



2008 Minerals Yearbook

EXPLOSIVES

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In 2008, U.S. explosives consumption was 3.42 million metric tons (Mt), about an 8% increase from that of 2007; sales of explosives were reported in all States except Delaware. Coal mining, with 69% of total consumption, continued to be the dominant use for explosives in the United States. Wyoming, West Virginia, and Kentucky, in descending order, led the Nation in coal production, accounting for 64% of the total. These States were also the leading explosives-consuming States, accounting for 44% of total U.S. explosives sales.

Legislation and Government Programs

The U.S. Department of Homeland Security (DHS) issued an Advanced Notice of Proposed Rulemaking (ANPR) to seek comments on the amendment to the Secure Handling of Ammonium Nitrate Program on October 30, 2008. Congress enacted the Secure Handling of Ammonium Nitrate Act on December 26, 2007. The Act gave DHS the authority to regulate entities and individuals that produce, sell, or distribute ammonium nitrate. This bill also allowed the DHS, working with the U.S. Department of Agriculture, to develop regulations to create a registry of those who handle ammonium nitrate-based fertilizer.

The ANPR was seeking comments on the amendment's proposed regulation on the sale and handling of ammonium nitrate, which would place stronger restrictions on the sale of ammonium nitrate. Ammonium nitrate purchasers would be required to apply for registration numbers from the DHS. The identities of all prospective purchasers would be compared against the U.S. Government's Terrorist Screening Database. Ammonium nitrate distribution, manufacturing, or storage facilities would be required to keep records of all sales for at least 2 years, report any loss or theft of ammonium nitrate within 1 day, and make records available for audits and inspections. The rule would complement the Chemical Facility Anti-Terrorism Standards, which seeks to regulate the storage and transportation of ammonium nitrate as well as other dangerous chemicals. Written comments were to be submitted to the DHS by December 29, 2008 (Department of Homeland Security, 2008).

Production

Sales of ammonium-nitrate-based explosives (blasting agents and oxidizers) were 3.38 Mt, which was about a 9% increase from those in 2007, and accounted for 99% of U.S. industrial explosives sales. Sales of permissibles were 40% higher than those in 2007, and sales of other high explosives decreased by 11% (table 1).

Companies contributing data to this report, including those that are not members of the Institute of Makers of Explosives (IME), are as follows:

Accurate Energetic Systems, LLC

Apache Nitrogen Products, Inc.¹
Austin Powder Co.
Baker Atlas (a division of Baker Hughes Inc.)
Davey Bickford USA, Inc.
Douglas Explosives, Inc.
Dyno Nobel Inc.
GEODynamics, Inc.
Jet Research Center (a division of Halliburton Co.)
Maine Drilling & Blasting Inc.
Maxam North America, Inc.
Nelson Brothers Inc.
Orica USA Inc.
Owen Oil Tools LP (a division of Core Laboratories N.V.)
Schlumberger Oilfield Services
Senex Explosives Inc.
Titan Specialties Ltd.
Vet's Explosives Inc.
Viking Explosives and Supply Inc.
W.A. Murphy, Inc.

Consumption

The principal application for explosives in the United States was coal mining, accounting for 69% of the total explosives consumption (table 2). In 2008, U.S. coal production increased slightly to a record level of 1.06 billion metric tons, according to preliminary data from the U.S. Department of Energy, Energy Information Administration (EIA) (U.S. Department of Energy, Energy Information Administration, 2009, p. 18). Coal production increased in the Appalachian and western regions by 3.2% and 2.0%, respectively, compared with 2007 for those regions. In the interior region, coal production remained about the same (Fremer, 2009, p. 5). Three States (Wyoming, West Virginia, and Kentucky), in descending order, led the Nation in coal production, accounting for 64% of the total. These States were also the leading explosives-consuming States.

Construction, the second ranked consuming industry, accounted for 11% of total explosives sales; quarrying and nonmetal mining, 10%; metal mining, 8%; and miscellaneous uses, 2%. Wyoming, West Virginia, Kentucky, Indiana, Virginia, Nevada, Texas, and Pennsylvania were, in descending order, the leading consuming States (greater than 100,000 metric tons sold), with a combined total of 65% of U.S. sales (table 3).

The dollar value of new construction (residential and nonresidential) put in place in 2008 decreased by 6.8% compared with that in 2007 (U.S. Census Bureau, 2009). Based on monthly data, the seasonally adjusted industry growth rate from 2007 to 2008 for metal mining was 3.6%, and the growth rate for quarrying and nonmetallic mineral mining was -13.2% (Federal Reserve Board, 2009).

¹Company not a member of the IME.

Classification of Industrial Explosives and Blasting Agents.—Apparent consumption of commercial explosives used for industrial purposes in this report is defined as sales as reported to the IME. Commercial explosives imported for industrial uses were also included in sales. The principal distinction between high explosives and blasting agents is their sensitivity to initiation. High explosives are cap sensitive, whereas blasting agents are not. Black powder sales were minor and were last reported in 1971. The production classifications used in this report are those adopted by the IME.

High Explosives.—*Permissibles.*—The Mine Safety and Health Administration (MSHA) approved grades by brand name as originally established by the National Institute for Occupational Safety and Health (NIOSH) testing.

Other High Explosives.—These include all high explosives except permissibles.

Blasting Agents and Oxidizers.—These include ammonium nitrate-fuel oil (ANFO) mixtures, regardless of density; slurries, water gels, or emulsions; ANFO blends containing slurries, water gels, or emulsions; and ammonium nitrate in prilled, grained, or liquor (water solution) form. Bulk and packaged forms of these materials are contained in this category. In 2008, about 95% of the total blasting agents and oxidizers sales was in bulk form.

World Review

In June, Dyno Nobel was acquired by Incitec Pivot Ltd. for A\$3.9 billion. In 2007, Incitec Pivot had acquired a 13% strategic stake in Dyno Nobel. Incitec Pivot would expand its explosives and fertilizer markets into North America. Dyno Nobel was the leading manufacturer and supplier of explosives in North America (Incitec Pivot Ltd., 2009, p. 10).

Australia.—Shortly after the acquisition of Dyno Nobel, Incitec Pivot approved the construction of the ammonium nitrate manufacturing complex at Moranbah in Central Queensland at a cost of \$885 million. The Moranbah project involves the construction of a 330,000-metric-ton-per-year (t/yr) fully integrated ammonium nitrate complex. The project was expected to be operational by 2011. This project originally started by Dyno Nobel had been abandoned in December 2007 owing to delays and cost pressures. Incitec Pivot reassessed the cost for completing the project and concluded that it was profitable even at higher cost than Dyno Nobel's original estimate (Incitec Pivot Ltd., 2008).

A memorandum of understanding was established between Yara International ASA and Burrup Holdings Ltd. to begin construction on a technical ammonium nitrate plant. The facility will be located in the Pilbara region of Australia and will produce 350,000 t/yr of ammonium nitrate. The joint venture called Burrup Nitrates Ltd. is a 50-50 share between the two companies (Nitrogen + Syngas, 2008).

Canada.—The Government of Canada enacted a regulation to control the sale of chemicals that can be used to make explosives. Sellers of certain chemicals, including ammonium nitrate, must register with the Explosives Regulatory Division of Natural Resources Canada and comply with security measures for customer identification, record keeping, and storage. The

regulation for ammonium nitrate took effect June 1, 2008 (Green Markets, 2008a).

India.—Deepak Fertilisers and Petrochemicals Corp. Ltd. entered into a \$14 billion agreement with Yara International ASA to produce and market ammonia nitrate and specialty fertilizers in India. The joint venture will also invest in the 300,000-t/yr ammonium nitrate plant under construction at Paradip in Orissa State scheduled to be completed in 2011 (Deepak Fertilisers and Petrochemicals Corp. Ltd., 2008).

Indonesia.—PT Kaltim Nitrate Indonesia (KNI) (a joint venture between PT Armindo Group and Orica Ltd. of Australia) planned to build a new ammonium nitrate plant at a cost of \$550 million. The plant in Bontang, East Kalimantan, would have a capacity of 300,000 t/yr and will produce ammonium nitrate for the Indonesian mining industry. The plant was expected to be operational by 2011 (Green Markets, 2008b).

Indonesian ammonium nitrate producer, PT Multi Nitrotama Kimia (MNK), was building a new explosive-grade ammonium nitrate plant in its industrial site in Cikampel, West Java, at a cost of \$56 million. The plant was expected to have a capacity of 100,000 t/yr of ammonium nitrate and was expected to be completed by 2009 (Nitrogen + Syngas, 2009). MNK reportedly controlled 70% of Indonesia's market for explosives, which was estimated to be about 300,000 t in 2008 (Jakarta Post, 2008).

Peru.—Orica acquired its joint venture partner's 48.6% interest in the Samex Mining Corp. joint enterprise in Peru for \$58.2 million, bringing its ownership to 99%. Samex was previously owned by Chilean explosives producer Empresa Nacional de Explosivos SA (Enaex). Orica will focus on a feasibility study to construct a 300,000-t/yr ammonium nitrate plant in Latin America with the preferred site being in Peru (Fertilizer Week, 2008b).

Turkey.—In May, Dyno Nobel reached an agreement to acquire a 50% stake in Nitro Mak, a Turkish manufacturer and supplier of bulk and packaged explosives and initiation systems, for \$37.5 million. The deal with Nitro Mak allowed Dyno Nobel to selectively reenter previously exited markets. Nitro Mak's operations in Albania and Romania provided Dyno Nobel with direct access to the Eastern European market (Fertilizer Week, 2008a).

Outlook

According to the EIA, U.S. coal production was expected to decrease by about 8% in 2009 in response to lower domestic coal consumption, fewer exports, and higher coal inventories. In 2010, production was projected to increase slightly (0.5%) as domestic consumption and exports increase with an improving economy (U.S. Department of Energy, Energy Information Administration, 2009, p. 6). Based on the coal production projections, explosives consumption is expected to decrease in 2009 and increase slightly in 2010.

References Cited

Deepak Fertilisers and Petrochemicals Corp. Ltd., 2008, Global specialty fertiliser and ammonium nitrate major Yara to sign JV with Deepak Fertilisers and Petrochemicals Corp. Ltd.: Pune, India, Deepak Fertilisers and Petrochemicals Corp. Ltd. press release, February 6, 2 p.

Department of Homeland Security, 2008, Secure handling of ammonium nitrate program; advanced notice of proposed rulemaking: Federal Register, v. 73, no. 210, October 29, p. 64280–64282.

Federal Reserve Board, 2009, Industrial production and capacity utilization—Tables 1 and 2; 1A, 1B, 1C, 1D, and 1E of the G.17 supplement; and table 10: Federal Reserve Board. (Accessed August 11, 2009, at http://www.federalreserve.gov/releases/G17/table1_2.htm.)

Fertilizer Week, 2008a, Dyno Nobel set to acquire Turkish explosives firm: Fertilizer Week, v. 22, no. 7, May 30, p. 10.

Fertilizer Week, 2008b, Orica acquires Samax stake in Peru: Fertilizer Week, v. 22, no. 18, August 15, p. 8.

Freme, Fred, 2009, U.S. coal supply and demand—2008 review: U.S. Department of Energy, Energy Information Administration, April, 14 p.

Green Markets, 2008a, Canada restricts ammonium nitrate, other chemicals: Green Markets, v. 32, no. 13, March 31, p. 9–10.

Green Markets, 2008b, Orica approves Bontang ammonium nitrate plant: Green Markets, v. 32, no. 26, June 30, p. 9.

Incitec Pivot Ltd., 2008, Moranbah AN complex: Southbank, Victoria, Australia, Incitec Pivot Ltd. press release, July 28, 2 p.

Incitec Pivot Ltd., 2009, 2008 annual report: Southbank, Victoria, Australia, Incitec Pivot Ltd., 124 p.

Jakarta Post, 2008, MNK to build new plants worth \$56m: Jakarta Post, December 12. (Accessed August 28, 2009, at <http://www.thejakartapost.com/news/2008/12/23/mnk-build-new-plants-worth-56m.html>.)

Nitrogen + Syngas, 2008, Yara and Burrup Holdings to build new AN plant: Nitrogen + Syngas, no. 294, July–August, p. 8.

Nitrogen + Syngas, 2009, MNK builds new AN plant: Nitrogen + Syngas, no. 297, January–February, p. 10.

U.S. Census Bureau, 2009, Annual value of construction put in place: U.S. Census Bureau, 2 p. (Accessed August 11, 2009, at <http://www.census.gov/const/C30/total.pdf>.)

U.S. Department of Energy, Energy Information Administration, 2009, Short-term energy outlook: U.S. Department of Energy, Energy Information Administration, July 7, 41 p. (Accessed August 10, 2009, at <http://www.eia.doe.gov/emeu/steo/pub/contents.html>.)

TABLE 1
SALIENT STATISTICS OF INDUSTRIAL EXPLOSIVES AND BLASTING
AGENTS SOLD FOR CONSUMPTION IN THE UNITED STATES¹

(Metric tons)

Class	2007	2008
Permissibles	860	1,200
Other high explosives	40,200	35,800
Blasting agents and oxidizers	3,110,000	3,380,000
Total	3,150,000	3,420,000

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

Source: Institute of Makers of Explosives.

TABLE 2
ESTIMATED INDUSTRIAL EXPLOSIVES AND BLASTING AGENTS SOLD FOR CONSUMPTION IN
THE UNITED STATES, BY CLASS AND USE^{1, 2}

(Thousand metric tons)

Class	Coal mining	Quarrying and nonmetal mining	Metal mining	Construction work	All other purposes	Total
2007:						
Permissibles	1	(3)	(3)	(3)	--	1
Other high explosives	5	12	1	14	8	40
Blasting agents and oxidizers	2,100 ^r	345 ^r	242 ^r	359 ^r	64 ^r	3,110
Total	2,110 ^r	357 ^r	243 ^r	373 ^r	72 ^r	3,150
2008:						
Permissibles	1	(3)	(3)	(3)	--	1
Other high explosives	5	13	2	15	1	36
Blasting agents and oxidizers	2,340	332	273	359	76	3,380
Total	2,350	345	275	374	77	3,420

^rRevised. -- Zero.

¹Distribution of industrial explosives and blasting agents by consuming industry estimated from indices of industrial production and economies as reported by the U.S. Department of Energy, the Federal Reserve Board, the U.S. Department of Transportation, and the U.S. Census Bureau.

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Less than ½ unit.

TABLE 3
INDUSTRIAL EXPLOSIVES AND BLASTING AGENTS SOLD FOR CONSUMPTION IN THE UNITED STATES, BY STATE AND CLASS¹

(Metric tons)

State	2007				2008			
	Fixed high explosives		Blasting agents and oxidizers	Total	Fixed high explosives		Blasting agents and oxidizers	Total
	Permissibles	Other high explosives			Permissibles	Other high explosives		
Alabama	26	298	101,000	101,000	25	301	87,300	87,600
Alaska	--	1,050	16,200	17,300	--	1,130	26,800	27,900
Arizona	29	7,080	63,500	70,600	54	7,220	75,300	82,600
Arkansas	--	214	21,800	22,000	--	259	16,000	16,300
California	--	1,550	33,500	35,100	--	441	35,600	36,000
Colorado	9	470	33,500	34,000	12	699	29,600	30,300
Connecticut	--	333	4,630	4,960	--	251	6,900	7,150
Delaware	--	--	--	--	--	--	--	--
Florida	--	178	21,300	21,500	--	160	35,700	35,900
Georgia	--	824	37,000	37,800	--	454	35,800	36,300
Hawaii	--	2	788	790	--	--	355	355
Idaho	--	132	11,500	11,600	--	54	43,900	44,000
Illinois	--	364	35,600	36,000	10	416	38,400	38,800
Indiana	--	714	145,000	146,000	--	975	187,000	188,000
Iowa	--	971	19,700	20,700	--	699	25,300	26,000
Kansas	--	187	13,800	14,000	--	138	19,800	19,900
Kentucky	303	1,890	366,000	368,000	308	2,010	386,000	388,000
Louisiana	--	1,220	2,020	3,240	--	628	3,180	3,800
Maine	--	171	2,220	2,390	--	123	2,970	3,100
Maryland ²	3	180	14,100	14,300	10	179	16,800	17,000
Massachusetts	--	269	4,770	5,040	15	155	5,640	5,810
Michigan	--	81	23,700	23,800	--	135	39,800	40,000
Minnesota	--	184	75,700	75,900	--	149	85,800	86,000
Mississippi	--	54	133	187	--	38	69	107
Missouri	1	1,790	48,700	50,500	4	1,980	68,200	70,200
Montana	--	1,570	70,300	71,900	--	1,880	73,500	75,400
Nebraska	--	93	1,770	1,860	--	82	8,250	8,330
Nevada	--	1,310	121,000	122,000	--	1,480	140,000	142,000
New Hampshire	--	540	12,200	12,700	--	321	11,500	11,800
New Jersey	--	103	4,630	4,730	--	60	6,020	6,080
New Mexico	(3)	279	28,800	29,100	(3)	297	45,900	46,200
New York	(3)	701	13,600	14,300	(3)	901	17,400	18,300
North Carolina	--	1,230	29,100	30,300	--	631	27,100	27,700
North Dakota	--	16	4,020	4,040	--	24	2,800	2,800
Ohio	1	614	28,300	28,900	--	1,180	60,400	61,600
Oklahoma	1	497	23,600	24,100	--	283	34,900	35,200
Oregon	--	1,550	10,200	11,800	--	1,460	14,300	15,800
Pennsylvania	63	1,520	88,000	89,600	64	1,290	102,000	103,000
Rhode Island	--	34	437	470	--	27	852	880
South Carolina	--	247	6,130	6,380	--	137	9,460	9,600
South Dakota	--	4	5,070	5,070	--	57	5,510	5,570
Tennessee	--	1,770	76,500	78,300	(3)	1,200	36,400	37,600
Texas	--	3,130	149,000	152,000	(3)	1,470	118,000	119,000
Utah	10	280	58,000	58,300	19	321	94,800	95,100
Vermont	6	518	1,200	1,720	3	92	1,770	1,860
Virginia	335	1,080	134,000	135,000	348	945	166,000	167,000
Washington	--	445	13,000	13,500	34	802	22,000	22,800
West Virginia	73	1,590	487,000	489,000	290	1,240	423,000	425,000
Wisconsin	--	442	13,900	14,300	6	496	11,900	12,400
Wyoming	--	418	638,000	638,000	--	517	675,000	676,000
Total	860	40,200	3,110,000	3,150,000	1,200	35,800	3,380,000	3,420,000

See footnotes at end of table.

TABLE 3—Continued

INDUSTRIAL EXPLOSIVES AND BLASTING AGENTS SOLD FOR CONSUMPTION IN THE UNITED STATES, BY STATE AND CLASS¹

¹Revised. -- Zero.

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

²Includes the District of Columbia.

³Less than ½ unit.

Source: Institute of Makers of Explosives.