

2006 Minerals Yearbook

NITROGEN

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The world production table was prepared by Linder Roberts, international data coordinator.

In 2006, U.S. ammonia production was 8.52 million metric tons (Mt) of contained nitrogen, about a 2% increase from production in 2005, and apparent consumption was slightly lower than that in 2005. Both imports and exports of ammonia were lower than those in 2005. Most of the imports in 2005 were from Canada, Trinidad and Tobago, and Ukraine. About 89% of the domestically produced ammonia consumed in the United States was used in fertilizer applications. Global ammonia production in 2006 of 124 Mt of contained nitrogen was slightly higher than that in 2005. China, India, Russia, and the United States were the leading producers, together accounting for about 56% of the total.

Legislation and Government Programs

Two bills that could result in increased U.S. natural gas supplies were introduced in 2006—H.R. 4761, the Deep Ocean Energy and Resources Act, and S. 3711, the Gulf of Mexico Energy Security Act. H.R. 4761 would allow the lifting of a 25-year-old moratorium on exploration for natural gas in waters within the jurisdiction of the United States. S. 3711 would expand natural gas exploration and drilling in the Gulf of Mexico by offering leases in these currently restricted areas. S. 3711 was attached to the Tax Relief and Health Care Act of 2006, which was passed by both houses and was signed by the President on December 20.

In March, the U.S. International Trade Commission (ITC) completed its sunset (5-year) review of imports of ammonium nitrate from Russia. The ITC determined that terminating the suspension agreement would be likely to lead to continuation of material injury from the imports, so the suspension agreement will remain in effect (U.S. International Trade Commission, 2006a). The suspension agreement, which limits the quantity of ammonium nitrate that can be exported from Russia into the United States, has been in effect since May 19, 2000. The material covered under the agreement includes only fertilizer-grade ammonium nitrate (bulk density greater than or equal to 53 pounds per cubic foot); explosives- or industrial-grade ammonium nitrate is excluded.

In November, the ITC announced that it would conduct a full 5-year review of the antidumping duty order on ammonium nitrate from Ukraine. The review was scheduled to be completed after May 2007 (U.S. International Trade Commission, 2006b). An antidumping duty of 156.29% ad valorem on imports of ammonium nitrate from Ukraine was originally established on September 21, 2001.

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. In 2006, production

of anhydrous ammonia (82.2% nitrogen) increased by 2% to 8.52 Mt of contained nitrogen compared with a revised figure of 8.34 Mt in 2005 (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).

The United States was a leading producer and consumer of elemental and fixed types of nitrogen. In declining order, urea, ammonium nitrate, ammonium phosphates [diammonium phosphate (DAP) and monoammonium phosphate (MAP)], nitric acid, and ammonium sulfate were the major downstream products produced from ammonia in the United States. Their combined production was 8.75 Mt of contained nitrogen, with urea accounting for 29% of the total and ammonium nitrate and ammonium phosphates each accounting for about 24% of the production (table 3).

Ammonia producers in the United States operated only at about 72% of design capacity in 2006; this percentage included capacities at plants that operated during any part of the year and does not include plants that were idle for all of 2006. Of the total available U.S. ammonia production capacity, more than 57% was concentrated in the States of Louisiana (33%), Oklahoma (18%), and Texas (6%) where there are large reserves of feedstock natural gas. Koch Nitrogen Co., Terra Industries Inc., CF Industries Inc., PCS Nitrogen Inc., and Agrium Inc., in descending order, accounted for 79% of total U.S. ammonia production capacity (table 4).

High natural gas prices at the beginning of 2006 led Terra Industries to suspend production at its 454,000-metric-ton-per-year (t/yr) Yazoo City, MS, ammonia plant on January 1. The company performed maintenance originally scheduled for February during the shutdown and supplied its customers from inventories or from purchased ammonia. The company's 399,000-t/yr Woodward, OK, plant had been closed since November 2005. By the beginning of March, both plants were reopened, but Terra Industries announced that it would cut back its U.S. urea-ammonium nitrate solution (UAN) production by 35% (Green Markets, 2006k). PCS Nitrogen closed its 542,000-t/yr Lima, OH, ammonia plant from mid-January to mid-March also because of high natural gas prices.

In July, Valero Energy Corp. announced that it would exit the nitrogen fertilizer business and permanently close its Nitromite Fertilizer subsidiary's 128,000-t/yr ammonia plants in Dumas, TX. The two plants, one of which had been idled for years, were built in the 1960s and were acquired when Valero merged with Ultramar Diamond Shamrock Corp. in 2001. The second plant has been closed since December 2005 because of high natural gas costs (Green Markets, 2006n).

In July, Mosaic Fertilizer LLC (a wholly owned subsidiary of The Mosaic Co.) signed a 15-year ammonia offtake agreement with Faustina Hydrogen Products LLC, an affiliate of US Syngas LLC. The term of the ammonia offtake begins upon the startup of

a petroleum coke gasification project to be constructed adjacent to Mosaic's Faustina, LA, phosphate manufacturing plant. Under the agreement, Mosaic will purchase a majority of the approximately 1.3 million metric tons per year (Mt/yr) of anhydrous ammonia that would be produced at the petroleum coke complex, which is scheduled to begin operating in 2009. Mosaic planned to continue operating its 508,000-t/yr ammonia plant in Faustina until the new plant is completed, and then the company would decide whether or not to continue to operate the existing plant (Mosaic Co., The, 2006a). On October 12, an explosion at the Faustina ammonia plant caused more than \$10 million in damage, and ammonia production was halted for 6 to 12 weeks to repair the damage. Mosaic reduced its phosphates production during the same period because it was using more costly purchased ammonia as feedstock (Mosiac Co., The, 2006b).

In January, Coffeyville Resources LLC announced that it was increasing production capacity for ammonia and UAN. Ammonia production capacity was scheduled to increase by 10% to about 400,000 t/yr, and UAN capacity would increase by more than 50% to 907,000 t/yr. The increased production was planned in conjunction with an increase in its petroleum refinery production, which generated additional hydrogen that would be used for ammonia production. The ammonia production increase was completed in July, and the ammonium nitrate and urea capacity expansions were projected to be completed by fall 2007. The fertilizer expansion would cost \$22 million (Green Markets, 2006d).

In April, Rentech Inc. completed the purchase of Royster-Clark Inc.'s nitrogen facility in East Dubuque, IL, for about \$70 million. Rentech planned to convert the 278,000-t/yr ammonia plant from natural gas-fed to coal-fed by installing coal-gasification technology by 2009. Once the conversion is complete, the plant's annual ammonia production capacity would increase by about 10%. In June, Rentech Energy Midwest Corp. (the plant's operating company) entered into an agreement with Kiewit Energy Co. to complete front-end engineering and design for the planned coal gasification conversion. Rentech intended to use ConocoPhillips Corp.'s E-GasTM technology to produce syngas initially for use in the production of ammonia and ammonia-based fertilizers and ultraclean Fischer-Tropsch fuels. The design phase was scheduled for completion during the first half of 2007 (Green Markets, 2006); Rentech Inc., 2006).

Agrium idled its Kenai, AK, nitrogen facility from October 23, 2006, through March 2007 because of tight natural gas supplies in the region; however, the company had secured sufficient gas to operate for about 8 months in 2007 at 75% capacity. Because of uncertain gas supplies, Agrium was investigating the conversion of the plant's feedstock from natural gas to coal gasification gases. The company completed a preliminary review of the project, which was designed to develop a low-emission coal gasification facility that would create a long-term offtake gas feed material for the Kenai facility and would also generate competitively priced electricity for the regional power grid. Agrium was awarded a \$2 million grant from the Denali Commission and a \$5 million grant from the State of Alaska for a feasibility study of the project (Agrium Inc., 2006).

Rising security costs and concerns continued to prompt some companies to stop marketing ammonium nitrate. Agriliance LLC

announced in August that it would stop selling ammonium nitrate. The company would no longer handle the material at its terminals nor offer the product in drop shipments directly from production points to dealer locations. Agriliance was the leading crop input company in North America, operating 149 retail locations and serving about 2,200 farm dealers (Green Markets, 2006a).

Increased caprolactam production at Honeywell Inc.'s Hopewell, VA, plant was expected to result in increased coproduct ammonium sulfate production. Caprolactam production was scheduled to increase by about 10% through an expansion and process improvements. The increase in caprolactam production was in response to increased global demand, especially in China. Honeywell produced more than 1.5 Mt of Sulf-N® brand ammonium sulfate annually (Green Markets, 2006f).

Two former nitrogen operations that were owned by bankrupt Farmland Industries Inc. in Lawrence, KS, and Pollack, LA, were given new life. The Lawrence ammonia and urea plants were purchased by Oman Chemicals and Pharmaceuticals LLC, dismantled, and shipped to Oman. The Pollack plant was converted to a biodiesel product plant (Green Markets, 2006e).

Environmental Issues

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 or "dead" zone. Some studies postulated that nitrate runoff from fertilizers is the principal cause of hypoxia, while others cited other causes for the hypoxic zone.

In 2006, the United Nations Environment Program estimated that there were 200 dead zones around the world, compared with 149 in 2004. Newly observed dead zones included ones in Pearl River Estuary and Changjiang River, China; Archipelago Sea, Finland; Fosu Lagoon, Ghana; Elefsis Bay, Greece; Paracas Bay, Peru; Mondego River, Portugal; Mersey Estuary, United Kingdom; Montevideo Bay, Uruguay; and the Western Indian Shelf (MSNBC, 2006).

Consumption

In 2006, apparent consumption of ammonia of 14.3 Mt of contained nitrogen was slightly lower than that in 2005. 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 2006 crop year (ending June 30, 2006) is listed in table 5. Consumption of 11.0 Mt of contained nitrogen was about 2.5% lower than that of 2005. Anhydrous ammonia and nitrogen solutions, mostly UAN containing 29.8% to 29.9% nitrogen, were the principal fertilizer products, representing 26% and 25%, respectively, of fertilizer consumption. Urea (45.9% nitrogen) constituted 20% of fertilizer consumption during the 2006 crop year. Ammonium nitrate containing 33.9% nitrogen constituted 3% of 2006 nitrogen fertilizer consumption, and

fertilizer consumption of ammonium sulfate, based on nitrogen content, was 2% of the total U.S. nitrogen-base fertilizer market. The leading nitrogen-consuming States in the 2006 crop year were, in descending order, Iowa, Illinois, Nebraska, Kansas, and California. Together, these five States accounted for 38% of the nitrogen-containing fertilizer consumption in the United States.

Stocks

Stocks of ammonia at yearend 2006 were 182,000 metric tons (t), a decrease of 28% from comparable revised stocks at yearend 2005, 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. In the third quarter, Valero announced that it had completed a new pumping station on the southern end of its ammonia pipeline in Louisiana, which will increase throughput volumes to both existing and new customers. Valero was close to starting a pipeline lateral project in southern Louisiana, which will serve an industrial end user. The company also identified an additional \$75 million of projects on its ammonia pipeline, primarily related to pipeline laterals to industrial end users (Valero L.P., 2006). In 2007, Valero L.P. and Valero GP Holdings LLC changed their names to NuStar Energy L.P. and NuStar GP Holdings LLC, respectively, as a result of their separation from Valero Energy Corp.

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, and in 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 2006, 659,000 t of ammonia was shipped through Magellan's pipeline compared with 647,000 t in 2005 (Magellan Midstream Partners L.P., 2007).

Prices

Midyear and yearend prices for nitrogen materials are listed in table 7, and the relationship between the natural gas price and Gulf Coast ammonia price is shown in figure 1. The average Gulf Coast ammonia price began the year at \$360 per short ton (\$397 per metric ton), and in general fell through the end of July to reach the low for the year of \$244 per short ton (\$269 per metric ton), which was its lowest level since January 2005. The price drop followed a general decline in the Henry Hub natural gas price. By mid-August, the average ammonia price began to increase again in response to increasing natural gas prices. At yearend, the ammonia price was about \$318 per short ton (\$351 per metric ton).

The average granular urea price also decreased for the first half of 2006. At the beginning of the year, the price was \$265 per short ton (\$292 per metric ton), and then the average price fell to reach a low for the year of \$193 per short ton (\$213 per metric ton) at the end of June. The average price trended upward though the rest of 2006, with a sharp increase in December to reach \$273 per short ton (\$301 per metric ton) at yearend.

The average ammonium nitrate price, which began the year at \$268 per short ton (\$295 per metric ton), fell throughout most of 2006. It reached a low of \$248 per short ton (\$273 per metric ton) at the beginning of September. It remained at this level until it rose slightly to \$255 per short ton (\$281 per metric ton) at the beginning of December and remained at that level until yearend.

Ammonium sulfate prices, however, did not follow the same trend of other nitrogen products, mainly because a substantial portion of the material is produced as a byproduct of caprolactam production. The average price was relatively stable at \$185 to \$200 per short ton (\$204 to \$220 per metric ton) throughout the first half of 2006. In mid-July, the price fell to about \$152 per short ton (\$168 per metric ton) and increased only slightly to reach \$163 per short ton (\$180 per metric ton) by yearend.

Foreign Trade

Ammonia exports were about 63% lower than those in 2005 (table 8). Although the Republic of Korea continued to be the leading destination for United States exports of ammonia (70% in 2006), the total quantity fell significantly from that in 2005. Most of the material shipped to the Republic of Korea was produced at the Agrium plant in Alaska, and with the closure of part of the plant capacity, there was less ammonia available for export.

Ammonia imports were 9% lower than those in 2005 and were more than 30 times greater than the quantity of exports. The average value of ammonia imports increased to \$326 per metric ton from \$310 per ton in 2005 (table 9). Trinidad and Tobago (57%) continued to be the leading import source. Canada and Ukraine (14% each) were the remaining significant import sources.

Tables 10 and 11 list trade data for other nitrogen materials and include information on principal source or destination countries. Exports of nitrogen materials increased in 2006, with the exception of ammonia and MAP. Changes in import quantities of nitrogen materials were mixed compared with imports in 2005. In general, the materials with the largest quantity of imports (ammonia, nitrogen solutions, and urea) had lower imports compared with those in 2005. Ammonium nitrate imports, however, increased by 25% because of the closure of a significant portion of U.S. ammonium nitrate production capacity in 2005.

World Review

Anhydrous ammonia and other nitrogen materials were produced in more than 80 countries. Global ammonia production in 2006 of 124 Mt was slightly higher than that in 2005 (table 12). China, with 31% of total production, was the leading world producer of ammonia. Asia contributed 49% of total world ammonia production, and the Commonwealth of Independent States (CIS), Estonia, and Lithuania produced 14% of the global total. North America represented 10% of the total; Central and South America and Western Europe, 7% each; the Middle East, 6%; and Africa, Eastern Europe, and Oceania together contributed the remaining 7%.

In 2006, world ammonia exports of 15.9 Mt of contained nitrogen were slightly higher than those in 2005. Trinidad and Tobago, Russia, Ukraine, Indonesia, and Canada accounted for 67% of the world export total. North America (primarily the United States) imported 38% of global ammonia trade, followed by Asia (23%) and Western Europe (22%) (International Fertilizer Industry Association, 2007).

European Union.—In September 2000, the European Union (EU) established antidumping measures on imports of UAN solutions originating in Algeria, Belarus, Russia, and Ukraine. After a sunset review, completed in December 2006, that covered the period from July 1, 2004, to June 30, 2005, the EU determined that the antidumping duties on imports of UAN originating in the abovementioned countries should be maintained (Official Journal of the European Union, 2006a). The duties established in 2000 were as follows: Algeria, €6.88 per metric ton; Belarus, €17.86 per ton; Russia, €17.80 to €20.11 per ton, depending on the company; and Ukraine, €26.17 per ton.

In December, The European Fertiliser Manufacturing Association requested a review of antidumping measures in force on imports of urea into the EU from Belarus, Croatia, Libya, and Ukraine. The review was scheduled to be completed by May 2008 (Official Journal of the European Union, 2006b). In 2002, antidumping duties were established as follows: Belarus, €7.81 per ton; Croatia, €9.01 per ton; Libya, €11.55 per ton; and Ukraine €8.85 to €16.84 per ton, depending on the producer.

Algeria.—Orascom Construction Industries (OCI) announced that it had signed an initial agreement with the Algerian state-owned oil and gas company Sonatrach for the establishment of a 1-Mt/yr ammonia-urea complex near Arzew for a total investment cost of \$746 million. Based on the agreement and following necessary approvals, Sonatrach will also enter into a 20-year gas supply agreement with the new venture. In October 2005, OCI announced an investment in the fertilizer industry through a 50% stake in the Middle East Petrochemical Co., which in turn owned 60% of Egyptian Basic Industries Corp. that is currently constructing a 2,000-metric-ton-per-day (t/d) ammonia plant in Ain Sokhna, Egypt, scheduled for startup during early 2009 (Middle East Economic Digest, 2006).

Australia.—Burrup Fertilisers Pty. Ltd. opened its \$575 million, 760,000-t/yr ammonia plant in Burrup, Western Australia, in April. Total output will be piped from the plant directly to the port of Dampier for export markets, under a long-term agreement with Yara International ASA. The company has entered into a 25-year take-or-pay agreement for the supply

of natural gas from the Harriet Joint Venture (Green Markets, 2006i).

Orica Inc. announced that it was expanding its ammonium nitrate production capacity by 100,000 t/yr at its Kooragang Island, New South Wales, facility at a cost of \$12 million. The first 30,000 t/yr of additional capacity was operational in June. The company also added 277,000 t/yr of capacity at its Yarwun, Queensland, facility in August, bringing total capacity to 580,000 t/yr (Green Markets, 2006h).

After receiving the results of a feasibility study, Dyno Nobel Ltd. and CSBP Ltd. decided not to build a new 250,000-t/yr ammonium nitrate plant at the existing Queensland Nitrates plant in Moura, Queensland. High steel prices and labor costs were cited as reasons for the decision. Dyno Nobel, however, was continuing to evaluate the construction of an ammonium nitrate complex in Moranbah, Queensland. The project would include an ammonia plant, a nitric acid plant, and an ammonium nitrate plant sited near much of Queensland's mining activities (Dyno Nobel Ltd., 2006).

Bangladesh.—Karnafuli Fertiliser Co. Ltd. (Kafco) announced that it was planning to invest \$500 million in a 2,500-t/d granular urea plant, subject to approval by the company's board of directors. Production capacity at the company's complex in Anwara Upazila, Chittagong District, was 1,500 t/d of ammonia and 1,725 t/d of urea. About one-half of Kafco's urea was exported, but the additional capacity could help to relieve the country's urea deficit, which was estimated to be 400,000 t/yr (Fertilizer Week, 2006i). The Bangladesh Government also announced that it planned to renovate six stateowned urea plants. No timetable was given for the renovation.

Belgium.—Kemira GrowHow Oyj planned to spend \$26.8 million to improve energy efficiency at its Tertre ammonia plant by 5%. The revamp, scheduled to coincide with the plant's maintenance turnaround in the first quarter of 2008, will focus on carbon dioxide removal techniques and the ammonia synthesis loop (Fertilizer Week, 2006j).

Brazil.—After 2 years of negotiations, Fertilizantes Fosfatados S.A. (Fosfertil) received state approval to construct a new 400,000-t/yr ammonia plant in Três Lagoas, Mato Grosso do Sul State. This site was selected because of its proximity to large supplies of natural gas in Bolivia. Construction of the \$263 million plant was scheduled to begin in July and be completed within 3 years (Fertilizer Week, 2006f).

Canada.—Koch Nitrogen Fertilizer Holding Inc. (an indirect subsidiary of privately held Koch Industries Inc.) announced that it would acquire the nitrogen fertilizer business of Simplot Canada Ltd. This purchase included a fertilizer complex in Brandon, Manitoba, along with associated product distribution terminals in Watson and Tuxford, Saskatchewan, and Oak Bluff, Manitoba. No financial details were disclosed. The Simplot Canada complex had the capacity to produce 430,000 t/yr of ammonia and 280,000 t/yr of urea as well as facilities to produce nitric acid, UAN solutions, ammonium nitrate solution, ammonium polyphosphate, and ammonium thiosulfate (Green Markets, 2006g).

Agrium Inc. entered into a nonbinding memorandum of understanding with the Northern Lights Partnership to supply hydrogen and other products from a proposed Northern

Lights' bitumen upgrader and gasification facility to Agrium's Redwater, Alberta, nitrogen and phosphate operations. Hydrogen from the gasification facility would replace natural gas as the feedstock for the Redwater plant at an expected lower cost. Hydrogen prices would not be tied to New York Mercantile Exchange or Alberta Energy Co. natural gas prices and would therefore be more stable and predictable. Plant modifications would need to be made at the Redwater nitrogen complex in order for it to use a hydrogen feedstock—primarily to construct infrastructure and utilities to tie the two facilities together. Startup of the Northern Lights upgrader was scheduled for late 2010 and would be located adjacent to Agrium's Redwater facility (Green Markets, 2006b).

China.—A 300,000-t/yr-ammonia and 520,000-t/yr-urea complex reportedly came onstream in March. The new complex in Xinjiang Province was operated by Aksu Huajin Fertilizer Plant [a subsidiary of Liaoning Huajin Chemical (Group) Corp.]. In addition, Ningxia Petrochemical Co. (a subsidiary of PetroChina Co. Ltd.) completed a revamp of its ammonia-urea complex in March (Nitrogen + Syngas, 2006c).

Anhui Fuyang Haoyuan Chemical Group Co. Ltd. and investment firm Zhongying Yangtze River reportedly set up a \$3.76 billion joint venture to invest in various chemical projects, including an 800,000-t/yr urea plant. The new plant was scheduled to be constructed in Hubei Province and would be operational in the first quarter of 2008. The plant will use coalbased feed material (Fertilizer Week, 2006d).

In September, Sichuan Lutianhua Co. Ltd. announced that it would acquire 100% of the equity in Ningxia Jiemei Fengyou Chemical Co. (a joint venture between Sino Champion Ltd. and Ningxia Fengyou Chemical Co. Ltd.) for \$29.6 million. The joint venture, in which Sino Champion holds 90% ownership, was building a 440,000-t/yr ammonia unit and a 760,000-t/yr urea unit in Ningxia Province. The plants were scheduled to be completed in 2009. Lutianhua, which produced ammonia and urea at Luzhou, Sichuan Province, reportedly could not achieve full capacity operation because of natural gas supply restrictions, whereas the company expects to be able to operate at full capacity at the Ningxia site (FertilizerWEEK Online, 2006b).

In September, China National Petroleum Corp. began construction on its 450,000-t/yr ammonia and 800,000-t/yr urea plant in Xinjiang Province. The project will be constructed in Kuerle City at a cost of \$356 million. No timetable was given for project completion (Nitrogen + Syngas, 2006b).

Egypt.—Uhde GmbH was awarded two contracts to construct fertilizer complexes in Egypt. These contracts were nearly identical to four awarded to Uhde in 2004. As with these previous four contracts, these two were for ammonia-urea complexes with capacities of 1,200 t/d of ammonia and 1,925 t/d of urea granules. One of the contracts was from Misr Oil Processing Co. to build a complex in Damietta free trade zone, which was due to start production mid-2008. The other award was from Alexandria Fertilizer Co. (AlexFert) for a complex in El Amira, with startup expected by early 2009 (Fertilizer Week, 2006a; Uhde GmbH, 2006). Two of the four fertilizer complexes for which Uhde was awarded contracts in 2004 were opened in 2006. In May, AlexFert opened its ammonia-urea complex, and in October, Egyptian Fertilizer Co. opened its complex. These

added 2,400 t/d of ammonia production capacity and 3,850 t/d of urea production capacity.

France.—Yara International decided to stop production of ammonia temporarily at its plant in Le Havre beginning on July 1. As a result, onsite urea production will also stop beginning on the same date. The complex has production capacities of 400,000 t/yr of ammonia and 350,000 t/yr of urea. The decision to stop production was linked to high natural gas prices in Europe, and any restart will depend upon a drop in natural gas prices (Fertilizer Week, 2006q). The plant remained closed through yearend.

India.—By July, Indian Farmers Fertilizers Cooperative Ltd. (IFFCO) completed the conversion of the naphtha-based ammonia-urea complex in Phulpur, Uttar Pradesh, to natural gas feedstock. The company had signed an agreement for the supply of liquefied natural gas (LNG) with the Gas Authority of India in 2004. IFFCO estimated that the feedstock switch would save the company about \$21 million in subsidies annually (Fertilizer Week, 2006g).

In January, Krishak Bharati Cooperative Ltd. (Kribhco) and Shyam Basic Infrastructure Projects Private Ltd. took management control of Oswal Chemicals and Fertilizers Ltd.'s 864,000-t/yr urea plant in Shajahanpur, Uttar Pradesh. Kribhco operated the plant, renamed KRIBHCO Shyam Fertilizers Ltd. (KSFL), as a joint venture and increased capacity utilization and improved energy consumption (Fertilizer Week, 2006k).

Indonesia.—Instead of selling the PT Asean Aceh Fertilizer facility at auction, the Indonesian Government planned to invest \$10 million to get the urea plant working again. The plant had been closed since 2004 because of a shortage of natural gas. The Government planned to convert the unit in Lhokseumawe, Sumatra, from a gas-based plant to a coal-based plant. No timetable was given for the conversion (Fertilizer Week, 2006h).

In November, PT Petrokimia Gresik shut its ammonia and urea plants after an explosion in the East Java Gas Pipeline, which was owned by Pertamina, Indonesia's state oil company. The plants remained closed at yearend.

Iran.—Ghadir Urea & Ammonia Co. (51%-owned by Ghadir Investment Co. and 49%-owned by National Petrochemical Co.) opened its No. 4 ammonia-urea facility in the first quarter of 2006. The complex, in Pars Special Economic Energy Zone, Assaluyeh, had the capacity to produce 680,000 t/yr of ammonia and 1.08 Mt/yr of urea in its first phase. Natural gas feed will be supplied by Pars Oil and Gas Co. (Chemical Market Reporter, 2006).

In October, Indonesia announced plans to build an ammonia-urea complex in Iran because of the availability of low-cost natural gas. The \$700 million complex was scheduled to be constructed in Asiah and would consist of ammonia and urea units, each with a capacity of 3,000 t/d. The project was expected to be financed with loans from the Islamic Development Bank. Both countries needed to sign a memorandum of understanding before a construction schedule can be determined (Nitrogen + Syngas, 2007c).

In September, Arak Petrochemical Co. (ARPC) announced plans to build a 600,000-t/yr-ammonia and 1.1-Mt/yr-urea complex at its petrochemicals site at Ardebil. The cost of the project was estimated to be about \$521 million, and construction

was scheduled to take 3 years. Output from the proposed plants was aimed at users in Turkey. ARPC was formerly an affiliate of National Petrochemical Co. of Iran and the country's Ministry of Oil (FertilizerWEEK Online, 2006e).

Iraq.—The country's State Company for Fertilizers was expected to receive a \$150,000 loan from the Government of Japan to revamp its ammonia-urea complex near Basra in southern Iraq. The complex reportedly was producing at a rate of 200,000 t/yr of ammonia and 300,000 t/yr of urea, significantly less than its engineered capacity. In addition to refurbishing the unit, the loan would be used to bring the plant's total capacity back to 1 Mt/yr of ammonia and urea (Nitrogen + Syngas, 2007d).

Kazakhstan.—KazAzot conducted a feasibility study to construct an ammonia-urea complex with the capacity to produce 660,000 t/yr of ammonia and 825,000 t/yr of urea. A specific location for the project was not selected, but the Balkhash and Zhezkazgan regions were under consideration. Denmarks's Haldor Topsøe A/S was expected to provide the ammonia technology, and Italy's Snamprogetti S.p.A. would provide the urea technology (Nitrogen + Syngas, 2007a).

Nigeria.—O-Secul Fertilizer Co. Ltd., which acquired the assets of National Fertilizer Co. of Nigeria in 2005, announced a name change to Notore Chemical Industries Ltd. Notore signed a 20-year natural gas contract with Nigerian Gas Co. (NGC) (a subsidiary of Nigerian National Petroleum Corp.). Under the contract, NGC would supply Notore with an initial 48 million cubic feet per day of natural gas, eventually rising to 143 million cubic feet per day to support Notore's expansion program. Notore planned to begin production in March 2007 with the production of 1,700 t/d of urea, increasing this to 3,500 t/d by 2010 under a second project phase (Nigerian National Petroleum Corp., 2006).

Pakistan.—In December, Fatima Group secured a \$378 million loan from a consortium of local and foreign banks for its joint-venture project with the country's Arif Habib Group to build a fertilizer complex in Senjharpur in Rahim Yar Khan District of Punjab, central Pakistan. The project, which has been allocated its required natural gas feedstock from the Mari gasfield, comprises plants for the production of 500,000 t/yr of ammonia and 500,000 t/yr urea, in addition to other fertilizer products. The total cost of the project was expected to be more than \$475 million, with the balance of funding expected to come from the participants' equity. Startup of the complex was expected in 2008. In April, Arif Habib purchased Pak-American Fertilizers Ltd. (a subsidiary of National Fertilizer Corp. of Pakistan) from the Government (FertilizerWEEK Online, 2006c). Pak-American Fertilizers operated 600-t/d-ammonia and 1,050-t/d-urea plants at Iskanderabad, Mianwali District.

Papua New Guinea.—In October, India's Oswal Chemicals and Fertilizers Ltd. (OCFL) signed a memorandum of understanding with Australia-based Oil Search Ltd. to begin a bankable feasibility study on a joint-venture ammonia and urea project at Konebada, southeastern Papua New Guinea. The proposed project would include a 2,500-t/d ammonia plant and a 4,500-t/d granular urea unit; when completed, the plant's granulation unit would be the world's largest single-train unit. Natural gas feedstock would come from the Papua gasfield and would be dependent upon construction of the Papua New

Guinea gas pipeline project. The projected date for completion of the complex was 2010, but this date was highly dependent on the completion of the natural gas pipeline. OCFL planned to sell 500,000 to 600,000 t/yr of urea from the proposed plant to international traders with the balance earmarked for the Australian market (Fertilizer Week, 2006m).

Qatar.—Qatar Fertiliser Co. (Qafco) (the 75-25 joint venture between Qatar Petroleum Co. and Yara International) awarded Uhde a contact to build the Qafco-V complex at Mesaieed. The fifth complex has the company's largest design capacity—1.55 Mt/yr of ammonia and 1.2 Mt/yr of granular urea. This would raise Qafco's total production capacities to 3.6 Mt/yr of ammonia and 4.2 Mt/yr of granular urea. About 1.3 to 1.4 Mt/yr of the ammonia is for export. Qafco V was scheduled for completion in 2010 (Fertilizer Week America, 2006).

Romania.—In December, Romania's Authority for State Asset Recovery announced that it would reexamine its privatization strategy for fertilizer and explosives group Nitramonia. The authority had offered Nitramonia's five subsidiaries separately for privatization in 2005, but since that offering, it decided that each firm requires a different approach. Explosives producer Nitroexplosives was expected to be privatized by way of a share sale, and a controlling stake would be offered to interested investors in the remaining four companies. No deadline was set for a decision on how to proceed with the privatization (FertilizerWEEK Online, 2006a).

Russia.—In November, the state-controlled (51% ownership) natural gas producer Gazprom announced that it would consolidate all of its fertilizer assets into a new company called Sibur Mineral Fertilizers. The assets to be transferred included a 76% ownership in Kemerovo JSC Azot (Kemerovo), 26% in Cherepovets Azot, and 14% in Minudobreniya Rossosh JSC. Also included in the consolidation was JSC Orton, which processed production from Kemerovo. When combined, Gazprom's fertilizer subsidiaries will control almost 10% of Russian fertilizer production in terms of 100% pure nutrients, with total mineral fertilizer output of 1.3 Mt/yr and 2.6 Mt/yr of ammonia (Nitrogen + Syngas, 2007b).

Gazprom also was increasing natural gas prices to most of its customers in the former Soviet republics and Eastern Europe. The natural gas price in Belarus was expected to increase to \$200 per thousand cubic meters from \$47 per thousand cubic meters on January 1, 2007. In January 2006, Gazprom cut off natural gas to Ukraine for several days because of a price dispute. This was eventually settled with Ukraine agreeing to pay \$95 per thousand cubic meters in 2006 compared with the 2005 price of \$48 per thousand cubic meters and agreeing to a price increase in 2007 (\$130 per thousand cubic meters) and a further increase in 2008. In several cases, Gazprom has said it would reduce proposed gas tariffs increases if it acquired a controlling percentage ownership in the country's gas distribution pipelines. In Poland, the natural gas price was scheduled to increase by 10% to \$230 per thousand cubic meters in 2007. Moldova and Georgia were facing similar increases, but in Armenia, the natural gas rate was expected to stay the same at \$110 per thousand cubic meters until 2008 in exchange for a controlling stake in the country's gas distribution network. Faced with gas shortages, the Russian Government reportedly

announced that it would triple domestic natural gas prices by 2011 to about \$125 per thousand cubic meters (FertilizerWEEK Online, 2006d).

Togliatti Azot's new ammonia terminal on the Taman Peninsula was expected to be ready for commercial operation by the end of 2006. The new terminal was expected to handle Togliatti's 2.5 Mt/yr of ammonia exports within 1 to 2 years. The cost of the project was estimated to be \$200 million (Fertilizer Week, 2006n). Construction of the terminal began in 2002 with an expected completion date in 2003, but funding problems delayed the project.

JSC Acron purchased EniChem S.p.A.'s decommissioned ammonia and urea plants at Porto Marghera, Italy. Acron planned to relocate the plants to Dorogbuzh, Russia, and restart production by 2008. Most of the ammonia that would be produced from the 400,000-t/yr plant was expected to be converted to urea in the associated 350,000-t/yr plant (Nitrogen + Syngas, 2006a).

Serbia.—In May, Lithuanian companies Sanitex and Arvi together with Serbian firm Univerzal-Holding purchased the country's principal nitrogen complex Azotara Pancevo for about \$16.1 million. By October, the plant had restarted production after having been shut down for about 6 months. In December, the new owners began a €500,000 upgrade of the plant, which was expected to increase the plant's ammonia production capacity to 1,050 t/d from 936 t/d. The upgrade also was expected to reduce natural gas consumption by 15% and reduce nitric oxide emissions (HIP Azotara d.o.o., undated).

Trinidad and Tobago.—In May, the Terra Industries, CF Industries, and Trinidad-based ANSA McAL Ltd. joint venture announced that it had signed a project agreement with the Government of Trinidad and Tobago that included natural gas supply agreement, governmental economic development initiatives, and other considerations. The joint-venture company was named First UAN Trinidad Ltd. and was supposed to break ground on the nitrogen complex in the third quarter of 2006, with completion scheduled for the first quarter of 2009. The complex would have five plants—one ammonia, one urea, one nitric acid, and two UAN—to be sited in Union Industrial Estates in La Brea. Estimated cost of the proposed complex would be \$835 million, but this could increase because of escalating construction costs in the country (Green Markets, 2006c).

In addition, Methanol Holdings (Trinidad) Ltd. broke ground in March on a \$1.2 billion facility to produce ammonia (1,850 t/d), urea (2,100 t/d), nitric acid, ammonium nitrate, UAN, and melamine. In September, Toyo Engineering Corp. of Japan was awarded the engineering contract from MAN Ferrostaal AG of Germany. The complex was scheduled to be constructed in Point Lisas Industrial State (Green Markets, 2006m).

Yara International announced that it would conduct a feasibility study to add downstream products that include urea, ammonium nitrate, and UAN to its ammonia plants in Trinidad. The company operated three plants, one which it owned outright and two that were joint ventures with the Government (Fertilizer Week, 2006p).

Potash Corp. of Sasketchewan completed debottlenecking its four ammonia plants in Point Lisas, increasing production by approximately 138,000 t/yr. The revamp was completed in the

third quarter at a cost of about \$20 million (Nitrogen + Syngas, 2006e)

Turkmenistan.—The Turkmen Government announced an additional expansion at its Turkmendokun Joint Stock Association's MaryAzot production site. The Government planned to construct a 230,000-t/yr ammonia unit at the site; this was in addition to the urea plant that was under construction and scheduled to come onstream in mid-2008. Although no construction start date was announced, the Government estimated that it would require about 3½ years to complete the project. The plants were expected be constructed by China's CITIC Group within the framework of an intergovernmental agreement between Turkmenistan and China on cooperation within the chemical industry. The total cost of the project was estimated to be \$266 million, and about 90% would be financed by a tax credit from the Chinese Government (Nitrogen + Syngas, 2006f).

Ukraine.—In October, CherkassyAzot awarded Haldor Topsøe a tender to revamp its ammonia plant. The modernization was expected to improve energy efficiency by reducing gas consumption by 33.3% per metric ton of ammonia. In addition, production capacity of the plant was expected to increase by 25% to 1,780 t/d from 1,400t/d. The estimated cost of the project was \$30 million, and the engineering work was expected to be completed by yearend 2007 (Fertilizer Week, 2006b). The company also planned to expand its prilled urea production to 3,000 t/d from 2,000 t/d by 2008 at a cost of \$40 million. The additional production would be exported to Brazil and India (Fertilizer Week, 2006c).

United Arab Emirates.—Rather than construct an ammonia and urea complex from scratch, as was originally planned, Oman Chemicals and Pharmaceuticals LLC announced plans to reassemble a secondhand plant from the United States in the Emirate of Sharjah. The reassembled plant (Farmland Industries' shuttered Lawerence, KS, plant) was scheduled to be operational in 2007. The relocation-and-reconstruction project, along with the construction of new ammonia storage tanks, was estimated to cost \$200 million (Nitrogen + Syngas, 2006d).

United Kingdom.—In October, Terra Industries and Kemira GrowHow announced that they had entered into a memorandum of understanding to create a new 50-50 joint venture to operate the fertilizer and associated chemicals businesses of both companies in the United Kingdom. The memorandum of understanding was subject to clearance from the United Kingdom competition authorities; this was expected to happen in 2007 (Green Markets, 2006l). Terra operated two nitrogen manufacturing facilities in the United Kingdom in Severnside and Teesside, and Kemira GrowHow operated a nitrogen facility in Ince. These plants had been operated at reduced capacity because of high natural gas prices.

Venezuela.—In February, Orica Ltd. and Petroquímica de Venezuela S.A. (Pequiven) signed a project development agreement to investigate the feasibility of constructing an ammonia and ammonium nitrate plant at the petrochemical complex of José in a 50-50 joint venture. Production capacities at the proposed plant were 726,000 t/yr of ammonia and 270,000 t/yr of ammonium nitrate. If financial and regulatory conditions are met, then construction was expected to start in 2007 with

first production in 2009. Latin America would be the target market for the ammonium nitrate, which will be used as both a fertilizer and an industrial explosive. The plant also would produce ammonia for sale (Fertilizer Week, 2006l).

Pequiven and Russia's JSC Azot Agrochemical Corp. also signed a memorandum of understanding to build two or three fertilizer plants in Venezuela. The units were expected to produce urea, ammonia and ammonium nitrate. According to the agreement, Pequiven would have a 59% stake in the venture and 41% would be held by Azot Agrochemical (FertilizerWEEK Online, 2006f).

Vietnam.—Construction of Vietnam National Chemical Corp.'s (Vinachem) 560,000-t/yr prilled urea plant in northern Ninh Binh Province, which was approved in 2005, was delayed because the company did not receive the expected financing from the Government of China. In November, however, Vinachem and Haun Qiu Co. of China signed a \$432 million agreement to construct the coal-based urea plant. The project still would require a development assistance loan package from the Chinese Government, which had not been approved by yearend. The proposed complex would have production capacities of 320,000 t/yr of ammonia and 560,000 t/yr of urea (Fertilizer Week, 2006o). Vinachem's proposed plant in Ninh Binh would be the second coal-based urea unit in the country. The country's existing coalbased unit, Ha Bac, was operated by Nitrogenous Fertilizer and Chemical Co. (Hanichemco) and owned by Vinachem. In August, Hanichemco announced that it planned to expand the capacity of the 180,000-t/yr Ha Bac urea plant to 480,000 t/yr. The cost of the expansion was estimated to be \$250 million. Hanichemco expected to submit the expansion plant to Vinachem, but financing for the project was not determined (Fertilizer Week, 2006e).

Outlook

According to U.S. Department of Agriculture (USDA), U.S. corn growers intended to plant 36.6 million hectares (Mha) of corn for all purposes in the 2007 crop year (July 1, 2006, to June 30, 2007), a 15% increase from that in 2006 and 11% higher than that in 2005. If this estimate is accurate, this would be the highest acreage planted since 1944, when 38.6 Mha was planted for all purposes (U.S. Department of Agriculture, National Agricultural Statistical Service, 2007). The increase in projected plantings was principally in response to the expected increase in consumption of corn for ethanol production.

According to long-term projections from the USDA, projected plantings for the eight major field crops in the United States increase from about 98.3 Mha in 2006 to about 100 Mha during most of the projection period, as higher prices and producer net returns bring land into production (U.S. Department of Agriculture, Economic Research Service, 2007; 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. Large increases are projected in corn used for ethanol production duringr the next several years. Relatively high prices for oil would contribute to favorable returns

for ethanol production, which, when combined with Government programs would provide economic incentives for a large expansion in ethanol production capacity. Feed and residual use of corn was projected to decline in the initial years and then rise only moderately as increased feeding of distillers grains (a coproduct of dry mill ethanol production) helps meet livestock feed demand. Gains in food and industrial uses of corn (other than for ethanol production) were projected to be smaller than increases in population. Consumer dietary concerns and other changes in tastes and preferences would limit increases in the combined use of corn for high-fructose corn syrup, glucose, and dextrose to about one-half the rate of population gain. U.S. corn exports were expected to fall during the next several years as more corn is used domestically in the production of ethanol. After growth in ethanol production in the United States slows, U.S. corn exports would rise in response to stronger global demand for feed grains to support growth in meat production. In addition, United States corn exports to Mexico were projected to increase because of the elimination of tariffs on corn imports from the United States.

Although natural gas prices in the United States have stabilized somewhat, they are still significantly higher than those in the rest of the world. This means that ammonia capacity at older, higher cost U.S. plants is still at risk of closure. For example, in the Middle East, the natural gas cost was estimated to be about \$0.75 per million British thermal units and in Trinidad and Tobago, the cost was estimated to be \$2.50 per million British thermal units (Potash Corp. of Saskatchewan, 2007, p. 42). The U.S. Department of Energy projected that the Henry Hub natural gas spot price in the United States was expected to average \$7.84 per thousand cubic feet in 2007 (\$7.60 per million British thermal units), 90 cents above the 2006 average, and \$8.16 per thousand cubic feet in 2008 (7.91 per million British thermal units) (U.S. Department of Energy, Energy Information Administration, 2007).

From the beginning of 2001, when natural gas prices began to spike in the winter, until the end of 2006, U.S. ammonia production capacity has declined by 4.9 Mt/yr, or 28% of the 2001 capacity. The interest that United States firms have shown in constructing new plants outside the United States, particularly in Trinidad and Tobago, indicated that in the future, much of the United States supply of ammonia was expected to be supplied by foreign production.

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 $\label{eq:table 1} \textbf{TABLE 1}$ SALIENT AMMONIA STATISTICS $^{1,\,2}$

(Thousand metric tons of contained nitrogen unless otherwise specified)

	2002	2003	2004	2005	2006
United States:					
Production	10,300	8,450	8,990	8,340 °	8,520 ^p
Exports	437	400	381	525	194
Imports for consumption	4,670	5,720	5,900	6,520	5,920
Consumption, apparent ³	14,500	13,900	14,400	14,400 ^r	14,300 ^p
Stocks, December 31, producers'	286	195	298	254 ^r	182
Average annual price, free on board Gulf Coast ⁴ dollars per short ton	137	245	274	314	302
Net import reliance as a percentage of apparent consumption ⁵	29	39	38	42 ^r	40 ^p
Natural gas price, wellhead, average price ⁶ dollars per thousand cubic feet	2.95	4.88	5.46	7.33 ^r	6.42 ^p
World:					
Production	109,000	110,000	117,000	122,000 ^r	124,000 ^e
Trade ⁷	12,900	13,900	14,600	15,600	15,900

^eEstimated. ^pPreliminary. ^rRevised.

¹Data are rounded to no more than three significant digits.

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

³Calculated from production plus imports minus exports and industry stock changes.

⁴Source: Green Markets.

⁵Defined as imports minus exports; adjusted for industry stock changes.

⁶Source: Monthly Energy Review, U.S. Department of Energy.

⁷Source: International Fertilizer Industry Association Statistics, World Anhydrous Ammonia Trade.

 $\label{eq:table 2} \text{ANHYDROUS AMMONIA SUPPLY AND DEMAND IN THE UNITED STATES}^1$

(Thousand metric tons of contained nitrogen)

	2004	2005	2006 ^p
Production:			
Fertilizer:			
January-June	4,240	4,160 °	3,420
July-December	4,230	3,300 ^r	4,160
Total	8,470	7,450 ^r	7,580
Nonfertilizer:			
January-June	273	402 ^r	471
July-December	251	482 ^r	464
Total	524	884 ^r	935
Grand total	8,990	8,340 °	8,520
Imports for consumption:			
January-June	3,060	3,250	3,000
July-December	2,840	3,270	2,920
Total	5,900	6,520	5,920
Exports:			
January-June	196	250	116
July-December	185	275	78
Total	381	525	194
Stocks, end of period:			
January-June	228	227 ^r	234
July-December	298	254 ^r	182
Apparent consumption: ²			
January-June	7,350	7,640 ^r	6,790
July-December	7,060	6,740 ^r	7,520
Total	14,400	14,400 °	14,300

^pPreliminary. ^rRevised.

Source: U.S. Census Bureau.

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

 $^{^2\}mbox{Calculated}$ from production plus imports minus exports and industry stock changes.

 ${\it TABLE~3}$ MAJOR DOWNSTREAM NITROGEN COMPOUNDS PRODUCED IN THE UNITED STATES $^{1,\,2}$

(Thousand metric tons)

		2005					2006 ^p					
	January-June		July-December ^r To		Total ^r Januar		January-June		July-December		Total	
	Gross	Nitrogen	Gross	Nitrogen	Gross	Nitrogen	Gross	Nitrogen	Gross	Nitrogen	Gross	Nitrogen
	weight	content	weight ^r	content	weight	content	weight	content	weight	content	weight	content
Urea	2,990 °	1,370 °	2,280	1,050	5,270	2,420	2,550	1,170	2,890	1,330	5,430	2,490
Ammonium phosphates ^{e, 3}	7,500	1,270	6,950	1,150	14,500	2,420	6,400	1,040	6,260	1,060	12,700	2,100
Ammonium nitrate	3,580 ^r	1,210 ^r	2,970	1,010	6,540	2,220	2,950	999	3,350	1,140	6,300	2,140
Nitric acid	3,630 ^r	799 ^r	3,080	678	6,710	1,480	3,070	676	3,570	785	6,640	1,460
Ammonium sulfate ⁴	1,350 ^r	286 ^r	1,290	273	2,640	559	1,290	274	1,310	278	2,600	552

^eEstimated. ^pPreliminary. ^rRevised.

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

 ${\it TABLE~4}$ Domestic producers of anhydrous ammonia in 2006^1

(Thousand metric tons per year of ammonia)

Company	Location	Capacity ²
Agrium Inc.	Borger, TX	490
Do.	Finley, WA ³	180
Do.	Kenai, AK	280
CF Industries Inc.	Donaldsonville, LA	2,040
Coffeyville Resources LLC	Coffeyville, KS	375
Dakota Gasification Co.	Beulah, ND	363
Dyno Nobel ASA	Cheyenne, WY	174
Do.	St. Helens, OR	101
El Dorado Chemical Co.	Cherokee, AL	175
Green Valley Chemical Corp.	Creston, IA	32
Honeywell International Inc.	Hopewell, VA	530
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 (Valero Energy Corp.)	Dumas, TX ⁴	128
PCS Nitrogen Inc.	Augusta, GA	688
Do.	Geismar, LA ³	483
Do.	Lima, OH	542
Rentech Energy Midwest Corp. ⁵	East Dubuque, IL	278
Shoreline Chemical	Gordon, GA	31
Terra Industries Inc.	Beaumont, TX ³	231
Do.	Port Neal, IA	336
Do.	Verdigris, OK	953
Do.	Woodward, OK	399
Do.	Yazoo City, MS	454
Total		12,700

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

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

²Ranked in relative order of importance by nitrogen content.

³Diammonium phosphate and monoammonium phosphate.

⁴Excludes coke plant ammonium sulfate.

 $^{^{2}}$ Engineering design capacity adjusted for 340 days per year of effective production capability. 3 Idle.

⁴Closed in 2006.

⁵Purchased from Royster-Clark Inc. in 2006.

 ${\it TABLE~5}$ U.S. NITROGEN FERTILIZER CONSUMPTION, BY PRODUCT TYPE $^{1,\,2}$

(Thousand metric tons of nitrogen)

Fertilizer material ³	2005	2006 ^p
Single-nutrient:		
Anhydrous ammonia	2,870	2,840
Nitrogen solutions ⁴	2,860	2,750
Urea	2,170	2,240
Ammonium nitrate	437	296
Ammonium sulfate	224	231
Aqua ammonia	79	75
Other ⁵	315	341
Total	8,950	8,770
Multiple-nutrient ⁶	2,340	2,240
Grand total	11,300	11,000

^pPreliminary.

Source: Terry, D.L., and Kirby, B.J., 2007, Commercial fertilizers 2006: Lexington, KY, Association of American Plant Control Officials Inc. and The Fertilizer Institute, 41 p.

 $\label{eq:table 6} {\it U.S. PRODUCER STOCKS OF FIXED NITROGEN} \\ {\it COMPOUNDS AT END OF PERIOD}$

(Thousand metric tons of contained nitrogen)

Material ¹	2005	2006 ^p
Ammonia:		
January-June	227 ^r	234
July-December	254 г	182
Nitrogen solutions: ²		
January-June	152 ^r	132
July-December	122 ^r	139
Urea:		
January-June	37 ^r	67
July-December	63 ^r	47
Ammonium phosphates: ³		
January-June	63	78
July-December	85 ^r	49
Ammonium nitrate:		
January-June	35 ^r	54
July-December	42 ^r	52
Ammonium sulfate:		
January-June	22	30
July-December	39 ^r	27
Yearend total ⁴	605 г	496
Saa faatnatas at and of tabla		

See footnotes at end of table.

 $^{^{1}\}mathrm{Data}$ are rounded to no more than three significant digits; may not add to totals shown.

²Fertilizer years ending June 30.

³Ranked in relative order of importance by product type.

⁴Principally urea-ammonium nitrate solutions, 29.9% nitrogen.

⁵Includes other single-nutrient nitrogen materials, all natural organics, and statistical discrepencies.

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

TABLE 6—Continued U.S. PRODUCER STOCKS OF FIXED NITROGEN COMPOUNDS AT END OF PERIOD

^pPreliminary. ^rRevised.

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

 ${\it TABLE~7}$ PRICE QUOTATIONS FOR MAJOR NITROGEN COMPOUNDS AT END OF PERIOD

(Dollars per short ton)

	2005		2006	
Compound	June	December	June	December
Ammonium nitrate, free on board (f.o.b.) Corn Belt ¹	225	265-270	255-260	250-260
Ammonium sulfate, f.o.b. Corn Belt ¹	210-218	195-200	150-152	160-165
Anhydrous ammonia:				
F.o.b. Corn Belt ¹	335-375	475-490	330-355	360-385
F.o.b. Gulf Coast ²	305	360	242-245	315-320
Diammonium phosphate, f.o.b. central Florida	210-213	230-233	225-232	220-221
Urea:				
F.o.b. Corn Belt, 1 prilled and granular	285-300	300-325	232-255	295-305
F.o.b. Gulf Coast, granular ²	250-255	260-267	190-195	265-280

¹Illinois, Indiana, Iowa, Missouri, Nebraska, and Ohio.

¹Ranked in relative order of importance.

 $^{^2\}mbox{Urea-ammonium}$ nitrate and ammoniacal solutions.

³Diammonium and monoammonium phosphates.

⁴Calendar year ending December 31.

²Barge, New Orleans, LA.

 ${\bf TABLE~8}$ U.S. EXPORTS OF ANHYDROUS AMMONIA, BY COUNTRY 1

(Thousand metric tons of ammonia)

Country	2005	2006
Canada	10	33
Chile	17	17
China	38	(2)
Korea, Republic of	552	166
Mexico	10	2
Taiwan	8	10
Other	4	8
Total	639	236

¹Value data suppressed by U.S. Census Bureau.

Source: U.S. Census Bureau.

 $\label{eq:table 9} \text{U.S. IMPORTS OF ANHYDROUS AMMONIA, BY COUNTRY}^1$

(Thousand metric tons of ammonia and thousand dollars)

	200)5	2006		
Country	Gross weight	Value ²	Gross weight	Value ²	
Canada	1,340	451,000	1,010	389,000	
Latvia	118	33,500			
Russia	426	136,000	670	217,000	
Trinidad and Tobago	4,490	1,370,000	4,070	1,280,000	
Ukraine	1,160	349,000	976	305,000	
Venezuela	148	44,800	252	76,600	
Other	244 ^r	75,900 ^r	219	77,800	
Total	7,930	2,460,000	7,200	2,350,000	

Revised. -- Zero.

²Less than ½ unit.

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

²Cost, insurance, and freight value.

 ${\it TABLE~10}$ U.S. EXPORTS OF MAJOR NITROGEN COMPOUNDS 1

(Thousand metric tons)

	2	005	2	006	
	Gross	Nitrogen	Gross	Nitrogen	
Compound	weight	content	weight	content	Principal destinations, 2006
Ammonium nitrate ²	82	28	127	43	Mexico, 84%; Canada, 14%.
Ammonium sulfate ²	665	180	1,010	272	Brazil, 53%; Dominican Republic, 8%; Canada, 8%.
Anhydrous ammonia	639	525	236	194	Republic of Korea, 70%; Canada, 14%.
Diammonium phosphate	5,620	1,010	5,660	1,020	India, 35%; China, 16%; Mexico, 7%.
Monoammonium phosphate	2,890	318	2,310	254	Canada, 27%; Australia, 14%; Brazil, 12%.
Urea	536	246	656	301	Mexico, 48%; Republic of Korea, 20%; Chile, 16%.
Total	10,400	2,310	9,990	2,080	

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

Source: U.S. Census Bureau.

 $\label{eq:table 11} \text{U.S. IMPORTS OF MAJOR NITROGEN COMPOUNDS}^1$

(Thousand metric tons and thousand dollars)

		2005			2006		
	Gross	Nitrogen		Gross	Nitrogen		
Compound	weight	content	Value ²	weight	content	Value ²	Principal sources, 2006
Ammonium nitrate ³	886	300	189,000	1,110	376	263,000	Canada, 49%; Romania, 18%.
Ammonium nitrate-							
limestone mixtures	2	1	209	4	1	253	India, 76%; Japan, 23%.
Ammonium sulfate ³	280	59	45,200	339	72	56,400	Canada, 88%.
Anhydrous ammonia ⁴	7,930	6,520	2,220,000	7,200	5,920	2,350,000	Trinidad and Tobago, 57%; Canada, 14%; Ukraine, 14%.
Calcium nitrate	119	20	13,100	157	27	17,200	Norway, 99%.
Diammonium phosphate	10	2	9,130	54	10	32,000	Russia, 87%.
Monoammonium phosphate	141	16	56,400	96	11	35,600	Canada, 48%; Russia, 28%.
Nitrogen solutions	2,820	844	543,000	1,980	591	383,000	Russia, 34%; Canada, 26%; Romania, 12%.
Potassium nitrate	87	12	33,900	150	21	59,900	Chile, 67%; Israel, 30%.
Potassium nitrate-sodium							
nitrate mixtures	6	1	2,250	(5)	(5)	184	Canada, 90%.
Sodium nitrate	71	12	20,000	75	12	23,100	Chile, 86%; Germany, 13%.
Urea	5,670	2,600	1,540,000	5,030	2,310	1,340,000	Canada, 36%; Qatar, 10%; Kuwait, 10%.
Total	18,000	10,400	4,670,000	16,200	9,350	4,550,000	

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

Source: U.S. Census Bureau.

²Includes industrial chemical products.

²Cost, insurance, and freight value.

³Includes industrial chemical products.

⁴Includes industrial ammonia.

⁵Less than ½ unit.

 ${\it TABLE~12}$ AMMONIA: WORLD PRODUCTION, BY COUNTRY $^{1,\,2}$

(Thousand metric tons of contained nitrogen)

Country	2002	2003	2004	2005	2006 ^e
Afghanistan ^e	20	20	20	20	20
Albania ^e	10	10	10	10	10
Algeria	563	578	543	550	470
Argentina	634 ^r	727 ^r	705 ^r	655 ^r	727 3
Australia	686	787	790 ^e	790 ^e	1,200
Austria ^e	440	440	440	440	440
Bahrain	377	312	311	330 ^r	370
Bangladesh ⁴	1,289	1,389	1,380	1,380	1,250
Belarus	799	726	765 ^e	800	850
Belgium	842	874	857	860	850
Bosnia and Herzegovina ^e	1	1	1	1	1
Brazil	1,021	939	1,077	950 ^r	950 ^p
Bulgaria	328	321	389	390	350
Burma	21	63	35 ^e	30 ^e	30
Canada	3,700	3,662	4,107	4,100 ^r	4,000
China	30,200	31,500	34,770 ^r	37,850 ^r	39,000
Colombia	111	108	98	100	100
Croatia	235	264	332	330	330
Cuba ^e	15 ^r	21 ^r	51 ^r	28 ^r	28
Czech Republic	215	235	233	235 ^r	220
Denmark ^e	2	2	2	2	2
Egypt	1,839	1,790	1,675	1,640	1,800
Estonia	39	81	166	170	170
Finland ^e	87	77	61	63	62
France	1,172	1,153	1,120	1,150	575
Georgia	90	125	130 ^e	130 ^e	140
Germany	2,560 ^r	2,803	2,741	2,289 ^r	2,300
Greece	66	123	132	130 ^e	130
Hungary	238	232	304	300	300
India ⁵	9,827	10,048	10,718	10,800 ^e	10,900
Indonesia	4,200	4,250	4,120	4,400	4,300
Iran	1,119	1,115	1,088	1,020	1,020
Iraq ^e	532		30	130 °	174
Ireland ^e	400				
Italy	391	475	532	500	500
Japan	1,192	1,061	1,101	1,083	1,100
Korea, North ^e	100	100	100	100	100
Korea, Republic of	153	119	163	165 ^{r, e}	90
Kuwait	414	444	413	467 ^r	470
Libya	533	577 °	577 ^e	580	520
Lithuania	468	462	424	430	450
Malaysia	848	910	843	920 ^e	950
Mexico	559 ^r	439 ^r	560 ^r	423 ^r	487
Netherlands	2,053	1,750 °	1,970 °	1,700	1,800
New Zealand	109	128	124	120	120
Norway	330	354	420	300 ^r	350
Oman			420	620 ^r	900
Pakistan		2.257			
	2,214 5	2,357	2,114	2,114 ^r	2,200
Peru ^e		5	5	5	2 100
Poland	1,311	1,906	1,984 ^r	2,080 °	2,100
Portugal	190	245	244	244 ^r	150
Qatar	1,166	1,185	1,428	1,750 ^r	1,750
Romania	930	1,180	1,172	1,200	1,050
Russia	8,600 e	9,100 ^e	9,800	10,000	10,500 ³

See footnotes at end of table.

$\label{eq:table 12-Continued} \mbox{AMMONIA: WORLD PRODUCTION, BY COUNTRY}^{1,\,2}$

(Thousand metric tons of contained nitrogen)

Country	2002	2003	2004	2005	2006 ^e
Saudi Arabia	1,737	1,743	1,726	1,780	2,000
Serbia and Montenegro ⁶	115	62	136	135	135
Slovakia	226	230	267 ^r	270	250
South Africa	492	493	459	460	480
Spain	415	432	404	460	400
Switzerland	33	29	32	32	32
Syria	143	161	115	120 ^e	170
Taiwan	11	11	11 ^e	11 ^e	12
Tajikistan ^e	15	20	20	20	18
Trinidad and Tobago	3,259 ^r	3,529	3,875	5,187 ^r	5,190
Turkey	301	289	329	330	100
Turkmenistan ^e	85	85	85	85	90
Ukraine	3,700	3,900 ^e	3,900 ^e	4,300	4,200
United Arab Emirates	364	421	380	360	380
United Kingdom	837	1,044	1,071	1,080	850
United States ⁷	10,300	8,450	8,990	8,040	8,520 ^p
Uzbekistan	740	815 ^e	840 ^e	850	870
Venezuela	666	732	1,012	900	1,160
Vietnam	58	80 ^e	216	450 ^r	420
Zimbabwe ^e	61	55	48	30	10
Total	109,000	110,000	117,000	122,000 ^r	124,000

^eEstimated. ^pPreliminary. ^rRevised. -- Zero.

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

²Table includes data available through June 18, 2007.

³Reported figure.

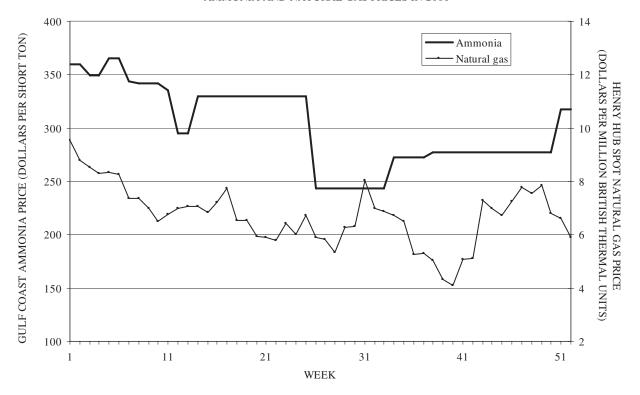
⁴May include nitrogen content of urea.

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

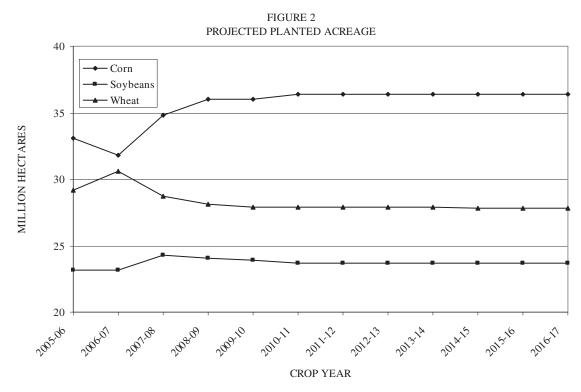
⁶In June 2006, Montenegro and Serbia formally declared independence from each other and dissolved their union. Mineral production data for 2006, however, still reflect the unified country.

⁷Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.

FIGURE 1 AMMONIA AND NATURAL GAS PRICES IN 2006



Sources: Green Markets and Natural Gas Weekly.



Source: U.S. Department of Agriculture.