



# 2009 Minerals Yearbook

---

## EXPLOSIVES

---

# EXPLOSIVES

By Lori E. Apodaca

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 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.

## References Cited

- Australian Broadcasting Corporation, 2009, Fears aired over nitrate plant halt: Australian Broadcasting Corporation, February 4. (Accessed February 4, 2009, at <http://www.abc.net.au/news/stories/2009/02/04/2481750.htm>.)
- Federal Reserve Board, 2010, 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 July 7, 2010, at [http://www.federalreserve.gov/releases/G17/table1\\_2.htm](http://www.federalreserve.gov/releases/G17/table1_2.htm).)
- Fertilizer Week, 2009, CSBP commissions study to raise AN capacity at Kwinana: Fertilizer Week, v. 23, no. 31, November 13, p. 2–3.
- Freme, Fred, 2010, U.S. coal supply and demand—2009 review: U.S. Department of Energy, Energy Information Administration, April, 15 p.
- Green Markets, 2009, TFI criticizes chem security and climate change bills: Green Markets, v. 33, no. 45, November 9, p. 13.
- Jakarta Post, 2009, RI to have largest explosives plant in SE Asia: Jakarta Post, June 4. (Accessed June 4, 2009, at <http://www.thejakartapost.com/news/2009/06/04/ri-have-largest-explosives-plant-se-asia.html>.)
- Nitrogen + Syngas, 2009a, Ammonium nitrate regulatory update: Nitrogen + Syngas, no. 301, September–October, p. 30–31.
- Nitrogen + Syngas, 2009b, Work begins on new LDAN unit: Nitrogen + Syngas, no. 300, July–August, p. 7.
- Nitrogen + Syngas, 2010a, Incitec Pivot to shut two AN plants: Nitrogen + Syngas, no. 303, January–February, p. 10.
- Nitrogen + Syngas, 2010b, More IGAN capacity for Indonesia: Nitrogen + Syngas, no. 303, January–February, p. 9.
- Orica Ltd., 2009, Kooragang Island expansion project: Orica Ltd. (Accessed December 10, 2009, at <http://www.oricaki.com.au/index.asp?page=59>.)
- U.S. Census Bureau, 2010, Annual value of construction put in place: U.S. Census Bureau, July 1, 2 p. (Accessed July 27, 2010, at <http://www.census.gov/const/C30/total.pdf>.)
- U.S. Department of Energy, Energy Information Administration, 2010, Short-term energy outlook: U.S. Department of Energy, Energy Information Administration, July, 43 p. (Accessed July 7, 2010, 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 STATES<sup>1</sup>

(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

<sup>1</sup>Data 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<sup>1,2</sup>

(Thousand metric tons)

Class	Coal mining	Quarrying and nonmetal mining	Metal mining	Construction work	All other 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.

<sup>1</sup>Distribution 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.

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

<sup>3</sup>Less than ½ unit.

TABLE 3  
INDUSTRIAL EXPLOSIVES AND BLASTING AGENTS SOLD FOR CONSUMPTION IN THE UNITED STATES, BY STATE AND CLASS<sup>1</sup>

(Metric tons)

State	2008				2009			
	Fixed high explosives		Blasting agents and oxidizers	Total	Fixed high explosives		Blasting agents and oxidizers	Total
	Permissibles	Other			Permissibles	Other		
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 <sup>2</sup>	10	179	16,800	17,000	--	272	9,750	10,000
Massachusetts	15	155	5,640	5,810	79	119	4,790	4,990
Michigan	--	135	39,800	40,000	--	125	23,700	23,800
Minnesota	--	149	85,800	86,000	--	56	16,600	16,700
Mississippi	--	38	69	107	--	18	5	22
Missouri	4	1,980	68,200	70,200	333	2,040	53,400	55,700
Montana	--	1,880	73,500	75,400	--	2,010	55,200	57,200
Nebraska	--	82	8,250	8,330	--	74	1,780	1,860
Nevada	--	1,480	140,000	142,000	29	1,220	21,600	22,800
New Hampshire	--	321	11,500	11,800	--	756	13,400	14,100
New Jersey	--	60	6,020	6,080	--	138	1,890	2,030
New Mexico	<sup>(3)</sup>	297	45,900	46,200	1	330	22,400	22,700
New York	<sup>(3)</sup>	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	<sup>(3)</sup>	1,200	36,400	37,600	--	1,420	28,000	29,400
Texas	<sup>(3)</sup>	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.

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

<sup>2</sup>Includes the District of Columbia.

<sup>3</sup>Less than ½ unit.

Source: Institute of Makers of Explosives.