NITROGEN

By Deborah A. Kramer

Domestic survey data and tables were prepared by Feri Naghdi, statistical assistant, and the world production table was prepared by Regina R. Coleman, international data coordinator.

Nitrogen (N) is an essential element of life and a part of all plant and animal proteins. Crop plants cultivated for human consumption and as animal feed require nitrogen for proper nutrition and maturation. Some crops, such as alfalfa, soybeans, garden peas, and peanuts, can convert atmospheric nitrogen into a usable form in a process called "fixation." Most nitrogen available for crop production, however, comes from decomposing animal and plant waste or from commercially produced fertilizers.

All commercial fertilizers contain their nitrogen in the ammonium and/or nitrate form or in a form that is quickly converted to these forms once the fertilizer is applied to the soil. Commercial production of anhydrous ammonia is based on reacting nitrogen with hydrogen under high temperatures and pressures. The source of nitrogen is air, which is almost 80% nitrogen. Hydrogen is derived from a variety of raw materials, including water and crude oil, coal, or natural gas hydrocarbons. Other nitrogen fertilizers are produced from ammonia feedstocks through a variety of chemical processes. Small quantities of nitrates are produced from mineral resources, principally in Bolivia and Chile.

In 1999, U.S. ammonia production totaled 14.1 million metric tons (Mt) of contained N, a small increase from that of 1998. Although the United States produces most of its ammonia requirements, imports, mainly from Canada, Russia, and Trinidad and Tobago, supplied a portion of consumption. Apparent consumption of ammonia decreased slightly. In spite of a drought on the east coast, national crop output was not significantly affected, therefore, fertilizer demand remained relatively constant. About 89% of the ammonia was used in fertilizer applications.

Oversupply of ammonia led to continued weak prices in the United States, and this prompted producers to permanently close several ammonia plants and idle some operating plants for extended periods. U.S. ammonia producers permanently closed three plants in 1999, one each in Iowa, Louisiana, and Nebraska, which reduced U.S. capacity by 865,000 metric tons per year (t/yr). In spite of these closures, two proposed nitrogen complexes, one in Arizona and one in Washington, were still being planned.

Global ammonia production in 1999 increased by about 4% from that of 1998 to about 109 Mt of contained N; most of the increase in production came from China. China and the United States continued to be the principal producers. In 1999, world urea production increased by about 6% to 48.7 Mt of contained N. Urea exports also increased to 11.1 Mt of contained N. China and India accounted for 47% of world production; production in China and India increased by 12% and 2%, respectively, compared with that in 1998. China continued its ban on imports of urea and supplied its needs with domestic production.

Legislation and Government Programs

Continuing the investigation begun in 1998, the International Trade Commission issued a preliminary determination that the domestic fertilizer-grade ammonium nitrate industry was likely to be materially injured by imports of this material from Russia (U.S. International Trade Commission, 1999). The International Trade Administration (ITA) then began an investigation of ammonium nitrate imports from Russia. In January 2000, the ITA issued a preliminary determination of sales at less than fair value and established a dumping margin of 264.59% ad valorem (U.S. Department of Commerce, 2000). In May 2000, the ITA negotiated a suspension agreement with the Russian Federation that calls for a minimum price to be established and imposes a limit on the quantity of material that can be imported into the United States. According to terms of the agreement, the minimum export price for Russian shipments to the United States is $85 per metric ton, f.o.b. Russian port. Imports of Russian ammonium nitrate were limited to 49,962 metric tons (t) for the remainder of 2000. Russian imports will be limited to 100,000 t in 2001; 110,000 t in 2002; 130,000 t in 2003; and 150,000 t in 2004 (Green Markets, 2000a).

ITA conducted 5-year (sunset) reviews on antidumping duties on solid urea from countries from the former Soviet Union (Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan). The original duty order was implemented in 1987 for the Soviet Union, and the order was transferred to the individual countries after the 1991 breakup. Because no domestic party responded to request for review of the orders, the duties on solid urea from Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Latvia, and Moldova were revoked (U.S. Department of Commerce, 1999c, d). The ITA determined, however, that the potential for dumping exists for solid urea from Armenia, Belarus, Estonia, Lithuania, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan and that the duties should be retained. The company-specific duties are Soyuzpromexport, 68.26% ad valorem; Phillipp Brothers Ltd. and Phillipp Brothers Inc., 53.23% ad valorem; and a country-wide rate (for all the countries covered by the order) of 68.26% ad valorem (U.S. Department of Commerce, 1999b).

The ITA also conducted a sunset review of antidumping duties established for solid urea from Romania. Based on the results of its review, the ITA concluded that revocation of the order would likely lead to dumping, so it maintained the antidumping duties at the rate established in 1987 of 90.71% ad valorem for I.C.E. Chimica and all other companies (U.S. Department of Commerce, 1999a).

The U.S. Environmental Protection Agency (EPA) conducted an assessment of the risks of contaminants in fertilizers to human health. The primary purpose of the fertilizer risk assessment was to determine if Federal regulatory action on fertilizer contaminants was needed. Based on its investigation, EPA concluded that of the large number of fertilizer products evaluated, only a few had contaminant levels high enough to potentially cause cancer risk or a noncancer hazard of concern. Potential human health risks of concern come from only arsenic and dioxin found in select liming agents and micronutrient fertilizers, which can be attributed to a single product sample with a single high-constituent concentration that far exceeds contaminant levels found in other similar fertilizer products. With these few exceptions, the contaminant levels found in the fertilizer products analyzed for this report were not expected to cause risks of concern, either through contamination of food products or through incidental ingestion of either the fertilizer product or of soil amended with fertilizer (U.S. Environmental Protection Agency, August 1999, Estimating risk from contaminants contained in agricultural fertilizers, accessed June 5, 2000, at URL http://www.epa.gov/epaoswer/hazwaste/recycle/fertiliz/risk/).

Production

Industry statistics for anhydrous ammonia and derivative products were developed by the Bureau of the Census. A summary of the production of principal inorganic fertilizers by quarter is reported in the series MQ325B (MQ28B prior to 1999), and industrial gases (including nitrogen) are reported in the quarterly report MQ325C (MQ28C prior to 1999). Final data for inorganic fertilizers are subsequently published in the companion annual report MA325B (MA28B prior to 1999), and data for industrial gases are published in the annual report MA325C (MA28C prior to 1999).

In 1999 production of anhydrous ammonia (82.2% N) increased slightly to 14.1 Mt of contained N, compared with a revised figure of 13.8 Mt in 1998 (table 1). Of the total production, 89% was for use as a fertilizer; the remaining 11% was used in other chemical and industrial sectors (table 2). Because a significant portion of the ammonia production was estimated, the production figure reported by the Bureau of the Census is probably high.

The United States remained the world's second largest producer and consumer of elemental and fixed types of nitrogen following China. In declining order, urea, ammonium phosphates (diammonium phosphate [DAP], monoammonium phosphate, and other ammonium phosphates), ammonium nitrate, nitric acid, and ammonium sulfate were the major downstream products produced from ammonia in the United States. Their combined production was 11.5 Mt of contained N, with urea accounting for about 34% of the production (table 3).

Ammonia producers in the United States operated at about 84% of design capacity. More than 57% of total U.S. ammonia production capacity was concentrated in the States of Louisiana (36%), Oklahoma (16%), and Texas (6%), owing to large indigenous reserves of feedstock natural gas. Farmland Industries Inc., Terra Industries Inc., PCS Nitrogen Inc., CF Industries Inc., and Unocal Corp., in declining order, accounted for 58% of total U.S. ammonia capacity (table 4).

Plant closures in 1999 characterized the U.S. nitrogen industry, with producers citing continued weak ammonia prices, increasing inventories, higher natural gas prices, and low demand as the reasons for many of the closures. At the end of April, Solutia Inc. announced that it would stop ammonia production at its 446,000-t/yr Luling, LA, facility. The company said that instead of investing in repairs to its facility, it would import lower priced ammonia from the Caribbean for its needs (Green Markets, 1999f). PCS Nitrogen announced the closure of two of its nitrogen facilities in August—its LaPlatte, NE, facility and its Clinton, IA, plant. These plants together account for about 419,000 t/yr of ammonia capacity, with additional production capacity for ammonium nitrate and nitrogen solutions. Before the closure, the plants had been operating only at about 50% of capacity because of high operating costs and weak nitrogen prices (Fertilizer Markets, 1999e).

In addition to the permanent closures, several plants were shut down for extended periods during the year. Farmland Industries closed its Lawrence, KS, nitrogen complex from the beginning of September until the end of November because of industry oversupply, high manufacturing costs, and poor market conditions. The company also closed its 459,000-t/yr Pollack, LA, ammonia plant beginning October 1 for the remainder of the year. Koch Industries Inc. closed one of its two Sterlington, LA, ammonia plants for slightly more than 1 month, beginning in September, because of poor market conditions. Mississippi Chemical Corp. announced a shutdown of some of its capacity at its Triad Nitrogen LLC nitrogen complex in Donaldsonville, LA. Beginning August 1, 1999, the 509,000-t/yr no. 2 plant would be closed indefinitely. In addition to these shutdowns, maintenance turnarounds at several plants lasted longer than normal (Green Markets, 1999e).

In addition to production cutbacks, several projects were delayed during 1999. Farmland Industries announced that startup at its new Coffeyville, KS, nitrogen complex would be delayed because of construction problems. The 454,000-t/yr ammonia plant was originally scheduled to be operational by the end of 1999. This plant will be unique because it is the first plant in the United States to recover ammonia from petroleum coke feedstock (Green Markets, 1999c). Terra Industries postponed the commissioning of its new ammonia loop at the company's Beaumont, TX, methanol plant until 2000; the plant, which will have the capacity to produce 231,000 t/yr of ammonia, originally was scheduled to be operational by the fourth quarter of 1999 (Green Markets, 1999g).

Two other companies, however, announced that their planned projects were progressing, in spite of the industry downturn. Apache Nitrogen Products Inc. reportedly was continuing with its plans to build a nitrogen complex in Benson, AZ, although it lost its partner The Devco Companies in February. The company is searching for a new partner before committing to building the complex, which will produce ammonia, urea, nitric acid, and urea-ammonium nitrate solutions. Btu Nitrogen LLC is still investigating the construction of an ammonia-urea complex near Walla Walla, WA, and was in financing talks with Key Global Finance Ltd. When financing is complete, it is estimated that construction of the project will take 20 to 24 months (Green Markets, 1999b).

After removing its nitrogen plants in Alaska and Washington from the market in February because of depressed fertilizer prices and low offers, Unocal decided to operate the facilities as wholly owned limited liability companies. The Kenai, AK, nitrogen complex will operate under the name Alaska Nitrogen Products LLC, and the Finley, WA, ammonia plant will operate as Prodica LLC, along with fertilizer plants in Kennewick, WA, and West Sacramento, CA. Both new companies will continue to be managed as divisions of Unocal. Unocal had announced that the facilities were for sale in late 1998 (Fertilizer Markets, 1999g).

In January, Royster-Clark Inc. announced that it would purchase the assets of IMC AgriBusiness, a subsidiary of IMC Global Inc., for $300 million. Most of IMC AgriBusiness' assets consist of retail farm markets, but also include a nitrogen complex in east Dubuque, IL, and four urea granulation plants east of the Mississippi River. As part of the transaction, Royster-Clark will buy back the outstanding 34% of IMC AgriBusiness' stock that is owned by Terra Industries (Fertilizer Markets, 1999f).

Environment

The ammonium and nitrate forms of N are highly soluble in water and are readily available for crop plant uptake. Ammonium is held by soil particles and, therefore, is not subject to movement down through the soil during periods of rainfall or irrigation. Nitrates, however, do move downward with soil water. This leaching process can lead to nitrate accumulation in ground water. As soils are warmed during the growing season, the ammonium form of nitrogen is subject to conversion to nitrate in a process called "nitrification." Most of the ammonium not used by the crop is eventually converted to nitrate. Nitrogen stabilizers and nitrification inhibitors can slow the conversion of soil ammonium to nitrate. Best management practices to increase nitrogen use efficiency and to reduce nitrate leaching include application of fertilizer close to the time of actual crop use, multiple applications, terracing, grass waterways, and strip cropping.

Hypoxia in the Gulf of Mexico recently has become a controversial environmental concern for the fertilizer industry and an issue that has spawned significant research efforts to determine its cause. "Hypoxia in the Gulf of Mexico" refers to an area along the Louisiana-Texas coast in which water near the bottom of the Gulf contains less than 2 parts per million of dissolved oxygen. Hypoxia can cause stress or death in bottom-dwelling organisms that cannot move out of the hypoxic zone. Some studies have postulated that nitrate runoff from fertilizers is the principal cause of hypoxia, while others have cited other causes for the hypoxic zone.

A group of scientists from Federal agencies and academic institutions completed a draft report that examines the hypoxia issue. As a foundation for the assessment, six interrelated reports that examine various aspects of hypoxia were developed. These six reports do not report the results of new research, but rather analyze existing data and apply existing models of the watershed-Gulf system. The six study areas were characterization of hypoxia; ecological and economic consequences of hypoxia; flux and sources of nutrients in the Mississippi-Atchafalaya River Basin; effects of reducing nutrient loads to surface waters within the Mississippi River Basin and Gulf of Mexico; reducing nutrient loads, especially nitrate-nitrogen, to surface water, ground water, and the Gulf of Mexico; and evaluation of economic costs and benefits of methods for reducing nutrient loads to the Gulf of Mexico. Although the assessment is intended to describe options rather than make specific recommendations, it also identifies additional research needed. According to the report, the two primary approaches to control hypoxia in the Gulf of Mexico are (1) reducing inputs of nitrogen to streams and rivers in the Basin and (2) restoring and enhancing natural denitrification processes in the Basin. In the first category, the most effective actions include improved management practices to retain nitrogen on fields, reducing application of nitrogen fertilizer, implementing alternative cropping systems, decreasing feedlot runoff, and reducing point sources. In the second category, the most effective actions would be increasing the acreage of wetlands and riparian buffers within the Mississippi River Basin (U.S. Environmental Protection Agency, 1999, Integrated assessment of hypoxia in the northern Gulf of Mexico, accessed June 5, 2000, at URL http://www.epa.gov/owowwtr1/ msbasin/ia/).

A report prepared by researchers at the University of Alabama, sponsored by The Fertilizer Institute, reviews the types of models used to determine nitrogen input onto the watershed and export from the Mississippi River. The reports concludes that differences among models may be partially a result of the use of different water years in the models and empirical data. In all models, fertilizer appears to account for one-third to two-thirds of the total nitrogen input to the landscape in the different drainage basins of the Mississippi River. The quantity of total nitrogen exported via riverine transport, however, varies among the major subbasins and between low-flow years and high-flow to flood years. The report suggests that the importance of hydrological variation in the transport of nitrogen in the Gulf of Mexico in the past 20 years is not very well known, and additional research needs to be done (Carey, A.E., and others, May 1999, The role of the Mississippi River in Gulf of Mexico hypoxia, accessed June 5, 2000, at URL http://www.tfi.org/hypoxia%20report.pdf).

Consumption

In 1999, apparent consumption of ammonia increased to 17.5 Mt of contained N, a slight increase from that in 1998.

Although there was a drought on the east coast during the summer, it did not affect fertilizer application rates significantly enough to cause a large decline in apparent consumption. Apparent consumption is calculated as the production plus imports minus exports, adjusted to reflect any changes in stocks.

Consumption of nitrogen fertilizers in the United States for the 1999 crop year (ending June 30, 1999) is listed in table 5. Consumption of 11.3 Mt of contained N was about the same as that in 1998. Anhydrous ammonia was the principal fertilizer product, representing 31% of fertilizer consumption. This percentage increased slightly from that in 1998 at the expense of urea, which declined by about the same quantity. Other uses of ammonia are in the production of amines, cyanides, and methyl methacrylate polymers (plexiglass); in liquid home and industrial cleaners; in pulp and paper products; in industrial refrigeration; in metallurgy; and as a propellant in vehicular air bags.

Urea and urea-ammonium nitrate (UAN) solutions constituted 40% of fertilizer consumption during the 1999 crop season. Urea is typically 45.9% N, and UAN solutions are typically 29.8% to 29.9% N. In the industrial sector, urea is used extensively as a protein supplement in ruminant animal feeds, in the production of urea-formaldehyde adhesives, and in the synthesis of plastics and resins.

Ammonium nitrate was used primarily in solid and liquid fertilizers, in industrial explosives, and as blasting agents. After World War II, ammonium nitrate became the leading solid nitrogen fertilizer in the United States and worldwide, and remained so until about 1975 when its use was surpassed by synthetic urea. Ammonium nitrate containing 33.9% N constituted 5% of 1999 nitrogen fertilizer consumption.

Ammonium sulfate was used mostly as a fertilizer material, valued for its nitrogen content (21.2% N) and its readily available sulfur content (24.3% sulfur). It is commonly produced as a byproduct of caprolactam production, an intermediate in nylon manufacture. Since the introduction of ammonium nitrate and urea as fertilizer materials, the relative importance of ammonium sulfate worldwide has steadily decreased. In the 1999 crop year, fertilizer consumption of ammonium sulfate, based on nitrogen content, was 2% of the total nitrogen-based fertilizer market. Nonfertilizer uses of ammonium sulfate include food processing, fire control, tanning, and cattle feed.

Nitric acid production is shown in table 3. Nitric acid is used in salt formation reactions to produce metal nitrates and in metal degreasing, treating, and pickling for graphic and galvanic industries. Nitration reactions with benzene, phenol, and toluene produce dyestuffs, pharmaceutical products, trinitrotoluene explosives, and disinfectants. Esterification reactions with glycol, glycerol, and cellulose produce nitroglycerine explosives (dynamite), celluloid, and nitrocellulose lacquers. Oxidation reactions with toluene, p-xylene, and cyclohexanone produce polyurethanes and polyester fibers (nylon).

Elemental nitrogen is used extensively by the electronics, metals, food, and aerospace industries because of its inert and cryogenic properties. Nitrogen can be used to prevent fires and explosions, as a purging agent for cleaning and processing equipment, and as a controlling atmosphere for annealing and heat treating and other metal preparation processes where oxygenation is a concern.

Stocks

Total yearend 1999 stock data were withheld by the Bureau of the Census. Stocks of ammonia in 1999 dropped by 5% from those at the end of 1998 according to data published by The Fertilizer Institute (table 6).

Transportation

Ammonia was transported by refrigerated barge, rail, pipeline, and truck. Three companies serve 11 States with pipelines 4,900 kilometers (km) in length, with 4,800 km of river barge transport, and by rail and truck used primarily for interstate or local delivery.

Koch Industries operated the Gulf Central ammonia pipeline from the Gulf of Mexico (Louisiana) to the Midwest as far north as Iowa, covering 3,070 km, and to the east to Huntington, OH. The annual capacity of this pipeline was about 2 Mt, with a storage capacity of more than 1 Mt.

CF Industries and Cargill Fertilizer Inc. jointly operated the 135-km long Tampa Bay Pipeline (TBP) system. TBP moved nitrogen compounds and ammonium phosphate for fertilizer producers in Hillsborough and Polk Counties, FL.

Capacities for trucks and railcars are usually 20 t and 100 t, respectively. Depending on the product loaded and the volume of the container, barges can accommodate from 400 t to 2,000 t.

Ammonium nitrate is transported by rail, road, and water, but its transportation on U.S. navigable waterways is restricted. Urea is shipped either in bulk or as bagged material.

Prices

After an upturn in price levels for the spring planting season, ammonia prices remained fairly steady throughout the rest of the year, fluctuating between $100 and $120 per short ton (figure 1). Although prices were slightly higher than those in 1998, they still were at fairly low levels historically, and this caused several U.S. producers to temporarily idle or permanently close some production capacity. After reaching its lowest level in August of about $83 per short ton, the Gulf Coast urea price began increasing steadily to end the year about $25 per short ton higher than it was in August (figure 2). The average granular Gulf Coast urea price for the year was about $94 per short ton, and the average ammonia price was $109 per short ton. Ammonium nitrate prices were relatively flat throughout 1999, and ammonium sulfate prices declined slightly during the year (figures 3-4).

Foreign Trade

Ammonia exports declined by about 8% from those of 1998 (table 8). The Republic of Korea remained the principal destination, accounting for 80% of total U.S. exports of ammonia. Imports of anhydrous ammonia increased by about 12% (table 9). Trinidad and Tobago (52%), Canada (23%), and Russia (21%) were the primary sources. With the startup of the two new ammonia production plants in Trinidad and Tobago in 1998, imports from this country into the United States continued to increase; imports in 1999 were 27% higher than those in 1998. Tables 10 and 11 list trade of other nitrogen materials.

World Review

Anhydrous ammonia and other nitrogen materials were produced in more than 80 countries. Global ammonia production in 1999 increased by about 4% from that of 1998 (table 12); most of the increase in production came from China. In 1999, total ammonia production was 109 Mt contained N, according to data reported to the U.S. Geological Survey. China, with 26% of this total, was the largest world producer of ammonia. Asia contributed 45% of total world ammonia production, and the United States and Canada represented 17% of the global total. Countries in the former U.S.S.R. produced 13% of the total; Western Europe, 9%; Middle East, 6%; Latin America, 5%; and Africa, Eastern Europe, and Oceania contributed the remaining 5%.

In 1999, world ammonia exports increased by 6% to 12.0 Mt of contained N, compared with those of 1998. Trinidad and Tobago (20%), Russia (18%), Ukraine (13%), and Canada (7%) accounted for 58% of the world total. The United States imported 31% of global ammonia trade, followed by Western Europe (31%) and Asia (19%) (International Fertilizer Industry Association, 2000a).

In 1999, world urea production increased by about 6% to 48.7 Mt of contained N. Urea exports also increased to 11.1 Mt of contained N. China and India accounted for 47% of world production; production in China and India increased by 12% and 2%, respectively, compared with that in 1998. The United States and Canada produced about 12% of the total. Exports from most geographic areas declined, with the exception of a 28% increase in the Middle East and a 4% increase in Western Europe. The Middle East exported the largest quantity of urea with 28% of the total. Russia and Ukraine accounted for 25% of total exports; Asia, 14%; Canada and the United States, 12%; Western Europe, 8%; Latin America, 5%; Eastern Europe, 5%; and Africa and Oceania shipped less than 1% each. Asia accounted for 31% of global urea imports; Latin America, 19%; North America, 15%; and Western Europe, 14% (International Fertilizer Industry Association, 2000b).

Argentina.—By October, Profertil S.A. had completed about 75% of its new 1.1-million-metric-ton-per-year (Mt/yr) urea plant in Cangrejales, Bahía Blanca. Commissioning of the plant was scheduled for March 2000, and commercial production was scheduled for mid-2000. Total cost for the project is estimated to be between $650 million and $680 million (Fertilizer Week, 1999k).

Australia.—By yearend, Westfarmers CSBP completed its 220,000-t/yr ammonia plant in Kwinana, Western Australia. As planned, the company will scrap its old 100,000-t/yr plant and will no longer need to import about 100,000 t of ammonia annually for its needs. Westfarmers uses the ammonia as feedstock for ammonium nitrate production, for gold extraction, and for nickel refining (Nitrogen & Methanol, 2000).

The board of Broken Hill Proprietary Co. Ltd. (BHP) did not approve the company's proposed joint venture with Incitec Ltd. to construct an ammonia-urea complex in Geelong, Victoria. Differences about gas supply arrangements were thought to be the reason that the joint-venture project was not approved (Nitrogen & Methanol, 2000).

In March, the Plenty River Mining Corp. and India's Chambal Fertilizers and Chemicals Ltd. signed a memorandum of understanding to assess the feasibility of an $800 million ammonia-urea plant. The partners completed a cost study in December, along with Snamprogetti SpA of Italy and Thiess Contractors Pty. Ltd., to construct a plant to produce 1,800 metric tons per day (t/d) of ammonia and 2,200 t/d of urea in the Burrup Peninsula of Western Australia. Apache Energy Ltd. is expected to provide the natural gas feedstock for the plant, which will be based on technology used at the José plant that is being constructed in Venezuela. Snamprogetti and Thiess will do additional work to model capital and operating costs for the proposed plant by February 2000 (Fertilizer Markets, 1999h).

Bangladesh.—Karnaphuli Fertilizer Co. plans to start up the first phase of its granular urea expansion by February 2000, according to senior company officials. The plant's capacity will be increased from 1,725 t/d to slightly more than 2,000 t/d with the expansion. A second expansion, which would increase capacity to 2,500 t/d, is planned for 2002, subject to approval from the World Bank (Fertilizer Week, 1999h).

Bulgaria.—As part of its privatization effort, Bulgaria sold two of its state-owned ammonia plants in 1999. Fifty-seven percent ownership of Chimco JSC was sold to U.S.-based trading firm IBE International Corp. in July for a total price of $575,000, significantly less than the original asking price (Fertilizer Week, 1999a). Acids & Fertilizers LLC, a consortium that represents Belgium's Union Minère S.A. and U.S. company Hartland Investment Inc., was selected as the buyer for 63% of Agropolychim JSC. Agropolychim had suspended production of triple superphosphate since July after the company went into liquidation; production was not expected to begin until the future of the company is assured (Fertilizer Week, 1999q).

Burma (Myanmar).—The Government canceled a project to construct a gas pipeline, powerplant, and 570,000-t/yr urea plant, which had been approved in 1996, citing the effects of the Asian economic crisis as the primary reason. Instead, the Government reportedly was giving priority to upgrading the three existing urea facilities. Total nameplate capacity at the urea facilities was estimated to be 360,000 t/yr, but the actual production capability was only about 200,000 t/yr. Total urea demand in Burma was estimated to be 600,000 to 700,000 t/yr, and this is forecast to increase to 1 Mt/yr by 2002 (Fertilizer International, 1999f).

Chile.—Minera Yolanda SCM, a producer of sodium and potassium nitrates, declared the equivalent of U.S. chapter 11 bankruptcy in February, a few months after the project opened. According to its owners, Kap Resources Ltd., weather conditions slowed the concentration of the nitrate salts in its solar ponds, leading to an insufficient supply of raw material for the plant (Green Markets, 1999d). In May, Potash Corp. of Saskatchewan (PCS) announced that it would purchase the operation for $36 million, which includes payments made to Minera Yolanda's secured creditors. The purchase also is contingent upon restructuring of the company's capital resulting in the repurchase, repayment, or cancellation of Minera Yolanda's debt. PCS expects that the plant will come on-stream at full capacity 18 months to 2 years after the restructuring is complete (Industrial Minerals, 1999).

China.—Urea production increased by 10% in 1998 from that in 1997; an annual 10% production increase was expected to continue throughout the early '00's, according to a spokesperson from China's State trade and economic commission. This increase in production is expected to keep pace with demand, so China is not expected to resume importing significant quantities of urea in the near future (Fertilizer Week, 1999c).

Japan's Toyo Engineering Corp. received a $16 million contract to supply its urea granulation technology for a 2,000-t/d granular urea plant to be installed by Lutianhua Group Inc. at its Luzhou, Sichuan, complex. Lutianhua Group already operates a 1,625-t/d prilled urea plant at the complex; the new technology will update a prilled unit constructed in the 1970's. Completion of the project is scheduled for mid-2000 (Fertilizer Week, 1999p).

Egypt.—In February, Abu Qir Fertilizers Co. inaugurated its new ammonia-urea complex near Alexandria. The new facility, Abu Qir III, has the capacity to produce 1,200 t/d of ammonia and 1,925 t/d of granulated urea. The plant was built by Germany's Krupp Uhde GmbH in just 33 months (Fertilizer International, 1999g).

India.—The Government's Cabinet Committee of Economic Affairs approved three new urea expansion projects in western India that are expected to help meet the country's projected demand for urea of 27.5 Mt by 2003. Krishak Bharati Co-operative (KRIBHCO) received approvals for expansions at Hazira and Gorakhpur; these expansions will increase total capacity at each site by 768,000 t/yr. Rashtriya Chemicals & Fertilizers Ltd. (RCF) also received approval for plant expansion by 768,000 t/yr at its Thal complex. Each of the plants will use naphtha and natural gas as feedstocks, initially using naphtha then switching to natural gas as it becomes available. KRIBHCO's Hazira expansion was given the highest priority (Fertilizer International, 1999i).

Chambal Fertilizers began operating its new ammonia and urea plants in Gadepan on a trial basis in October. Total production capacity at the new facility is 1,350 t/d of ammonia and 2,350 t/d of prilled urea. The Ministry of Agriculture is expected to dictate the sale destinations for the products (Fertilizer Week, 1999b).

Coromandel Fertilizers Ltd. is selling its 130,000-t/yr naphtha-based urea plant because of its decision to exit the nitrogen business. All production ceased in 1997. By yearend, no buyer had been found (Nitrogen & Methanol, 1999b).

The Indian Government proposed deregulating the country's fertilizer sector over the next 5 years. For the country's current fiscal year, the subsidy for the fertilizer industry was $3.04 billion, about 65% of which was spent on subsidizing urea prices. A series of gradual urea price increases is expected to be the most likely outcome of the deregulation. As a result, India was expected to renegotiate its obligation to the World Trade Organization (WTO) to remove its urea subsidies by 2001 (Fertilizer Week, 1999f).

India temporarily halted urea imports for agricultural use in October because of high stock levels. At the beginning of August, stocks were about 3 Mt compared to a monthly demand of 2.25 Mt. Average imports into India were about 100,000 metric tons per month. Urea imports for use by fertilizer blenders were not affected by the ban (Fertilizer International, 1999d).

Indonesia.—Kaltim Pasifik Amoniak expected to complete its 660,000-t/yr ammonia plant in Bontang in early 2000, with commercial production scheduled for March. About 150,000 t of the plant's annual output is to be supplied to PT Pupuk Kalimantan Timur's adjacent urea plant, and the remainder of the output is expected to be exported to markets in southeast Asia (Fertilizer Markets, 1999b). Construction began on PT Pupuk Iskandar Muda's ammonia-urea complex in Lhokseumawe. The $260 million, 570,000-t/yr plant is expected to be completed by the end of 2001, with startup at the beginning of 2002 (Nitrogen & Methanol, 1999a).

Iran.—The country's State Economic Council approved plans to construct a new ammonia-urea complex in the Kermanshah region of western Iran. Planned plant capacities are 1,750 t/d of granular urea and 1,000 t/d of ammonia. Scheduled completion date for the complex is 2002, and the new facility will be funded by the private sector and buyback guarantees (Fertilizer International, 1999a).

Kuwait.—Petrochemical Industries Co. (PIC) plans to revamp its Shuaiba I urea plant, increasing production capacity to 1,750 t/d from 1,300 t/d and converting the plant to produce granular rather than prilled urea. Total cost of the urea revamp is estimated to be $75 million. In addition, PIC is reworking its ammonia output at the complex to restrict ammonia output to quantities sufficient to feed the urea plant with no additional material for export. To accomplish this, PIC will convert one of its two 260,000-t/yr ammonia plants to methanol production. Merchant ammonia supply from the PIC complex is expected to cease by late 2001 (Fertilizer International, 1999h; Fertilizer Week, 1999j).

Malaysia.—Full commercial production at Petronas Fertilizer (Kedah) Sdn. Bhd.'s new 600,000-t/yr granular urea facility began in August. About 70% of the plant's production is scheduled to be exported (Fertilizer International, 1999c).

Mexico.—In May, Grupo Acerero del Norte S.A. de C.V. (GAN), the owner of Agro Nitrogenados de Mexico (Agromex), reportedly filed for a suspension of payments, a form of legal protection in Mexico that is similar to U.S. bankruptcy filing. As a result, Agromex stopped producing urea on May 18 because Petroquimica Cosoleacaque S.A. de C.V. (Pecosa) stopped supplying the plant with ammonia after Agromex's credit was withdrawn. Deliveries of ammonia were resumed later in the year. Also as a result of the filing by its parent company, Agromex's planned purchase of Grupo Ferquimex-

Fertimina-Seimex, was canceled. Agromex is the country's largest urea-producing operation, with about 1.7 Mt/yr of capacity (Fertilizer Markets, 1999c). GAN's financial problems reportedly resulted from problems at its steel subsidiary, and although three Mexican steel firms had submitted offers to purchase GAN's steel subsidiary, no buyer had been found for the urea plant (Fertilizer Markets, 1999a).

Although no determination was finalized by yearend, in August, Mexico's customs agency recommended antidumping duties of 105% for urea imported from the U.S. firm Unocal and 205% to 210% for urea imported from Russia. The delay in assessing the duties was attributed to the timing of the proposal; it coincided with the prime fertilizer delivery period for the upcoming planting season. GAN reportedly cited the level of imports and the high price of domestically produced ammonia as a reason to threaten to permanently close its nitrogen complex (Fertilizer Markets, 1999i).

Norway.—Hydro Agri, a unit of Norsk Hydro A/S, restarted production at the Porsgrunn ammonia plant in July. The plant was recently revamped and expanded to increase its production capacity to 525,000 t/yr. Plant output is expected to be used internally at the company's downstream production facilities, replacing ammonia imported from the Black Sea (Fertilizer Week, 1999e).

Oman.—In February, India's RCF withdrew as an equity partner from Oman-India Fertilizer Co.'s proposed 1.45-Mt/yr ammonia-urea complex because of proposed fertilizer subsidy policies that are expected to be implemented by the Indian Government. Buyback guarantees from Indian partners were the main reason for constructing the plant, and if subsidy policies change, this could affect the buyback capability (Fertilizer Week, 1999i). By yearend, however, Indian Farmers Fertilizer Cooperative (IFFCO) replaced RCF as an equity partner, and the Indian Government guaranteed offtake agreements. IFFCO will have 25% ownership along with KRIBHCO. Gas feedstock supplier Oman Oil Co. will own the remaining 50%. With the entrance of IFFCO into the venture, the size of the proposed plant has increased. Total capacity for the $1.1 billion plant will be 1.66 Mt/yr consisting of two ammonia trains, each capable of producing 1,750 t/d, and two granular urea trains, each capable of producing 2,530 t/d. Completion is scheduled for 2003 (Fertilizer Markets, 1999d).

Pakistan.—On December 21, the Government of Pakistan imposed a duty of 10% on imports of urea in order to protect the domestic industry. The Economic Coordination Committee maintained that urea prices have declined in the international market and that imported urea was being sold at prices less than that of the locally produced urea. Private urea producers in Pakistan are not expected to be allowed to increase their prices following the imposition of the duty (Green Markets, 2000b).

Qatar.—Qatar Fertiliser Co. (Qafco) appointed British Sulphur Consultants to complete a market analysis for Qafco to build a fourth nitrogen fertilizer complex at Umm Said. The study for the Qafco IV complex, which will have a capacity of 2,000 t/d of ammonia and 3,200 t/d of granular urea, is expected to be completed by the first quarter of 2000. Qafco, a 75%-25% joint venture between Qatar General Petroleum Corp. and Norsk Hydro, also has been working on obtaining funding for the project (Fertilizer Week, 1999l).

Romania.—Nitrogen producer SC Doljchim S.A. Craiova was purchased by the national oil company, Petrom, for a reported $15 million in June. Petrom was expected to settle the plant's outstanding debts to banks by mid-July and to local suppliers by early August. Capacity at the complex is about 500,000 t/yr of ammonia, 300,000 t/yr of urea, and 300,000 t/yr of ammonium nitrate (Fertilizer Week, 1999d).

Russia.—In April, the government of the Russian Federation approved a 5% export duty on chemical and mineral fertilizers, which includes urea, ammonium nitrate, and urea solutions. The duty was fixed at about $3.90 per metric ton for urea and nitrogen solutions and will be in place for at least 6 months. The duty was implemented in response to declining export prices of fertilizer materials from the Black Sea (Fertilizer Week, 1999m).

Saudi Arabia.—Saudi Arabia Fertilizer Co. (Safco) began trial production at its new ammonia/granular urea complex in Jubail in October. The Safco II plant has the capacity to produce 400,000 t/yr of ammonia and 600,000 t/yr of urea. Although most of the ammonia will be used for urea production, about 150,000 t/yr will be available for the merchant market. A 150,000-t/yr ammonia supply contract was signed between Saudi Arabia Basic Industries Co., the parent company of Safco, and India's Godavari Fertilizers and Chemicals Ltd. that is believed to account for the merchant ammonia from the new plant (Fertilizer Week, 1999n).

Plans to construct a 1,500-t/d ammonia plant by United Jubail Fertilizer Co. were postponed again in 1999, although no justification was provided for the continued postponement. Under a new timetable, evaluation of the contractors' bids originally received in 1998 was expected to be completed by mid-2000. Plant construction is estimated to take about 25 months, with completion scheduled for the first quarter of 2003, if a contractor is selected according to the new timetable (Fertilizer Week, 1999r).

South Africa.—In May, AECI Ltd. reached a long-term, 160,000-t/yr, ammonia supply agreement with Sasol Ltd. This agreement resulted in the immediate closure of AECI's Kynoch Fertilizer (Pty.) Ltd. 90,000-t/yr Milnerton ammonia production plant. Kynoch Fertilizer also plans to close its 600,000-t/yr Modderfontein ammonia-urea production facility by March 2000 (Green Markets, 1999a).

Trinidad and Tobago.—In spite of press reports in 1998 that CL Financial Ltd. had shelved plans to build a 500,000-t/yr ammonia plant, the company reportedly revived these plans late in 1999. The cost of the plant, which has escalated to a capacity of 645,000 t/yr, is estimated to be between $300 and $350 million. Equity partners in the venture are expected to be Germany's Ferrostaal AG, who will assist with construction of the plant, U.S. firm Duke Energy Corp., who will assist in handling the ammonia offtake through its Duke Energy Merchants subsidiary, and EOG Resources Trinidad Ltd., who will assist in natural gas procurement. Tentative groundbreaking for the plant is scheduled for first quarter 2000, with first production by mid-2002 (Green Markets, 1999i).

Turkey.—The country's sole urea producing plant, owned by

Istanbul Gübre Sanayii, was damaged during the August 17 earthquake and its ensuing tremors. The plant will remain shut down until at least February 2000 as a result (Fertilizer Week, 1999g).

United Arab Emirates.—Alterations to Southern Petrochemical Industries Corp.'s ammonia unit have delayed the plant's scheduled completion from mid-1999 to late 2000. The ammonia unit for the 226,000-t/yr plant will be able to use natural gas feedstock rather than naphtha, as was planned in the original design. The new plant also will have the capacity to produce 396,000 t/yr of urea (Fertilizer Week, 1999o).

Vietnam.—BHP Power, a subsidiary of BHP, reportedly withdrew from a proposed integrated power station and 800,000-t/yr urea plant in Phu My because of slow progress since the project was originally approved by the Vietnamese Government in 1996. In addition, full technical details had not been finalized. Although the company has sold its shares in the project to the other partners, construction of the plant is not expected to proceed until natural gas terms are agreed upon (Fertilizer International, 1999b).

Current Research and Technology

Scientists at the U.S. Department of Agriculture's (USDA) Agriculture Research Service developed a new computer model that can help farmers minimize the quantity of nitrogen that they add to the soil in the spring as insurance fertilizer. Typically, farmers add so-called "insurance fertilizer" to the quantity called for by a fall soil sample, to compensate for possible nitrogen losses over the winter. To use the new computer model, the farmer needs to know only the clay and organic matter content of the top 6 inches of soil, as well as the soil pH and data from a field weather station. With this information, the farmer sends in soil samples to a State university or private lab for a preplant soil-nitrate test. The preplant soil-nitrate test solves the problem of estimating nitrogen losses over winter by sampling for nitrogen just before planting. The new model also eliminates the need for the second soil-nitrate test by predicting nitrogen content for up to 90 days after planting from the information that the farmer has provided. The model uses soil and weather information to predict how much nitrogen will be produced after spring planting by microbes. The microbes feed on soil organic matter and decaying plants, stalks, and leaves from the previous year's crop from which they produce nitrogen that remains in the soil. By adding this natural production to the quantity measured at planting, the model tells farmers exactly how much nitrogen will be available to plants during the critical 60-day uptake period. The model subtracts this sum from the crop's total fertilizer need to recommend how much, if any, nitrogen fertilizer should be added for the best economic yield (U.S. Department of Agriculture, October 1999, Model takes the guesswork out of fertilizing, accessed June 6, 2000, at URL http://www.ars.usda.gov/is/AR/archive/oct99/model1099.htm).

ThermoEnergy Corp. completed the first successful test of its patented ammonia removal process that removes or reduces the nitrogen content of wastewater from municipal sewage-treatment plants, then converts that nitrogen to an ammonium salt that can be used as a fertilizer. The company is constructing a pilot-plant-scale facility at a municipal wastewater treatment facility in New York to evaluate the new technology further; tests conducted at the facility in late 1998 had proved promising. At this wastewater treatment plant, the water is squeezed out of the sludge, and any heavy metals are present remain in the sludge, so the ammonium salt produced from the water should not contain any heavy metals (Green Markets, 1999h).

Work at Israel's Institute of Technology in Haifa has developed a model for ammonium release, diffusion, and nitrification that indicates that placing the ammonium source granules in a cluster when fertilizing reduces nitrification. Nitrification can become an environmental problem as bacteria in the soil convert the nitrogen in an ammonium form to a nitrate form that can be leached from the soil. This method of fertilizer application may be able to be used rather than using chemical inhibitors or complex chemical coatings on the fertilizer, which add cost (Fertilizer International, 1999e).

In India, briquettes consisting of DAP and urea have been economically produced on a small scale, using portable equipment that can be used by small rice farmers. The price and scale of the process makes it affordable for small village farmers, and using the briquettes has significantly increased yields compared to the traditional fertilization method. Normally farmers fertilize their rice with prilled urea, one-half at transplanting and one-half at tilling, plus superphosphate at transplanting. The briquettes are designed to be hand placed on the same day that the rice is planted, one for every four rice hills. An equivalent rice yield could be achieved with 40% less fertilizer, which is a significant saving to the small farmer. In addition, there is less risk to the environment from nutrient loss when using the briquettes (Fertilizer International, 1999j).

Outlook

The USDA again projects large supplies of field crops for 2000 and 2001, with the exception of wheat, just as was predicted for the previous 2 years. In the 2000-01 crop year, soybean crops are expected to exceed 3 billion bushels for the first time; plantings are projected to increase for the eighth consecutive year. Corn production is expected to increase slightly in 2000-01, and wheat plantings are expected to decrease by 3% from those in the 1999-2000 crop year. Total planted acreage for the three major crops, corn, soybeans, and wheat, is projected to increase only from 214 to 214.5 (Agricultural Outlook, 2000). Based on the projected small increase in planted acreage, nitrogen consumption in the United States in 2000 should remain at about the same level as that in 1999, barring any severe weather patterns.

In the United States, natural gas prices increased in the first half of 2000, prompting some producers to announce extended shutdowns in their nitrogen operations. If the high natural gas prices persist, some of the higher cost plants in the United States may close permanently.

Increases in world ammonia and urea production capacities are forecast to continue, with new plants in Argentina, China, Indonesia, Saudi Arabia, the United Arab Emirates, and

Venezuela expected to be operational in 2000. A small quantity of the production capacity from these new plants most likely will be offset by some plant closures in Europe, and perhaps more in the United States. Globally, the potential inclusion of China as a member of the WTO potentially could have a significant impact on the fertilizer industry. If China ends its ban on urea imports, this market would reopen and perhaps alleviate some of the oversupply in the marketplace.

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TABLE 1
SALIENT AMMONIA STATISTICS 1/ 2/

(Thousand metric tons of contained nitrogen, unless otherwise specified)

	1995	1996	1997	1998	1999 p/
United States:					
Production	13,000	13,400	13,300	13,800 r/	14,100
Exports	319	435	395	614	562
Imports for consumption	2,630	3,390	3,530	3,460	3,060
Consumption, apparent 3/	15,300	16,400	15,800	17,100 r/	16,700
Stocks, December 31, producers'	959	881	1,530	1,050 4/	996 4/
Average annual price per ton product, f.o.b. gulf coast 5/	$191	$190	$173	$121	$109
Net import reliance as a percent of apparent consumption 6/	15	19	16	19 r/	15
Natural gas price, wellhead 7/	$1.55	$2.17	$2.32	$1.94 r/	$2.07 e/
World:					
Production	100,000	103,000	104,000	105,000 r/	109,000 e/
Trade 8/	10,800	10,900	11,300 r/	11,300	12,000

e/ Estimated. p/ Preliminary. r/ Revised.
1/ Data are rounded to no more than three significant digits, except prices.
2/ Synthetic anhydrous ammonia, calendar year data, Bureau of the Census; excludes coke oven byproduct.
3/ Calculated from production, plus imports minus exports, and industry stock changes.
4/ Source: The Fertilizer Institute.
5/ Source: Green Markets.
6/ Defined as imports minus exports, adjusted for industry stock changes.
7/ Monthly Energy Review, U.S. Department of Energy. Average annual cost at wellhead in dollars per thousand cubic feet.
8/ Source: International Fertilizer Industry Association Statistics, World Anhydrous Ammonia Trade.

TABLE 2
FIXED NITROGEN PRODUCTION IN THE
UNITED STATES 1/

(Thousand metric tons of contained nitrogen)

	1998 r/	1999 p/
Anhydrous ammonia, synthetic:		
Fertilizer	11,800	12,500
Nonfertilizer	1,950	1,600
Total	13,800	14,100

p/ Preliminary. r/ Revised.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.

Sources: Bureau of the Census, Current Industrial Reports MA325B and MQ325B (formerly MA28B and MQ28B).

TABLE 3
MAJOR DOWNSTREAM NITROGEN COMPOUNDS
PRODUCED IN THE UNITED STATES 1/ 2/

(Thousand metric tons)

Compound	1998	1999 p/
Urea:		
Gross weight	8,140 r/	8,460
Nitrogen content	3,740 r/	3,890
Ammonium phosphates: 3/		
Gross weight	16,200 r/	15,500
Nitrogen content	2,790	2,790
Ammonium nitrate:		
Gross weight	8,240 r/	7,410
Nitrogen content	2,790 r/	2,510
Nitric acid:		
Gross weight	8,420 r/	8,170
Nitrogen content	1,850 r/	1,800
Ammonium sulfate: 4/		
Gross weight	2,560 r/	2,630
Nitrogen content	542 r/	558

p/ Preliminary. r/ Revised.
1/ Data are rounded to no more than three significant digits.
2/ Ranked in relative order of importance by nitrogen content.
3/ Diammonium phosphate (DAP), monoammonium phosphate (MAP), and other ammonium phosphates.
4/ Excludes coke plant ammonium sulfate.

Sources: Bureau of the Census, Current Industrial Reports MA325B and MQ325B (formerly MA28B and MQ28B).

TABLE 4
DOMESTIC PRODUCERS OF ANHYDROUS AMMONIA IN 1999 1/

(Thousand metric tons per year of ammonia)

Company	Location	Capacity 2/
Agrium Inc.	Borger, TX	448
Air Products and Chemicals Inc.	Pace Junction, FL	71
Alaska Nitrogen Products LLC 3/	Kenai, AK	1,180
Avondale Ammonia Co.	Fortier, LA	399
Borden Chemicals Inc.	Geismar, LA	364
CF Industries Inc.	Donaldsonville, LA	1,730
Coastal Chem Inc.	Cheyenne, WY	174
Coastal St. Helens Chemical	St. Helens, OR	88
Dakota Gasification Co.	Beulah, ND	334
E.I. du Pont de Nemours & Co. Inc.	Beaumont, TX	451
Farmland Industries Inc.	Beatrice, NE	255
Do.	Dodge City, KS	263
Do.	Enid, OK	907
Do.	Fort Dodge, IA	339
Do.	Lawrence, KS	409
Do.	Pollock, LA	459
Green Valley Chemical Corp.	Creston, IA	32
Honeywell International Inc. 4/	Hopewell, VA	409
IMC-Agrico Co.	Donaldsonville (Faustina), LA	508
J.R. Simplot Co.	Pocatello, ID	93
Koch Industries Inc.	Sterlington, LA	1,110
LaRoche Industries Inc.	Cherokee, AL	159
Mississippi Chemical Corp.	Yazoo City, MS	644
Nitromite Fertilizer	Dumas, TX	128
PCS Nitrogen Inc.	Augusta, GA	622
Do.	Geismar, LA	476
Do.	Lima, OH	551
Do.	Woodstock, TN	356
Prodica LLC 3/	Finley, WA	150
Royster-Clark Inc.	East Dubuque, IL	292
Shoreline Chemical	Gordon, GA	31
Terra Industries Inc.	Blytheville, AR	390
Do.	Port Neal, IA	319
Do.	Verdigris, OK	989
Do.	Woodward, OK	446
Triad Nitrogen LLC 5/	Donaldsonville (Ampro), LA	509
Do.	Donaldsonville (Triad), LA	417
Wil-Grow Fertilizer Co.	Pryor, OK	86
Do.	Do.	247
Total		16,800

1/ Data are rounded to no more than three significant digits; may not add to total shown.
2/ Engineering design capacity adjusted for 340 days per year of effective production capability.
3/ Wholly owned limited liability company of Unocal Corp.
4/ Merger of AlliedSignal Inc. and Honeywell Inc., effective December 1, 1999, changed ownership of plant.
5/ Wholly owned subsidiary of Mississippi Chemical Corp.

Sources: International Fertilizer Development Center (IFDC); North American Fertilizer Capacity, Ammonia, February 2000.

TABLE 5
U.S. NITROGEN FERTILIZER CONSUMPTION,
BY PRODUCT TYPE 1/ 2/

(Thousand metric tons nitrogen)

Fertilizer material 3/	1998		1999 p/
Single nutrient:			
Anhydrous ammonia	3,300	r/	3,520
Nitrogen solutions 4/	2,810	r/	2,660
Urea	1,840	r/	1,850
Ammonium nitrate	599		579
Ammonium sulfate	209	r/	204
Aqua ammonia	50	r/	67
Other 5/	305		287
Total	9,110	r/	9,160
Multiple nutrient 6/	2,170		2,130
Grand total	11,300	r/	11,300

p/ Preliminary. r/ Revised.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Fertilizer years ending June 30.
3/ Ranked in relative order of importance by product type.
4/ Principally urea-ammonium nitrate (UAN) solutions, 29.9% N.
5/ Includes other single-nutrient nitrogen materials, all natural organics, and statistical discrepancies.
6/ Various combinations of nitrogen (N), phosphate (P), and potassium (K): N-P-K, N-P, and N-K.

Source: Commercial Fertilizers 1999. Prepared as a cooperative effort by The Fertilizer Institute and the Association of American Plant Food Control Officials.

TABLE 6
U.S. PRODUCER STOCKS OF FIXED NITROGEN
COMPOUNDS AT YEAREND 1/ 2/

(Thousand metric tons nitrogen)

Material 3/	1998	1999 p/
Ammonia 4/	1,050	996
Nitrogen solutions 5/	W	W
Urea	115	125
Ammonium phosphates 6/	68	68
Ammonium nitrate	W	W
Ammonium sulfate	41	48
Total	1,270	1,240

p/ Preliminary. W Witheld to avoid disclosing company proprietary data; not included in total.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Calendar year ending December 31.
3/ Ranked in relative order of importance.
4/ Source: The Fertilizer Institute.
5/ Urea-ammonium nitrate and ammoniacal solutions.
6/ Diammonium and monoammonium phosphates.

Sources: Bureau of the Census, Current Industrial Reports MA325B and MQ325B (formerly MA28B and MQ28B), except where noted.

TABLE 7
PRICE QUOTATIONS FOR MAJOR NITROGEN COMPOUNDS
AT YEAREND

(Per short ton product)

Compound	1998	1999
Ammonium nitrate; f.o.b. Corn Belt 1/	$110-$115	$110-$115
Ammonium sulfate; f.o.b. Corn Belt 1/	118-128	109-112
Anhydrous ammonia:		
F.o.b. Corn Belt	131-141	157-165
F.o.b. Gulf Coast 2/	98	109
Diammonium phosphate; f.o.b. central Florida	172-175	138-140
Urea:		
F.o.b. Corn Belt, prilled and granular	110-125	115-125
F.o.b. Gulf Coast, granular 2/	82-85	107-110
F.o.b. Gulf Coast, prilled 2/	75-80	102

1/ Illinois, Indiana, Iowa, Missouri, Nebraska, and Ohio.
2/ Barge, New Orleans.

Source: Green Markets.

TABLE 8
U.S. EXPORTS OF ANHYDROUS AMMONIA,
BY COUNTRY 1/

(Thousand metric tons ammonia)

Country	1998	1999
Belgium	4	2
Brazil	19	--
Canada	27	27
Colombia	11	--
Costa Rica	11	(2/)
Japan	(2/)	3
Korea, Republic of	571	547
Mexico	(2/)	21
Morocco	19	--
Taiwan	82	80
Other	3	4
Total	747	684

-- Zero.
1/ Value data suppressed by Bureau of the Census.
2/ Less than 1/2 unit.

Source: Bureau of the Census.

TABLE 9
U.S. IMPORTS OF ANHYDROUS AMMONIA, BY COUNTRY 1/

(Thousand metric tons ammonia and thousand dollars)

Country	1998 Gross weight	1998 Value 2/	1999 Gross weight	1999 Value 2/
Algeria	8	1,060	--	--
Belgium	--	--	3	686
Brazil	40	5,740	--	--
Canada	999	167,000	1,110	190,000
Colombia	31	4,200	25	2,850
France	1	382	3	326
Germany	(3/)	9	--	--
Japan	(3/)	2	(3/)	74
Latvia	8	1,390	--	--
Mexico	167	21,600	19	2,100
Peru	--	--	(3/)	66
Russia 4/	853	53,800	1,010	12,300
Switzerland	94	14,500	80	8,200
Trinidad and Tobago	1,960	265,000	2,480	276,000
Ukraine	NA	25,400	NA	55,000
Venezuela	47	6,000	(3/)	29
Total	4,210	565,000	4,730	548,000

NA Not available. -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ C.i.f. value.
3/ Less than 1/2 unit.
4/ Quantity data from the Journal of Commerce Port Import/Export Reporting Service; may include imports from Ukraine.

Sources: Bureau of the Census; Journal of Commerce Port Import/Export Reporting Service.

TABLE 10
U.S. EXPORTS OF MAJOR NITROGEN COMPOUNDS 1/

(Thousand metric tons)

Compound	1998 Gross weight	1998 Nitrogen content	1999 Gross weight	1999 Nitrogen content
Ammonium nitrate 2/	55	19	28	9
Ammonium sulfate 2/	1,050	284	1,070	288
Anhydrous ammonia	747	614	684	562
Diammonium phosphate	9,870	1,780	10,500	1,890
Monoammonium phosphate	1,680	185	1,790	197
Urea	841	386	890	409
Mixed chemical fertilizers 3/	38	5	268	32
Other nitrogenous fertilizers 4/	172	51	204	60
Total	14,500	3,320	15,400	3,450

1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes industrial chemical products.
3/ Harmonized codes 3105.10.0000, 3105.20.0000, and 3105.51.0000.
4/ Harmonized codes 3101.00.0000, 3102.29.0000, 3102.60.0000, and 3102.90.0000.

Source: Bureau of the Census.

TABLE 11
U.S. IMPORTS OF MAJOR NITROGEN COMPOUNDS 1/

(Thousand metric tons and thousand dollars)

Compound	1998 Gross weight	1998 Nitrogen content	1998 Value 2/	1999 Gross weight	1999 Nitrogen content	1999 Value 2/
Ammonium nitrate 3/	759	257	99,900	935	317	111,000
Ammonium nitrate-limestone mixtures	25	7	2,470	10	3	1,970
Ammonium sulfate 3/	319	68	29,800	342	73	34,500
Anhydrous ammonia 4/	4,210	3,460	565,000	4,730	3,890	548,000
Calcium nitrate	(5/)	(5/)	16,500	(5/)	(5/)	12,500
Diammonium phosphate	44	8	11,100	36	6	8,360
Monoammonium phosphate	126	14	35,600	47	5	18,800
Nitrogen solutions	633	189	60,700	614	184	54,600
Potassium nitrate	24	3	6,910	21	3	6,980
Potassium nitrate-sodium nitrate mixtures	21	3	3,770	16	2	2,970
Sodium nitrate	125	21	23,800	105	17	22,900
Urea	3,320	1,530	520,000	3,260	1,500	486,000
Mixed chemical fertilizers 6/	324	39	67,000	262	31	60,900
Other nitrogenous fertilizers 7/	192	57	28,400	202	60	40,200
Total	10,100	5,650	1,470,000	10,600	6,090	1,410,000

1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ C.i.f. value.
3/ Includes industrial chemical products.
4/ Includes industrial ammonia.
5/ Less than 1/2 unit.
6/ Harmonized codes 3105.10.0000, 3105.20.0000, 3105.51.0000, and 3105.90.0050.
7/ Harmonized codes 3101.00.0000, 3102.29.0000, 3102.60.0000, and 3102.90.0000.

Source: Bureau of the Census.

TABLE 12
AMMONIA: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Thousand metric tons of contained nitrogen)

Country	1995	1996	1997	1998	1999 e/
Afghanistan e/	10	5	5	5	5
Albania e/	15	15	10	10	10
Algeria	176	150	380 e/	350	455
Argentina	79	80	107 e/	86	88
Australia	433	446	432 e/	430	431
Austria e/	400	450	450	450	450
Bahrain	358	323	356 e/	336	370
Bangladesh 3/	1,271	1,233	1,080	1,129	1,240 4/
Belarus	668	678	590 e/	685	750
Belgium	720	750	760	756	840
Bosnia and Herzegovina e/	1	1	1	1	1
Brazil	993	977	1,019	949	1,084 4/
Bulgaria	1,203	1,194	808	448	315
Burma	66	57	62	52	65 4/
Canada	3,773	3,840	4,081	3,900	4,135 4/
China e/	22,600	23,000	25,000	26,500	28,400
Colombia	99	102	81	100	75
Croatia	310	307	331	248	318
Cuba e/	135	135	135	135	135
Czech Republic	254	304	251 e/	258	223
Denmark e/	2	2	2	2	2
Egypt	1,096	1,126	1,061 r/ 4/	1,141	1,407 4/
Estonia	170	167	169	173	164
Finland	6	6 e/	6 e/	6	6
France	1,470	1,570 e/	1,757	1,570	1,570
Germany	2,518	2,485	2,470 e/	2,512	2,406 4/
Georgia	52	77	84	64	104
Greece	65	90	83 e/	178	160
Hungary	307	347	339 e/	288	261
Iceland	7	7	7	6	7
India 5/	8,287	8,549	9,328 r/	10,240 r/	10,376 4/
Indonesia	3,336	3,647	3,770 e/	3,600	3,700
Iran	715	882	880	1,034	865
Iraq e/	220	220	220	220	220
Ireland	408	377	465	458	405
Israel 3/	70	65	57	1	--
Italy	487	397	446	409	367
Japan	1,584	1,567	1,589	1,460 r/	1,378 4/
Kazakhstan	49	75	75 e/	--	--
Korea, North e/	600	600	600	600	500
Korea, Republic of	616	599	509	457	500
Kuwait	493	412	432 e/	452 3/	397
Libya	534	546	537	545 r/	552
Lithuania	442	461	384	496 r/	487
Malaysia	333	329	243	351	432
Mexico	1,992	2,054	1,448	1,418 r/	1,003 4/
Netherlands	2,580	2,652	2,480	2,350 e/	2,430
New Zealand	79	68	80	94	110
Nigeria e/	170	164	134	168	148
Norway	289	295	279	245	30
Pakistan	1,493	1,606	1,549	1,797	1,999 4/
Peru	24	18	15	15	--
Poland	1,726	1,713	1,824	1,683	1,474 4/
Portugal	155	198	196	204	223
Qatar	653	644 r/	943	1,127	1,130
Romania	1,487	1,513	781 e/	378	686
Russia	7,900	7,900	7,150	6,500	7,633 4/
Saudi Arabia	1,327	1,386	1,405	1,418 r/	1,402 4/
Serbia and Montenegro	135	193	193	141	60
Slovakia	178	197	229 e/	234	58
South Africa	759	770	752	723	785
Spain	453	466	497	460	437
Switzerland e/	30	32	32	31	32

See footnotes at end of table.

TABLE 12--Continued
AMMONIA: WORLD PRODUCTION, BY COUNTRY 1/ 2/

(Metric tons of contained nitrogen)

Country	1995	1996	1997	1998	1999 e/
Syria	64	80	84	129	112
Taiwan	226	252 r/	289 r/	231 r/	146 4/
Tajikistan e/	15	10	10	10	10
Trinidad and Tobago	1,696	1,801	1,772	2,271	2,720
Turkey	366	519 r/	558 r/	560 r/	82
Turkmenistan	52 e/	70	61	75	75
Ukraine	3,100	3,300	3,400 e/	3,300	3,711 4/
United Arab Emirates	363	331	373	331	380
United Kingdom	799	850	642	870	902
United States 6/	13,000	13,400	13,300	13,800 r/	14,100 4/
Uzbekistan	906	950	950	875	790
Venezuela	600	605	612	522	520
Vietnam	54	54	54 e/	33	33
Zambia	1	2	1 e/	--	--
Zimbabwe e/	43	61	64	57	61
Total	100,000	103,000	104,000	105,000 r/	109,000

e/ Estimated. r/ Revised. -- Zero.

1/ World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2/ Table includes data available through June 23, 2000.

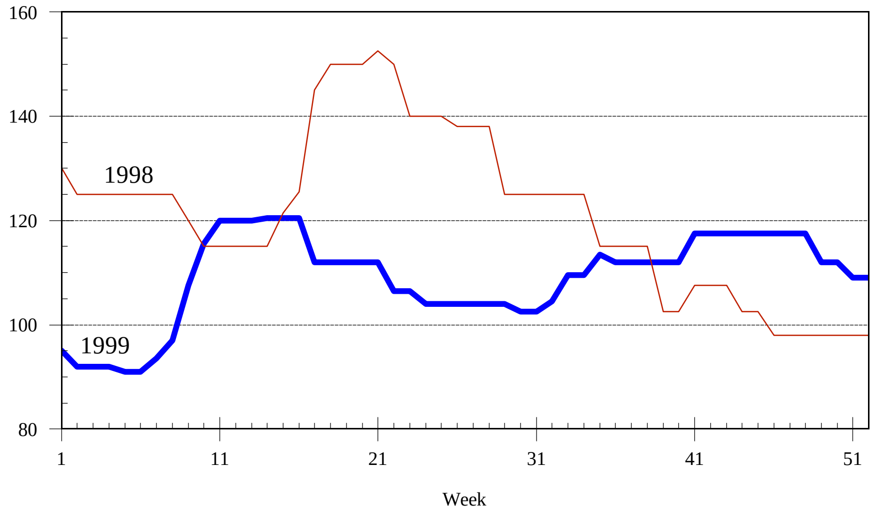
3/ May include nitrogen content of urea.

4/ Reported figure.

5/ Data are for years beginning April 1 of that stated.

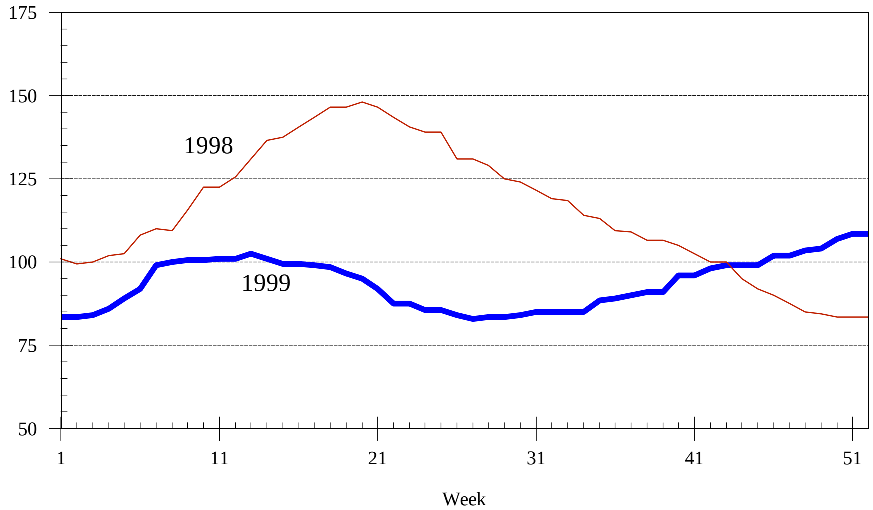
6/ Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

FIGURE 1
AVERAGE GULF COAST AMMONIA PRICES
(Dollars per short ton)



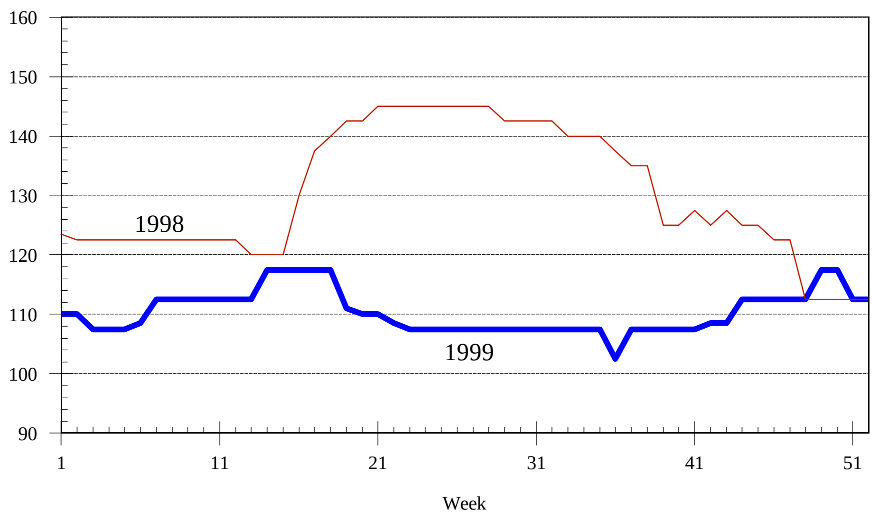
Source: Green Markets.

FIGURE 2
AVERAGE GULF COAST GRANULAR UREA PRICES
(Dollars per short ton)



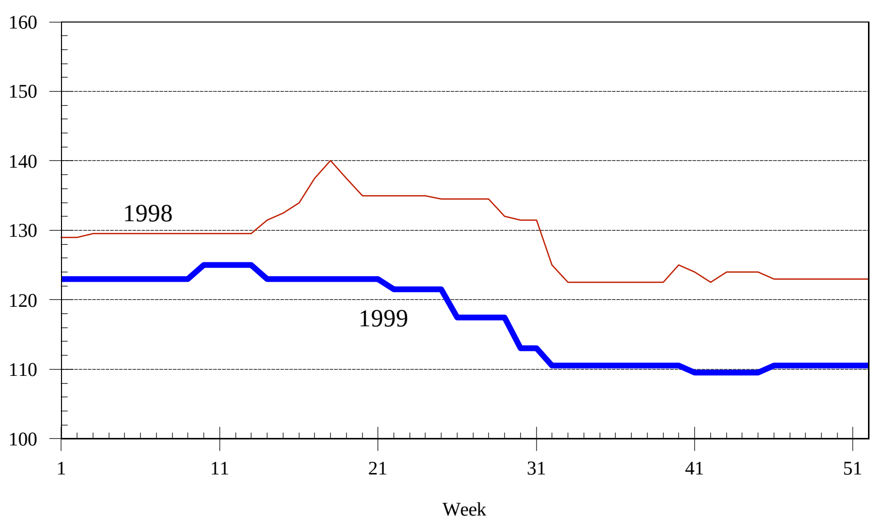
Source: Green Markets.

FIGURE 3
AVERAGE AMMONIUM NITRATE PRICES
(Dollars per short ton)



Source: Green Markets.

FIGURE 4
AVERAGE AMMONIUM SULFATE PRICES
(Dollars per short ton)



Source: Green Markets.