



2007 Minerals Yearbook

EXPLOSIVES

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In 2007, U.S. explosives sales were 3.15 million metric tons (Mt), a slight decrease from those in 2006; sales of explosives were reported in all States except Delaware. Coal mining, with 66% 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 61% of the total. These States were also the leading explosives-consuming States, accounting for 47% of total U.S. explosives sales.

Legislation and Government Programs

The Secure Handling of Ammonium Nitrate Act of 2007 was signed into law by the President on December 26. The Act gives the U.S. Department of Homeland Security (DHS) the authority to regulate entities and individuals that produce, sell, or distribute ammonium nitrate-based fertilizer. This bill also allows 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. Only facilities and people registered with the DHS would be able to legally access ammonium nitrate-based fertilizer. Anyone purchasing ammonium nitrate would be required to have a registration number, and retailers would be required to keep records of ammonium nitrate sales for at least 3 years (Green Markets, 2008).

In April, the Occupational Safety and Health Administration (OSHA) proposed to revise the explosives and blasting agents' standard. The revision is intended to enhance the protections provided to employees engaged in the manufacture, storage, sale, transportation, handling, and use of explosives. The proposal updates and clarifies the regulatory language, revises the standard to be consistent with other Federal regulations, incorporates updated consensus standards, and provides the regulated community with greater compliance flexibility (OSHA Trade News Release, 2007).

Production

Sales of ammonium-nitrate-based explosives (blasting agents and oxidizers) were 3.11 Mt, which was a slight decrease from those in 2006, and accounted for 99% of U.S. industrial explosives sales. Sales of permissibles were 32% lower than those in 2006, and sales of other high explosives increased by 8% (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 International (a division of Baker Hughes Inc.)
Daveyfire Inc.
Douglas Explosives Inc.
Dyno Nobel Ltd.
D.C. Guelich Explosive Co.
Jet Research Center (a division of Halliburton Co.)
Mining Services International Inc. (a division of MaxamCorp S.A.)
Nelson Brothers Mining Services LLC
Orica USA Inc.
Owen Oil Tools Inc. (a division of Core Laboratories N.V.)
Schlumberger Perforating Center
Senex Explosives Inc.
Titan Completion Products Ltd.
Vets Explosives Inc.
Viking Explosives and Supply Inc.
W.A. Murphy Inc.

In August, Dyno Nobel Ltd. announced delays and cost increases in expanding its ammonium nitrate facility in Cheyenne, WY. The company had originally planned to spend \$50 million to increase production capacity by 50%, with completion expected in October 2007. However, the cost was revised upward to \$80 million, with completion in 2008 to 2010. Under the revised plan, ammonium nitrate solution (AMSOL) production was to be commissioned in the second quarter of 2008. The AMSOL production capacity was to be expanded to 227,000 metric tons per year (t/yr) from 136,000 t/yr (Green Markets, 2007).

Consumption

Coal mining, with 66% of total explosives consumption, remained the principal application for explosives in the United States (table 2). In 2007, U.S. coal production decreased by 1.5% to a level of 1.04 billion metric tons, according to data from the U.S. Department of Energy, Energy Information Administration (EIA) (U.S. Department of Energy, Energy Information Administration, 2008). Coal production decreased in the Appalachian and interior regions by 3.6% and 3.2%, respectively. In the western region, coal production increased by 0.3% (Fremer, 2008, p. 2). Wyoming, West Virginia, and Kentucky, in descending order, led the Nation in coal production, accounting for 61% of the total. These States were also the leading explosives-consuming States.

Quarrying and nonmetal mining, the second-ranked consuming industry, accounted for 12% of total explosives sales; construction, 11%; metal mining, 8%; and miscellaneous uses, 3%. Wyoming, West Virginia, Kentucky, Texas, Indiana, and Virginia, in descending order, were the leading consuming States, with a combined total of 61% of U.S. sales (table 3).

The value of new construction in 2007 decreased by 2.6% compared with that in 2006 (U.S. Census Bureau, 2008). Based on monthly data, the seasonally adjusted industry growth rate

¹Companies denoted by an asterisk are not members of the IME.

from 2006 to 2007 for metal mining was -0.7%, and the growth rate for nonmetallic mineral mining and quarrying was -15.5% (Federal Reserve Board, 2008).

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 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 2007, about 95% of the total blasting agents and oxidizers sales was in bulk form.

World Review

In August, Incitec Pivot Ltd. announced that it had acquired a 13% strategic stake in industrial-grade ammonium nitrate producer and distributor Dyno Nobel. Incitec Pivot is Australia's leading integrated fertilizer manufacturer and distributor, with nitrogen and phosphate fertilizer production facilities (Fertilizer Week, 2007c).

Australia.—In December, Dyno Nobel suspended its plan to build an industrial-grade ammonium nitrate plant at Moranbah, Queensland. Dyno Nobel blamed delays and cost pressures for the decision. The plant was to have a production capacity of 330,000 t/yr and was to be completed in the second half of 2008. Dyno Nobel incurred an estimated cost of \$280 million from the project (Fertilizer Week, 2007b).

CSBP Ltd., which is part of the Wesfarmers Ltd. Group, planned to expand its ammonium nitrate plant in Kwinana. When fully operational in 2008, the expansion was expected to double the ammonium nitrate production capacity at Kwinana to about 470,000 t/yr. The project cost approximately \$305 million. Nearly 120,000 t/yr of the additional output was to be used to produce urea ammonium nitrate solution, with the balance being consumed by the growing explosives sector (Fertilizer Week, 2007a).

Canada.—In March, Dyno Nobel acquired Le Groupe, Castonguay Inc., the largest drilling and blasting company in Canada, for approximately \$43 million. The acquisition provided a platform for expanded services in eastern Canada (Dyno Nobel Ltd., 2007a).

China.—Dyno Nobel acquired 29.9% holding in Fabchem China Ltd., a leading initiation and explosives supplier in China. Fabchem was undertaking a number of investment projects within China to expand its manufacturing capacity; it also proposed to acquire and expand a small ammonium nitrate plant (Dyno Nobel Ltd., 2008, p. 10).

India.—Deepak Fertilisers and Petrochemicals Corp. Ltd. awarded a detailed engineering design contract to Uhde India Ltd. and Jacobs Engineering Group for a 300,000-t/yr ammonium nitrate plant that will be located at Paradip in Orissa State. Deepak intended to import ammonia feedstock for the new plant. Some of the output was to be used for ammonium nitrate melt and some for prilled product. The product was to be sold primarily in the mining sector. The plant was scheduled to be completed by June 2009 at a cost of \$91 million (Nitrogen + Syngas, 2007).

South Africa.—In September, Dyno Nobel finalized its agreement to acquire a 50% stake in Sasol Dyno Nobel, a South African initiation systems manufacturer. This agreement provided direct access to the southern African market that is undergoing a conversion away from the older cap and safety fuse products to nonelectric initiation systems (Dyno Nobel Ltd., 2007b).

Outlook

According to the EIA, U.S. coal production was expected to increase by 2.9% in 2008 and fall by 0.5% in 2009. Western coal production, which represented slightly more than one-half of total domestic coal production, was expected to increase by 3.0% in 2008 and by an additional 0.3% in 2009 (U.S. Department of Energy, Energy Information Administration, 2008). Based on the coal production projections, explosives consumption is expected to increase in 2008 and decrease in 2009.

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

(Metric tons)

Class	2006	2007
Permissibles	1,260	860
Other high explosives	37,400	40,200
Blasting agents and oxidizers	3,120,000	3,110,000
Total	3,160,000	3,150,000

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
2006:						
Permissibles	1	(3)	(3)	(3)	--	1
Other high explosives	5 ^r	13 ^r	1	14 ^r	4 ^r	37
Blasting agents and oxidizers	2,080 ^r	390 ^r	236 ^r	352 ^r	65 ^r	3,120
Total	2,090 ^r	403 ^r	237 ^r	366 ^r	69 ^r	3,160
2007:						
Permissibles	1	(3)	(3)	(3)	--	1
Other high explosives	5	12	1	14	8	40
Blasting agents and oxidizers	2,080	358	236	351	85	3,110
Total	2,090	370	237	365	93	3,150

^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	2006				2007			
	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	98	408	160,000	160,000	26	298	101,000	101,000
Alaska	--	997	15,800	16,800	--	1,050	16,200	17,300
Arizona	62	6,470	56,600	63,100	29	7,080	63,500	70,600
Arkansas	--	218	20,000	20,200	--	214	21,800	22,000
California	--	899	29,900	30,800	--	1,550	33,500	35,100
Colorado	17	512	33,100	33,700	9	470	33,500	34,000
Connecticut	--	392	4,760	5,150	--	333	4,630	4,960
Delaware	--	--	--	--	--	--	--	--
Florida	--	176	33,000	33,200	--	178	21,300	21,500
Georgia	--	1,380	44,000	45,400	--	824	37,000	37,800
Hawaii	--	34	1,200	1,230	--	2	788	790
Idaho	--	146	8,180	8,330	--	132	11,500	11,600
Illinois	(2)	471	41,000	41,500	--	364	35,600	36,000
Indiana	--	818	151,000	152,000	--	714	145,000	146,000
Iowa	--	686	18,200	18,900	--	971	19,700	20,700
Kansas	--	112	6,250	6,360	--	187	13,800	14,000
Kentucky	384	1,870	355,000	357,000	303	1,890	366,000	368,000
Louisiana	--	666	2,100	2,770	--	1,220	2,020	3,240
Maine	--	174	1,930	2,100	--	171	2,220	2,390
Maryland ³	--	279	11,200	11,500	3	180	14,100	14,300
Massachusetts	--	348	6,180	6,530 ^r	--	269	4,770	5,040
Michigan	--	69	23,900	24,000 ^r	--	81	23,700	23,800
Minnesota	--	196	69,700	69,900	--	184	75,700	75,900
Mississippi	--	12	132	144	--	54	133	187
Missouri	--	1,860	49,800	51,700	1	1,790	48,700	50,500
Montana	--	1,550	61,700	63,200	--	1,570	70,300	71,900
Nebraska	--	81	1,790	1,870	--	93	1,770	1,860
Nevada	1	1,340	109,000	110,000	--	1,310	121,000	122,000
New Hampshire	--	482	12,500	13,000	--	540	12,200	12,700
New Jersey	--	180	6,980	7,160	--	103	4,630	4,730
New Mexico	(2)	397	33,500	33,900	(2)	279	28,800	29,100
New York	6	727	11,200	11,900	(2)	701	13,600	14,300
North Carolina	--	1,180	33,700	34,900	--	1,230	29,100	30,300
North Dakota	--	1	4,350	4,350	--	16	4,020	4,040
Ohio	(2)	464	31,600	32,100	1	614	28,300	28,900
Oklahoma	--	311	24,700	25,000	1	497	23,600	24,100
Oregon	--	2,160	20,700	22,900	--	1,550	10,200	11,800
Pennsylvania	269	1,260	78,300	79,800	63	1,520	88,000	89,600
Rhode Island	--	21	363	384	--	34	437	470
South Carolina	--	260	7,670	7,930	--	247	6,130	6,380
South Dakota	--	5	3,890	3,900	--	4	5,070	5,070
Tennessee	--	1,620	37,100	38,700	--	1,770	76,500	78,300
Texas	16	913	92,800	93,700 ^r	--	3,130	149,000	152,000
Utah	43	251	55,800	56,100	10	280	58,000	58,300
Vermont	4	75	1,390	1,469	6	518	1,200	1,720
Virginia	244	2,050	164,000	166,294	335	1,080	134,000	135,000
Washington	--	699	19,900	20,600	--	445	13,000	13,500
West Virginia	112	971	529,000	530,000	73	1,590	487,000	489,000
Wisconsin	--	436	13,100	13,500	--	442	13,900	14,300
Wyoming	--	721	628,000	629,000 ^r	--	418	638,000	638,000
Total	1,260	37,400	3,120,000	3,160,000	860	40,200	3,110,000	3,150,000

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.

²Less than ½ unit.

³Includes the District of Columbia.

Source: Institute of Makers of Explosives.