

2009 Minerals Yearbook

EXPLOSIVES [ADVANCE RELEASE]

EXPLOSIVES

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In 2009, U.S. explosives consumption was 2.26 million metric tons (Mt), about a 34% decrease from that of 2008; sales of explosives were reported in all States except Delaware. Coal mining, with 70% 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 63% of the total. These States were also the leading explosives-consuming States, accounting for 45% of total U.S. explosives sales.

Legislation and Government Programs

In November, the U.S. House of Representatives passed the Chemical Facility Anti-Terrorism Act of 2009 (H.R. 2868). The bill would permanently authorize and expand the Chemical Facility Anti-Terrorism Standards (CFATS) that took effect in 2007 and expired in the fall of 2009 (Green Markets, 2009). CFATS 2009 also included two controversial features—the Inherently Safer Technologies provision for facilities in high-risk categories, which authorizes the Department of Homeland Security to designate any chemical substance as a substance of concern and establish threshold quantities for each chemical that is used, stored, manufactured, processed, or distributed by a chemical facility and a citizen enforcement, which would allow lawsuits by citizens against the facilities that violate the Act.

The National Fire Protection Association (NFPA) revised its code relating to explosives and ammonium nitrate. The NFPA combined code NFPA 490 (code for the storage of ammonium nitrate) with NFPA 400 (code for hazardous materials). NFPA 400 included several documents related to hazardous materials and did not change any of the information on ammonium nitrate that was part of NFPA 490 (Nitrogen + Syngas, 2009a).

Production

Sales of ammonium-nitrate-based explosives (blasting agents and oxidizers) were 2.24 Mt, which was about a 34% decrease from those in 2008, and accounted for about 99% of U.S. industrial explosives sales. Sales of permissibles (explosives approved for use in gassy and dusty environments) were about 34% higher than those in 2008, and sales of other high explosives decreased by 34% (table 1).

Companies contributing data to this report, that are members of the Institute of Makers of Explosives (IME), are as follows:

Accurate Energetic Systems, LLC 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.) Senex Explosives Inc. Titan Specialties Ltd. Vet's Explosives Inc. Viking Explosives and Supply Inc. W.A. Murphy, Inc. Incitec Pivot Ltd. announced it would cease production of monium nitrate in early 2010 at its Pattle Mountain NV

ammonium nitrate in early 2010 at its Battle Mountain, NV, site. The site would continue to be used as a warehousing and distribution facility for ammonium nitrate. Battle Mountain's plant had a 130,000-metric-ton-per-year (t/yr) ammonium nitrate production capacity (Nitrogen + Syngas, 2010a).

Consumption

The principal application for explosives in the United States was coal mining, accounting for 70% of the total explosives sales for consumption (table 2). In 2009, U.S. coal production decreased to 973 million metric tons, according to preliminary data from the U.S. Energy Information Administration (EIA) (Freme, 2010, p. 1). Coal production decreased in the Appalachian and western regions by 13% and 7.7%, respectively, compared with production in 2008. In the interior region, coal production remained about the same (Freme, 2010, p. 5). Three States (Wyoming, West Virginia, and Kentucky), in descending order, led the Nation in coal production, accounting for 63% of the total. These States were also the leading explosives-consuming States.

Construction, the second ranked consuming industry, accounted for 10% of total explosives sales; quarrying and nonmetal mining, 9%; metal mining, 8%; and miscellaneous uses, 3%. Wyoming, West Virginia, Kentucky, Indiana, Virginia, Alabama, and Pennsylvania were, in descending order, the leading consuming States (greater than 90,000 metric tons sold), with a combined total of 67% of U.S. sales (table 3).

The dollar value of new construction (residential and nonresidential) put in place in 2009 decreased by 15% compared with that in 2008 (U.S. Census Bureau, 2010). Based on monthly data, the seasonally adjusted industry growth rate from 2008 to 2009 for metal mining was -13.4%, and the growth rate for quarrying and nonmetallic mineral mining was -17.8% (Federal Reserve Board, 2010).

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 2009, about 93% of the total blasting agents and oxidizers sales was in bulk form.

World Review

Australia.—In February, Incitec Pivot announced that the construction of the A\$935 million Moranbah ammonium nitrate plant in Central Queensland was put on hold for at least a year as the demand for explosive products had fallen. The Moranbah project is a 330,000 t/yr fully integrated ammonium nitrate complex that was about 25% complete when the project was stopped (Australian Broadcasting Corporation, 2009).

CSBP Ltd. announced the approval of an engineering and design study to increase ammonium nitrate production capacity at its Kwinana industrial complex, 40 kilometers south of Perth, Western Australia. The project was anticipated to increase the ammonium nitrate production capacity by 260,000 t/yr, bringing CSBP's overall ammonium nitrate capacity to 780,000 t/yr. Cost estimates for the expansion were \$417 to \$463 million (Fertilizer Week, 2009).

In December, Orica Ltd. of Australia received approval from the Australian Government to expand its Kooragang Island nitrogen complex. The project was expected to include the expansion of the existing ammonia plant and the installation of a new nitric acid plant and ammonium nitrate plant. The proposed expansion would increase the ammonium nitrate capacity to approximately 750,000 t/yr from 430,000 t/yr (Orica Ltd., 2009).

Canada.— Incitec Pivot announced it would end ammonium nitrate production at its Maitland, Ontario, plant in early 2010. The site was expected to continue to be used as a warehousing and distribution facility for ammonium nitrate. Maitland had an 189,000-t/yr ammonium nitrate capacity (Nitrogen + Syngas, 2010a).

India.—Deepak Fertilisers and Petrochemicals Corp. Ltd. began work on the new 300,000-t/yr low-density ammonium nitrate plant at the company's Taloja site in Maharashtra. Deepak originally had planned to locate the new facility in Orissa but opted to expand the existing site after failing to acquire land for this project. The new unit was scheduled for completion by November 2010 (Nitrogen + Syngas, 2009b). *Indonesia.*—In June, the State-owned construction company PT Rekayasa signed a contract with PT Kaltim Nitrate Indonesia (KNI) (a joint venture between PT Armindo Group and Orica Ltd. of Australia) to build the largest ammonium nitrate plant in southeast Asia at a cost of \$173 million. The plant was scheduled to be built in Bontang, East Kalimantan, and would have a capacity of 300,000 t/yr. The plant was expected to be completed in the second quarter of 2011 (Jakarta Post, 2009).

PT Multi Nitro Kimia (a part of PT Ancora Indonesia Resources) planned to expand its industrial-grade ammonium nitrate production to 130,000 t/yr from 37,000 t/yr by 2011 (Nitrogen + Syngas, 2010b).

Outlook

According to the EIA, U.S. coal production was expected to decrease by less than 1% in 2010 compared with that in 2009 in response to high coal inventories. In 2011, production was projected to increase by about 3.6% compared with that in 2010 to meet continued growth in coal consumption (U.S. Department of Energy, Energy Information Administration, 2010, p. 7). Based on the coal production projections, explosives consumption was expected to remain about the same in 2010 as in 2009 and increase slightly in 2011.

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TABLE 1

SALIENT STATISTICS OF INDUSTRIAL EXPLOSIVES AND BLASTING AGENTS SOLD FOR CONSUMPTION IN THE UNITED STATES $^{\rm 1}$

(Metric tons)

Class	2008	2009		
Permissibles	1,200	1,610		
Other high explosives	35,800	23,700		
Blasting agents and oxidizers	3,380,000	2,240,000		
Total	3,420,000	2,270,000		

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	Metal mining	Construction	All other	Total
Class	mining	nonmetal mining	mining	work	purposes	Total
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
2009:	-					
Permissibles	2	(3)	(3)	(3)		2
Other high explosives	3	8	1	10	1	24
Blasting agents and oxidizers	1,580	201	175	225	56	2,240
Total	1,590	209	176	235	57	2,270

-- 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.

 $^2\text{D}ata$ are rounded to no more than three significant digits; may not add to totals shown. $^3\text{Less}$ than $^{1\!/}_2$ unit.

TABLE 3

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

(Metric tons)

		2008			2009			
	Fixed high ex	plosives	Blasting agents		Fixed high ex	plosives	Blasting agents	
State	Permissibles	Other	and oxidizers	Total	Permissibles	Other	and oxidizers	Total
Alabama	25	301	87,300	87,600	14	257	95,900	96,200
Alaska		1,130	26,800	27,900		528	16,020	16,500
Arizona	54	7,220	75,300	82,600	39	119	25,500	25,700
Arkansas		259	16,000	16,300		123	15,800	15,900
California		441	35,600	36,000	15	539	20,500	21,100
Colorado	12	699	29,600	30,300	18	659	23,400	24,100
Connecticut		251	6,900	7,150	24	274	6,460	6,760
Delaware								
Florida		160	35,700	35,900		93	28,300	28,400
Georgia		454	35,800	36,300		254	23,800	24,100
Hawaii			355	355		0	680	680
Idaho		54	43,900	44,000		151	9,510	9,660
Illinois	10	416	38,400	38,800		324	32,400	32,700
Indiana		975	187,000	188,000	70	980	189,000	190,000
Iowa		699	25,300	26,000	111	422	14,200	14,700
Kansas		138	19,800	19,900		119	6,640	6,760
Kentucky	308	2,010	386,000	388,000	206	1,330	292,000	293,000
Louisiana		628	3,180	3,800		571	4,010	4,580
Maine		123	2,970	3,100		183	3,620	3,800
Maryland ²	10	179	16,800	17,000		272	9,750	10,000
Massachusetts	10	155	5,640	5,810	79	119	4,790	4,990
Michigan	15	135	39,800	40,000		125	23,700	23,800
Minnesota		133	85,800	40,000 86,000		56	16,600	23,800
Mississippi		38	69	80,000 107		18	10,000	10,700
Missouri	4	1,980	68,200	70,200	333	2,040	53,400	55,700
Montana		1,980	73,500	70,200		2,040	55,200	57,200
Nebraska		82	8,250			2,010	1,780	37,200 1,860
		82 1,480	140,000	8,330		1,220	21,600	
Nevada		321	140,000	142,000	29	756		22,800
New Hampshire		60	6,020	11,800		138	13,400 1,890	14,100
New Jersey	(3)			6,080				2,030
New Mexico	(3)	297	45,900	46,200	1	330	22,400	22,700
New York		901	17,400	18,300	8	734	5,640	6,380
North Carolina		631	27,100	27,700		575	20,400	21,000
North Dakota		24	2,800	2,800		11	2,650	2,660
Ohio		1,180	60,400	61,600		362	41,900	42,300
Oklahoma		283	34,900	35,200		140	19,600	19,700
Oregon		1,460	14,300	15,800		111	4,700	4,810
Pennsylvania	64	1,290	102,000	103,000	36	1,390	90,400	91,800
Rhode Island		27	852	880		25	914	939
South Carolina		137	9,460	9,600		205	4,970	5,170
South Dakota		57	5,510	5,570		54	4,380	4,430
Tennessee	(3)	1,200	36,400	37,600		1,420	28,000	29,400
Texas	(3)	1,470	118,000	119,000	18	699	62,700	63,500
Utah	19	321	94,800	95,100	43	219	64,100	64,400
Vermont	3	92	1,770	1,860	4	196	1,480	1,680
Virginia	348	945	166,000	167,000	299	1,560	114,000	116,000
Washington	34	802	22,000	22,800	53	670	7,950	8,670
West Virginia	290	1,240	423,000	425,000	154	758	348,000	349,000
Wisconsin	6	496	11,900	12,400	30	231	7,620	7,880
Wyoming		517	675,000	676,000	29	240	377,000	378,000
Total	1,200	35,800	3,380,000	3,420,000	1,610	23,700	2,240,000	2,270,000

⁻⁻ Zero.

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

²Includes the District of Columbia.

 $^{3}Less$ than $^{1}\!/_{2}$ unit.

Source: Institute of Makers of Explosives.