumers. Recent legislation established price zones for residential users.

[95] Another piece of recent legislation discussed earlier in the section on consumption (Resolution No. 166 of the Russian Government, dated February 14, 1997, entitled "On Measures to Provide Agricultural Workers with Mineral Fertilizers and Chemical Means for Crop Protection") reportedly gave natural gas purchasers a discount of 15 percent on the price of natural gas if the gas was used to produce fertilizer intended for domestic consumption. In order for the discount to be granted, the procedure developed in accordance with the legislation required that the consumers show some evidence of sales of the resultant product to domestic consumers.

Table 5-5
Natural gas prices: Russia and Ukraine; spring and fall, 1992-98

Month/year	Russia-- Rubles per 1,000 cubic meters	Exchange rate (rubles per $1)	U.S. Dollars per million Btu	Ukraine- U.S. Dollars per million Btu
March 1992	R270	R100	0.09	
April 1993	R400	R750	0.17	
October 1993				1.50
April 1994				1.70
May 1994	R35,823	R1,875	0.61	
November 1994				1.90
April 1995				2.50
May 1995	R161,100	R4,908	1.05	
September 1995[1]	R257,150	R4,430	1.85	
April 1996	R280,212	R4,922	1.82	2.60
October 1996	R289,177	R5,417	1.70	
March 1997	R297,500	R5,702	1.67	
April 1997				2.60
October 1997	R297,500	R5,872	1.62	2.50
April 1998	[2]R304.500	[2]R6.129	1.58	1.75

[1] Fertecon, “Natural Gas Costs in Russia,” p. 2.
[2] New ruble, redenominated as of January 1998. One new ruble equals 1,000 old rubles.

Source: Pierre L. Louis, “Fertilizer and Raw Materials Supply and Supply/Demand Balances,” (paper presented at the 66th Annual IFA Conference in Toronto, Canada, May 14, 1998), pp. 26 and 28, except as noted.

debt with RAO GazProm (the privatized Russian natural gas supplier),[96] or who had made arrangements to reduce or eliminate their arrearages within a certain time period, to be eligible for a discount of up to 40 percent on their natural gas purchase.[97] Very few entities have reportedly been able to take advantage of the discount. Of the ones that could, including 5 AN firms, none were able to qualify for the full 40 percent discount. Most reportedly qualified for discounts of about 15-18 percent.[98] Acron states that it has obtained discounts under this program, but that it has satisfied the "strict" payment requirements in that it has paid by cash and has no debts to GazProm outstanding.[99] The legislation was perceived to be necessary in that barter transactions, prevalent in Russia, reportedly accounting for between 50-80 percent of all transactions for all goods.[100] Rather than simply trading input for output, barter transactions can be relatively complicated, reportedly involving several intermediate levels.

Companies unable to repay debts, especially for gas, reportedly may enter tolling agreements with GazProm whereby gas is paid for with fertilizer product.[101] In December 1997, a representative of Mezhregiongaz (the domestic sales and distribution branch of GazProm) stated that Mezhregiongaz had tolling agreements with 14 companies, i.e., all Russian nitrogen producers with the exception of JSC Acron at Novgorod and ZAO Kuibyshevazot at Togliatti. Fertilizers produced by these tolling agreements were reportedly sold on the domestic market and exported.[102]

GazProm reportedly has an accumulated debt owed to it by consumers of approximately 90-100 billion rubles, or about US$14-16 billion.[103] It is difficult for GazProm to collect all of the outstanding monies, however, in part, because of social reasons.[104] As such, legislation such as that proposing the 40-percent discount is intended to increase the number of entities paying cash to GazProm with

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[96] GazProm was privatized into a JSC as of November 1992. In 1994, the company's equity was split 4 ways: (1) the employees could buy shares totaling up to 15 percent of the company; (2) individuals from the Russian regions served by GazProm could buy "privatization vouchers" totaling approximately 35 percent; (3) GazProm purchased such vouchers for about a 10 percent share; and (4) the Russian Government retained a 40 percent share, which it still has today. ("As GazProm Goes, So Goes Russian Bailout," *The Journal of Commerce*, July 15, 1998, p. 2; IEA, OECD, *Energy Policies of the Russian Federation*, 1995 Survey, p. 164.)

[97] Presidential Edict No. 628, "On the Natural Gas Price Reductions for Russian Consumers," dated June 19, 1997. The final gas price, however, including the discount, can not be less than the costs to produce and transport the gas. For more information about the edict, see the section in this chapter entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry."

[98] For example, as noted earlier, the price of natural gas in Russia in April 1998 was $1.58. Applying an 18 percent discount to this price yields a price of $1.30.

[99] JSC Acron written submission, dated July 17, 1998, p. 25.

[100] JSC Acron written submission, dated July 17, 1998, p. 25; C. Gaddy and B. Ickes, "Russia's Virtual Economy," *Foreign Affairs*, Vol. 77, No. 5, Sept./Oct. 1998, p. 56. For example, a fertilizer company may need trucks rather than grain so negotiations will then involve grain for trucks for AN; if the truck supplier doesn't need grain, additional product(s) might be needed which would then be bartered for with product (e.g., toys, furniture). (USITC fieldwork in Russia, June 22-July 2, 1998; Sharon LaFraniere, "The Cashless Society: Bartering Chokes Russian Economy," *The Washington Post*, p. 1, Sept. 3, 1998.)

[101] Kantor, *The Russian Nitrogen Industry*, p. 9.

[102] Pierre L. Louis, "Fertilizer and Raw Materials Supply and Supply/ Demand Balances" (paper presented at the 66th annual IFA Conference in Toronto, Canada, May 14, 1998), p. 25.

[103] The exchange rate used to convert these values was 6.23 RR per US dollar.

[104] USITC fieldwork in Russia, June 22-July 2, 1998.

the probability that this, in turn, could increase cash payments to the government which, in turn, could result in further cash outlays by the government.[105]

In addition to payment problems, GazProm has also encountered a decline in domestic demand for natural gas during 1991-97, according to recently released Russian gas statistics, resulting in an almost steady decline of gas production during that time (table 5-6). The production of fertilizers and other chemicals accounted for about 5 percent of domestic gas production in 1991 and approximately 2.7 percent of gas production in 1997.[106]

Table 5-6
Russia: Gas production, exports, and domestic deliveries, 1993-97

Source	1993	1994	1995	1996	1997
	--------------------(billion cubic meters)-----------------------				
Production	617.6	606.8	594.9	600.3	569.2
Exports	179.5	184.7	190.6	197.2	189.8
Outside NIS	100.9	105.9	117.4	124.0	116.8
Other NIS	78.6	78.8	73.2	73.2	73.0
Domestic deliveries	382.9	350.6	339.4	337.3	331.9
Power generation	163.9	147.2	138.9	138.5	135.2
Metallurgy	34.4	31.2	31.3	29.5	27.5
Fertilizer and chemical	27.0	16.3	16.0	15.9	15.6
Heating and other	157.6	155.9	153.2	153.4	153.6

Source: A.I. Gritsenko (VNIIGaz, Russia), as presented in Pierre L. Louis, "Fertilizer and Raw Materials Supply and Supply/Demand Balances," (paper presented at the 66th Annual IFA Conference in Toronto, Canada, May 14, 1998), p. 29.

Ammonium Nitrate Prices

Prices for AN consumed in Russia are difficult to obtain, in part, because much of the trade in the product is done via barter and it is hard to assess the value of such exchanges.[107] The prices noted in the following tabulation in Russian rubles, however, are official statistics for 1992-97, provided by the State Committee on Statistics of the Russian Federation:[108]

[105] GazProm's tax revenues reportedly account for about 25 percent of the annual budget of the Russian Federation. For more information, see the section in this chapter entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry."

[106] Louis, "Fertilizer and Raw Materials Supply and Supply/ Demand Balances" pp. 27-29.

[107] USITC fieldwork in Russia, June 22-July 2, 1998.

[108] Official Russian statistics obtained from the State Committee of the Russian Federation for Statistics. These data do not include value-added tax, transport expenditures, and other taxes.

Average prices of ammonium nitrate in Russia, 1992-97

	Thousand rubles per metric ton	Dollars per metric ton[1]	1997 dollars per metric ton[2]
1992	[3]3	6	121
1993	[3]24	24	107
1994	[3]145	66	146
1995	[3]408	89	122
1996	[4]711	139	141
1997	[4]1,016	176	176

[1] This column shows the nominal value of Russian AN in U.S. dollars with the conversion by the average yearly rate.

[2] This column shows real values in 1997 U.S. dollars. First, a real value series was constructed in Russian rubles using the Russian producer price index, then these were converted to U.S. dollars.

[3] Average price for year.

[4] Price at end of year.

One possible reason for the significant price increase during 1992-97 in ruble terms could have been the general hyperinflation.[109] These prices do not include transportation and taxes. Transportation costs vary significantly throughout Russia, generally depending on the mode of transportation used, the distance traveled, and the season.[110] According to one source, as a rule of thumb, trucking is usually the transportation method of choice for distances under 1,000 km, whereas the railway system is preferred for distances greater than 1,000 km. The railway system, a state-owned monopoly, is a countrywide system. Company-owned trucks are said to be subject to sufficient regulation that renting trucks is considered to be a viable option to owning.[111]

On average, transporting product by truck costs about $1 per kilometer for 20 metric tons, depending on backhaul arrangements and the delivery date needed. Although the designs of trucks and railcars differ, particularly depending on use, it is estimated that the average 6-wheel truck can carry about 20 metric tons of product (larger trucks, which can carry about 40 metric tons of product, are not generally used for chemicals) and the average railcar can carry about 50 metric tons of product. With trucking, poor road conditions in the area of transport also have to be taken into consideration.[112]

Distribution channels in Russia may also cause variations in the price of the domestic product. According to Russian sources, several channels of distribution are available to Russian ammonium nitrate producers:[113]

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[109] For more information, see the following section entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry."

[110] The way a product is transported (e.g., bagged or bulk) can also make a difference in choosing/pricing transportation options.

[111] USITC fieldwork in Russia, June 22-July 2, 1998.

[112] Ibid.

[113] Ibid.

(1) Direct distribution to the farmer. Many of the chemical producing companies were built prior to the dissolution of the Soviet Union and, as such, are well known to farmers. If farmers are familiar with the AN producing facilities, they can buy product directly from the producing plants themselves.;[114]

(2) Farmers who live too far from a plant to go directly to it might go to a local Seljkozkhimija outlet. During the Soviet Union, an entity under the Ministry of Agriculture, called Seljkozkhimija, acted solely as a centralized distribution group in the Soviet Union, providing countrywide distribution to collective farmers. Collectives would calculate how much they needed in terms of inputs and would forward these figures to the Seljkozkhimija which, in turn, would forward them to the Ministry of Agriculture. If the products needed to be imported, the Ministry of Agriculture would then forward the request to the Ministry of Finance to obtain money to purchase the products. If there was domestic production available, the request would instead be forwarded to the Ministry of Chemicals and a plant or plants would be assigned to produce the needed product(s). The Seljkozkhimija still exists, but is now basically a private company (JSC).;

(3) Individual distribution companies/systems started by the producing companies;

(4) Some independent distributors; or

(5) A distribution company that represents several producers (apparently some producers are setting up separate distribution companies that make transactions among member companies at or near market cost). This arrangement, which is said to occur throughout the Russian economy reportedly allows overseas sales at lower costs.

Exporters in Russia have stated that prices for Russian AN exports are near world market prices for the product in the foreign markets. Companies exporting the product will generally conduct negotiations based on international prices obtained from international sources such as British Sulphur, Fertecon, the *Fertilizer Market Bulletin*, and *Green Markets*. According to Russian sources, export prices are also reportedly examined closely by the Russian Customs authorities.[115] To reduce the risk of antidumping allegations in foreign markets, the Russian Customs declaration asks for the contract price for exports. The price declared is then compared with pricing information maintained by the Government and, if Russian Customs thinks that there is a perceived difference between the export price and the world price, then companies have to compensate for the difference.[116] Recently published prices for bagged AN, f.o.b. Black Sea, for the first 6 months of 1998, ranged from about $73 per metric ton to about $105 per metric ton.[117]

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[114] According to the VTI written submission, dated August 6, 1998, the product from the Nevinnomyssk plant is distributed from the factory to the farm using trucks and "some" rail.

[115] USITC fieldwork in Russia, June 22-July 2, 1998.

[116] Ibid.

[117] Fertecon, *FSU Update*, January 1998, March 1998, April 1998, May 1998, and June 1998.

Estimates of transportation costs within and outside Russia vary.[118] The following estimates were presented by two independent sources. According to the first industry source, the average rail price would be about $20-25 per metric ton from factory to port and a fee of $5 per metric ton would be added for terminal handling.[119] The second source estimates that the cost of "inland freight and handling" in Russia in 1998 is about $30 per metric ton (an increase from $12 per metric ton in 1993).[120] The first source states that if 10,000 metric tons of AN are shipped by ocean to the United States, the cost would be about $20-25 per metric ton for ocean freight.[121] The second source states that if 20,000 metric tons of bagged AN are shipped to the U.S. Gulf, the cost of ocean freight would be $16 per metric ton versus about $10 per metric ton to Western Europe for about 5,000-7,000 metric tons of bagged product (these latter ocean freight estimates represent a decrease from $20 and $12, respectively, in 1993).[122] Overall, both sources estimate that the total cost for shipping AN from Russian production facilities to a U.S. port in 1998 would be approximately $40-50 per metric ton.[123]

Outlook

With regard to the future outlook for ammonium nitrate consumption in Russia, Mr. Kantor of JSC Acron forecasts that, "assuming that the evolution of the food processing sector proceeds along normal lines," increased levels of crops will result in increased demand for fertilizer, with the level of demand in "the most fertile regions of Russia" perhaps "returning to at least 50 percent of the old Soviet levels" within 2-4 years.[124]

In line with this, domestic and Russian sources believe that grain production in Russia can be significantly increased from current levels. Despite a relatively low level overall, grain and oilseed production in 1997 was still higher than in 1996. However, according to one industry source, even if grain and oilseed, and livestock production recover in Russia, it is ambiguous whether consumption of fertilizer at the farm level will recover to the levels used under the Soviet Union since farmers must now pay higher prices for fertilizer under the market system, compared to receiving it virtually free under the Soviet Union.

Farm collectives, which in the Soviet era were directed by the government as to what crops to plant, can now choose the crops they plant. These farms (each covering about 2,000-4,000 hectares) have, in many cases, been privatized as joint stock companies, albeit often with a similar managerial hierarchy to that which existed in the collective. The farmers have shares in the JSC, and are given dividends in addition to their salary, but the manager generally chooses what to plant. Independent decisions on crops to be produced may result in different crops being planted than in previous years and, in the foreseeable future, there might be bigger switches between competing fertilizer products (e.g., ammonia, urea, AN, etc.). However, except at the universities, little research is said to be currently underway in regard to which fertilizers are best for which

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[118] The costs can also vary depending on the transportation arrangements that individual companies have put in place (e.g., backhaul agreements, etc.).

[119] USITC fieldwork in Russia, June 22-July 2, 1998.

[120] Fertecon, "Russian Ammonium Nitrate Costs of Supply," April 1998, p. 1-5.

[121] USITC fieldwork in Russia, June 22-July 2, 1998.

[122] Fertecon, "Russian Ammonium Nitrate Costs of Supply," p. 1-5.

[123] USITC fieldwork in Russia, June 22-July 2, 1998; and Fertecon, "Russian Ammonium Nitrate Costs of Supply," p. 1-5.

[124] "Spearheading Russia's Revival," p. 33.

crops. Moreover, since there are no extension programs, there is no link between the research being conducted and the consumer.[125]

Long-term changes are still expected, however, particularly if current legislative efforts to implement land reforms and mortgage systems, including a system that would allow farmers to pledge collateral to obtain inputs, are successful.[126] On a long-term basis, the outlook for ammonium nitrate in Russia could be expected to improve if very significant actions occur and reforms are undertaken, including domestic Russian consumption levels rising to the point of providing a viable market option for domestic AN producers, the economy shifting from what is primarily a barter economy to a cash economy, and, of course, especially given recent events, the Russian economy as a whole improving.

Government Policies Affecting the Russian Ammonium Nitrate Industry

Trade and Economic Policies

The most overarching policy change in Russia in the 1990s has been its efforts to transition its economy after the dissolution of the Soviet Union. In making this transition, Russia has experienced production declines, high inflation, and little domestic or foreign direct investment.[127] From 1991 to 1996, Russian GDP declined by 47 percent but increased marginally in 1997 for the first time since 1991[128] (see table 5-7).[129] Inflation, as indicated by producer prices, was in the triple digit range from 1992 to 1995 but fell to approximately 15 percent in 1997.[130] Low inflation and moderate GDP growth were forecast for 1998, but government deficits that became apparent in May 1998 have forced the central bank to raise interest rates, and growth prospects for the year appear dim.[131]

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[125] Ibid.

[126] There is currently no clear way for farmers to get title to specific plots of land. The reform of the land code would allow farmers to actually own identified, defined plots of land, possibly resulting in joint stock companies being broken into smaller portions. Such land ownership is expected to provide for greater independence on the part of the farmer and help transform the farm sector into a true free-market economy. On July 9, 1998, Russia's parliament passed legislation that will "establish a framework for granting mortgages and give financial institutions the right to seize private property assets from debtors who default on their loans." President Yeltsin had vetoed the legislation twice because it excluded "rural land property." Land ownership is a controversial topic. ("Parliament Passes Bill that Allows Property Mortgages," *The Moscow Times*, July 10, 1998; USITC fieldwork in Russia, June 22-July 2, 1998.) For more information, see the section in this chapter entitled "Government Policies Affecting the Russian Ammonium Nitrate Industry."

[127] Real investment fell by more than output during the past several years This suggests that Russia's capital stock is shrinking; however, the fall in official government investment has been offset somewhat by extra-budgetary funds. (OECD, *OECD Economic Surveys, 1997-1998, Russian Federation*, p. 125). Despite the fall in overall investment, Russian AN firms have been successful in attracting some new investment.

[128] In January 1998, Russia introduced the new ruble which equals 1,000 old rubles. Ruble prices in this subsection of the report have been converted to new rubles.

[129] OECD, *OECD Economic Surveys, 1997-1998, Russian Federation.*

[130] Stanley Fisher, "The Russian Economy at the Start of 1998," U.S.-Russia Investment Symposium, Harvard University, 1998.

[131] "Russia Raises Rates to 80% as Stocks Dive," *International Herald Tribune*, June 27-28, 1998, p. 13, and "Russia Cuts Main Interest Rate 20 Points to 60%," *Russia Today*, Aug. 6, 1998. After rising to 80 percent, the Russian Central Bank's refinancing rate was lowered to 60 percent in early August 1998.

Table 5-7
Selected Russian Federation macroeconomic indicators, 1993-97

Indicator	1993	1994	1995	1996	1997
Real GDP (annual percentage changes)	-8.7	-12.6	-4.0	-2.8	0.4
Producer prices (annual percentage changes)	944	337	236	51	15
Official exchange rate (new rubles per US$, per. av.)	.992	2.191	4.559	5.121	5.785
Annual interest rate (Central Bank refinance rate, percent)	210	180	160	48	21
General government revenue (percent of GDP)	36.2	34.6	31.9	32.1	33.0
General government expenditure (percent of GDP)	43.6	45.1	37.7	41.6	40.4
Federal fiscal deficit as percent of GDP	6.5	11.4	5.4	8.0	6.5
Gross national saving as percent of GDP	26.6	29.7	25.2	22.4	22.2
Total exports (billions of US$)	44.3	67.5	81.0	89.1	87.4
Total imports, c.i.f. (billions of US$)	32.8	50.5	60.9	62.3	67.6

Sources: Real GDP from Stanley Fisher, "The Russian Economy at the Start of 1998" which cites Russian authorities and IMF staff estimates, general government revenues and expenditures from IMF, "Progress with Fiscal Reform in Countries in Transition," 1998, and other figures from IMF, *International Financial Statistics*, May 1998.

The Russian ruble (RR) has depreciated steadily relative to the U.S. dollar, from an average of 0.992 RR per dollar (or $1.008 per RR) in 1993 to 6.995 RR per dollar (or $0.143 per RR) on August 21, 1998. Since 1996, the Russian central bank has intervened in the foreign currency market to keep the RR within a fairly narrow range, but the target range has frequently changed.[132] This has avoided abrupt changes while allowing for devaluation. During much of the 1998 summer, the central bank targeted 6.1 RR per dollar.[133] Because of the current economic downturn, including large declines in the Russian stock market, the Russian central bank and government recently announced that the RR would be allowed to fluctuate within a wider band of 6.0 and 9.5 RR per dollar.[134] Ruble devaluation hurts Russian banks holding foreign debt and ruble-denominated assets. Devaluation will also likely contribute to lower U.S. dollar prices of imported Russian AN. Inflation, which could occur with exchange rate targeting, may mitigate this effect somewhat.[135]

[132] Artyon Danielyan, "New Russian Ruble Policy to Start Softly Monday," Reuters, June 28, 1996.

[133] Marjukka Hiltunen "Russian and Baltic Economies, The Week in Review 34," Aug. 21, 1998.

[134] Ibid., and "Yeltsin Resting, Russians Exchange Rubles," Reuters, Aug. 18, 1998. The Moscow Interbank Currency Exchange rate was reported to be 7.01 rubles per U.S. dollar on Aug. 21, 1998. The exchange rate and policies concerning the Russian ruble continues to change. The discussion regarding the exchange rate in this section reflects the situation as of Aug. 21, 1998.

[135] Fertecon notes that, as a result of the changes in the exchange rate of the ruble and official inflation rates during 1993 and the present, "the net effect has been to increase the general level of costs in Russia by nearly 730 percent in U.S. dollar terms." (Fertecon, "Russian Ammonium Nitrate Costs of Supply, p. 1-5).

The Russian Government has used different mechanisms to privatize state-owned companies, and firms are often only partially privatized, with the Government retaining a stake. Sometimes privatization has included a stipulation that the purchaser invest a certain amount in plant and equipment. The Russian Government reclaimed possession of a portion of the shares of the Cherepovets Nitrogen Co., a previously privatized AN producer, reportedly because the purchaser did not fulfill the sales agreement.[136] The Russian Government reportedly is seeking to resell these shares on the condition that the purchaser make a large investment in the plant.[137] As of August 1998, the State Property Ministry of the Russian Federation (41 percent) was the largest shareholder.[138]

Although not an official policy, the Russian Government has tolerated tax arrears to some degree.[139] Tax and other types of arrears, which are also common, may have had some effect on pricing of Russian products and the financial viability of Russian firms, including suppliers of inputs to the AN industry. According to 1994 Russian Government data, 45 percent of firms were in arrears to suppliers, 44 percent were late paying taxes, and 8 percent had overdue bank loans. In addition, wage arrears accounted for about half the monthly wage bill.[140] Oe source concludes that late payments are part of firms' optimizing behavior and provide a soft form of financing.[141] Although some firms eventually pay their debts, the recent high incidence of insolvency among Russian businesses suggests that a sizeable portion may have unrecoverable debts. Three Russian producers of mineral fertilizers, including AN, reported losses at the end of 1997. These losses ranged from 54.8 million new rubles to 641 million rubles.[142] The Government reportedly is currently making a stronger effort to collect overdue tax debt. For example, it recently froze the accounts and seized property of two of GazProm's subsidiaries, Orenburgazprom and Uraltransgaz for nonpayment of taxes.[143]

Lack of Government revenue is one of the primary reasons for the recent Russian financial crisis. Tax code reform and collection enforcement are needed and were conditions of recent IMF assistance. Both the number of taxes and exemptions have proliferated. Russian firms have reportedly responded to high taxes and arbitrary exemptions with a high rate of tax avoidance. In 1997, tax collection was 30 percent below the target level, and about 20 percent of the collection was in nonmonetary assets.[144] In response to these concerns and under IMF pressure, President Yeltsin signed a series of tax and finance laws.[145] These laws are intended to

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[136] Fertecon, "Government Re-Nationalizes 41% of Cherepovets Azot," *FSU Update*, Jan. 1998, p. 24. Acron's written submission, dated July 17, 1998, p. 30.

[137] "Government Re-Nationalizes 41% of Cherepovets Azot," p. 25; Mississippi Chemical's written submission, dated June 30, 1998, p. 5.

[138] "Leading Russian Nitrate Fertilizer Producers Threaten Shutdown," p. 2.

[139] USITC fieldwork in Russia, June 22-July 2, 1998.

[140] G. Alfandari and M. Schaffer, "'Arrears in the Russian Enterprise Sector," in S. Commander, Q. Fan, and M. Schaffer (eds.), *Enterprise Restructuring and Economic Policy in Russia*, 1996, pp. 97-99.

[141] Ibid., p. 87.

[142] Russian Nitrogen Fertiliser Exporters Loses Main Markets," p. 4. The companies mentioned were JSC Azot - Kemerovo (641 million new rubles), JSC Azot - Berezniki (77 million), and JSC Azot - Cherepovets (54.8 million). In the case of Cherepovets, this loss represents an increase of 66 percent from its loss of 33 million in 1996. Cherepovets' production of AN is said to have declined during 1996-97 by almost 12 percent to 187,000 metric tons. (Interfax International Ltd., "Ammonia Maker Cherepovets Azot Posts Losses Up 66%," *Chemical Report*, vol. III, Issue 8(39), Aug. 1998, p. 11.

[143] Boris Aliabyev, "State Told to Stay Clear of GazProm," *Moscow Times*, June 23, 1998, p. 13.

[144] IMF, "Progress with Fiscal Reform in Countries in Transition," *World Economic Outlook–1998, p. 99.*

[145] "Yeltsin Enacts New Simplified Tax Laws," *Russia Today*, Aug. 6, 1998.

make taxes more uniform, provide measures to ensure that citizens and businesses pay taxes on time, and give the central bank certain liquidation authority over organizations that do not clear their debts.

Firms have continued to make a large number of barter transactions, a practice that was common in the Soviet Union. Russian law requires banks to remit funds to the Government from commercial accounts if the firm involved has not paid its taxes.[146] If a firm has accumulated tax arrears, it can reportedly continue operations without paying taxes by making barter transactions.[147] There are businesses that specialize in exchanging goods for money plus a commission to facilitate the trade in goods. Because goods are not as liquid as cash, in-kind payments are often greater than cash payments for equivalent goods and services.[148] AN companies have allegedly paid for inputs with barter-type arrangements.[149]

The Russian Government has taken some steps to encourage cash payments. For example, Presidential Edict no. 628, which was extended to 1998, provides up to a 40 percent discount to natural gas customers, who paid for current gas supplies in advance in cash and entered an agreement to clear back debt to GazProm by Dec. 31, 1997, provided that the discounted price is not below GazProm's production cost. Only a small percentage of the Russian economy could meet these requirements, and the discounts actually given were prorated by the degree of advance payment. An evaluation of the program found that 131 Russian enterprises throughout the Russian economy took advantage of this discount in 1997, although none qualified for the full 40 percent discount. Five of these firms were AN producers, which qualified for 15 to 18 percent discounts.[150]

In June and July 1998, the Duma (the lower House of the Russian Parliament) considered, as part of the Government's anticrisis plan, a provision to discount natural gas and electricity prices by 50 percent. On July 25, 1998, President Yeltsin signed Decrees No. 889 and 890, entitled "On Measures to Reduce Tariffs on Electric Energy" and "On Measures to Reduce Natural Gas Prices." These decrees reduce prices of electricity and natural gas by 50 percent, as of August 1, 1998, to industrial and Governmental consumers that pay their monthly bills in cash provided the reduced prices are not less than actual production costs. Decree no. 916 signed by the Prime Minister on Aug. 10, 1998, provided for implementation of the natural gas decree.[151] Customers paying between 20 and 70 percent of their gas bill in cash may be entitled to a 1 percent discount for every 3 percent paid in cash, and those paying more than 70 percent but less than the full amount may receive a 1 percent discount for every 2.5 percent paid in cash. Advance payments may entitle the customer to a 1 percent discount for every 2 percent paid in advance in cash. GazProm has expressed concern that a 50-percent tariff reduction may put the price below its cost.[152]

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[146] USITC fieldwork in Russia, June 22-July 2, 1998.

[147] S. Commander, Q. Fan, and M. Schaffer (eds.), *Enterprise Restructuring and Economic Policy in Russia*, 1996, pp. 4-5. Nonmonetary compensation of workers is similarly becoming commonplace. Here, too, the tax regime, which includes an excess wage tax, contributes to the use of barter.

[148] USITC fieldwork in Russia, June 22-July 2, 1998.

[149] Ibid.

[150] Ibid. In the case of companies with no debts, the inability to qualify for the full discount was reportedly because of the stated limitation on the level of the discount so as to prevent the price of the natural gas (including the discount) from dropping below the cost of production. Acron, for example, stated in its written submission that it had satisfied the conditions of the program in that it regularly paid GazProm with cash in advance and it had no debts to GazProm. (JSC Acron written submission, dated July 17, 1998, p. 25).

[151] David Konick, Senior Legal Advisor, IRIS Program on Natural Monopolies, Moscow, Aug. 27, 1998.

[152] USITC fieldwork in Russia, June 22-July 2, 1998.

The three largest broad categories of Russian general Government expenditures in 1996 were subsidies, wages, and interest payments with, respectively, 7.7, 6.2, and 5.6 percent of the GDP.[153] Federal Government transfers to business, which had amounted to 30 percent of the GDP in 1992, fell to 6-7 percent of GDP in 1994.[154] Some Government transfers compensate firms for injurious Government policies; for example, 43 percent of firms receiving transfers faced some type of price and margin controls.[155] A World Bank survey revealed that the chemical sector, which includes the AN industry, ranked fifth in receipt of gross Government transfers ; however, it is not possible to identify such transfers more specifically by subsector (e.g., to the AN industry level).[156]

Russian foreign trade expanded in 1993-97, and Russia maintained a positive external current account balance. The removal of export restrictions on petroleum led to increases in overall exports. Average tariff rates have not increased much, consistent with Russia's desire to join the World Trade Organization. Russia currently applies an ad valorem duty of 10 percent on imports of AN, and no other import restrictions on AN are presently in place.[157] Russian AN firms have apparently taken advantage of the removal of export barriers to increase Russian AN exports.

The Trade Defense Act was approved on April 15, 1998. This act establishes a framework for administering antidumping complaints. As of mid-May 1998, no cases had been initiated under this new law.[158]

Industry-specific Policies

The natural gas, railroad, and electricity industries, all of which provide key goods and services to the Russian ammonium nitrate industry, are considered "natural monopolies" in Russia and are subject to legislation on natural monopolies passed in 1995 and 1997. These three sectors received about 20 percent of all Russian fixed capital investment in 1995 and 1996.[159] State ownership, Government regulations, and leniency in collection of debt and other financial obligations may affect how these sectors price their goods and services.

Reform in the electric power sector has perhaps advanced further than in the other natural-monopoly sectors. The Russian Federal Energy Commission (FEC) is authorized to obtain information, recommend rate-setting methodologies, and serve as an appeals board for price disputes. However regional energy commissions still establish policy, and in some regions the commissioners are officials of the firms that they are supposed to regulate.[160]

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[153] IMF, *World Economic Outlook*, "Progress with Fiscal Reform in Countries in Transition," 1998, pp. 98-120. Containing government spending is also important to maintaining the Government's solvency.

[154] S. Commander, Q. Fan, and M. Schaffer (eds.), *Enterprise Restructuring and Economic Policy in Russia*, 1996, pp. 4-5. pp. 5-6.

[155] G. Alfandari, Q. Fan, and L. Freinkman, "Government Financial Transfers to Industrial Enterprises and Restructuring," in S. Commander *et al*, p. 185.

[156] Ibid., pp. 166-202. No finer level of detail is currently available.

[157] Letter from Alexey Ruzhin, Russian Ministry for Foreign Economic Relations, Aug. 20, 1998.

[158] John Helmer, "Name Change Upends Russian Trade Agency," *Journal of Commerce*, May 11, 1998, p.15.

[159] OECD, *OECD Economic Surveys, 1997-1998, Russian Federation*, p. 125.

[160] B. Slay and V. Capelik, "The Struggle for Natural Monopoly Reform in Russia," *Post Soviet Geography and Economics*, v. 38, 1997, p. 407.

Reform of the natural gas and railroad industries has moved more slowly. The Government-owned railroad companies function as regional monopolies under a cartel arrangement managed by the Railroad Ministry. Similar state-run companies extend into other NIS, which facilitates movement of goods, including substantial shipments of AN, among these countries.

The Railroad Ministry estimates that 70 percent of the railroad industry's costs are independent of the volume of rail traffic, in contrast to 30 percent in most western rail systems.[161] There is also regional cross-subsidization. In 1996, the Government limited rail freight rate increases to 80 percent of inflation for the first half of the year. This rate was then increased to 100 percent for the third quarter but frozen for the fourth quarter. Since then, railway managers have been able to set prices and to offer discounts to meet the competition.[162]

Arrears are a serious problem for the railroad companies, although much of the debt is owed by the electric power monopoly for coal transport. An estimated 60 percent of freight carried by Russian railways in 1996 was paid for by barter. At that time, the railways also owed 3.4 billion rubles in back taxes.[163] Some Russian mineral fertilizer producers reportedly own their own railcars, which reduces freight costs.[164]

GazProm was created in 1990 and endowed with rights to most of Russia's vast natural gas assets and many managerial functions previously carried out by the Natural Gas Ministry. GazProm was incorporated in 1992 with the Russian Government holding all stock. The Government sold 49 percent of GazProm's equity to individual shareholders by 1995, and the Government's current share is about 40 percent. GazProm accounted for 94 percent of Russian natural gas production in 1997. GazProm's assets include 14 Transgaz companies that pump gas through GazProm's unified gas pipeline system and GazExport, Russia's only exporter of natural gas. GazProm owns shares in construction firms, equipment producers, farms, newspapers, a television station, pipeline companies in Eastern and Western Europe and recently acquired a bank.[165] Even though GazProm has not paid all of its taxes, it supplied 26 percent of the Russian Government's tax receipts in 1996 and accounted for about half of Russia's foreign exchange earnings.[166] GazProm reported revenues of 138.8 billion rubles ($23 billion) and after tax profits of 38.7 billion rubles ($6.45 billion) in 1997.[167]

GazProm accounts for about 20 percent of the world's natural gas production and is reported to have 32.9 trillion cubic meters of reserves at the end of 1995, compared with Royal Dutch Shell's 1.35 trillion cubic meters and Exxon's 1.2 trillion cubic meters. Until 1997, wholesale prices for a given type of Russian customer were the same regardless of location, amount purchased, and season. In 1997, Government Resolution no. 987 decreed that gas prices be differentiated by distance and that the difference between the minimum and maximum price be at least 25 percent. Since then, 6 pricing zones have been established in Russia in which price is based on average costs of supplying each zone.[168] Information was not readily

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[161] Ibid, p. 415.

[162] Ibid.

[163] Ibid. p. 417

[164] USITC fieldwork in Russia, June 22-July 2, 1998.

[165] OECD, *OECD Economic Surveys, 1997-1998, Russian Federation*, p. 100.

[166] Ibid., pp. 396-429.

[167] John Kenyon, "GazProm Promised Help on Debts," *Moscow Times*, June 27, p. 13.

[168] Gas prices are listed for the six zones in FEC Resolution No. 241, dated June 11, 1998.

available in regard to the impact of the price zones on AN producers in Russia. According to one source, however, all but three Russian ammonia plants are located in one region and would, therefore, as of February 1, 1997, have paid about R297,500 per 1,000 cubic meters (or about $1.65 per million Btu).[169]

GazProm customers, including many Government agencies, owed it 70 billion rubles as of June 1997, but GazProm found the resources to clear 11.5 billion rubles of its 15 billion ruble debt with the Russian Federation Government.[170] GazProm receives payment in cash for only 10 percent of its natural gas deliveries, payment in-kind for 70 percent of its deliveries, and no payment for the remaining 20 percent of deliveries.[171] GazProm had been reluctant to deny service to nonpaying customers for social reasons.[172] Power companies represent about 40 percent of GazProm's debt, and, faced with its tax obligations, GazProm recently cut off supplies to a power company in St. Petersburg and to various companies in the Urals.[173]

According to a GazProm representative, it does not accept AN in exchange for natural gas because the market for AN is limited.[174] There have reportedly been some tolling arrangements, however, in which AN acquired by GazProm in exchange for natural gas is marketed through the AN company's ordinary marketing channels. GazProm allegedly bases its selling price for this AN on its internal gas cost, which is lower than the AN producer's purchase price of gas, and GazProm's AN is therefore priced less than the producing company's own AN.[175]

It has been alleged that GazProm has taken equity positions in AN companies as payment for natural gas and that it owns, for example, 51 percent of the Kemerovo AN plant.[176] A GazProm representative, however, stated that GazProm did not own any AN companies.[177]

Price regulation has kept natural gas prices low in Russia. As noted above, in the first half of 1996, all prices of the natural monopolies were indexed to 80 percent of producer price inflation. After the restriction on natural-monopoly pricing was lifted, natural gas prices were frozen at levels below GazProm's export price. As discussed above, certain legislation provides cash-paying natural gas customers sizeable discounts. As a result, many Russian consumers, including manufacturers of AN, are able to purchase natural gas at very low prices. In regard to AN specifically, although U.S. industry representatives have suggested that Russian producers have not paid for natural gas or rail transport, such information was not substantiated

[169] Fertecon, "Natural Gas Costs in Russia," 1998, p. 1. Fertecon states that 3 pricing regions were established as of February 7, 1997.

[170] "Industry News, *World Gas Intelligence*, June 21, 1997. During the Russian staff fieldwork (June 1998), a GazProm representative stated that the debt owed it now totaled 15 trillion rubles.

[171] USITC fieldwork in Russia, June 22-July 2, 1998. These percentages are from the Russian Federal Energy Commission. Some interviewees placed the barter figure lower and the nonpayment figure higher. Previous citation by Aliabyev stated that GazProm is not paid for half its deliveries and only 10-13 percent of payments are in cash, which are used to pay taxes and wages.

[172] USITC fieldwork in Russia, June 22-July 2, 1998.

[173] *Moscow Times*, July 4 and July 8, 1998 as reported in JSC Acron's written submission, dated July 17, 1998, appendix 6.

[174] USITC fieldwork in Russia, June 22-July 2, 1998.

[175] Mississippi Chemical written submission, dated June 30, 1998, p. 7.

[176] Fertecon, *FSU Update*, May 1998.

[177] USITC fieldwork in Russia, June 22-July 2, 1998.

during field work.[178] However, they have reportedly benefitted from natural gas pricing and rail rates available to all sectors of the economy,[179] as well as from tolling arrangements with the natural gas company.[180]

Mississippi Chemical has alleged that Russian manufacturers of mineral fertilizers benefit from specific support under Resolution 166 of the Russian Government.[181] This resolution provides 15 percent discounts on natural gas, 30-50 percent discounts on electric and thermal power, and reclassification of fertilizer producers to the lowest customer tariff class for railway transport. Acron stated that the purpose of Resolution 166 was to stimulate domestic agricultural production and that these discounts only apply to production of fertilizer destined for the domestic agricultural market.[182] Acron added that final settlement of electric and gas discounts are made on the basis of payment and shipment documents to Russian agricultural producers and that the Railroad Ministry gives fertilizer companies the lowest tariffs only on domestic shipments.[183] Although the details of the Railroad Ministry's system to distinguish between shipments for domestic consumption and for export were not made known to the Commission, JSC Acron reported that only shipments to Russian agricultural producers are eligible for the discount.[184] Rail is the most common means of transporting AN in Russia. Also, the natural gas and electricity discounts lower the overall production costs for AN firms that produce for both domestic and export markets.

Agricultural Policies

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[178] Commission hearing transcript, June 16, 1998, pp. 27 and 61; also Mississippi Chemical written submission, dated June 30, 1998, p. 11.

[179] JSC Acron written submission, dated Sept. 1, 1998, p. 1. For example, JSC Acron states in its written submission that the Railroad Ministry gives fertilizer companies the lowest tariffs only on domestic shipments. In order for the discount to be granted, consumers must show some evidence of sales of the resultant product to domestic consumers. Also, B. Slay and V. Capelik, "The Struggle for Natural Monopoly Reform in Russia," *Post Soviet Geography and Economics,* v. 38, 1997, p. 407.

[180] Mississippi Chemical written submission, dated June 30, 1998, p. 7.

[181] Commission hearing transcript, June 16, 1998, p. 20. PCS Nitrogen Inc. has also stated that the impact of U.S. imports of Russian AN are the result of "production/transportation subsidies to Russian AN producers." PCS Nitrogen Inc. written submission, dated June 29, 1998, p. 3.

[182] The procedure, developed in compliance with the resolution, stated that "the final settlements for the used power resources and natural gas shall be effected by the producing factories in compliance with the actual amount of chemicals supplied to agricultural producers of the Russian Federation confirmed by payment and shipment documents." "Procedure for the Participation of Entities in the Financing and Supply of Mineral Fertilizers and Chemical Means of Crop Protection to Agricultural Producers in 1997," dated March 21, 1997.

[183] AJSC Acron states that they wish "to emphasize that it has paid, and continues to pay, for electricity pursuant to a unified tariff schedule that applies to all industrial enterprises in its geographic region (Northwest Russia), and it has obtained no special discount under Resolution No. 166 or any other program. The electrical power tariff schedule is established by the regional energy commission on the basis of the cost of energy generation incurred within the region." (JSC Acron written submission, dated July 17, 1998, p. 23.)

[184] JSC Acron written submission, dated Sept. 1, 1998, p. 1. In order for the discount to be granted, the procedure developed in accordance with Resolution No. 166 of the Russian Government required that the consumers show some evidence of sales of the resultant product to domestic consumers. Moreover, JSC Acron states that it "wishes to emphasize that it pays for the transportation of its fertilizer products directly from the tariff schedules established by the Ministry of Railway Transportation." (JSC Acron written submission, dated July 17, 1998, p. 24.)

Prior to 1991, agriculture in the Soviet Union was supported by extensive Government programs that included determining production levels and controlling wholesale grain prices and food prices in urban areas.[185] The Soviet Government supplied farmers with fertilizers and other inputs at low prices, which often led to inefficiently high input use. About 10 percent of the GDP of the Soviet Union went into Government support for the food sector in 1990.[186] In the 1970s and 1980s, the Soviet Union subsidized domestic meat consumption, which encouraged meat consumption beyond what would have existed under market prices. In turn, this encouragement of meat production and consumption bolstered domestic levels of feed grain production for use as livestock inputs and indirectly boosted fertilizer use.

With the collapse of the Soviet Union in 1991, Russia began economic reforms to transform its agriculture through price liberalization, reduced Government support to agriculture, and lessened state control of grain marketing channels.[187] In 1992, the Russian Government lifted price controls for many agricultural products and slashed subsidies provided for agriculture. The state continued to purchase grain but allowed private trade, and the state share of grain procurement fell from 76 percent of all grain marketed in 1991 to 34 percent in 1995.[188]

As a result of these reforms, Russian livestock production has contracted 30 to 40 percent since 1991, and Russian meat prices have risen closer to world price levels.[189] The grain and oilseed sector also declined, but by a far lesser degree. Consumers drastically reduced purchases of meat, particularly domestic meat,[190] and turned to lower-priced bread and potatoes.

Private Russian grain trade expanded after the reforms, but most of the growth in nonstate sales occurred from farmers increasingly using in-kind payments to purchase labor and other inputs. For example, most grain received by farm workers for wages goes to feed private livestock holdings. In addition, regional Government control over grain and oilseed marketing replaced the Russian Federal influence, in some cases, by setting controls on grain outflows through quotas, licenses, taxes, and bans on agricultural products leaving the producing region.[191]

Thus, the general trend of recent Russian agricultural policy has been to reduce outlays to the agricultural sector. Grants and other Government assistance to agriculture for fuel, fertilizer, and machinery repair declined during 1996-98 by 52 percent from U.S. $1,008 million in 1996 to $828 million in 1997, and

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[185] Library of Congress, Federal Research Division, *Russia: A Country Study*, 1998, pp. 323-330.

[186] Roger Hoskins and William Liefert, USDA, ERS, "FSU Reform: Effects on Oilseed Imports," *Agriculture Outlook*, March 1996, p. 19.

[187] USDA, ERS, *Former USSR Update: Focus on Russian Grain Marketing*, March 18, 1996, p. 1.

[188] Ibid., p. 2.

[189] R. Hoskins and W. Liefert, p. 2. See also USDA, ERS, *Transition Economies: International Agriculture and Trade*, June 11, 1998, pp. 2-3.

[190] Imports of poultry and meat from the United States and elsewhere rose sharply since these were considerably cheaper than domestic beef, pork, and poultry.

[191] USDA, FAS, Mar. 18, 1996, p. 5. In 1997, for example, authorities in the Krasnodar Kray region and the Belgorod Oblast restricted the export of grain outside of their regions until the producer fulfilled obligations to the local grain reserve. USDA, FAS, "August Update on the Grain Situation," prepared by the American Embassy, Moscow, Sept. 19, 1997, p. 2.

then to $481 million in 1998.[192] Assistance for fertilizer and plant protection purchases declined in 1998 to about $205 million from $324 million budgeted in 1997.[193] Actual payments have tended to be less than budgeted amounts. As a result, many Russian agricultural entities lack the means to pay for AN.[194]

Environmental Concerns

Increased concerns about nitrates in water may have reduced fertilizer usage somewhat in both the United States and Europe. In Russia, however, there has apparently been less attention regarding the environmental aspects of fertilizer use. At usage levels of AN common in the Soviet Union, some build-up of nitrates in the soil and increased nitrate levels in water were likely. However, as AN usage plummeted more recently, those problems are believed to have been reduced.

Moreover, Russian AN producers have generally not been subject to Government regulations covering environmental concerns inasmuch as there are said to be no specific environmental or worker safety regulations that affect their industry.[195] The Russian industry has, in some cases, however, incorporated several environmental features found in the United States and Europe. One example is the addition of catalytic converters to scrub nitric acid emissions.[196] JSC Acron, for example, states that it has made "significant investments" in environmental upgrades, including investments in: reducing emissions; improving its water exhaust purification process; and modernizing the company's biological waste-water purification system.[197] At present, there are reportedly no Russian environmental regulations concerning the intensity or location of AN application.[198]

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[192] USDA, FAS, *1998 Federal Budget Outlays for Agriculture*, American Embassy, Moscow, Apr. 27, p. 5 1998; and USDA, FAS, *Agricultural Situati*on, American Embassy, Moscow, Sept. 29, 1997, p. 5.

[193] USDA, FAS, *1998 Federal Budget Outlays for Agriculture*, p. 5.

[194] Interfax International Ltd., "Russian First Quarter Fertiliser Usage Falls 22.1%," *Chemical Report*, Vol. III, Issue 7, July 1998, p. 4.

[195] USITC fieldwork in Russia, June 22-July 2, 1998.

[196] Ibid.

[197] JSC Acron written submission, dated July 17, 1998, p. 19.

[198] USITC fieldwork in Russia, June 22-July 2, 1998.

CHAPTER VI

A COMPARISON OF KEY FEATURES OF THE INDUSTRIES IN THE UNITED STATES, THE EUROPEAN UNION, AND RUSSIA

This chapter compares the significant market factors and government policies affecting the major players in the world AN industry. In addition, it examines trends in foreign market shares and pricing in the United States during 1993-97. Table 6-1 summarizes many of the important features of the U.S., the EU, and the Russian AN industries in 1997.

Market Factors

Numerous factors, including external ones, affect world markets for AN and other nitrogenous fertilizers. Such factors can result in either additional supply or reduced demand for these products, thereby influencing product pricing.

Important changes affecting the U.S. market for solid, fertilizer-grade AN, for example, include the impact of new U.S. production capacity for solid, fertilizer-grade AN; imports; growing U.S. stocks of wheat and corn; and the recently-imposed Chinese ban on imports of certain nitrogenous fertilizers, including AN and urea. China is a major world consumer of nitrogenous fertilizers and the closing of this market to non-Chinese sources is considered to have depressed world nitrogenous fertilizer prices, largely because of the interrelated nature of many of these products (i.e., as inputs or potential substitutes for the others).[1] Chinese imports of nitrogenous fertilizers accounted for about 7 percent of worldwide consumption of nitrogenous fertilizers in fertilizer year 1996/97. Moreover, world markets and prices for nitrogenous fertilizers, including AN, are also affected by increased ammonia and urea capacity in the United States and Trinidad and Tobago. All of these factors are reflected in U.S. price trends for AN. After generally trending up through mid-1997, U.S. prices for AN declined significantly in 1998.

In the EU, stricter environmental legislation and increased CAP-imposed set-asides contributed to the decline in consumption of solid, fertilizer-grade AN during 1992-93. AN consumption in the EU then increased during 1994-96. By 1996, grain prices worldwide were higher and EU set-aside requirements had been reduced, resulting in the planting of more arable land. Consumption of AN is expected to decline during the next 10 years, largely as a result of environmental restraints.[2] Additionally, increased reliance on satellite mapping to precisely determine soil and crop fertilization requirements may also lead to lower AN consumption.

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[1] According to a source in Russia, world prices for nitrate fertilizers declined during the past year and a half because of "slumping demand" from major importers such as China. (Interfax International Ltd., "Leading Nitrate Fertilizer Producers Threaten Shutdown," *Chemical Review*, vol. III, issue 3(34), March 1998, p. 2.) VTI states that AN prices are "linked to supply and demand-driven world nitrogen prices (mainly urea), which have declined dramatically over the past 2 years." (International VTI Group, VTI Fertasco, Inc., written submission dated August 6, 1998, p. 2.) Additional sources include statements published in annual and quarterly Reports of Mississippi Chemical in 1997 and 1998, and in annual reports of CF Industries and PCS (the parent of PCS Nitrogen, Memphis, TN).

[2] The European Fertilizer Manufacturers Association (EFMA), *The Fertilizer Industry of the European Union*, (June 1997), pp. 15-16. CAP 2000 requirements have not been factored into this forecast.

Table 6-1.
Solid, fertilizer-grade ammonium nitrate: selected information.

Market features	The United States	The EU	Russia
Nitrogenous product(s) most consumed in fertilizer applications in region	Ammonia, UAN, NPKs, urea, and AN	AN is second only to CAN as the nitrogenous fertilizer product of choice in the EU. However, nitrogen vehicle selection varies by the consuming country (e.g., AN is expected to remain the primary nitrogenous fertilizer of choice in the UK and decrease slightly in France with corresponding increases in urea and UAN. CAN is expected to remain the Netherlands' primary nitrogen source.)	Mostly AN with some ammonia, complex fertilizers, ammonium sulphate, etc.
Number of firms in industry	13 producing solid AN; 10 producing solid, fertilizer-grade AN	About 70 percent of EU production capacity is held by 4 companies (Norsk-Hydro-23%; Grande Paroisse-18%; Kemira-15%; and Fertiberia-14%).	12
Industry production capacity (metric tons per year (mtpy)); capacity utilization, 1997	2.4 million mtpy; 99%	8.8 million mtpy; 65% -- 2.3 million mtpy UK; 85% -- 2.7 million mtpy France; 70%	8.74-8.87 million mtpy; 60%
Level of technology	High	High	Medium,[1] but varies by company[2] In recent years, several Russian nitrogenous fertilizer producers, including Acron, have been investing in plant and technology upgrades (e.g., efforts to reduce energy consumption in ammonia production).

[1] EFMA characterizes the level of Russian technology in its nitrogenous fertilizer industry as needing to be "revamped." EFMA, "Factors of Competitiveness: Comparison of the Competitiveness of the Nitrogen Fertilizer Industry in the Main Producing Regions."

[2] Mr. Kantor of Acron stated that, with regard to the Russian fertilizer industry as a whole, "the majority of Russian producers operate obsolete plants and lack a diversified product range." ("Spearheading Russia's Revival," p. 35.)

Table 6-1. – Continued
Solid, fertilizer-grade ammonium nitrate: selected information.

Market features	The United States	The EU	Russia
Primary feedstock type; 1997 feedstock price ($ per million Btu)	Natural gas; $2.23 per million Btu (wellhead)[3] Several U.S. companies reportedly use co-generated electricity to supply much of their energy.	Natural gas; $2.00 per million Btu --- UK; about $3.57 per million Btu -- France	Natural gas (some naphtha); about US $1.58 per million Btu delivered (before discounts). Natural gas is also used by many Russian AN production facilities as an energy source.
Level of domestic ownership	Primarily domestic with some outside investment (Canadian)	Significant foreign investment; primarily foreign-owned in the United Kingdom; approximately 35-40% foreign direct investment in France; and about half foreign-owned in the Netherlands	Primarily domestic with some outside investment
Share of world imports; share of world exports, (percent), 1997	7% imports; U.S. exports of AN are minor, about 30,000 metric tons	EU: 30% imports; about 19% exports France: 14% imports; 6% exports UK: 13% imports; less than 4% exports	Russia imports practically no AN; 42% exports
Production (prdn), metric tons (mt); import (mt); export (mt); and consumption levels (mt) of solid, fertilizer-grade AN in 1997	2.4 million mt prdn.; 515,000 mt imports (netted for the portion of Canadian exports believed to be explosive-grade AN); about 30,000 mt exports; 2.9 million mt consumption	5.2 million mt production (UK–1.8 million mt; France-1.8 million mt); 2.5 million mt imports (UK-713,000 mt; France-687,000 mt); 1.0 million mt exports (UK-91,000 mt; France-350,000 mt); 6.4 million mt consumption (UK-2.3 million mt; France-2.2 million mt)	5.0 million mt prdn; 15,000 mt imports; 2.4 million mt exports; 2.7 million mt consumption

[3] Although the price of natural gas to consumers can vary depending on several factors, including location, U.S. industry representatives stated that, for the United States, the wellhead price is considered to be a good benchmark.

Table 6-1. – Continued
Solid, fertilizer-grade ammonium nitrate: selected information.

Market features	The United States	The EU	Russia
Proximity to domestic and export markets (producing industries are generally close to domestic markets; the variation is largely seen in terms of export markets.)	Close for domestic; minimal exports.	Close for domestic; moderately close for primary intra-EU markets.	Close for domestic; moderately close to distant for export markets

In Russia, a major factor affecting the domestic AN industry is the low purchasing power of the agricultural sector. Government assistance to agriculture has been greatly reduced in recent years. Moreover, programs administered by the banking sector that were intended to provide credit to the agricultural sector have not worked well, reportedly because of the attractiveness of loans with higher rates that can be granted to other sectors of the economy. Additionally, prices of fertilizers in Russia have increased since the dissolution of the Soviet Union and many large collective farms, formerly state-owned but now nominally privatized, are reportedly insolvent and unable to buy agricultural inputs. With reduced Government assistance, farmers have had difficulty purchasing needed inputs such as fertilizers, pesticides, and seeds.

Barter, another factor, is a dominant feature of the Russian economy, accounting for a substantial portion of transactions for all goods.[3] Barter is often a reaction to an economy with a lack of available cash. However, because goods are not as liquid as cash, in-kind payments are often greater than cash payments for equivalent goods and services.[4] These factors contributed to a general decline in consumption of solid, fertilizer-grade AN in Russia of about 52 percent during 1992-97.

This decline in fertilizer consumption prompted those Russian fertilizer producers who can export (e.g., those in fairly close proximity to a port) to do so, to markets around the world, including the United States. The export potential of many companies was apparently boosted in 1994 (the year that Russian exports started entering the U.S. market) with the dissolution of the State Committee involved in export. Export licensing procedures were eased so that everyone had the right to export rather than only licensed companies. Moreover, most, if not all, of the companies producing AN in Russia have been privatized in recent years. This has resulted, according to a representative of one firm, in the companies being able to seek out export markets and to make independent decisions as to production levels of various products to meet market needs.[5] The companies are also reportedly obtaining some foreign investment, although this investment is limited by the age of the facilities and the current economic downturn in Russia.

Government Policies

Government policies, including those policies affecting natural gas availability and pricing, have had a significant impact on the business climate in the United States, the EU, and Russia. The impact of various types of government policies in each region is summarized below.

Economic Policies

Producers of solid, fertilizer-grade AN in the United States and in much of Europe have benefitted from relatively stable financial policies over the past 10 years and relatively low inflation rates. These

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[3] A recent article characterizes the barter situation as follows: "Since Yeltsin launched his economic reforms in 1992, industrial enterprises have been starved for investment as governments slashed subsidies. At the same time, though, the government kept enterprises afloat by allowing them to pay for electricity, fuel, and other necessities through long chains of wasteful barter deals. This system has become known as Russia's 'virtual economy' because it managed to keep millions of workers employed in unproductive factories." (Patricia Kranz, "Russia: Is There A Solution?", *Business Week*, September 7, 1998, p. 28.)

[4] As noted in chapter V, the Russian Government has instituted various measures to reduce or eliminate the barter/countertrade system.

[5] JSC Acron written submission, dated July 17, 1998, pp. 2, 8, and 12. Also, USITC fieldwork in Russia, June 22-July 2, 1998.

policies facilitate business planning and access to capital. Russia, however, has experienced high inflation and an uncertain business climate. Mature capital markets have not yet emerged to replace the state investment used by the former Soviet Union. Reportedly, as a result, many Russian AN producers, except JSC Acron and some of the other exporting companies, have not modernized or retrofitted existing facilities on an ongoing basis.[6]

Russian input suppliers' reluctance to take firm action against late and nonpaying customers, and their willingness to make special payment arrangements, may enable some less-efficient firms to remain in business that would not be able to do so under a strict market economy. For example, GazProm has been reluctant to deny services to nonpaying firms in all sectors, although it has recently taken steps against several companies.[7] Also, the railroad monopoly has provided services that are not firmly based on costs.[8] In regard to AN specifically, although U.S. industry representatives have suggested that Russian producers have not paid for natural gas or rail transport, such information was not substantiated during field work.[9] However, they have reportedly benefitted from natural gas pricing and rail rates available to all sectors of the economy,[10] as well as from tolling arrangements with the natural gas company.[11]

Agricultural Policies

Relatively stable agricultural policies in both the United States and Europe have resulted in high agricultural production and therefore a comparatively steady demand for solid, fertilizer-grade AN. Traditionally, as discussed in chapter IV, the governments in most European countries have had a high degree of involvement in their agricultural sectors. However, overall government involvement has gradually decreased in the United States and somewhat in Europe. For example, set-aside programs are being scaled back or eliminated in both the United States and Europe. Deficiency payments have been eliminated in the United States, and the farmer is free to decide what and how much to plant. Proposed amendments to the CAP include decreased regulation of the prices of certain agricultural products and decoupling income compensation from farm output. The effect of these actions has, however, been offset by other policies in the United States and Europe. In the United States, for example, reauthorization of some conservation programs, such as the Conservation Reserve Program, the Great Plains Conservation Compliance, and the Wetland

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[6] According to one source, more than half of Russia's mineral fertilizer plants, including those producing ammonia and urea, are past their service lives, and only 30 percent of the equipment meets contemporary production standards. Major needs are said to include continuing efforts to improve the efficiency of energy and materials use. As such, industry development depends on its ability to finance, or secure outside financing for, these projects. Interfax International Ltd., "Russian Mineral Fertilizer Market for 1997," *Chemical Report*, vol. VII, Issue 5(36), May 1998, p. 6.)

[7] USITC fieldwork in Russia, June 22-July 2, 1998. *Moscow Times*, July 4 and July 8, 1998 as reported in JSC Acron's written submission, dated July 17, 1998, appendix 6.

[8] B. Slay and V. Capelik, "The Struggle for Natural Monopoly Reform in Russia," *Post Soviet Geography and Economics*, v. 38, 1997, p. 415.

[9] Commission hearing transcript, June 16, 1998, pp. 27 and 61; also Mississippi Chemical written submission, dated June 30, 1998, p. 11.

[10] JSC Acron written submission, dated Sept. 1, 1998, p. 1. For example, JSC Acron states in its written submission that the Railroad Ministry gives fertilizer companies the lowest tariffs only on domestic shipments. In order for the discount to be granted, consumers must show some evidence of sales of the resultant product to domestic consumers. Also, B. Slay and V. Capelik, "The Struggle for Natural Monopoly Reform in Russia," *Post Soviet Geography and Economics*, v. 38, 1997, p. 407.

[11] Mississippi Chemical written submission, dated June 30, 1998, p. 7.

Reserve Program will still likely result in some acreage being taken out of production, and the reauthorization of the Export Enhancement Program will stimulate production. In Europe, grains are subject to a unified interventionist price, although these price levels, except that for barley, are approaching world levels.[12]

In Russia, the movement from state control of agriculture toward a more market-oriented system has been difficult. Reforms are incomplete, and the experience gained on the Russian collective farm has left many agricultural workers poorly equipped to become independent farmers. Moreover, Russia has no farm extension system comparable to the U.S. farm extension service to provide advice on quantities and types of fertilizer most suitable for different conditions. As noted in chapter V, some private companies, including at least one U.S. company, provide Russian farmers inputs in exchange for the right to purchase the farmers' production. Companies desiring to sell inputs to Russian farmers often must expand vertically into distribution because of the poorly developed existing Russian distribution system and because of the difficulty in enforcing contracts with independent individuals or firms for distribution services.[13]

Direct government support to the agricultural sector has been reduced because of the overall budget problems of the Russian Federal Government. The result has been a significant decrease in fertilizer usage. Agriculture accounted for about 20 percent of government investment during the latter years of the Soviet Union, but much of this investment targeted low productivity land and had little effect in improving agricultural efficiency.[14] The sharp contraction of agriculture's share of government resources most likely can be attributed to a shift toward support for more productive sectors during the transition to a market economy.

Land reform and greater restructuring of previous state farms reportedly need to occur before agricultural production and fertilizer use can be expected to increase significantly. Current Russian land reform is based on Presidential Decree No. 1767 of 1993. Privatization under this decree has resulted in the government giving land to the collective farms, which were then required to issue each member a share of the land. In practice, however, only 6 percent of Russian farmers have claimed their land share to start a private farm.[15] In the collective system, the individual farmer lacks clear incentives to make decisions on how to use land most efficiently.

Efficiency increases are considered necessary throughout Russian agriculture. Improved efficiency would be expected if land privatization were completed.[16] The right to buy, sell, mortgage, and inherit land could also make it easier for the efficient farmer to acquire credit and agricultural inputs. The overall Russian food production and distribution system also reportedly needs further development before farm production and fertilizer use can be expected to increase.[17]

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[12] USDA, *Europe: Situation and Outlook Series*, WRS-97-5, Dec. 1997, p. 2.
[13] USITC fieldwork in Russia, June 22-July 2, 1998.
[14] OECD, pp. 124-125.
[15] American Embassy, Moscow, "Agricultural Situation Report," 1997, pp. 5-6.
[16] Ibid., p. 6.
[17] USITC fieldwork in Russia, June 22-July 2, 1998. Also, Acron in its written submission, dated July 17, 1998, notes that it is increasing its domestic distribution services.

Environmental Policies

Increased concerns about nitrates in water may have reduced fertilizer usage somewhat in both the United States and Europe. In the United States, the EPA administers several voluntary and mandatory programs to protect water quality. In addition, many States have regulations that limit use of agricultural inputs in certain areas. In Europe, similar regulations exist to control nitrate levels in water. For example, a European directive on nitrates has lowered livestock production somewhat, although it has had little effect on grain production.

In contrast, there has apparently been little consideration of the environmental aspects of fertilizer use in Russia. At usage levels of AN common in the Soviet Union, some build-up of nitrates in the soil and increased nitrate levels in water was likely. However, as AN usage plummeted more recently, those problems are believed to have been reduced.

In comparison to other environmental policies, efforts to address soil erosion in the United States, which have resulted in increased use of low-till and no-till farming systems, have led to increased consumption of AN. AN use in these types of farming systems is significant in the United States. There is no evidence that these farming systems are in widespread use in other areas.

Additionally, Government regulations, including those covering environmental concerns, in both the United States and Europe have tended to increase the cost of producing AN. Costs include additional employees and equipment to ensure compliance. Equipment needed to comply with environmental regulations can be expensive. For example, prill tower scrubbers can cost $5-6 million apiece.[18] Russian firms producing solid, fertilizer-grade AN have generally not been subject to these types of regulations, inasmuch as there are no specific environmental or worker safety regulations that affect Russian AN producers. The Russian industry has, in some cases, however, incorporated several environmental features found in the United States and Europe. One example is the addition of catalytic converters to scrub nitric acid emissions.[19]

Trade Policies

The EU has a tariff of 6.8 percent for solid, fertilizer-grade AN, which is applied to members of the WTO. The United States has a general rate of duty of "free" on imports of AN and currently has no antidumping or countervailing orders in place against imports of AN. In August 1995, the EU issued a community-wide antidumping order on imports of AN from Russia.[20] In 1998, the variable duty was changed to a specific duty of ECU 26.3 ($28.89) per ton. Russia permits imports of AN; however, the combination of abundant Russian production and its weak internal market have led to practically no imports of AN into Russia. Neither the United States, the EU, nor Russia have policies that impede any of their domestic firms from exporting AN.

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[18] USITC fieldwork at several domestic producers, May 19-22, 1998.

[19] USITC fieldwork in Russia, June 22-July 2, 1998.

[20] The order imposed a variable duty that was the difference between ECU 102.9 per ton and the net c.i.f. price at an EU border before customs clearance. The product under consideration in the EU investigation was "ammonium nitrate, which is a fertilizer produced in prill or granular form, containing between 33 and 35 percent nitrogen plant nutrient." (Council Regulation (EC) No. 2022/95, *Official Journal of the European Communities*, 23/8/95, p. No. L 198/2.)

Industry-specific Policies

Government policies affecting natural gas are different in the United States, the EU, and Russia. In the United States, the natural gas industry was gradually deregulated since the mid-1980s, generally resulting in increased competition and lower, albeit fluctuating, prices to consumers. Competition exists in both the supply and distribution segments with the lowest prices near points of supply, such as in the Gulf Coast States, and in Western States that import low-cost natural gas from Canada. Deregulation has lagged in Europe except in the UK where the process is well advanced. Natural gas pricing within Europe varies considerably, but lower prices are generally available near production sites, such as in parts of the Netherlands. Although European prices are generally higher than U.S. prices, European prices are expected to decrease as deregulation proceeds and as lower-cost production from the North Sea becomes available.

In Russia, GazProm continues to be the major provider of natural gas and a significant exporter to the other NIS and to Europe. Russian Government efforts to regulate GazProm under natural monopoly provisions have not been entirely successful. GazProm is, however, in the process of changing its pricing policy to more closely reflect production and transportation costs. Six different pricing zones that reflect delivery costs have been established, and efforts are underway to eliminate industrial consumers' cross-subsidization of residential consumption. As such, the average price paid by Russian AN producers now varies by zone. Russian industrial consumers who pay in advance in cash may receive reduced rates as long as the rates are above GazProm's cost of production. Access to these reduced rates appear to be available to industrial consumers on an economy-wide basis.

Although the United States and the EU regulate rail transport, the Russian rail system remains more firmly under direct state control than in other countries. Rates appear to have little relationship to the cost of services provided. Also, payment in kind seems to be accepted. Only a few Russian companies are located close enough to ports such that overland transport costs for bringing AN to a port are considered to be economically feasible.

Production Costs

Costs of AN Inputs and Production

Table 6-2 provides a breakdown of the estimated manufacturing cost of ammonia in a 1,000 metric tons per day plant built in 1990 on the U.S. Gulf Coast[21] and the updated estimated manufacturing cost in the same plant in mid-1998. The fixed investment includes off-sites, consisting of raw water and boiler feed water treatment, ammonia storage, and a (water) cooling tower. The working capital includes product storage for 30 days at $150 per ton. Natural gas is feedstock to a reduced-energy process commercialized in the 1980s. As can be seen from this analysis, the natural gas feedstock amounted to over 70 percent of the total production cost before return on investment and is a key factor in determining ammonia production profitability.[22]

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[21] Kirk-Othmer, *Encyclopedia of Chemical Technology*, 4th edition, vol. 2, pp. 678-679.

[22] Kirk-Othmer, *Encyclopedia of Chemical Technology*, pp. 678-679

Table 6-2
Cost of producing ammonia in the United States, 1990 and 1998, in nominal dollars.[1]

(*Dollars per metric ton of ammonia*)

Source	1990	1998
Natural gas ($2.00 per million Btu in 1990, $2.00 in 1998)	76.00	71.40
Other cash costs:		
Boiler feed water make-up	.28	([2])
Cooling water circulation	2.10	([2])
Catalyst cost	1.70	([2])
Labor, personnel shift	1.44	([2])
Supervision, 100% of labor	1.44	([2])
Interest on working capital	1.30	([2])
Insurance	4.10	([2])
Maintenance	8.36	([2])
General sales and marketing	4.10	([2])
Subtotal, other cash costs	24.82	24.60
Cash cost of production	100.82	96.00
Depreciation	27.50	27.50
Total production cost	128.32	123.50

[1] Reduced energy ammonia process; yearly production 345,000 metric tons; total investment $99 million ($95 million in fixed investment (including cooling tower, boiler feedwater treatment, raw water, and ammonia storage as minimum off-sites requirement) and $4.5 million in working capital). Cost of natural gas is based on 38 million Btu per metric ton of ammonia in 1990 and 35.7 million Btu per metric ton in 1998. (Labor $10.00 per hour in 1990.)
[2] Not detailed for this estimate.

Sources: Kirk-Othmer, *Encyclopedia of Chemical Technology,* 4th ed., vol. 2, pp. 678-679 (1990 data), and information obtained from U.S. sources.

Advances in technology have reduced the U.S. industry's consumption of natural gas to produce one metric ton of ammonia from 42 million Btu in the 1970s to an average of 37.3 million Btu in 1997.[23] For the particular plant in table 6-2, only 8 years old, the consumption is estimated to be 35.7 million Btu of natural gas priced at $2.00 per million Btu in the first quarter of 1998 compared to 38 million Btu of natural gas at $2.00 per million Btu in 1990. As noted in table 6-2, such technology advances reduce the estimated cash cost to $96 per metric ton, and the total cost (including depreciation) to $123.50 per metric ton in the first quarter of 1998 from $100.82 and $128.32 per metric ton, respectively, in 1990.

[23] Ibid.; The Fertilizer Institute, "Production Cost Surveys," p. 1. The 1997 figure applies to most of the industry, namely 43 ammonia plants averaging 26 years of age.

Production Costs of Ammonium Nitrate in the United States

Table 6-3 gives the estimated production cost of fertilizer-grade AN in three representative plants in the United States in early 1998.[24] About 47 plants produce AN solution in the United States, with an average capacity of about 240,000 metric tons per year. The five largest plant capacities range from 640,000 to 1,140,000 metric tons per year. The AN solution produced is used in the manufacture of multiple products (e.g., UAN solutions, solid fertilizer-grade product, solid explosive-grade product, etc.). Of the 19 plants producing solid AN, only about 11 produce fertilizer-grade AN, mostly in the more-than-220,000 metric-tons-per-year range (only the prilling or granulating part of the plant is that small; the remainder of the plant is sized to include production of all AN for the other uses).[25] The following 3 estimates, obtained from consultants, are presented to provide a better perspective of the range of production costs in the United States, depending on the operating conditions of a given plant.

In table 6-3, the first plant (labeled "large") is a prototypical large-production Gulf Coast leader-producer[26] AN plant with production capacity of 495,000 metric tons per year, operated at 89 percent of capacity, in the first quarter of 1998.[27] This plant, representative of the 11 that produce solid, fertilizer-grade AN in the United States, began operations in 1990. Its capital cost was $114 million--$76.0 million onsites (i.e., inside battery limits) and $38.0 million offsites (i.e., outside battery limits--supplying electricity, water supply, steam, heating, and plant office space to the entire production complex). The second plant[28] (labeled "medium-size") starts with an ammonia plant of 412,000 metric tons per year capacity (which corresponds with the average size of the 43 U.S. ammonia plants surveyed as part of The Fertilizer Institute's annual cost survey),[29] followed by a nitric acid plant of 275,000 metric tons per year capacity and a single-stream AN plant of 365,000 metric tons per year capacity. These figures are

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[24] The three estimates are provided by Chem Systems, Fertecon Ltd., and Blue, Johnson & Associates, respectively. Chem Systems is a U.S. management consulting firm that assists business within the global energy, chemicals, plastics, and process industries. Their expertise includes process technology/economic evaluation (including site-specific project development), market research and forecasting, and strategic planning.

Fertecon Ltd. is an independent British consultancy firm, specializing in fertilizer raw materials, intermediates, and finished products. In addition to producing marketing reports, some of which provide medium- and long-term forecasts, the company provides advice on a consulting basis to clients on strategic and investment decisions in the fertilizer and related industries.

Blue, Johnson & Associates, a U.S. management consulting firm, services the chemical, mineral, and energy industries, with emphasis on fertilizers and their feedstocks. In addition to providing an annual, multi-client industry information service that publishes reviews and forecasts of the fertilizer industries, the company also conducts projects on a consulting basis that address asset evaluations, acquisition and business strategies, project venture strategies, and marketing strategies.

[25] In the estimates provided by Chem Systems, the capacity of the plant is 495,000 metric tons per year. Blue, Johnson's proxy plant has less than half that capacity, which would increase its unit cost of production to some degree. As noted in a recent fax to Commission staff from Blue, Johnson, the individual production capacity of 11 of the 19 plants producing solid AN (fertilizer- and explosive-grade) in the United States is approximately 181,000 to 363,000 metric tons per year. (Fax from Blue, Johnson, dated Aug. 6, 1998.) Mississippi Chemical, who only produces fertilizer-grade AN, has a total production capacity of 1,088,400 metric tons for AN solution, of which about 860,000 metric tons, or 79 percent, is for solid product.

[26] According to a representative of Chem Systems, a "leader-producer" is representative of the industry's most efficient producers, i.e., within the top 25th percentile.

[27] Letter from Chem Systems to Commission staff, July 22, 1998.

[28] Fertecon Ltd. letter to Commission staff, July 27, 1998.

[29] The Fertilizer Institute, "Production Cost Surveys," p. 1.

Table 6-3
Cost of producing ammonium nitrate in the United States, 1998

Source	Large plant[1]	Medium-size plant[2]	Small plant[3]
	Dollars per metric ton		
Ammonia[4]	[5]41.6	[6]37	[7]50
Other cash costs:			
Catalyst/chemicals	5.0	([8])	([8])
Utilities[9]	1.3	([8])	([8])
Direct fixed costs[10]	10.2	([8])	([8])
Allocated fixed costs[11]	4.4	([8])	([8])
Subtotal, other cash costs	20.9	61	[12]49
Total, cash costs	62.5	98	99
Depreciation on ammonia plant[13]	11.9	([8])	([8])
Depreciation on AN (and nitric acid) plants[14]	18.2	([8])	([8])
TOTAL AN cost, f.o.b. plant	92.6	([8])	([8])

[1] Information provided by Chem Systems in a letter to Commission staff, July 22, 1998.
[2] Information provided by Fertecon Ltd. to Commission staff, July 27, 1998.
[3] From information contained in “The Sheet,” published by Blue, Johnson & Associates, June 1998, pp. 1, 3, and 4; fax from Blue, Johnson to Commission staff, dated August 6, 1998.
[4] Although many companies purchase natural gas and then produce ammonia themselves, some companies purchase ammonia and then continue the production process from that point. For those plants that purchase ammonia, the cost of ammonia, as well as the overall total, would be about $21 more (fax from Blue, Johnson to Commission staff, dated August 6, 1998).
[5] From table 6-2, with 0.433 tons of ammonia per ton AN, produced from gas bought for $2.00 per million Btu, at a unit cost of $96 per metric ton ammonia ($96 per metric ton ammonia x 0.433 = $41.6). The amount of natural gas consumed per metric ton ammonia is 35.7 million Btu. The capacity is 495,000 metric tons per year.
[6] Ammonia used per ton AN = 0.45 ton, produced from gas bought for $2.20 per million Btu, at a unit cost of $83 per metric ton ammonia. The amount of natural gas consumed per metric ton ammonia is 37.5 million Btu. ($83 per metric ton ammonia x 0.45 = $37) The capacity is 365,000 metric tons per year.
[7] Ammonia used per ton AN = 0.47 ton, produced from gas bought for $2.23 per million Btu, at a unit cost of $106 per metric ton ammonia. The amount of natural gas consumed per metric ton ammonia is 36.4 million Btu. ($106 per metric ton ammonia x 0.47 = $50) The capacity is 188,000 metric tons per year.
[8] Not detailed for this estimate.
[9] Power: 0.027 KWH per ton AN; steam: 0.11 tons per ton; cooling water: 67 tons per ton; and boiler feed water: 0.3 tons per ton.
[10] Operational manning: 30 operators; 5 supervisors; 1 foreman; maintenance: 3 percent of onsites; and direct overhead: 45 percent of labor plus supervision.
[11] General plant overhead: 60 percent of direct fixed costs; and insurance and taxes 1.5 percent of total plant capital.
[12] Blue, Johnson’s estimate of $49 for “Other cash costs” is considered representative of the non-ammonia cash costs for plants of this size. According to industry sources, however, as the size and integration of individual U.S. plants increases to the level of Russian plants, this value declines towards the “other cash costs” value listed in the Russian plant estimate in the next table.
[13] Table 6-2. ($27.50 per metric ton x 0.433 metric tons = $11.90)
[14] 10 percent of onsites and 5 percent of offsites.

applicable to June 1998. The third plant complex[30] (labeled “small”) reflects a representative “proxy”[31] plant in Louisiana on the Mississippi River, with a capacity of 188,000 metric tons per year, in the second quarter of 1998, supplied with ammonia from a neighboring site. This size plant is smaller than most of those actually operated in the industry.

Production Costs of Ammonium Nitrate in Russia and the European Union

The Russian AN product is essentially the same as that produced in the United States and the EU in terms of nitrogen content. The technology, licensed from leading engineering companies, is basically the same. The Russian production units were of similar design as those in the United States and the EU when they were installed (mostly from the 1950s to the 1970s), but reportedly have not been as well-maintained and have not been improved as in the United States and in the EU. As in every other region, the availability and cost of natural gas is the all-important competitive feature. Natural gas is available at varying prices to manufacturers in each of the regions addressed (see industry sections). Within Russia, legislation addresses the availability and pricing of natural gas (see Chapter V for more information).

The many Russian producers are spread over a broad geographical area, mostly located to serve the major areas of domestic agricultural production, which are inland. About 4 to 5 Russian producers reportedly engage in significant export activity.

Western European natural-gas-based ammonia plants are on average believed to be nearly 10 percent more efficient than those in the United States and considerably more efficient than those in Russia.[32] This basically results from the historically higher cost of natural gas feedstock in Western Europe and the consequent need to reduce energy consumption by additional investment to improve competitiveness--the additional capital cost being justified by the energy cost savings.[33]

The estimated 1998 cash cost to produce AN in Russia and the EU, as compared with that of the United States, is summarized in table 6-4.[34] These figures are based on estimated costs of natural gas of $2.20 per million Btu in the United States and $1.30 per million Btu in Russia, the latter figure representing a 20 percent discount from the estimated posted price in Russia.[35] For the EU, the estimated price of natural gas, $2.50 per million Btu, is based on the average cost for ammonia producers in the Netherlands in June 1998, a cost which is said to be closely followed by most gas suppliers to ammonia producers throughout Western Europe.[36]

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[30] Blue, Johnson & Associates, “The Sheet,” June 1998, pp. 1, 3, and 4, and a fax from Blue, Johnson to Commission staff, dated August 6, 1998.

[31] The plant is considered a “proxy” because it is compiled from information collected by Blue, Johnson for actual plants. The actual plant data, however, are proprietary and cannot be released.

[32] According to information provided by Fertecon.

[33] Fertecon Ltd.

[34] Ibid.

[35] The discount is considered representative of the discounts that are available to some AN producer firms (for more information, see Chapter V).

[36] The price of natural gas varies as a result of several factors. For more discussion on natural gas pricing in the EU and Russia, please see Chapters IV and V.

Table 6-4
Cost of production of ammonium nitrate in Russia,[1] the United States, and the EU, January-June 1998

Item	Russian plant[2]	U.S. plant[3]	EU plant[4]
	Cash cost per metric ton		
Natural gas, $/MM Btu	$1.30	$2.20	$2.50
Ammonia, $/ metric ton	$57	$83	$86
Use per ton of AN	x 0.45	x 0.45	x 0.44
Ammonia cost in AN	26	37	38
Other cash costs[5]	39	61	64
AN total	65	98	102

[1] Data for June 1998. Fertecon Ltd., the source of these data, notes that the costs were calculated using an exchange rate of 6,000 "old" Russian rubles per US$1. The Russian ruble was redenominated in January 1998 to a rate of 6 "new" rubles per US$1.

[2] As cited from Fertecon Ltd.'s estimates for one Russian plant, Novomoskovsk, considered to be a typical producer in Russia. The Novomoskovsk complex contains ammonia, nitric acid, and AN units. The amount of natural gas consumed to produce one metric ton of ammonia is 44 million Btu.

[3] Fertecon Ltd. The amount of natural gas consumed to produce one metric ton of ammonia is 37.5 million Btu.

[4] Fertecon Ltd. The amount of natural gas consumed to produce one metric ton of ammonia is 34.4 million Btu.

[5] "Other cash costs" are defined by Fertecon as production site costs, excluding feedstock costs, which are required to produce each product. According to Fertecon, they include "all on-site labor, purchased labor and materials, chemicals/catalyst, services and utilities (e.g. water, electricity, steam, etc.), insurance, taxes (not income tax) and general plant overheads. Depreciation and interest repayments are not included." As mentioned earlier, these costs can vary depending on the size of the production facility, its integration, and other factors.

Source: Information provided by Fertecon Ltd.

Market Share Trends

During 1993-97, the U.S. market for solid, fertilizer-grade AN increased by 26.5 percent. The share of the market held by U.S. producers during these years decreased from 86.4 percent to 82.2 percent. In comparison, the Russian share of the U.S. market increased from zero to 7 percent and the EU share of the market increased slightly, from 3.4 percent to 3.5 percent. A more detailed description of market share shifts during these years follows.

In 1993, the U.S. market for solid, fertilizer-grade AN amounted to 2,284,000 metric tons, with domestically produced AN accounting for about 86.4 percent of the total (or 1,974,000 metric tons).[37] U.S. imports from all sources amounted to 310,000 metric tons, accounting for about 13.6 percent of U.S. consumption.[38] U.S. imports from the EU accounted for about 3.4 percent of the U.S. market and about 24.8 percent of total U.S. imports of fertilizer-grade AN. The remaining imports came from a variety of sources, including Canada, Norway, Japan, and Bulgaria.

In 1994, the U.S. market for solid, fertilizer-grade AN amounted to 2,462,500 metric tons, with domestically produced AN accounting for about 81.3 percent of the total (or 2,002,000 metric tons). U.S. imports of fertilizer-grade AN from all sources amounted to about 460,500 metric tons, accounting for about 18.7 percent of U.S. consumption. In turn, U.S. imports of Russian material, entering the United States for the first time in 1994, accounted for about 3.1 percent of the U.S. market (77,000 metric tons) and, in terms of import share, about 16.7 percent of total U.S. imports of fertilizer-grade AN. U.S. imports from the EU accounted for about 4.3 percent of the U.S. market and 22.8 percent of total U.S. imports of fertilizer-grade AN. The remaining imports came from a variety of sources, including Canada, Poland, Norway, Japan, South Africa, Mexico, Egypt, and Cyprus.

By 1997, however, the size of the U.S. market had increased by 17.3 percent from 1994, to 2,889,000 million metric tons. Domestically produced AN, amounting to 2,374,000 million metric tons, accounted for an increased share of the U.S. market as compared with 1994, or about 82.2 percent, an increase of about 0.9 percentage points (the market share declined to 79.3 percent in 1995 before increasing to 81.1 percent in 1996).[39] U.S. imports of AN from all sources accounted for a smaller share of the market than in 1994, decreasing by 0.9 percentage points to 17.8 percent of total consumption. U.S. imports from

[37] The U.S. production data were adjusted by subtracting estimated exports. In 1992 and 1993, prior to the U.S. imports of Russian material, the U.S. industry's share of the U.S. market for solid, fertilizer-grade AN was 89.2 and 86.4 percent of the total, respectively. In 1994, however, with the advent of imports from Russia, the domestic industry's share of the U.S. market declined to 81.3 percent.

[38] Although most U.S. imports of AN are fertilizer-grade, U.S. industry sources have stated that U.S. imports of AN from Canada included both fertilizer- and explosive-grade material. They estimated that fertilizer-grade material accounted for about 50 percent of total U.S. ammonium nitrate imports from Canada in 1997. For the purposes of this report, this proportion has been applied for the entire 1993-97 period.

[39] As noted in Chapter III, Mississippi Chemical submitted U.S. production data that differed from that available from the U.S. Department of Commerce and displayed a different trend. Had the Mississippi Chemical production and consumption data been used in this analysis, the U.S. industry's share of the market (adjusted for estimated U.S. exports) would have been 79.0 percent in 1993, 75.2 percent in 1994, 69.3 percent in 1995, 70.5 percent in 1996, and 73 percent in 1997, with the remainder in each year accounted for by imports. The share of the U.S. market held by U.S. imports of AN from Russia would have increased from 2.9 percent in 1994 to 7.2 percent in 1997; the EU share would have decreased from 3.9 percent to 3.6 percent. Russia and the EU would still have accounted for the same shares of total imports.

Russia increased their share of total consumption by 3.8 percentage points and total imports by 21.8 percentage points as compared with 1994, accounting for 6.9 percent and 38.5 percent, respectively.[40] Since the import share has remained roughly constant between 1994 and 1997 and Russia's share increased, the share of imports from other countries generally declined. For example, U.S. imports from the EU held smaller shares of both total consumption and total imports, accounting for 3.5 percent and 19.4 percent, respectively, compared with 4.3 percent and 22.8 percent.[41]

In 1993, Canada and the Netherlands accounted for about 82 percent of total U.S. imports of solid, fertilizer grade AN. In 1994, Canada, the Netherlands, and Russia accounted for about 72 percent of total U.S. imports of fertilizer-grade AN. The remainder of the U.S. imports in 1994 were sourced from Poland, Norway, Mexico, Egypt, and Cyprus. As noted in the following tabulation (in terms of percent shares), Canada's share of U.S. fertilizer-grade imports of AN during 1993-94 dropped by about 24 percentage points and then remained in the 30-40 percent range during 1994-97.

	Russia's share of U.S. imports	The Netherlands' share of U.S. imports	Canada's share of U.S. imports	Other countries' share of U.S. imports
1993	-	25	57	18
1994	17	23	33	27
1995	32	18	32	18
1996	24	33	37	6
1997	39	17	38	6

During 1993-97, the EU market for solid, fertilizer-grade AN increased from 4,864,000 metric tons to 6,392,000 million metric tons. However, the share of the market held by EU producers during these years decreased from 68 percent to 60 percent. In comparison, the Russian share of the EU market increased from 4.8 percent to 14 percent. The U.S. exports minimal amounts of AN. A more detailed description of the changes in market share shifts in the EU during these years is presented below.

In 1993, EU consumption of solid, fertilizer-grade AN amounted to about 4,864,000 metric tons, of which 3,318,000 metric tons, or about 68 percent of the total, was accounted for by domestic shipments. Imports, about 1,546,000 metric tons, accounted for approximately 32 percent of the EU market for solid,

[40] The share of total Russian AN exports accounted for by those sent to the United States during 1994-97 increased irregularly from about 4 percent in 1994 to about 8 percent in 1997. In comparison, the share of the total Netherlands' AN exports accounted for by those sent to the United States increased steadily during 1994-96 from 18 percent to 31 percent before declining to about 16 percent in 1997.

[41] The shares of the U.S. market held by foreign suppliers other than Russia and the EU countries also shifted during 1994-97. For example, whereas imports from some suppliers increased during this period, several suppliers active in the 1994 market were found to be no longer involved in the 1997 market (i.e., Egypt, Cyprus, Mexico, and Estonia). Market share shifts that occurred during 1994-97 include, in terms of percentage points: Canada (net increase of 0.5, assuming 50 percent of imports by quantity are fertilizer-grade); Egypt (a net decrease of 2.2); Cyprus (-1.1); Mexico (-1); Norway (-0.3); Poland (+0.4); and Estonia (-0.2).

fertilizer-grade product. In turn, the share of the EU market held by imports from Russia, which accounted for about 15 percent of total EU ammonium nitrate imports, amounted to about 4.8 percent.

In 1994, EU consumption of solid, fertilizer-grade AN amounted to about 5,484,000 metric tons, of which 3,544,000 metric tons, or about 65 percent of the total, was accounted for by domestic shipments. Imports, about 1,940,000 metric tons, accounted for approximately 35 percent of the EU ammonium nitrate market. In turn, the share of the EU market held by imports from Russia, which accounted for about 16 percent of total EU ammonium nitrate imports, amounted to about 6 percent.

By 1997, the size of the EU market for solid, fertilizer-grade AN increased by 16.6 percent to about 6,392,000 metric tons; however, the share held by domestic shipments decreased to about 60 percent. Imported product, amounting to 2,538,000 metric tons, accounted for about 40 percent of the EU market; imports from Russia, about 863,000 metric tons, or 34 percent of total EU imports, increased their share of the total EU market to about 14 percent.[42]

Outlook

The prognosis is mixed for the U.S., EU, and Russian AN industries. U.S. producers estimate that U.S. demand for solid, fertilizer-grade AN will be stable to slightly increasing for the next 5 years.[43] In contrast, EFMA estimates that the combined effect of changes in the CAP, the Nitrate Directive, and other relevant factors in the EU will lead to decreased EU nitrogen consumption, including solid, fertilizer-grade AN, by 5.2 percent by season 2005/2006.[44] Due to the many uncertainties about Russian agriculture, it is very difficult to predict future AN consumption there. However, it is noted that despite its many institutional problems, Russia is believed to possess the potential to increase its grain production significantly.[45]

Worldwide prices of nitrogenous fertilizers, including those of AN, are declining, prompting some switches in products made and consumed and, therefore, in production levels. Continuation of this decline in the prices of nitrogenous fertilizers may make some products, including solid, fertilizer-grade AN, less attractive to export. U.S. import data indicate that January-June 1998 import levels from the Netherlands and from Russia have decreased in comparison to the same period in 1997 (Russian product decreased from 135,000 metric tons to 75,000 metric tons, whereas the product from the Netherlands decreased from 47,000 metric tons to 39,000 metric tons). At least one foreign producer asserted that exports to the United States could decrease as domestic prices decrease.[46] The degree of influence of imported product pricing on the U.S. market is uncertain, but price spreads have been significant. As noted in the report, the domestic Southeast price, f.o.b., was $154 in January-June 1998, compared with c.i.f. unit values of about $82 per metric ton for the product from the Netherlands and about $94 per metric ton for the Russian product. In the case of Russian product, however, the situation may be ameliorated if domestic Russian consumption levels

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[42] According to one source, about 40 percent of Russian AN exports go to the EU. (Fertecon, *FSU Update*, March 1998, p. 21.)

[43] USITC fieldwork at several domestic producers, May 19-22, 1998.

[44] EFMA, p. 19.

[45] USITC fieldwork in Russia, June 22-July 2, 1998. Also, Russia's potential as a grain producer is attested to by the fact that it was the world's leading grain exporter in 1914 before the Soviets came to power.

[46] The decline in U.S. imports from Russia could be attributed to declining prices in the U.S. market. JSC Acron notes that "most recently, Acron shifted sales away from the U.S. market because of the decline in prices in that market, looking instead for more profitable markets." (JSC Acron written submission, dated July 17, 1998, p. 15.)

improve to the point of providing a viable market option, if currency-based trade expands at the expense of the currently widespread barter and countertrade economy, and if the Russian economy as a whole improves.

Appendix A
Request Letter from the Committee on Finance, U.S. Senate

(The request letter is not included in the electronic version.)

Appendix B
FEDERAL REGISTER Notice

(The *Federal Register* notice is not included in the electronic version.)

Appendix C
Commission Hearing Schedule

(The Commission hearing schedule is not included in the electronic version.)

Appendix D
Glossary

Glossary of Terms and Acronyms

Ammonia–A volatile compound (chemical nomenclature NH_3) made commercially by splitting hydrogen from natural gas and from steam and then combining it with nitrogen from the air; evaporates at room temperature; must be kept under pressure.

Ammonium nitrate (AN)–Produced by reacting ammonia with nitric acid; chemical nomenclature NH_4NO_3.

Anhydrous ammonia–Concentrated ammonia fertilizer in liquid form, typically 82 percent nitrogen content.

AN–Ammonium nitrate.

Calcium ammonium nitrate –See "CAN" below.

CAN–Calcium ammonium nitrate, generally containing 26 percent nitrogen; has reduced explosive potential compared with AN.

EU–The 15 European Union countries.

GazProm–Russian company created in 1990 with ownership of most Russian natural gas assets; in 1998, it was about 60 percent privately owned and 40 percent government owned. Company accounts for about 20 percent of world natural gas production.

Granulated ammonium nitrate (granular)–Hot AN is sprayed to form solid particles in a rotating drum; resulting granules have a moisture content of about 0.1 percent.

JSC–A Russian corporation; there are 2 types of JSCs: AO (or "open" corporation) – an organization that is publicly owned with a large number of shareholders and the ability to sell shares in the organization; and ZAO, "closed" corporation.

MMBtu–Million Btu (British Thermal Units) of energy equivalent.

Natural gas off-system–Gas that is purchased outside of a local gas distribution system.

NIS–The Soviet Union was dissolved in December 1991. The Russian Federation (Russia) is the largest (in terms of geographic size, population, and economic output) of the successors of the Soviet Union. References to the successor states of the Soviet Union are as new independent countries (NIS).

Nitric acid–An acid (chemical nomenclature HNO_3) generally formed in AN producer's facilities from the reaction of ammonia with oxygen and (in a second reaction) with steam.

Nitrogenous fertilizers–Any chemical fertilizer containing some form of nitrogen, including AN, anhydrous ammonia, urea, UAN, and CAN.

NPK–Nitrogen (any nitrogenous fertilizer), phosphorous (diammonium phosphate), and potassium (potash); multinutrient fertilizers containing a mixture of these three plant nutrients.

Prilled AN (prills)–Hot AN is fed into the top of a "prilling" tower where it drops and is sprayed into a current of cool air that dries the falling AN drops, forming individual "prills."

Tolling agreement–Payment for an input (such as natural gas) furnished to an industry through in-kind barter of the product containing the input.

UAN (urea-ammonium nitrate solutions)–Nitrogen fertilizer solution of urea and ammonium nitrate.

Urea–Dry nitrogen fertilizer (generally 46 percent nitrogen content).

Appendix E
Production, trade, and consumption data for world producers and world markets for certain nitrogenous fertilizers, 1997

World producers and world markets for certain nitrogenous fertilizers in 1997

1997 world production data for nitrogenous fertilizers counts the United States and Russia among the leading world producers of ammonia, urea, solid AN and AS.[47] The United States produced 14 percent of world ammonia production, 7 percent of world urea production, 22 percent of world solid AN production[48] and 16 percent of world AS production.[49] Russian world production for the same nitrogenous fertilizers were calculated as: ammonia (7 percent); urea (3 percent); solid AN (15 percent), and AS (7 percent). Within the EU, France was a significant world producer of ammonia (2 percent) and solid AN (5 percent). Approximately one-half of world CAN production was in the EU: Netherlands (21 percent); Belgium (10 percent); Germany (9 percent); and Spain (7 percent).

Production of Ammonia

Country	Percent
China	24
United States	14
India	9
Russia	7
Canada	4
Indonesia	4
Netherlands	2
France	2
Total	66

Production of Urea

Country	Percent
China	24
India	19
United States	7
Indonesia	6
Canada	4
Pakistan	3
Russia	3
Ukraine	3
Total	69

Production of AN

Country	Percent
United States	22
Russia	15
United Kingdom	6
France	5
Poland	5
Ukraine	5
China	4
Uzbekistan	4
Total	66

Production of CAN

Country	Percent
Netherlands	21
Belgium	10
Germany	9
Spain	7
Turkey	6
Poland	5
Former Yugoslavia	4
South Africa	4
Total	66

Production of AS

Country	Percent
United States	22
Japan	10
Mexico	8
Belgium	8
Russia	7
Canada	4
Germany	4
Netherlands	4
Total	61

Source: Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

[47] Although China and India are major producers of ammonia and urea, they consume all production domestically and are additionally the world's two largest export markets for nitrogenous fertilizers.

[48] IFA, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics,1997*, various pages. Although IFA members are requested to report solid AN only, the U.S. statistics may include AN used in UAN synthesis. AN figures may also include quantities used for explosives.

[49] According to IFA's *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics, 1997,* U.S. production of AN amounted to about 7.4 million metric tons product. According to official statistics of the U.S. Department of Commerce, U.S. production of AN in all forms in 1997 (including solid and UAN solution) amounted to about 7.5 million metric tons product (see table 3-2 in this report). If official production statistics of the U.S. Department of Commerce for all solid AN (fertilizer- and explosive-grade) are used, the U.S. share of worldwide production of solid AN is about 13 percent, compared with about 17 percent for the EU and Russia.

Russia dominated 1997 world nitrogenous fertilizer exports. Russia accounted for 22 percent of world ammonia exports, 12 percent of world urea exports, 42 percent of world exports of solid AN, and 12 percent of world AS exports. Within the EU, the Netherlands provided 5 percent of world ammonia exports, 9 percent of world exports of solid AN and 9 percent of world AS exports. Additionally, France accounted for 6 percent of world exports of solid AN. Countries of the EU provided over 70 percent of 1997 world CAN exports: Netherlands (35 percent); Belgium (20 percent); Germany (7 percent); Austria (5 percent); and Spain (5 percent). Countries of the EU also dominated 1997 world AS exports (Belgium 19 percent and the Netherlands 9 percent), while the United States and Russia each contributed 12 percent.

Exports of Ammonia

Country	Percent
Russia	22
Trinidad & Tobago	14
Ukraine	11
Canada	7
Netherlands	5
United States	3
Total	62

Exports of Urea

Country	Percent
Russia	12
Ukraine	11
Indonesia	11
Saudi Arabia	8
Canada	6
Qatar	5
Total	53

Exports of AN

Country	Percent
Russia	42
Bulgaria	10
Netherlands	9
France	6
Lithuania	6
Belgium	4
Total	77

Exports of CAN

Country	Percent
Netherlands	35
Belgium	20
Germany	7
Czech Republic	5
Austria	5
Spain	5
Total	77

Exports of AS

Country	Percent
Belgium	19
Japan	13
United States	12
Russia	12
Netherlands	9
Canada	6
Total	71

Source: Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

For 1997 world nitrogenous fertilizer imports, market emphasis shifted to the United States and countries of the EU. The United States was the principal world importer of ammonia (31 percent) with significant amounts also imported by the United Kingdom, France, and Spain (4 percent each). With respect to urea, only the Netherlands (8 percent) and Italy (4 percent) of the EU were among the significant importers. However, countries of the EU together accounted for approximately 46 percent of 1997 world imports of solid AN, including France (14 percent); the United Kingdom (13 percent); and Spain (3 percent). U.S. imports of solid AN (7 percent) in 1997 were largely fertilizer-grade product, with some explosive-grade material from Canada.[50] The EU also accounted for approximately 69 percent of 1997 world CAN imports: Germany (38 percent); France (9 percent); Belgium (7 percent); the Netherlands (5 percent); Spain (5 percent); and Ireland (5 percent). The United States and France each accounted for 7 percent of 1997 world AS imports.

Imports of Ammonia

Country	Percent
United States	31
India	8
Korea	6
United Kingdom	4
France	4
Spain	4
Total	57

Imports of Urea

Country	Percent
China	12
India	11
Netherlands	8
Vietnam	7
Italy	4
Thailand	3
Total	52

Imports of AN

Country	Percent
France	14
United Kingdom	13
United States	7
Turkey	6
China	5
Spain	3
Total	48

Imports of CAN

Country	Percent
Germany	28
France	9
Belgium	7
Netherlands	5
Spain	5
Ireland	5
Total	69

Imports of AS

Country	Percent
Brazil	17
Turkey	9
France	7
Malaysia	7
Thailand	7
United States	7
Total	54

Source: Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*

[50] U.S. industry sources estimate that fertilizer-grade AN accounts for about 50 percent of AN imported from Canada, with explosive-grade product representing the remainder.

In 1997, over one-half of world ammonia consumption occurred in China (24 percent), the United States (17 percent), and India (10 percent). Russia (5 percent) and Indonesia (3 percent) also consumed significant ammonia in 1997. Almost 60 percent of 1997 world urea consumption was accounted for by China (28 percent), India (21 percent), and the United States (9 percent). Indonesia (4 percent), Pakistan (4 percent), and Italy (2 percent) together contributed another 10 percent to urea consumption.

Approximately 45 percent of 1997 world consumption of solid AN occurred in the United States (23 percent), Russia (8 percent), the United Kingdom (7 percent), and France (7 percent). China (5 percent) and Poland (5 percent) were also significant AN consumers in 1997. Consumption of CAN occurred primarily in countries of the EU: Germany (24 percent); Spain (9 percent), the Netherlands (8 percent) and France (6 percent). Poland (6 percent) and Italy (4 percent) were also significant CAN consumers in 1997. In 1997, AS consumption was led by the United States (14 percent), Mexico (8 percent), Brazil (8 percent), and Thailand (7 percent).

Consumption of Ammonia

Country	Percent
China	24
United States	17
India	10
Russia	5
Indonesia	3
Germany	2
Total	61

Consumption of Urea

Country	Percent
China	28
India	21
United States	9
Indonesia	4
Pakistan	4
Italy	2
Total	68

Consumption of AN

Country	Percent
United States	23
Russia	8
United Kingdom	7
France	7
China	5
Poland	5
Total	55

Consumption of CAN

Country	Percent
Germany	24
Spain	9
Netherlands	8
France	6
Poland	6
Italy	4
Total	55

Consumption of AS

Country	Percent
United States	14
Mexico	8
Brazil	8
Thailand	7
Japan	5
Turkey	4
Total	46

Source: Derived from International Fertilizer Industry Association (IFA) 1997 *Ammonia Statistics*, *Urea Statistics*, *Ammonium Nitrate/Calcium Ammonium Nitrate Statistics*, and *Ammonium Sulfate Statistics.*