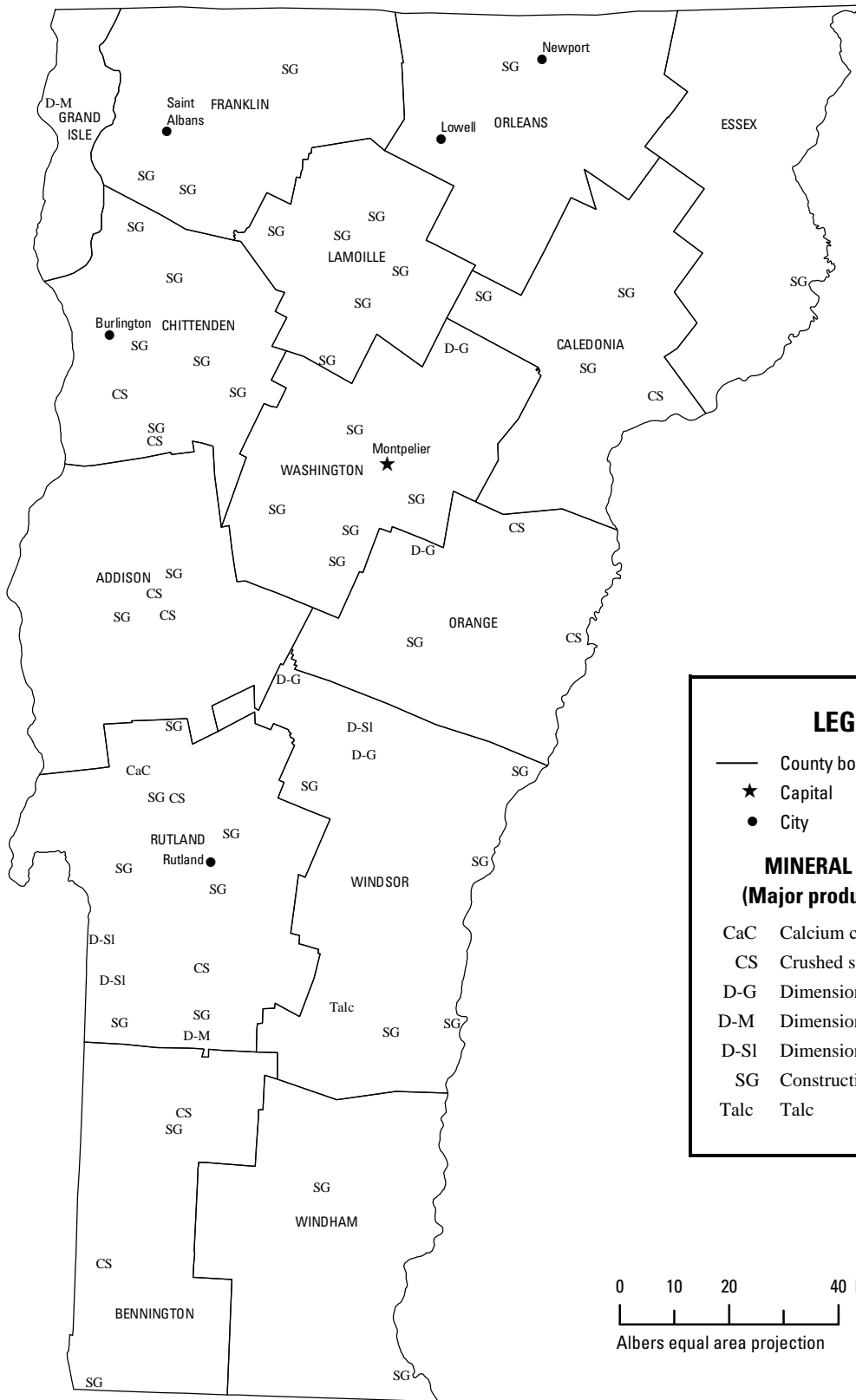




2006 Minerals Yearbook

VERMONT

VERMONT

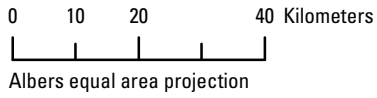


LEGEND

- County boundary
- ★ Capital
- City

**MINERAL SYMBOLS
(Major producing areas)**

- CaC Calcium carbonate
- CS Crushed stone
- D-G Dimension granite
- D-M Dimension marble
- D-SI Dimension slate
- SG Construction sand and gravel
- Talc Talc



Source: Vermont Geological Survey/U.S. Geological Survey (2006).

THE MINERAL INDUSTRY OF VERMONT

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Vermont Geological Survey for collecting information on all nonfuel minerals.

In 2006, Vermont's nonfuel raw mineral production¹ was valued at \$84.2 million,² based upon annual U.S. Geological Survey (USGS) data. Although this represents a 13.8% decrease from the State's total nonfuel mineral value for 2005, Vermont's total nonfuel mineral value actually significantly increased from that of 2005; a significant portion of crushed stone data (in addition to talc data) were withheld because they were company proprietary data. Vermont was 47th in rank (45th in 2005) among the 50 States in total nonfuel mineral production value, yet, per capita, the State ranked 28th in the Nation in its minerals industry's value of nonfuel mineral production; with a population of about 624,000, the value of production was about \$135 per capita.

In 2006, crushed stone, construction sand and gravel, and dimension stone, in descending order of value,² were Vermont's leading nonfuel mineral commodities. A significant increase took place in the actual production and value of crushed stone. Similarly, an 11% increase in construction sand and gravel production resulted in a \$5.3 million increase in value from that of 2005 (table 1). The production of talc had only a small increase, but because of a more substantial increase in unit value, its value of production rose by more than 20%.

In 2005, Vermont continued to be ranked third in the quantity of talc produced among seven producing States and rose to third from fourth in the production of dimension stone.

The Vermont Geological Survey³ (VGS) provided the following narrative information. The State Geologist manages interdisciplinary studies with strong geologic components, especially those focused on surface waters, ground water resources, and geologic hazards. Review of projects as they relate to Criteria 9D and 9E of Act 250, known as the Land Use and Development Act, is a VGS activity that recognizes the importance of lands with high potential for extraction of mineral and earth resources. The VGS reviews and makes recommendations regarding mine and quarry reclamation plans in response to current environmental concerns. Work continued on a Statewide study of ground water analysis, and the State

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2006 USGS mineral production data published in this chapter are those available as of March 2008. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Because data for crushed slate (2005-06), crushed marble and crushed quartzite (2006), and talc have been withheld (company proprietary data), the actual total values for 2004-06 are substantially higher than those reported in table 1.

³Marjorie Gale, Environmental Scientist V, a Geologist with the Vermont Geological Survey, authored the text of the State mineral industry information provided by that agency. The Vermont Geological Survey is designated in Vermont State government as the Division of Geology and Mineral Resources within the Vermont Department of Environmental Conservation.

provided geologic support and published various open file reports. These are made available to the public, consultants, industry, and government.

Advice to the public is provided on a variety of matters as required by State statute. Guidance is provided when questions arise about the development of rock and mineral deposits suitable for building, road making, and economic purposes. In the event of any significant discovery of hydrocarbons in the State, the VGS provides geologic services for Vermont's Natural Gas and Oil Resources Board. Information about the VGS and the Earth Resources pages is available at <http://www.anr.state.vt.us/dec/geo/vgs.htm>.

Environmental Issues

The following narrative was taken from the Vermont Agency of Natural Resources, Department of Environmental Conservation, Waste Management Division:

"The Vermont Asbestos Group Mine (VAG) site is an inactive asbestos mine and mill which operated in the early 1900s and closed in 1993. It was the largest asbestos mine in the United States. The mine site comprises 623 hectares on private lands on Belvidere Mountain within the towns of Eden and Lowell, Vermont. The mine site consists of a network of eleven mine and mill buildings and structures and two significant mill tailings piles estimated at 26-27 million metric tons. The asbestos ore was mined from open pits producing chrysotile "white" asbestos. 90 to 96% of the chrysotile mined in the United States came from the VAG Mine. General Aniline & Film Corporation (GAF), along with its predecessor corporation Ruberoid, operated the mine from 1936-1975. In 1975, the current owner, VAG purchased the property from GAF. In the late 80s and early 90s, the production rate at the mine was significantly less than in the past. The mine closed in 1993" (Vermont Agency of Natural Resources, undated).

In late 2004, the Vermont Agency of Natural Resources, Department of Environmental Conservation, Wetlands Program received a complaint from a down-gradient property owner about tailings material eroding onto his wetland. The Vermont Agency of Natural Resources, Department of Environmental Conservation, Wetlands Program began a 2-year study in 2005 of the biological and chemical assessments within the Lamoille River and Missisquoi River watersheds. Data indicated that the aquatic biota, water quality, and streambed quality was degraded in both watersheds. In May 2006, the State met with officials from the U.S. Environmental Protection Agency and the Agency of Toxic Substance and Disease Registry to discuss site assessment and funding options for remediation of the site. In August 2006, VAG hired a consultant from URS Corporation to address interim corrective action measures and to collect data for a human health assessment.

Government Programs

In 2006, Vermont issued 10 sand and gravel extraction permits and amendments through the Act 250 process, Vermont's Land Use and Development Law. Extraction rates varied up to a maximum of 38,000 cubic meters per year. There were three permits issued for surface extraction of up to 1,150 cubic meters of stones to be used for landscaping. There were seven permit applications submitted for sand and gravel extraction for Act 250 review in 2006 and the process will continue into 2007. Two sand and gravel pit applications and two rock quarry applications were denied.

The District Environmental Court ruled in favor of the appeal from J.P. Carrara & Sons, Inc. and concluded that "Carrara's proposed continuation, deepening and continued use of explosives in its Quarry will not cause or result in a detriment to the public health, safety, or general welfare under the applicable criteria preserved in this appeal, provided its operation conforms with Carrara's application and all exhibits submitted, and provided its operation conforms to the terms and conditions referenced in the permit that accompanies this Decision." (Durkin, 2006). The Carrara Dolomite Quarry on Route 103 in Clarendon first obtained an Act 250 permit in 1988. In 1996, Carrara began extracting rock from below ground level. In 2005, Carrara filed for an amendment to expand and lower the quarry floor to a depth of 158 meters above sea level. Neighbors' opposition to the expansion was mainly based on a variety of water issues. OMYA Inc., North America with a plant in Florence, Vermont, hosted the sixth annual open house at its white marble quarry in Middlebury during Earth Science Week 2006. Visitors were able to view and experience first hand the rocks, quarry equipment, and products. The calcium carbonate in ground form produced by OMYA is used in food, paint, paper, pharmaceuticals, and plastics.

The VGS has been an active participant in the STATEMAP program. STATEMAP is a component of the congressionally

mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects, (2) STATEMAP, which is a matching-funds grant program with State geological surveys, and (3) EDMAP, a matching-funds grant program for universities that has a goal to train the next generation of geologic mappers.

The VGS continued geologic operations conducting surveys and research of the geology, mineral resources, and topography of the State. Emphasis was on completion of the bedrock map of Vermont, surficial mapping by quadrangle and watershed, and a natural hazard map program. The VGS published several maps including bedrock geologic maps of Middlesex, Stowe, Williston, and Woodstock. Surficial geologic maps were published for Middlesex, Wallingford, and Stowe. A surficial and ground water resources map was published for Woodstock. All maps are in 1:24,000 scale. Mapping projects address societal issues in Vermont: landslide hazard, nitrate and naturally occurring radionuclides in bedrock and ground water, and riverine erosion. Prototype aquifer and aquifer recharge area mapping is underway for town planning. Digital surficial and bedrock data were also used to customize HAZUS, a multihazard risk assessment computer program, to make it realistically simulate local Vermont conditions.

References Cited

- Durkin, T.S., 2006. Route 103 Quarry (Appeal of J.P. Carrara & Sons, Inc.)— Decision on the merits: Vermont Environmental Court (Docket No. 205-10-05 Vtec). (Accessed June 19, 2009, at [http://www.vermontjudiciary.org/GTC/Environmental/ENVCRT Opinions/ Route 103 Quarry 205-10-05 Vtec.pdf](http://www.vermontjudiciary.org/GTC/Environmental/ENVCRT%20Opinions/Route%20103%20Quarry%20205-10-05%20Vtec.pdf).)
- Vermont Agency of Natural Resources, [undated], Vermont asbestos group mine site: Vermont Agency of Natural Resources. (Accessed June 19, 2009, at <http://www.anr.state.vt.us/DEC/wastediv/sms/VAG/Site.Chronology.pdf>.)

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN VERMONT^{1,2}

(Thousand metric tons and thousand dollars)

Mineral	2004		2005		2006	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel, construction	4,970	24,000	5,240	32,000	5,810	37,300
Stone:						
Crushed	5,110	30,800	4,960 ^{r,3}	37,900 ^{r,3}	2,070 ³	19,300 ³
Dimension	100	30,600	98	27,800	100	27,600
Talc, crude	W	W	W	W	W	W
Total	XX	85,400	XX	97,700 ^r	XX	84,200

^rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

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

³Excludes certain stones; value withheld to avoid disclosing company proprietary data.

TABLE 2
VERMONT: CRUSHED STONE SOLD OR USED, BY KIND¹

Kind	2005			2006		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone ²	6	1,380	\$9,010	7	1,550	\$14,500
Dolomite	2 ^r	216 ^r	1,460 ^r	2	205	1,610
Granite	2	303	2,130	2	278	2,820
Marble	1	2,030	13,700	1	W	W
Quartzite	2	987 ^r	11,200 ^r	2	W	W
Slate	1	W	W	1	W	W
Miscellaneous stone	1	49	365	1	43	423
Total	XX	4,960 ^r	37,900 ^r	XX	2,070	19,300

^rRevised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

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

²Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
VERMONT: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2006, BY USE¹

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	W	W
Filter stone	W	W
Other coarse aggregate	31	169
Total	40	2,630
Coarse aggregate, graded:		
Concrete aggregate, coarse	(2)	(2)
Other graded coarse aggregate	32	199
Fine aggregate (-¾ inch), other	4	17
Coarse and fine aggregates:		
Graded road base or subbase	(2)	(2)
Other coarse and fine aggregates	243	1,560
Unspecified: ³		
Reported	831	8,250
Estimated	910	8,800
Total	1,740	17,100
Grand total	2,070	19,300

W Withheld to avoid disclosing company proprietary data; included in "Total."

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

²Withheld to avoid disclosing company proprietary data; included in "Grand total."

³Reported and estimated production without a breakdown by end use.

TABLE 4
VERMONT: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2006, BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	399	\$3,920	\$9.83
Asphaltic concrete aggregates and road base materials	866	5,670	6.54
Fill	229	509	2.22
Snow and ice control	186	935	5.03
Filtration	32	238	7.44
Other miscellaneous uses	147	307	2.09
Unspecified: ²			
Reported	764	5,580	7.30
Estimated	3,190	20,200	6.33
Total or average	5,810	37,300	6.42

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

²Reported and estimated production without a breakdown by end use.