

# NITROGEN

By Deborah A. Kramer

**Domestic tables were prepared by Oana Petrican, statistical assistant, and the world production table was prepared by Regina R. Coleman, international data coordinator.**

In 2004, U.S. ammonia production was 8.85 million metric tons (Mt) of contained nitrogen, about a 3% increase from production in 2003. Apparent consumption was about 2% higher than that in 2003. Imports of ammonia also were about 3% higher than those in 2003, with most of the imports in 2004 coming from Canada, Russia, and Trinidad and Tobago. About 92% of the domestically produced ammonia consumed in the United States was used in fertilizer applications. Global ammonia production in 2004 of 117 Mt of contained nitrogen was about 6% higher than that in 2003. China, India, Russia, and the United States were the leading producers, together accounting for about 55% of the total.

## Legislation and Government Programs

The U.S. Department of Commerce, International Trade Administration (ITA) revoked its antidumping duty orders on urea from Belarus, Estonia, Lithuania, Romania, Tajikistan, Turkmenistan, and Uzbekistan because no domestic company intended to participate in the ITA's 5-year sunset review (U.S. Department of Commerce, International Trade Administration, 2004).

The Nitrogen Solutions Fair Trade Committee [a group of U.S. urea-ammonium nitrate solution (UAN) producers] filed a complaint in the U.S. Court of International Trade in 2003 appealing the International Trade Commission's (ITC) ruling that United States UAN producers were not injured by imports of UAN from Belarus, Russia, and Ukraine. As a result, hearings were held in October 2004, and the court issued a ruling in January 2005 that upheld the ITC's final determination (U.S. Court of International Trade, 2005§<sup>1</sup>).

## Production

Industry statistics for anhydrous ammonia and derivative products were developed by the U.S. Census Bureau. A summary of the production of principal inorganic fertilizers by quarter was reported in the series MQ325B, and industrial gases (including nitrogen) were reported in the quarterly report MQ325C. In 2004, production of anhydrous ammonia (82.2% nitrogen) increased by 3% to 8.85 Mt of contained nitrogen compared with a revised figure of 8.60 Mt in 2003 (table 1). Of the total production, 92% was for use as a fertilizer; the remaining 8% was used in other chemical and industrial sectors (table 2).

The United States remained the world's second ranked producer and consumer of elemental and fixed types of

nitrogen following China. In declining order, urea, ammonium phosphates [diammonium phosphate, monoammonium phosphate (MAP), 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 9.12 Mt of contained nitrogen, with urea accounting for about 29% of the production (table 3).

Ammonia producers in the United States operated only at about 59% of design capacity in 2004; this percentage included capacities at plants that operated during any part of the year. Of the plants that operated in 2004, almost 56% of total U.S. ammonia production capacity was concentrated in the States of Louisiana (34%), Oklahoma (16%), and Texas (6%) owing to large reserves of feedstock natural gas. Terra Industries Inc., Koch Nitrogen Co., CF Industries Inc., Agrium Inc., and PCS Nitrogen Inc., in descending order, accounted for 83% of total U.S. ammonia capacity (table 4).

Henry Hub natural gas prices fluctuated between \$4 to \$8 per million British thermal units in 2004, averaging about \$6 per million British thermal units. The continued volatility in natural gas prices was cited as the reason for closure of several ammonia facilities in the United States in 2004. In March, Mississippi Chemical Corp. permanently closed its 422,000-metric-ton-per-year (t/yr) No. 1 ammonia unit at its Triad Nitrogen LLC facility in Donaldsonville, LA, along with melamine and urea production at the site. The company planned to continue to operate its No. 2 ammonia plant, with 478,000 t/yr of capacity, as swing production—operating as market conditions warrant (Green Markets, 2004f). Terra Industries announced that it would close its Blytheville, AR, nitrogen plant at the end of May; the plant had the capacity to produce 388,000 t/yr of ammonia and 435,000 t/yr of urea. The company planned to continue to operate the facility as a storage terminal for ammonia produced at its Verdigris, OK, plant (Green Markets, 2004k). In the third quarter, Air Products and Chemicals Inc. closed its 78,000-t/yr ammonia plant in Florida along with associated methanol production facilities. The company planned to purchase its ammonia and methanol requirements (Air Products and Chemicals Inc., 2004§).

Terra Industries also planned to mothball its 231,000-t/yr Beaumont, TX, ammonia plant for an indefinite period at the request of Methanex Corp., the purchaser of the ammonia. Under the 5-year agreement that Terra Industries had with Methanex, the company received a lump-sum payment from Methanex and a percentage of the profits, but Methanex had the right to close its Beaumont methanol plant. The ammonia plant traditionally had used hydrogen from the methanol plant in its manufacturing process, and Terra Industries planned to look for other hydrogen sources (Green Markets, 2004j).

<sup>1</sup>References that include a section mark (§) are found in the Internet References Cited section.

After filing for bankruptcy in 2003, Mississippi Chemical agreed to be acquired by Terra Industries for about \$268 million in December 2004. As a result of the acquisition, Terra Industries owned a 50% interest in the 715,000-t/yr Point Lisas Nitrogen Ltd. ammonia facility in Trinidad and Tobago. In addition, Terra Industries acquired nitrogen manufacturing facilities in Yazoo City, MS, and Donaldsonville with a combined production capacity of 1.3 million metric tons per year (Mt/yr) of ammonia (including the shuttered No. 1 plant in Donaldsonville). Terra Industries also owned a storage and distribution terminal in Donaldsonville and a 50% interest in an ammonia terminal located near Houston, TX (Terra Industries Inc., 2004§). Mississippi Chemical's No. 4 ammonia plant at Yazoo City, MS, was not included in Terra Industries' acquisition of the company assets. At yearend, Mississippi Chemical was attempting to find a buyer for the 159,000-t/yr unit that had been idle since January 2003.

In October, IMC Global Inc. and Crop Nutrition (a division of Cargill Inc.) merged to form a new company, The Mosaic Co. The new company included IMC's 508,000-t/yr ammonia plant in Donaldsonville, which supplied ammonia for the company's ammonium phosphates production at the same site.

In March, Farmland Industries Inc. completed the sale of its Coffeyville, KS, refinery and nitrogen assets to Coffeyville Resources LLC (a unit of Pegasus Partners II LP). The ammonia plant has the capacity to produce 350,000 t/yr, much of which was converted to UAN.

Rentech Inc. entered into an agreement with Royster-Clark Inc. to purchase its 278,000-t/yr East Dubuque, IL, ammonia plant and convert the plant from natural gas feed to a coal-fed gasification plant. Rentech would continue to operate the plant with natural gas feed while completing the conversion. Rentech also would receive up to \$5 million in grants from the State of Illinois to be used for the design, engineering, and permitting phases of the plant conversion. The plant conversion was expected to be completed by early 2008 using Rentech's Fischer-Tropsch gas-to-liquids synthesis gas conversion process. The conversion would increase the plant's capacity by 20% and produce surplus electricity for sale (Green Markets, 2004d). In March 2005, however, the two companies called off the sale but agreed to continue to cooperate in the conversion to a coal-fed plant.

In December, Agrium and Unocal Oil Co. of California (Unocal) reached an agreement in its long-standing dispute over gas supplies for Agrium's 1.25-Mt/yr Kenai, AK, ammonia facility. The settlement established a gas supply obligation from Unocal to the Kenai facility until October 31, 2005; Agrium would receive \$47 million in compensation for reduced future gas deliveries, environmental, and other liabilities, and Unocal would agree to settle all the disputed earn-out claims for \$22 million. Unocal was obligated to supply nearly 1 billion cubic meters of gas at the same price as the current gas supply agreement through October 31, 2005. The new gas supply agreement would allow the Kenai plant to operate at an average rate of 66% through that date. According to Agrium, the settlement represented a gain of \$105 million for the company. Agrium would receive an additional \$50 million from Unocal, related to an arbitration panel ruling earlier in 2004 (Green Markets, 2004a).

## Environment

Hypoxia has become a controversial environmental concern for the fertilizer industry and an issue that spawned significant research efforts to determine its cause. Hypoxia refers to the phenomenon that happens where water near the bottom of an affected area 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 postulated that nitrate runoff from fertilizers is the principal cause of hypoxia, while others cited other causes for the hypoxic zone.

The second "National Coastal Condition Report" (NCCR II) was published in 2004. The report is a comprehensive report on the condition of the Nation's estuarine waters and coastal fisheries and is a collaborative effort between the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey in cooperation with agencies representing States and tribes. This report examined several available data sets from different agencies and areas of the country and summarized them to present a broad baseline picture of the condition of coastal waters for 1997 to 2000. Five primary indexes were created using data available from national coastal programs—benthic index, coastal habitat index, fish tissue contaminants index, sediment quality index, and water quality index. The water quality index is made up of five indicators—chlorophyll-a, dissolved oxygen, nitrogen, phosphorus, and water clarity. One of the major findings of the study period was that the indicators that generally showed the best condition were two of the individual components of water quality—dissolved inorganic nitrogen and dissolved oxygen (U.S. Environmental Protection Agency, 2004, p. ES.1-ES.10).

A report from the United Nations Environmental Programme (2004§), claimed that the number of dead zones in the world's oceans is increasing. According to the report, oxygen-starved areas in bays and coastal waters have been expanding since the 1960s, and the number of known locations around the world has doubled since 1990. Although many of these sites are small coastal bays and estuaries, seabed areas in marginal seas of up to 70,000 square kilometers also were affected. Increased flows of nitrogen from agricultural runoff and the deposition in coastal areas of airborne nitrogen compounds from fossil-fuel burning stimulated blooms of algae in these waters. Although the dead zones had different causes, the report recommended such methods as precision agriculture and planting nitrogen-fixing trees and cover crops as steps to reduce regional and global impacts of nitrogen runoff.

## Consumption

In 2004, apparent consumption of ammonia of 14.3 Mt of contained nitrogen was about 2% higher than that in 2003. 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 2004 crop year (ending June 30, 2004) is listed in table 5. Consumption of 12.0 Mt of contained nitrogen was about

8% higher than that of 2003. Nitrogen solutions, mostly UAN containing 29.8% to 29.9% nitrogen, were the principal fertilizer product, representing 25% of fertilizer consumption. Ammonia represented 25%, and urea (45.9% nitrogen) constituted 20% of fertilizer consumption during the 2004 crop year. Ammonium nitrate containing 33.9% nitrogen constituted 4% of 2004 nitrogen fertilizer consumption, and fertilizer consumption of ammonium sulfate, based on nitrogen content, was 2% of the total U.S. nitrogen-based fertilizer market.

## Stocks

Stocks of ammonia at yearend 2004 were 274,000 metric tons (t), an increase of 39% from comparable stocks at yearend 2003, according to data published by the U.S. Census Bureau (table 6).

## Transportation

Ammonia was transported by refrigerated barge, rail, pipeline, and truck. Three companies served 11 States with 5,090 kilometers (km) of pipelines and 4,800 km of river barge transport; rail and truck were used primarily for interstate or local delivery.

Valero L.P. operated the Gulf Central ammonia pipeline. The 3,200-km pipeline originates in the Louisiana Delta area and has access to three marine terminals. It moves north through Louisiana and Arkansas into Missouri, where it splits at Hermann, MO, one branch going east into Illinois and Indiana and the other branch continuing north into Iowa and then turning west into Nebraska. The capacity of this pipeline was about 2 Mt/yr, with a storage capacity of more than 1 Mt. CF Industries and Cargill Fertilizer Inc. jointly operated the 135-km Tampa Bay Pipeline (TBP) system. The TBP moved nitrogen compounds and ammonium phosphate for fertilizer producers in Hillsborough and Polk Counties, FL. Magellan Midstream Partners LP's 1,750-km ammonia pipeline, which originates at production facilities in Borger, TX, Verdigris and Enid, OK, and terminates in Mankato, MN, has a maximum delivery capacity of about 820,000 t/yr. It transports ammonia to 13 delivery points along the pipeline system and has a storage capacity of about 500,000 t.

In November, Valero, Kaneb Services LLC, and Kaneb Pipe Line Partners, L.P. announced that they had a definitive agreement to merge Valero and Kaneb Partners. The total value of the transaction was estimated to be \$2.8 billion, and it was expected to close in the first quarter of 2005. The assets of the combined partnership, which will retain the name Valero L.P., include approximately 15,600 km of pipeline that includes a 3,200-km anhydrous ammonia pipeline (Green Markets, 2004b).

## Prices

Midyear and yearend prices for nitrogen materials are listed in table 7. Normally, ammonia price changes follow those of natural gas. During the first half of 2004, this price relationship followed its normal pattern; however, wide natural gas price fluctuations in the second half of 2004 did not lead to corresponding fluctuations in ammonia prices (figure 1).

Average ammonia prices fell through the first quarter of 2004 to reach the lowest level of the year in April at \$215 per short ton (\$237 per metric ton). Prices increased slightly and leveled off at \$270 per short ton (\$298 per metric ton) in June. In October, the average ammonia price began to rise and ended the year at \$285 per short ton (\$314 per metric ton).

The average urea price fell from \$194 per short ton (\$214 per metric ton) through May when it reached its lowest level for the year at \$165 per short ton (\$182 per metric ton). From that point, prices increased steadily to a yearend average price of \$228 per short ton (\$251 per metric ton).

Ammonium nitrate prices fell slightly from \$193 per short ton (\$213 per metric ton) to \$184 per short ton (\$203 per metric ton) in May before climbing to \$203 per short ton (\$224 per metric ton) by yearend. Ammonium sulfate prices rose throughout 2004, beginning the year at \$138 per short ton (\$152 per metric ton) and increasing to \$185 per short ton (\$204 per metric ton) by yearend.

## Foreign Trade

Ammonia exports were about 5% lower than those in 2003, and because of higher prices, the values increased by 26% (table 8). The Republic of Korea continued to be the leading destination for U.S. exports of ammonia, accounting for 83% of the total. Most of the material shipped to the Republic of Korea was produced at the Agrium plant in Alaska.

Ammonia imports were 3% higher than those in 2003 (table 9). Trinidad and Tobago (54%) continued to be the leading import source. Canada (18%) and Russia (12%) were the remaining significant import sources.

Tables 10 and 11 list trade of other nitrogen materials and include information on principal source or destination countries. Exports of nitrogen materials declined in 2004, with the exception of ammonium nitrate and MAP. Changes in imports of nitrogen materials were mixed compared with imports in 2003.

## World Review

Anhydrous ammonia and other nitrogen materials were produced in more than 80 countries. Global ammonia production in 2004 of 117 Mt was about 6% higher than that of 2003 (table 12). A significant portion of this increase resulted from a 3.3-Mt increase in production from China, which, with 30% of total production, was the leading world producer of ammonia. Asia contributed 48% of total world ammonia production, and the Commonwealth of Independent States (CIS), Estonia, and Lithuania produced 14% of the global total. North America represented 12% of the total; Western Europe, 9%; Central America and South America, 6%; the Middle East, 5%; and Africa, Eastern Europe, and Oceania contributed the remaining 6%.

In 2004, world ammonia exports of 14.6 Mt of contained nitrogen were about 5% higher than those in 2003. Russia (25%), Trinidad and Tobago (24%), Ukraine (10%), Indonesia (8%), and Canada (7%) accounted for 74% of the world export total. The United States imported 41% of global ammonia

trade, followed by Asia (24%) and Western Europe (20%) (International Fertilizer Industry Association, 2005a).

In 2004, world urea production increased by 7.5% to 56.7 Mt of contained nitrogen. Worldwide, urea exports fell by 12% to 0.794 Mt of contained nitrogen. China and India, the two leading producing countries, accounted for 50% of world production; production in China increased by 15%, and production in India increased by 3% compared with those of 2003. The United States and Canada produced about 9% of the total. The CIS, Estonia, and Lithuania exported the largest quantity of urea with 29% of the total. The Middle East accounted for 25% of total exports; Asia, 19%; North America, 9%; Central America and South America, 7%; Eastern Europe and Western Europe, 4% each; and Africa, 2%. Asia accounted for 26% of global urea imports; North America, 23%; Central America and South America, 16%; Western Europe, 12%; and Africa, 7%; and the Middle East and Oceania, 6% each (International Fertilizer Industry Association, 2005b). The above percentages for trade in ammonia and urea reflect material that is shipped intraregion as well as material that is shipped among regions; for example, material shipped from Canada to the United States is included in the North American trade shipments.

**European Union.**—The addition of 10 member countries into the European Union (EU) in May affected antidumping duties that had been in place for various nitrogen products sold from Belarus, Russia, and Ukraine into the EU. The new member countries, known as the EU-10, were Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. On May 1, the following EU antidumping duties were removed: the €1.45 duty on urea from Estonia, the €3.98 duty on UAN and the €1.05 duty on urea from Lithuania, and the €20.65 to €26.91 duty on ammonium nitrate and the €19.00 to €22.00 duty on UAN from Poland (Fertilizer Week, 2004v).

In May, the European Commission decided that the EU-10 could import 50% of their ammonium nitrate requirements from Russia and Ukraine free of antidumping duties for a period of 6 months from May 2004; this period was later extended to 1 year. For the remainder of the EU, the antidumping duties remained at €7.07 for ammonium nitrate from Russia and €3.25 for ammonium nitrate from Ukraine (Fertilizer Week, 2004c).

**Australia.**—The Western Australia government awarded the rights to the land for the Dampier Nitrogen Project to the consortium of Plenty River Corp., Theiss Pty., and Uhde GmbH. The consortium signed an agreement with Dyno Nobel Pacific Ltd. to become a partner in the project; Dyno Nobel produced low-density ammonium nitrate for use in explosives. Under the new development agreement, the size of the original project has changed. Instead of a 2,300-metric-ton-per-day (t/d) ammonia plant and a 3,500-t/d urea plant, the complex will consist of a 2,300-t/d ammonia plant, a 1,750-t/d urea plant, and a 235,000-t/yr ammonium nitrate plant. The three companies together will operate the ammonia plant, Plenty River and Theiss will operate the urea plant, and Dyno Nobel will operate the ammonium nitrate plant. Dyno Nobel's share of the ammonia production will be about 400,000 t/yr, with the remainder going to Plenty River and Theiss for urea production. Feasibility studies and financing for the plants were expected to be completed by the second quarter of 2005 (Fertilizer Week, 2004p).

**Bolivia.**—In September, China's Sichuan Lutianhua Co. Ltd., China Chengda Chemical Engineering Corp., and Bolivia's IISA-Tumpar Group announced that they would construct an ammonia-urea complex in Puerto Suarez, Bolivia. The production capacity of the project will be 180,000 t/yr of ammonia and 300,000 t/yr of urea. The \$160 million project will be owned 60% by Lutianhua, 30% by Chengda Chemical, and 10% by IISA-Tumpar. Although the companies began a feasibility study on the project, no timetable was set for construction (Fertilizer Week, 2004j).

**Brazil.**—Fertilizantes Fosfatados S.A. Fosfertil announced that it would build a \$450 million ammonia-urea complex in Brazil, but had not chosen the location. The company was investigating three sites for the 800,000-t/yr ammonia and 800,000-t/yr granular urea plants—Paulinea in Sao Paulo State, Tres Lagoas in Mato Grosso do Sul State, and Uberaba in Minas Gerais State. Natural gas costs at each of the three sites were estimated to be too high to make production from the facility competitive with imports, but Fosfertil hoped that one of the locations could become economically competitive because of recent changes in Brazil's natural gas industry (Nitrogen & Methanol, 2004a).

**Bulgaria.**—Although Agropolychim JSC completed energy-savings programs at its ammonia and nitric acid plant in Devnya in 2003, some of its other planned projects have been hampered. Agropolychim had planned to move a urea plant from Chimco AD's operations at Vratsa to Devnya to reduce Agropolychim's urea purchases for its UAN plant, but Chimco announced that it would move the urea plant to the United Arab Emirates instead (Fertilizer Week, 2004m).

In December, the Vratsa district court ruled that Chimco was insolvent and opened bankruptcy proceedings. The proceedings were supposed to be completed by June 2005, but Chimco's ownership was uncertain. IBE Trade Corp., a U.S. company that purchased the company in 2001, filed a case with Bulgaria's Supreme Cassation Court to recover a 71% stake in Chimco. The court had earlier convicted a previous manager of IBE Trade of illegal transfer of IBE Trade assets to two offshore companies. Meanwhile, a subsidiary of Italy's Indagro SA, has rented all Chimco's production facilities for 1 year (Sofia Echo.com, 2004§).

**Chile.**—Sociedad Química y Minera de Chile S.A. (SQM) announced plans to invest \$145 million during the next 3 years to increase production capacity for iodine and potassium and sodium nitrates. SQM planned to increase nitrates capacity to 1.3 Mt/yr from 950,000 t/yr. A new potassium nitrate recovery facility will be installed at SQM's Nueva Victoria facility to process nitrate salts generated by increased iodine production at the facility. A new 250,000-t/yr potassium nitrate granulation facility will be built, but SQM had not selected a site for this facility (Fertilizer Week, 2004t).

On September 30, ACF Minera S.A., the 50%-owner and operator of the Aguas Blancas iodine, potassium nitrate, and sodium nitrate mine, formally breached its contractual commitment to fund and complete an expansion at the mine, and in October, Atacama Minerals Corp. took control of the board of the Chilean operating subsidiary. Atacama Minerals then entered into a formal agreement with ACF to acquire its interest

in Aguas Blancas for \$11.2 million to be paid upon closing, followed by a further payment of \$4.5 million payable within 12 months of closing. Closing was scheduled for April 2005 (Atacama Minerals Corp., 2005§).

In January, explosives manufacturer Enaex S.A. purchased an ammonia-urea complex from the liquidator of Irish Fertilizer Industries Ltd.'s equipment; Irish Fertilizer Industries closed in 2002. Enaex had planned to install the 530,000-t/yr ammonia plant and 400,000-t/yr urea plant in Chile to produce material for export to the U.S. market, but the Government of Argentina announced that it would decrease natural gas exports to Chile to conserve supplies for domestic use. At yearend, Enaex was considering a number of other locations for the plant including Brazil, Columbia, Peru, and Trinidad and Tobago (Fertilizer Week, 2004b).

**China.**—China continued to plan and construct new ammonia and urea plants using coal gasification technology rather than using naphtha as a feed material. Shanxi Jinfeng Coal Chemical Co. began construction of a 360,000-t/yr ammonia plant and a 520,000-t/yr urea plant based on coal gasification. The complex was estimated to cost \$110 million. The Qujing municipal government and Yunnan Petrochemical Group agreed to build a 500,000-t/yr ammonia plant in Qujing City, Yunnan (Asia Fertilizer & Agronomic Bulletin, 2004).

Liaoning Huajin Chemical (Group) Corp. began construction of an ammonia-urea complex in Kuche, Xinjiang. The company received governmental approval for a 300,000-t/yr ammonia plant and a 520,000-t/yr urea plant. The complex was scheduled to begin production in August 2005 (Asian Chemical News, 2004).

**Egypt.**—Germany's Uhde was awarded contracts to construct three ammonia-urea complexes in Egypt. In January, the company was awarded contracts from Egyptian Fertilizer Co. (EFC) and Alexandria Fertilizers Co. (AlexFert). Each complex has capacities of 1,200 t/d of ammonia and 1,925 t/d of urea. The ammonia plants will be based on Uhde's proprietary ammonia process, while the urea plants will be built according to Netherlands-based Stamicarbon's (a unit of Koninklijke DSM N.V.) synthesis and granulation technology. The EFC complex will be at Ain Sukhna, and the AlexFert complex, at Abu Qir. Both were scheduled to start production in late 2006 (Fertilizer Week, 2004y). In June, Helwan Fertilizer Co. (a unit of El Nasr Coke and Chemical Co.) also awarded Uhde a contract to construct an ammonia-urea complex. The contract was for an ammonia-urea complex with a capacity of 1,200 t/d of ammonia and 1,925 t/d of urea. The \$302 million to \$387 million complex will be located in Helwan and was scheduled to start production in mid-2007 (Fertilizer Week, 2004f). In December, Uhde won its fourth contract to construct an ammonia-urea complex. This contract was for a complex identical in size to the aforementioned for Al Mansora Fertilizer Co., which was a venture to be established by state-owned El Delta Co. for Fertilizer and Chemical Industries. The new firm was expected to start up in 2007-08 (Fertilizer Week, 2004x).

**Georgia.**—Russian gas company Itera Holdings Ltd. planned to construct a 1.0-Mt/yr urea plant in either Batumi or Poti, which are ports on the Black Sea. The new plant was part of Itera's investments in Georgia's sole fertilizer producer

RustaviAzot; Itera purchased 90% ownership of RustaviAzot in 2002. The cost of the new plant was estimated to be \$250 million, but no timetable was established for construction (Fertilizer Week, 2004i).

**India.**—Indian Farmers Fertiliser Cooperative Ltd (IFFCO) announced plans to expand its four existing urea plants at Phulpur and Aonla, Uttar Pradesh. The company planned to expand capacity at its Phulpur-I, Aonla-I, and Aonla-II units to 3,000 t/d each from 2,620 t/d and expand capacity at its Phulpur-II unit to 2,080 t/d from 1,670 t/d. These expansions, costing \$1.4 million, would bring IFFCO's total urea production capacity to 4.2 Mt/yr. In addition, the project will include switching Phulpur's plant from naphtha-based feedstock to liquefied natural gas, which was expected to reduce production costs. The expansion was scheduled to be completed by the end of 2006 (Fertilizer Week, 2004g).

**Iran.**—In April, National Petrochemical Co. (NPC) awarded a \$237 million contract to a consortium of Japan's Toyo Engineering Corp. and Chiyoda Corp. and Iran's Petrochemicals Industries Design and Engineering Co. to provide engineering, procurement, and equipment for its second ammonia-urea complex in Bandar Assaluyeh. The complex will have a design capacity of 2,050 t/d of ammonia and 3,250 t/d of urea and was scheduled for completion by the end of 2004 (Fertilizer Week, 2004u).

NPC canceled plans to construct a 500,000-t/yr ammonia plant on Kharg Island. The construction was canceled because of potential problems integrating the ammonia plant with a proposed methanol plant at the same site (Nitrogen & Methanol, 2004b).

**Japan.**—In May, Showa Denko K.K. began commercial production of ammonia using waste plastic at the company's Kawasaki plant. Approximately 195 t/d of collected waste plastic was processed into 175 t/d of ammonia and other liquid products. The waste recycling project began in April 2003 (Showa Denko K.K., 2004§).

**Lithuania.**—AB Achema planned to construct a 1,500-t/d ammonia plant in Jonava to come onstream by mid-2006. The new plant will raise Achema's total ammonia production capacity to slightly more than 1 Mt/yr. Output from the new plant was expected to be used to make ammonium nitrate and calcium ammonium nitrate at the same site (Fertilizer Week, 2004a).

**Oman.**—In September, Sohar International Urea & Chemical Industries S.A.O.C. awarded a \$500 million contract to Japan's Mitsubishi Heavy Industries Ltd. to construct an ammonia-urea complex at Sohar. The complex will include a 2,000-t/d ammonia plant and a 3,500-t/d urea production and granulation plant, which are scheduled to begin commercial operation in the first quarter of 2008. The plants will use Haldor Topsøe A/S of Denmark's ammonia production process, Snamprogetti S.p.A. of Italy's urea synthesis technology, and Yara Fertilizer Technology B.V. of Belgium's urea granulation technology (Fertilizer Week, 2004s).

**Poland.**—After a final privatization plan could not be agreed upon by the country's four fertilizer producers in 2003, a new plan was developed and approved in 2004. Under the new plan, Poland's state-owned fuel company Nafta Polska S.A. planned to sell the four companies separately instead of as one unit as

was originally planned. Under Polish law, 15% of the shares will be allotted to employees, 10% to 12% to the state, and the remainder will be sold. Polski Koncern Naftowy ORLEN S.A., one of the country's fuel and chemical producers, signed a letter of intent to purchase shares of two of the four—Zakłady Azotowe “Kędzierzyn” S.A. and Zakłady Azotowe w Tarnowie-Mościcach S.A. The remaining two—Zakłady Azotowe “Police” S.A. and Zakłady Azotowe “Pulawy” S.A.—were not privatized by yearend (Fertilizer Week, 2004k).

**Qatar.**—Qatar Fertiliser Co. (QAFCO) inaugurated its new ammonia-urea complex, QAFCO IV, in April. The QAFCO IV plant had the capacity to produce 2,000 t/d of ammonia and 3,500 t/d of urea. The \$550 million QAFCO IV expansion brought QAFCO's total production capacity at Masaieed to 2.0 Mt/yr of ammonia and 2.8 Mt/yr of urea. QAFCO is owned 75% by Qatar Petroleum and 25% by Yara International ASA. The company was also completing an expansion to its QAFCO III urea plant that would bring the company's total granular urea capacity to 6,500 t/d; this expansion was expected to be completed by mid-2005 (Fertilizer Week, 2004q).

**Romania.**—In July, Austria's OMV AG acquired the Government's 51% ownership of oil and gas producer SNP Petrom S.A. for \$1.83 billion. Petrom's subsidiary Doljchim has the capacity to produce 600,000 t/yr of ammonia and 400,000 t/yr of urea as well as other fertilizer products (Fertilizer Week, 2004n).

**Russia.**—In April, Russia's MDM Group was dissolved and its management function was transferred to its holding companies, one of which was EuroChem, which owns five fertilizer plants in Russia and one in Lithuania. Eurochem planned to spend \$207 million in 2004 to upgrade its fertilizer operations. Among the upgrades was an investment of \$27 million at Novonoskovsk to modernize and increase capacity at one of its ammonia units to 1.65 Mt/yr from 1.36 Mt/yr and increase urea production capacity to 1,200 t/d from 750 t/d. At Nevinnomyssk, EuroChem planned to modernize its urea unit to increase capacity by 90 t/d to bring the total capacity at the site to 740,000 t/yr (Fertilizer Week, 2004d). EuroChem announced later in 2004 that it would spend \$17 million to increase ammonia capacity at Nevinnomyssk to 1,650 t/d from 1,450 t/d by the end of 2005.

**Serbia and Montenegro.**—The Swiss firm All Immo Holding S.A. reportedly purchased Serbia's Azotara Subotica fertilizer complex for \$9.97 million. The plant has been idle since May 2003, but investments by the new owner were expected to allow the plant to reopen by mid-2005 (Fertilizer Week, 2004l).

**Trinidad and Tobago.**—Nitrogen 2000 Unlimited's 1,850-t/d ammonia plant was completed in August and inaugurated at the end of October. The \$322 million plant was completed 5 months ahead of schedule and uses the Kellogg advanced ammonia process for ammonia production.

In February, Koch Nitrogen acquired an additional 15% ownership of Caribbean Nitrogen Co.'s 1,850-t/d ammonia plant in Point Lisas as well as the rights to market 100% of the plant's ammonia production. Koch Nitrogen purchased Duke Energy Corp.'s ownership, to bring its total to 25%. In addition, Koch Nitrogen has an ownership stake and long-term marketing rights in Nitrogen 2000 (Green Markets, 2004e).

Potash Corporation of Saskatchewan Inc. planned to expand its ammonia production capacity in Trinidad by 132,000 t/yr at a cost of \$30 million. More than one-half the additional capacity was expected to be onstream in the first quarter of 2005; the remainder was scheduled for the third quarter. The increase would bring the total ammonia capacity at the plant to 2.23 Mt/yr; urea capacity at the plant was 670,000 t/yr (Green Markets, 2004i).

A new consortium announced that it would construct a \$700 million ammonia-urea-melamine complex in Trinidad, beginning in June 2005. The consortium, known as Caribbean Petrochemical Manufacturing Co., consisted of CL Financial Ltd. (70%) and MAN Ferrostaal AG of Germany (30%). Both of these companies already owned portions of Caribbean Nitrogen and Nitrogen 2000. Although no plant size was determined, analysts estimated that the plant would be about the same size as the other recently constructed plants—1,850 t/d. Plant construction would require about 2 years (Green Markets, 2004g).

**Turkey.**—In early 2004, the Turkish Privatization Agency sold two of the four fertilizer subsidiaries of Türkiye Gübre Sanayii (Tügsas)—Gemlik Gübre Sanayi A.Ş., and İGSAİ-İstanbul Gübre Sanayi A.Ş. Gemlik was sold to coal importing company Yılyak A.Ş. for \$83 million, and İGSAŞ was sold to plastics manufacturer Yıldız A.Ş. for \$100 million.

**Turkmenistan.**—State-owned Turkmendokunkhimiya's new ammonia and urea project at Tedžen was completed by the end of 2004. Capacities at the new plants were 600-t/d of ammonia and 1,050-t/d of urea. This would increase Turkmenistan's total urea capacity to 750,000 t/yr and would end the country's dependence on Russia for urea imports (Fertilizer Week, 2004w).

**Ukraine.**—In November, the State Property Fund sold 49% ownership of Azot Severodonetsk to the founder and president of IBE Trade; ownership of the rest of the company remained with the State Property Fund. Severodonetsk had the capacity to produce 990,000 t/yr of ammonia, 590,000 t/yr of urea, and 450,000 t/yr of ammonium nitrate (Fertilizer Week, 2004r).

After an investigation that began in 2003, Ukraine lifted restrictions on imports of ammonium nitrate from Russia. Ammonium nitrate imports had been monitored for 1 year prior to the decision, and after the 1-year period, Ukraine's Ministry of Economics determined that Russian imports had not damaged the Ukrainian producers (Fertilizer Week, 2004e).

**United Arab Emirates.**—Australian fertilizer company Incitec Pivot Ltd. planned to conduct a detailed feasibility study for the construction of an ammonia-urea complex in Brunei. The feasibility study, to be undertaken by Incitec Pivot together with its equal partners, Mitsubishi Corp. and WestSide Ltd., will cover such issues as gas supply, the costs of utilities and infrastructure, and an environmental assessment. The proposed plant would have a capacity of 1.2 Mt/yr of urea and would be the largest urea manufacturing operation in Asia. The project was expected to cost about \$600 million and take 3 years to build. Incitec Pivot would have the majority offtake rights and would maintain the complex for the joint venture (Fertilizer Week, 2004h).

**Vietnam.**—The Phu My prilled urea plant, operated by Vietnam Oil and Gas Corp., came onstream in September.

Technical problems at startup limited the plant's production to about 75% of its 740,000-t/yr capacity, but these were overcome by yearend. The Phu My plant, along with two other urea plants that were scheduled to be completed by mid-2006, would enable Vietnam to be self-sufficient in urea (Fertilizer Week, 2004o).

## Current Research and Technology

GloTell™, an additive to anhydrous ammonia designed to deter thieves and detect leaks, reached the commercial market in September. The product, developed at Southern Illinois University at Carbondale and manufactured by Royster-Clark, is marketed as an organic nontoxic additive to anhydrous ammonia that, when the ammonia is exposed to the environment, turns anything touched by the ammonia fluorescent pink. Its primary purpose is to deter the theft of anhydrous ammonia for methamphetamine production by staining pink the methamphetamine and all the equipment used in its manufacture. The visible stain would remain for at least 72 hours—possibly as long as 7 days—and minute quantities would be detectable under ultraviolet light. According to Royster-Clark, GloTell™ would add about \$9 per short ton (\$8.15 per metric ton) to the cost of ammonia that is treated (Green Markets, 2004c). In addition, another potential additive developed at Iowa State University was undergoing final testing at yearend, and New York has approved a study of ferrocene as a potential additive for anhydrous ammonia.

A research team at Cornell University has succeeded in converting nitrogen into ammonia using a long-predicted process that has challenged scientists for decades. The achievement involves using a zirconium metal complex to add hydrogen atoms to the nitrogen molecule and convert it to ammonia, without the need for high temperatures or high pressure. The team was able to break the nitrogen molecule's atomic bond by using zirconium in a soluble form at 45° C and to add hydrogen atoms to a so-called dinitrogen bridge. Complete fixation to ammonia was achieved at 85° C. Unlike the traditional Haber-Bosch process, the new process does not use a catalyst. Instead the zirconium makes only one ammonia molecule at a time, not vast numbers as in an industrial process. The researchers do not believe that the Haber-Bosch process could be replaced, but the new process may be useful in making value-added nitrogen chemicals, such as hydrazines for rocket fuels or fine chemicals for drug synthesis or dyes (Cornell University, 2004§).

The U.S. Department of Energy (DOE) awarded Peabody Energy Corp.'s Mustang Energy project a \$19.7 million Clean Coal Power Initiative grant for demonstrating technology to achieve ultralow emissions at its proposed 300 megawatt generating station near Grants, NM. Under the grant, Peabody would collaborate with Airborne Clean Energy LLC, Veolia Water North America (a subsidiary of Veolia Environnement), and Icon Construction Services Ltd. in a commercial-scale demonstration of the Airborne Process™ scrubber, regeneration, and fertilizer production systems. The grant would be used to create a commercial scale demonstration of proprietary technology that operates in a manner similar to a traditional scrubber system. The system will use sodium bicarbonate in the

scrubber and was expected to remove 99.5% of sulfur dioxide, 98% of nitrogen oxide, and 90% of mercury. Byproducts from the scrubbing process—nitrogen and sulfur—would be used to create granular fertilizer. The Mustang demonstration would be the leading application of the Airborne technology to date (Green Markets, 2004h).

## Outlook

According to the U.S. Department of Agriculture's (USDA) National Agricultural Statistical Service (2005§), planted corn area in 2005 was estimated to be 32.9 million hectares (Mha), about 0.6% higher than that in 2004. If this estimate is correct, planted corn area would be the largest since 1985. Expected area increased from that in 2004 throughout much of the Corn Belt and southern Great Plains; however, growers in most States in the Mississippi Delta, Southeast, and northern Great Plains intended to decrease their corn acreage as producers switched to other more profitable crops because of low corn prices and high fuel and fertilizer costs. With these 2005 projections, nitrogen demand by the fertilizer industry is expected to be slightly higher than that in 2004.

According to long-term projections by the USDA's Economic Research Service (2005§), projected plantings for the eight major field crops in the United States will increase slowly, from a low of 100 Mha to nearly 102 Mha by 2014 (figure 2). Yield increases also were projected to contribute to production gains, limiting price increases and thereby reducing the need for more land to be planted. Corn, soybeans, and wheat would account for about 87% of area planted for the eight major field crops. During the 10-year period, the crop mix was expected to shift to corn and away from soybeans. Corn planted area was projected to rise gradually as increasing exports and domestic demand lead to rising prices and net returns. Domestic corn use was projected to grow throughout the period, particularly for feed use and ethanol. Feed and residual use of corn would rise as the U.S. livestock sector grows in response to increases in domestic demand for and exports of beef, pork, and poultry. An expanding domestic economy would increase total meat consumption in the United States. In addition, as incomes grow in the rest of the world, especially in developing economies, consumers would shift to more meat in their diets, which requires more feed grains for meat production. As a result, the baseline analysis called for expanded world trade in feed grains and increased exports from the United States to support growth in global meat production. Significant increases are projected in corn use for ethanol production during the next several years, reflecting continued expansion of production capacity. State-level bans on methyl tertiary butyl ether as a fuel oxygenate have increased incentives for ethanol expansion in recent years, and high petroleum prices have led to additional support for ethanol use.

Natural gas prices are expected to continue to be an important factor in U.S. ammonia production. If natural gas prices remain at high levels, ammonia production capacity at older, higher cost plants in the United States will most likely close. The DOE projects that Henry Hub prices are expected to average about \$6.90 per million cubic feet (\$6.72 per million British thermal

units) in 2005 and slightly more than \$7.10 per million cubic feet (\$6.91 per million British thermal units) in 2006, which would continue to put pressure on marginal producers (U.S. Department of Energy, 2005§). New lower cost ammonia plants that have been constructed in such locations as Trinidad and Tobago to supply the U.S. market also would put pressure on some less efficient U.S. producers. As a result, more U.S. plants are likely to close, and the United States will increase its import dependency for ammonia.

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TABLE 1  
 SALIENT AMMONIA STATISTICS<sup>1,2</sup>

(Thousand metric tons of contained nitrogen unless otherwise specified)

	2000	2001	2002	2003	2004
<b>United States:</b>					
Production	11,800	9,120	10,300 <sup>r</sup>	8,600 <sup>r</sup>	8,850 <sup>p</sup>
Exports	662	647	437	400	381
Imports for consumption	3,880	4,550	4,670	5,720	5,900
Consumption, apparent <sup>3</sup>	14,900	13,200	14,500	14,000 <sup>r</sup>	14,300 <sup>p</sup>
Stocks, December 31, producers <sup>1</sup>	1,120 <sup>4</sup>	261 <sup>r</sup>	286 <sup>r</sup>	197 <sup>r</sup>	274
Average annual price, free on board Gulf Coast <sup>5</sup> dollars per short ton	169	183	137	245	274
Net import reliance as a percentage of apparent consumption <sup>6</sup>	21	31	29 <sup>r</sup>	39 <sup>r</sup>	38 <sup>p</sup>
Natural gas price, wellhead, average price <sup>7</sup> dollars per thousand cubic feet	3.68 <sup>r</sup>	4.00 <sup>r</sup>	2.95	4.88 <sup>r</sup>	5.49 <sup>c</sup>
<b>World:</b>					
Production	108,000	105,000	109,000 <sup>r</sup>	110,000 <sup>r</sup>	117,000 <sup>p</sup>
Trade <sup>8</sup>	12,700	12,600	12,900 <sup>r</sup>	13,900 <sup>r</sup>	14,600 <sup>p</sup>

<sup>c</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits.

<sup>2</sup>Synthetic anhydrous ammonia, excluding coke oven byproduct; data are for calendar year and are from the U.S. Census Bureau unless otherwise noted.

<sup>3</sup>Calculated from production plus imports minus exports and industry stock changes.

<sup>4</sup>Source: The Fertilizer Institute.

<sup>5</sup>Source: Green Markets.

<sup>6</sup>Defined as imports minus exports; adjusted for industry stock changes.

<sup>7</sup>Source: Monthly Energy Review, U.S. Department of Energy.

<sup>8</sup>Source: International Fertilizer Industry Association Statistics, World Anhydrous Ammonia Trade.

TABLE 2  
ANHYDROUS AMMONIA SUPPLY AND DEMAND IN THE UNITED STATES<sup>1</sup>

(Thousand metric tons of contained nitrogen)

	2002	2003	2004 <sup>p</sup>
<b>Production:</b>			
<b>Fertilizer:</b>			
January-June	4,640 <sup>r</sup>	3,770 <sup>r</sup>	4,090
July-December	4,660 <sup>r</sup>	3,820 <sup>r</sup>	4,090
Total	9,300 <sup>r</sup>	7,590 <sup>r</sup>	8,180
<b>Nonfertilizer:</b>			
January-June	540	563 <sup>r</sup>	362
July-December	494 <sup>r</sup>	453 <sup>r</sup>	310
Total	1,030 <sup>r</sup>	1,020 <sup>r</sup>	672
Grand total	10,300 <sup>r</sup>	8,600 <sup>r</sup>	8,850
<b>Imports for consumption:</b>			
January-June	2,090	2,890	3,060
July-December	2,570	2,820	2,840
Total	4,670	5,720	5,900
<b>Exports:</b>			
January-June	242	234	196
July-December	195	166	185
Total	437	400	381
<b>Stocks, end of period:</b>			
January-June	246 <sup>r</sup>	241 <sup>r</sup>	203
July-December	286 <sup>r</sup>	197 <sup>r</sup>	274
<b>Apparent consumption:<sup>2</sup></b>			
January-June	7,050 <sup>r</sup>	7,030 <sup>r</sup>	7,310
July-December	7,490 <sup>r</sup>	6,980 <sup>r</sup>	6,980
Total	14,500	14,000 <sup>r</sup>	14,300

<sup>p</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Calculated from production plus imports minus exports and industry stock changes.

Source: U.S. Census Bureau.

TABLE 3  
MAJOR DOWNSTREAM NITROGEN COMPOUNDS PRODUCED IN THE UNITED STATES<sup>1,2</sup>

(Thousand metric tons)

	2003 <sup>r</sup>						2004 <sup>p</sup>					
	January-June		July-December		Total		January-June		July-December		Total	
	Gross weight	Nitrogen content	Gross weight	Nitrogen content	Gross weight	Nitrogen content	Gross weight	Nitrogen content	Gross weight	Nitrogen content	Gross weight	Nitrogen content
Urea	2,910	1,340	2,880	1,320	5,780	2,660	2,860	1,310	2,890	1,330	5,760	2,640
Ammonium phosphates <sup>3</sup>	7,300	1,160	7,920	1,310	15,200	2,480	7,770	1,210	7,340	1,190	15,100	2,400
Ammonium nitrate	2,800	951	2,930	993	5,730	1,940	3,000	1,020	3,020	1,020	6,020	2,040
Nitric acid	3,260	717	3,490	768	6,750	1,490	3,420	751	3,290	723	6,700	1,470
Ammonium sulfate <sup>4</sup>	1,320	279	1,290	273	2,600	552	1,370	291	1,270	269	2,640	560

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Ranked in relative order of importance by nitrogen content.

<sup>3</sup>Diammonium phosphate and monoammonium phosphate.

<sup>4</sup>Excludes coke plant ammonium sulfate.

Source: U.S. Census Bureau, Current Industrial Reports MQ325B.

TABLE 4  
DOMESTIC PRODUCERS OF ANHYDROUS AMMONIA IN 2004<sup>1</sup>

(Thousand metric tons per year of ammonia)

Company	Location	Capacity <sup>2</sup>
Agrium Inc.	Borger, TX	490
Do.	Finley, WA <sup>3</sup>	180
Do.	Kenai, AK	1,250
Air Products and Chemicals Inc.	Pace Junction, FL <sup>4</sup>	78
CF Industries Inc.	Donaldsonville, LA	2,040
Coffeyville Resources LLC	Coffeyville, KS	350
Dyno Nobel ASA	Cheyenne, WY	174
Do.	St. Helens, OR	101
Dakota Gasification Co.	Beulah, ND	363
El Dorado Chemical Co.	Cherokee, AL	175
Green Valley Chemical Corp.	Creston, IA	32
Honeywell International Inc.	Hopewell, VA	409
Koch Nitrogen Co.	Beatrice, NE	265
Do.	Dodge City, KS	280
Do.	Enid, OK	930
Do.	Fort Dodge, IA	350
Do.	Sterlington, LA	1,110
Mosaic Co., The	Faustina (Donaldsonville), LA	508
Nitromite Fertilizer	Dumas, TX	128
PCS Nitrogen Inc.	Augusta, GA	688
Do.	Geismar, LA	483
Do.	Lima, OH	542
Royster-Clark Inc.	East Dubuque, IL	278
Shoreline Chemical	Gordon, GA	31
Terra Industries Inc.	Beaumont, TX	231
Do.	Blytheville, AR <sup>4</sup>	388
Do.	Donaldsonville (Ampro), LA <sup>5</sup>	478
Do.	Donaldsonville (Triad), LA <sup>5</sup>	422
Do.	Port Neal, IA	373
Do.	Verdigris, OK	1,060
Do.	Woodward, OK	444
Do.	Yazoo City, MS <sup>5</sup>	463
Total		15,100

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to total shown.

<sup>2</sup>Engineering design capacity adjusted for 340 days per year of effective production capability.

<sup>3</sup>Idle since January 2001.

<sup>4</sup>Closed in 2004.

<sup>5</sup>Purchased from Mississippi Chemical Corp. in December 2004.

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

(Thousand metric tons of nitrogen)

Fertilizer material <sup>3</sup>	2003	2004 <sup>p</sup>
Single-nutrient:		
Nitrogen solutions <sup>4</sup>	2,660 <sup>r</sup>	3,050
Anhydrous ammonia	2,860 <sup>r</sup>	3,030
Urea	2,280 <sup>r</sup>	2,430
Ammonium nitrate	473 <sup>r</sup>	470
Ammonium sulfate	218 <sup>r</sup>	233
Aqua ammonia	73	98
Other <sup>5</sup>	389	315
Total	8,950 <sup>r</sup>	9,620
Multiple-nutrient <sup>6</sup>	2,100 <sup>r</sup>	2,330
Grand total	11,000 <sup>r</sup>	12,000

<sup>p</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Fertilizer years ending June 30.

<sup>3</sup>Ranked in relative order of importance by product type.

<sup>4</sup>Principally urea-ammonium nitrate solutions, 29.9% nitrogen.

<sup>5</sup>Includes other single-nutrient nitrogen materials, all natural organics, and statistical discrepancies.

<sup>6</sup>Various combinations of nitrogen (N), phosphate (P), and potassium (K): N-P-K, N-P, and N-K.

Source: Commercial Fertilizers 2004. 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 END OF PERIOD

(Thousand metric tons of nitrogen)

Material <sup>1</sup>	2003	2004 <sup>P</sup>
Ammonia:		
January-June	241 <sup>r</sup>	203
July-December	197 <sup>r</sup>	274
Nitrogen solutions: <sup>2</sup>		
January-June	91 <sup>r</sup>	77
July-December	96 <sup>r</sup>	133
Urea:		
January-June	78	45
July-December	56	93
Ammonium phosphates: <sup>3</sup>		
January-June	80 <sup>r</sup>	57
July-December	61 <sup>r</sup>	82
Ammonium nitrate:		
January-June	48 <sup>r</sup>	31
July-December	41 <sup>r</sup>	44
Ammonium sulfate:		
January-June	20	21
July-December	25	18
Yearend total <sup>4</sup>	476 <sup>r</sup>	644

<sup>P</sup>Preliminary. <sup>r</sup>Revised.

<sup>1</sup>Ranked in relative order of importance.

<sup>2</sup>Urea-ammonium nitrate and ammoniacal solutions.

<sup>3</sup>Diammonium and monoammonium phosphates.

<sup>4</sup>Calendar year ending December 31.

Source: U.S. Census Bureau, Current Industrial Reports  
MQ325B.

TABLE 7  
PRICE QUOTATIONS FOR MAJOR NITROGEN COMPOUNDS AT END OF PERIOD

(Dollars per short ton)

Compound	2003		2004	
	June	December	June	December
Ammonium nitrate, free on board (f.o.b.) Corn Belt <sup>1</sup>	170-180	190-195	178-190	195-210
Ammonium sulfate, f.o.b. Corn Belt <sup>1</sup>	137-145	135-140	165-175	180-190
Anhydrous ammonia:				
F.o.b. Corn Belt <sup>1</sup>	275-290	315-330	295-315	350-370
F.o.b. Gulf Coast <sup>2</sup>	250	290	270	285
Diammonium phosphate, f.o.b. central Florida	158-160	185-195	180-185	205-215
Urea:				
F.o.b. Corn Belt, <sup>1</sup> prilled and granular	180-195	215-225	198-208	255-270
F.o.b. Gulf Coast, granular <sup>2</sup>	162-167	192-195	187-188	225-230

<sup>1</sup>Illinois, Indiana, Iowa, Missouri, Nebraska, and Ohio.

<sup>2</sup>Barge, New Orleans, LA.

Source: Green Markets.

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

(Thousand metric tons of ammonia)

Country	2003	2004
Canada	18	10
Chile	--	15
Korea, Republic of	416	383
Mexico	37	16
Philippines	--	24
Taiwan	11	10
Other	5	5
Total	487	463

-- Zero.

<sup>1</sup>Value data suppressed by U.S. Census Bureau.

Source: U.S. Census Bureau.

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

(Thousand metric tons of ammonia and thousand dollars)

Country	2003		2004	
	Gross weight	Value <sup>2</sup>	Gross weight	Value <sup>2</sup>
Argentina	52	12,800	23	5,500
Belgium	--	--	(3)	12
Brazil	52	10,200	73	20,100
Canada	1,120	249,000	1,280	323,000
Colombia	6	1,000	28	7,200
France	5	969	--	--
Hungary	--	--	10	2,870
Indonesia	21	5,510	67	16,900
Italy	(3)	15	--	--
Latvia	87	20,200	(3)	8,640
Libya	--	--	21	5,950
Lithuania	--	--	24	7,010
Mexico	--	--	25	8,430
Netherlands	6	1,170	(3)	4
Qatar	35	7,220	--	--
Russia	1,450	309,000	864	212,000
Saudi Arabia	88	22,200	--	--
Spain	--	--	15	3,690
Trinidad and Tobago	3,680	777,000	3,880	1,030,000
Turkey	--	--	17	5,300
Ukraine	109	21,000	524	138,000
United Kingdom	(3)	11	(3)	48
Venezuela	240	53,100	323	87,300
Total	6,950	1,490,000	7,180	1,880,000

-- Zero.

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Cost, insurance, and freight value.

<sup>3</sup>Less than ½ unit.

Source: U.S. Census Bureau.

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

(Thousand metric tons)

Compound	2003		2004		Principal destinations, 2004
	Gross weight	Nitrogen content	Gross weight	Nitrogen content	
Ammonium nitrate <sup>2</sup>	52	18	109	37	Mexico, 74%; Canada, 18%.
Ammonium sulfate <sup>2</sup>	868	234	718	194	Brazil, 50%; Dominican Republic, 12%; Canada, 10%.
Anhydrous ammonia	487	400	463	381	Republic of Korea, 83%.
Diammonium phosphate	6,210	1,120	5,040	907	China, 28%; India, 8%; Pakistan, 8%; Mexico, 8%.
Monoammonium phosphate	2,920	322	3,420	376	Brazil, 30%; Australia, 22%; Canada, 18%.
Urea	876	402	704	323	Mexico, 61%; Republic of Korea, 22%.
Total	11,400	2,490	10,500	2,220	

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Includes industrial chemical products.

Source: U.S. Census Bureau.

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

(Thousand metric tons and thousand dollars)

Compound	2003			2004			Principal sources, 2004
	Gross weight	Nitrogen content	Value <sup>2</sup>	Gross weight	Nitrogen content	Value <sup>2</sup>	
Ammonium nitrate <sup>3</sup>	1,200	408	166,000	1,060	358	191,000	Canada, 48%; Netherlands, 16%; Romania, 16%.
Ammonium nitrate-limestone mixtures	4	1	341	2	1	178	Japan, 62%; Germany, 17%; Netherlands, 14%.
Ammonium sulfate <sup>3</sup>	283	60	28,500	326	69	37,500	Canada, 92%.
Anhydrous ammonia <sup>4</sup>	6,950	5,720	1,490,000	7,180	5,900	1,880,000	Trinidad and Tobago, 54%; Canada, 18%; Russia, 12%.
Calcium nitrate	91	15	8,900	126	21	11,100	Norway, 98%.
Diammonium phosphate	142	26	30,700	31	6	12,900	Russia, 57%; Belgium, 14%.
Monoammonium phosphate	164	18	41,000	156	17	48,600	Canada, 60%; Mexico, 10%; Russia, 10%.
Nitrogen solutions	1,740	521	225,000	2,010	602	319,000	Russia, 31%; Canada, 21%; Belarus, 12%.
Potassium nitrate	79	11	23,900	66	9	21,800	Chile, 81%; Israel, 11%.
Potassium nitrate-sodium nitrate mixtures	50	8	18,000	42	6	14,800	Israel, 57%; Chile, 39%.
Sodium nitrate	88	15	17,100	66	11	15,700	Chile, 94%.
Urea	4,970	2,280	866,000	4,940	2,270	1,020,000	Canada, 37%; Kuwait, 13%; Qatar, 10%.
Total	15,800	9,080	2,920,000	16,000	9,270	3,580,000	

<sup>1</sup>Data are rounded to no more than three significant digits; may not add to totals shown.

<sup>2</sup>Cost, insurance, and freight value.

<sup>3</sup>Includes industrial chemical products.

<sup>4</sup>Includes industrial ammonia.

Source: U.S. Census Bureau.

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

(Thousand metric tons of contained nitrogen)

Country	2000	2001	2002	2003	2004
Afghanistan <sup>e</sup>	20	20	20	20	20
Albania <sup>e</sup>	10	10	10	10	10
Algeria	458	469	563	578	542 <sup>e</sup>
Argentina	190 <sup>r</sup>	597	617	724	701
Australia	576	762	686	787	790
Austria <sup>e</sup>	450	440	440	440	440
Bahrain	350	372	377	312	311
Bangladesh <sup>3</sup>	1,255	1,273	1,289	1,389	1,380
Belarus	730	725	799 <sup>r</sup>	726 <sup>r</sup>	765 <sup>e</sup>
Belgium	863	788	842	874	857
Bosnia and Herzegovina <sup>e</sup>	1	1	1	1	1
Brazil	925	769	1,021	939	1,077
Bulgaria	533	477	328	321	389
Burma	78	28	21	63	35 <sup>e</sup>
Canada	4,130	3,439	3,700 <sup>r</sup>	3,662 <sup>r</sup>	4,107 <sup>e</sup>
China	27,700	28,200	30,200 <sup>r</sup>	31,500 <sup>r</sup>	34,800 <sup>e</sup>
Colombia	93	95	111	108 <sup>r</sup>	98
Croatia	325	259	235	264	332
Cuba <sup>e</sup>	135	135	135	135	135
Czech Republic	246	206	215	235	233
Denmark <sup>e</sup>	2	2	2	2	2
Egypt	1,511	1,801	1,839	1,790	1,675
Estonia	145	151	39	81	166
Finland <sup>e</sup>	75 <sup>4</sup>	80	87 <sup>r</sup>	60	70
France	1,620 <sup>e</sup>	1,380 <sup>e</sup>	1,172	1,153	1,120
Germany	2,473 <sup>r</sup>	2,522	2,623 <sup>r</sup>	2,803	2,741
Georgia	135	60	90	125	130 <sup>e</sup>
Greece	121	57	66	123	132
Hungary	352	324	238	232	304
Iceland	7 <sup>e</sup>	3	--	--	--
India <sup>5</sup>	10,148	10,081	9,827	10,048 <sup>r</sup>	10,718
Indonesia	3,620	3,655	4,200	4,250	4,120
Iran	965	1,087	1,119	1,115	1,088
Iraq <sup>e</sup>	200	280	532	--	--
Ireland	410	443	400 <sup>e</sup>	--	--
Italy	408	434	391	475	532
Japan	1,410	1,318	1,188	1,054	1,090
Korea, North <sup>e</sup>	100	100	70 <sup>r</sup>	70 <sup>r</sup>	70
Korea, Republic of	369	368	153	119	163
Kuwait	410	400	414	444 <sup>e</sup>	413
Libya	552	495	533	577 <sup>e</sup>	577 <sup>e</sup>
Lithuania	420	440	467	461	424
Malaysia	605	726	848	910	843
Mexico	701	548	437 <sup>r</sup>	440	568
Netherlands <sup>e</sup>	2,540	1,990	2,050	1,750	1,970
New Zealand	105	117	109	128	124
Norway	334	323	330	354	420
Pakistan	1,884	2,228	2,214	2,357	2,114
Peru <sup>e</sup>	--	5	5	5	5
Poland	1,862	1,735	1,311	1,906	1,976
Portugal	246	202	190	245	244
Qatar	1,097	1,159	1,166 <sup>r</sup>	1,185 <sup>r</sup>	1,428
Romania	1,016	949	930	1,180	1,172

See footnotes at end of table.



TABLE 12—Continued  
AMMONIA: WORLD PRODUCTION, BY COUNTRY<sup>1, 2</sup>

(Thousand metric tons of contained nitrogen)

Country	2000	2001	2002	2003	2004
Russia	8,735	8,690	8,600 <sup>e</sup>	9,100 <sup>e</sup>	9,800
Saudi Arabia	1,743	1,774	1,737	1,743	1,726
Serbia and Montenegro	60 <sup>e</sup>	66	115	62	136
Slovakia	271	215	226	230	268
South Africa	560	506	492	493	459
Spain	442	436	415	432	404
Switzerland	33	31	33	29	32
Syria	91	138	143	161	115
Taiwan	11	12 <sup>r</sup>	11 <sup>r</sup>	11 <sup>r</sup>	11 <sup>e</sup>
Tajikistan <sup>e</sup>	15	5	15	20	20
Trinidad and Tobago	2,680	3,036	3,296	3,529 <sup>r</sup>	3,875
Turkey	53	67	301	289	329
Turkmenistan <sup>e</sup>	75	75	85	85	85
Ukraine	3,577	3,700	3,700	3,900 <sup>e</sup>	3,900 <sup>e</sup>
United Arab Emirates	348	358	364	421	380
United Kingdom	814	850	837	1,044	1,071
United States <sup>6</sup>	11,800	9,120	10,300 <sup>r</sup>	8,600 <sup>r</sup>	8,850 <sup>p</sup>
Uzbekistan	810	670	740	815 <sup>e</sup>	840 <sup>e</sup>
Venezuela	423	808	666 <sup>r</sup>	732 <sup>r</sup>	1,012
Vietnam	42	53	58	80 <sup>e</sup>	216
Zimbabwe <sup>e</sup>	58	58	61	55	48
Total	108,000	105,000	109,000 <sup>r</sup>	110,000 <sup>r</sup>	117,000

<sup>e</sup>Estimated. <sup>p</sup>Preliminary. <sup>r</sup>Revised. -- Zero.

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

<sup>2</sup>Table includes data available through June 18, 2005.

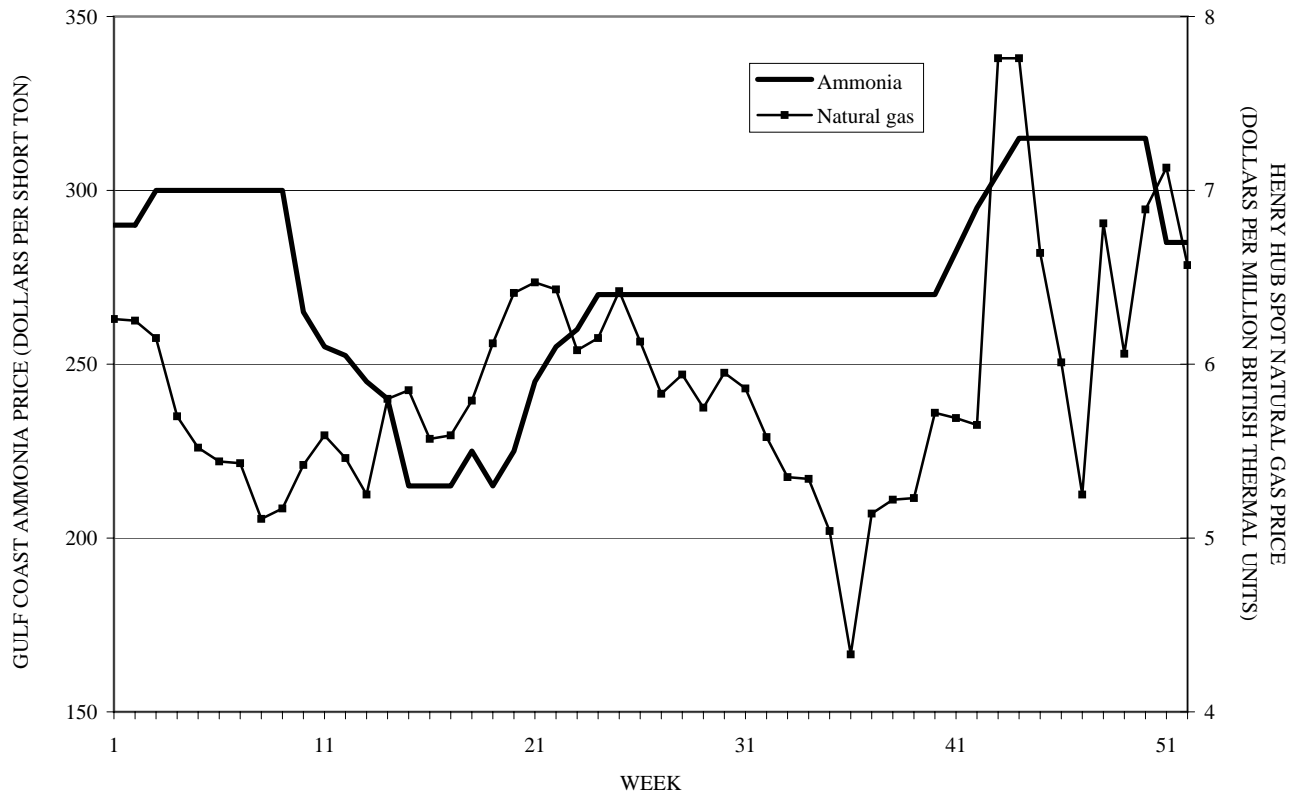
<sup>3</sup>May include nitrogen content of urea.

<sup>4</sup>Reported figure.

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

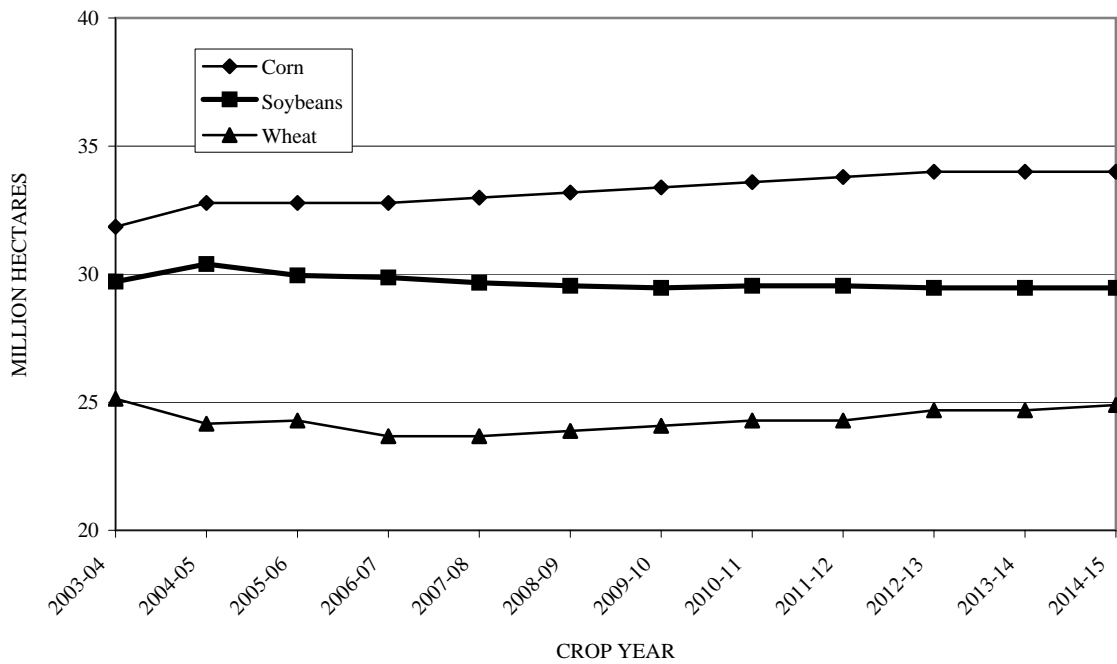
<sup>6</sup>Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

FIGURE 1  
AMMONIA AND NATURAL GAS PRICES IN 2004



Sources: Green Markets and Natural Gas Weekly.

FIGURE 2  
PROJECTED PLANTED ACREAGE



Source: U.S. Department of Agriculture.