



2010 Minerals Yearbook

EXPLOSIVES

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In 2010, U.S. explosives consumption was 2.68 million metric tons (Mt), about an 18% increase from that of 2009; sales of explosives were reported in all States except Delaware. Coal mining, with about 71% 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 46% of total U.S. explosives sales.

Legislation and Government Programs

Effective February 3, the Occupational Safety and Health Administration (OSHA) terminated the rulemaking that had been proposed in 2007 to amend its Explosives and Blasting Agents Standard (CFR 1910.109). In 2007, The Institute of Makers of Explosives (IME) and the Sporting Arms and Ammunition Manufacturers' Institute petitioned OSHA to revise the standard. However, the rule had been on hold since 2007 because additional clarification was needed as to the intent of the rulemaking. OSHA concluded that other Federal agencies already regulated explosives hazards in many situations; therefore, this proposal had limited scope and would not have amended many of the substantive requirements that were part of OSHA's existing explosives standard (Occupational Safety and Health Administration, 2010).

Production

Sales of ammonium-nitrate-based explosives (blasting agents and oxidizers) were 2.65 Mt, which was about an 18% increase from those in 2009, 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 39% lower than those in 2009, and sales of other high explosives decreased by about 5% (table 1).

Companies contributing data to this report, that are members of the 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.

El Dorado Chemical Co. (a subsidiary of LSB Industries Inc.) signed a 5-year agreement with Orica International Pte Ltd. (Orica) to supply Orica with 230,000 metric tons per year (t/yr) of industrial-grade ammonium nitrate. The new agreement replaces the previous agreement to supply 190,000 t/yr of ammonium nitrate to Orica (Green Markets, 2010b).

Apache Nitrogen Products Inc. was investing \$5.5 million to upgrade its Arizona ammonium nitrate prill plant. They were replacing the dry end of the prill ammonium nitrate process in order to reduce moisture problems. Sixty percent of the liquid ammonium nitrate produced onsite was used to produce low-density ammonium nitrate prill for use in the mining industry. Ammonium nitrate production capacity was 180,000 t/yr (Green Markets, 2010a).

Consumption

The principal application for explosives in the United States was coal mining, accounting for about 71% of the total explosives sales for consumption (table 2). In 2010, U.S. coal production increased slightly to 985 million metric tons, according to preliminary data from the U.S. Energy Information Administration (EIA) (Watson and others, 2011, p. 1). Coal production decreased in the Appalachian region by 2.1%, compared with production in 2009. In the Interior (midwest) and Western regions of the United States, coal production increased by 7.4% and 1.1%, respectively (Watson and others, 2011, 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 and quarrying and nonmetal mining each accounted for 9% of total explosives sales; metal mining, 8%; and miscellaneous uses, 3%. Wyoming, West Virginia, Kentucky, Indiana, Nevada, Virginia, and Pennsylvania were, in descending order, the leading explosives 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 2010 decreased by 11% compared with that in 2009 (U.S. Census Bureau, 2011). Based on monthly data, the seasonally adjusted industry growth rate from 2009 to 2010 for metal mining was 8.9%, and the growth rate for quarrying and nonmetallic mineral mining was 2.5% (Federal Reserve Board, 2011).

Classification of Industrial Explosives and Blasting Agents.—Apparent consumption of commercial explosives used for industrial purposes is defined in this report 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 included in this category. In 2010, about 96% of the total blasting agents and oxidizers sales was in bulk form.

World Review

Australia.—Incitec Pivot Ltd. announced that it would restart construction of the AUD935 million Moranbah ammonium nitrate plant in Central Queensland in May. The plant was delayed for almost a year as the demand for explosive products had fallen. The Moranbah project, a 330,000-t/yr fully integrated ammonium nitrate complex, was expected to begin production in 2012 (Incitec Pivot Ltd., 2010).

Incitec Pivot revived its plans for an explosives-grade ammonium nitrate plant at the King Bay/Hearson Cove Industrial Estate on the Burrup Peninsula in Western Australia. The plant was expected to produce 350,000 t/yr of ammonium nitrate. Construction was expected to start in early 2012, with operations beginning in 2014 (Fertilizer Week, 2010b).

In August, Burrup Nitrates Pty Ltd. [a joint venture between Burrup Holdings Ltd. (BHL) and Yara International ASA] received approval to build a 350,000-t/yr technical-grade ammonium nitrate plant on the Burrup Peninsula adjacent to BHL's 760,000-t/yr ammonia plant. Construction was planned to begin in late 2010 and be completed by 2013 (Burrup Nitrates Pty Ltd., 2010; Fertilizer Week, 2010a).

Egypt.—The Egypt Hydrocarbon Corp. secured financing to build a large-scale ammonium nitrate and nitric acid complex in Suez at a cost of \$298 million. KBR Inc. conducted feasibility and front-end engineering design studies. Uhde GmbH was awarded the engineering, procurement, and construction contract, and technology licenses for the 350,000-t/yr low-density ammonium nitrate and 300,000-t/yr nitric acid plants. The complex was expected to be completed by 2013 (Nitrogen + Syngas, 2011).

Indonesia.—PT Multi Nitrotama Kimia awarded CFI Holding Pte. Ltd. [the complete engineering package] including procurement management for its new ammonium nitrate complex in Cikampek. The complex would include a

300-metric-ton-per-day low-density ammonium nitrate plant and a low-density ammonium nitrate bagging unit. The plant was expected to be operational by 2011 (Fertilizer Week, 2010c).

South Africa.—Omnia Holdings Ltd. planned to build a \$178.6 million ammonium nitrate and nitric acid complex at Sasolburg to meet the fast-growing demand in the local explosives and fertilizer markets. The new ammonium nitrate plant would have a production capacity of 330,000 t/yr, with output split between explosive- and fertilizer-grade ammonium nitrate. Uhde was contracted to provide plant technology and licenses, engineering design, and critical component supplies. The plant was expected to be completed by 2012 (Nitrogen + Syngas, 2010).

Outlook

According to the EIA, U.S. coal production in 2011 was expected to remain the same as that in 2010. In 2012, production was projected to increase by about 2.9% compared with that in 2011 to meet continued growth in coal consumption (U.S. Energy Information Administration, 2011, p. 8). Based on the coal production projections, explosives consumption was expected to remain about the same in 2011 as in 2010 and increase slightly in 2012.

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

(Metric tons)

Class	2009	2010
Permissibles	1,610	990
Other high explosives	23,700	22,600
Blasting agents and oxidizers	2,240,000	2,650,000
Total	2,270,000	2,680,000

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
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
2010:						
Permissibles	1	(3)	(3)	(3)	--	1
Other high explosives	3	8	1	10	1	23
Blasting agents and oxidizers	1,880	244	225	236	66	2,650
Total	1,890	252	226	246	67	2,680

-- 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	2009				2010			
	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	14	257	95,900	96,200	37	191	91,800	92,000
Alaska	--	528	16,020	16,500	--	724	13,300	14,100
Arizona	39	119	25,500	25,700	15	273	39,200	39,500
Arkansas	--	123	15,800	15,900	--	100	19,600	19,800
California	15	539	20,500	21,100	--	352	23,400	23,700
Colorado	18	659	23,400	24,100	14	406	62,500	62,900
Connecticut	24	274	6,460	6,760	--	147	3,560	3,710
Delaware	--	--	--	--	--	--	--	--
Florida	--	93	28,300	28,400	--	77	13,300	13,300
Georgia	--	254	23,800	24,100	--	429	18,200	18,600
Hawaii	--	0	680	680	--	--	478	478
Idaho	--	151	9,510	9,660	1	58	11,600	11,600
Illinois	--	324	32,400	32,700	7	370	41,100	41,400
Indiana	70	980	189,000	190,000	--	1,410	159,000	160,000
Iowa	111	422	14,200	14,700	6	609	19,600	20,200
Kansas	--	119	6,640	6,760	--	82	11,600	11,700
Kentucky	206	1,330	292,000	293,000	182	1,400	281,000	283,000
Louisiana	--	571	4,010	4,580	--	238	2,670	2,910
Maine	--	183	3,620	3,800	--	190	2,890	3,080
Maryland ²	--	272	9,750	10,000	11	463	14,800	15,200
Massachusetts	79	119	4,790	4,990	--	103	4,280	4,390
Michigan	--	125	23,700	23,800	--	92	25,400	25,400
Minnesota	--	56	16,600	16,700	--	103	83,900	84,000
Mississippi	--	18	5	22	--	39	(3)	40
Missouri	333	2,040	53,400	55,700	3	1,430	61,300	62,700
Montana	--	2,010	55,200	57,200	--	1,570	54,200	55,800
Nebraska	--	74	1,780	1,860	--	88	2,330	2,420
Nevada	29	1,220	21,600	22,800	327	1,060	115,000	116,000
New Hampshire	--	756	13,400	14,100	--	129	3,150	3,280
New Jersey	--	138	1,890	2,030	--	66	3,990	4,060
New Mexico	1	330	22,400	22,700	--	130	24,200	24,300
New York	8	734	5,640	6,380	(3)	555	13,400	13,900
North Carolina	--	575	20,400	21,000	--	313	17,800	18,100
North Dakota	--	11	2,650	2,660	--	10	2,610	2,620
Ohio	--	362	41,900	42,300	(3)	364	49,000	49,400
Oklahoma	--	140	19,600	19,700	--	747	20,800	21,600
Oregon	--	111	4,700	4,810	5	178	5,320	5,510
Pennsylvania	36	1,390	90,400	91,800	36	1,290	99,300	101,000
Rhode Island	--	25	914	939	--	31	1,360	1,390
South Carolina	--	205	4,970	5,170	--	76	5,420	5,500
South Dakota	--	54	4,380	4,430	--	23	7,160	7,180
Tennessee	--	1,420	28,000	29,400	--	2,440	28,300	30,800
Texas	18	699	62,700	63,500	--	994	33,900	34,900
Utah	43	219	64,100	64,400	37	302	62,800	63,100
Vermont	4	196	1,480	1,680	4	67	1,760	1,830
Virginia	299	1,560	114,000	116,000	119	817	113,000	114,000
Washington	53	670	7,950	8,670	43	630	18,500	19,200
West Virginia	154	758	348,000	349,000	138	806	334,000	335,000
Wisconsin	30	231	7,620	7,880	5	329	9,810	10,100

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

(Metric tons)

State	2009				2010			
	Fixed high explosives		Blasting agents and oxidizers	Total	Fixed high explosives		Blasting agents and oxidizers	Total
	Permissibles	Other high explosives			Permissibles	Other high explosives		
Wyoming	29	240	377,000	378,000	(3)	314	623,000	623,000
Total	1,610	23,700	2,240,000	2,270,000	990	22,600	2,650,000	2,680,000

-- 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.