

# **CALIFORNIA NON-FUEL MINERALS 2007**

**By Susan Kohler, Senior Geologist, California Geological Survey**

Based on the U.S. Geological Survey's (USGS) preliminary data for 2007, California ranked third behind Arizona and Nevada in non-fuel mineral production, accounting for approximately 6.3% of the nations' total. The market value of mineral production for California was \$4.3 billion. California produced about 30 different industrial minerals during the year. California led the nation in the production of sand and gravel, portland cement, diatomite and natural sodium sulfate, and was the only producer of boron and rare earths. The state ranked second behind Florida for masonry cement. The only metals produced were gold and silver. California ranked 6<sup>th</sup> in gold production out of nine states that reported for the year. Other minerals produced include common clay, bentonite clay (including hectorite), crushed stone, dimension stone, feldspar, fuller's earth, gemstones, gypsum, iron ore (used in cement manufacture), kaolin clay, lime, magnesium compounds, perlite, pumice, pumicite, rare earths, salt, silver, soda ash, and zeolites.

There were about 660 active mines producing non-fuel minerals during 2007. Approximately 10,000 people are employed at these mines and their processing plants.

## **INDUSTRIAL MINERALS**

Construction sand and gravel continued to be California's leading industrial mineral, with an estimated total value of \$1.37 billion for 143.3 million tons produced. Vulcan Materials Company led the state in the production of sand and gravel. California's second largest mineral commodity was portland cement valued at nearly \$1.18 billion for 12.0 million tons produced. U.S. Borax and Chemical Corporation Inc., (a subsidiary of Rio Tinto Inc.), led the state and nation in the production of boron at their Boron Mine and facility in Kern County. Valued at about \$600 million, boron was California's third highest dollar-value mineral produced in 2007. Crushed stone ranked fourth in the state with a value of \$558 million.

### **Aggregate**

California's residential construction slowdown during the year contributed to a significant decrease in both production and value of construction aggregate (sand and gravel and crushed stone). Total production in 2007 was 191.0 million tons compared to 229.1 million tons produced in 2006 – amounting to a 16.6% decrease. The value of construction aggregate produced decreased by 11%. California is the second largest producer of construction aggregate in the nation behind Texas.

During 2007 Caltrans designated \$8.1 billion of the \$19.9 billion transportation bond package (Proposition 1B, approved in 2006) to be used for safety improvements and repairs to state highways, upgrades to freeways, repairs to local streets and roads, improvements to the seismic safety of local bridges, and expansion of public transit. The package also authorizes state and regional agencies to engage in public and private partnerships to attract billions of additional dollars in private investment for the development of transportation infrastructure in the state. Many of these infrastructure projects will require large amounts of construction aggregate and cement. The increased demand for construction materials necessary for these projects may offset some of the reduced demand from declining residential construction.

The Fresno County Board of Supervisors upheld an earlier Planning Commission decision approving an expansion of the Vulcan Materials Company sand and gravel operation located along the Kings River near Centerville, Fresno County. The approval of the 50-year, 440-acre expansion also allows an increase in annual production with time from 1 million to 2.5 million tons per year. The Kings River is also the site of Calaveras Material's proposed sand and gravel operation at a 315-acre site located along the rivers northern bank. The proposed mine was tentatively approved by the Fresno County Planning Commission in December, 2007 but was later disapproved in March 2008. Calaveras Materials is currently appealing the decision.

Kaweah River Rock Company Inc.'s proposed project in Tulare County to mine sand and gravel from 280 acres of land south of the company's existing operation, received final approval in October 2007. The company plans to start mining the additional acreage in summer 2008. The expansion will add approximately 20 million tons of alluvial sand and gravel reserves to the northern Tulare County area.

Baldwin Contracting Company Inc.'s proposed 200-acre, 5.5 million cubic yard, M&T Ranch sand and gravel mining project was approved in February 2007 by the Butte County Board of Supervisors. The approval was appealed by project opponents and was subsequently disapproved by the Board of Supervisors in January 2008.

Brown Sand Inc. was granted a permit in August 2007 to mine sand at a site located along the southern bank of the San Joaquin River in Lathrop, San Joaquin County. The 35-year permit allows for the extraction of 14 million tons of sand that will be processed at Brown Sand's existing plant located near the new site.

Hanson PLC was purchased by HeidelbergCement in August 2007. Included in the purchase were Hanson's California holdings, consisting of 31 aggregate mining properties, the Permanente limestone mine in Santa Clara County, and six sand dredging operations located in San Francisco and Suisun Bays.

A year-long truce declared in December 2006 between the City of Santa Clarita and CEMEX was extended another six months (until June 2008) as discussions continue regarding a proposed 56 million ton aggregate mine in Soledad Canyon. The truce prevents the City of Santa Clarita from campaigning against the mine and CEMEX from moving ahead in obtaining the permits necessary to open the mine. The extended truce will hopefully allow enough time for CEMEX to work with the City of Santa Clarita and elected officials to come up with a mutually acceptable resolution in the 7-year old dispute over the proposed mine.

Granite Construction Company began the permitting process for the Liberty Quarry project, a proposed 155-acre, 270 million ton, crushed rock quarry located in southeastern Riverside County about 3 miles south of Temecula near the Riverside/San Diego county border. If approved, the quarry could provide up to 5 million tons of construction aggregate annually to the eastern San Diego County and southeastern Riverside County region.

The BoDean Company Inc. was granted a 24-acre permit expansion in January 2007 to mine an additional 9.2 million tons of crushed rock at the company's Blue Rock Mine located about one mile west of the unincorporated town of Forestville in Sonoma County. The BoDean Company plans to start mining the expansion area in summer 2008.

Shasta County approved two new sand and gravel mining permits during 2007 – a 30-year permit granted to Tullis Inc. to mine 268 acres containing approximately 10 million tons of sand and gravel, and a 15-year permit granted to Reading Wake Board to mine 39-acres containing about 1.7 million tons. The county also approved a reclamation plan amendment adding about 0.5 million tons of aggregate reserves to an existing operation owned by Grant Amen.

Rinker Material's Solano Concrete sand and gravel operation located near Fairfield, Solano County, was acquired by CEMEX as part of its \$14.2 billion purchase of Rinker Materials Corporation in July 2007. The CEMEX purchase also included Rinker's Lavic cinder mine located in San Bernardino County.

Eagle Rock Aggregates (a subsidiary of Polaris Minerals Corporation) completed a \$27million receiving, storage, and distribution terminal located in the Port of Richmond in fall 2007. The 95,000 square foot facility was constructed to receive shipments of high quality sand and gravel from Vancouver Island, British Columbia. The first shipment arrived at the new facility in October 2007. Before the large ships carrying up to 79,200 tons of aggregate can dock at the port's shallow water berth, they are partially unloaded onto barges while anchored in the San Francisco Bay. The barged rock is towed up the Petaluma River to Landing Way Depot where it is distributed in southern Sonoma County. In addition to the Richmond facility, aggregate from Canada is currently being shipped to San Francisco's Pier 92 and to the port of Redwood City. Polaris

anticipates future shipping of Canadian aggregate into the Los Angeles, Long Beach, and San Diego areas. HeidelbergCement, CEMEX, and Shamrock are currently the only aggregate companies buying imported aggregate from Canada. HeidelbergCement also barges sand from Mexico into San Diego. About 2 million tons of aggregate was imported into California from Canada and Mexico in 2007.

## **Cement**

The modernization of Texas Industries, Inc.'s Oro Grande cement plant and mining/crushing facilities in San Bernardino County continued throughout the year. Scheduled for completion in May of 2008, the \$360 million renovations will almost double the plants annual cement processing capacity from 1.2 to 2.2 million tons.

Mitsubishi Cement Corporation's 200-acre expansion of its Cushenbury limestone mine, San Bernardino County (approved in October 2004) began development in fall 2007. The expansion adds 50 million tons of cement-grade limestone to the mine's existing reserves.

Hanson Permanente Cement Inc. (recently purchased by HeidelbergCement) worked on revising and expanding the 1987 reclamation plan for its Permanente limestone mine, Santa Clara County. The 1987 plan expires in 2010. The Permanente quarry and processing plant currently supplies about 50% of San Francisco Bay Area's cement.

In anticipation of increasing cement imports, CEMEX and Pan Pacific Cement began construction of two new state-of-the-art bulk cement terminals at the Port of Sacramento in summer 2007. CEMEX is investing more than \$54 million on their new terminal that will handle up to 1.1 million tons of cement annually – almost five times what CEMEX currently handles at its existing Sacramento facility. Pan Pacific's new facility will cost about \$20 million and will have a maximum capacity of about 880,000 tons per year. Both facilities are scheduled to be completed in 2008.

## **Other Industrial Minerals**

Molycorp Inc. and the Pittsburg & Midway Coal Mining Company, (both subsidiaries of Chevron Corporation) were merged in September 2007 to form a single subsidiary mining company – Chevron Mining Inc. The newly formed corporation includes the Mountain Pass rare earth mine located in San Bernardino County. The Mountain Pass Mine has been mostly idle since 1998 when mining operations were ordered to cease because of environmental issues. Processing was limited to production of bastnasite concentrates from stockpiled ore. Since then, Molycorp has been working to bring the facility into compliance with environmental requirements. Molycorp reached a long awaited milestone in

September, 2007 when the plant's extraction circuits were restarted, resuming the processing of lanthanum concentrate and didymium from stockpiled rare earth concentrates. Chevron Mining Inc. has not set a date to restart mining or full scale plant operation.

Searles Valley Minerals Inc. (SVM) was purchased for an undisclosed amount in December 2007 by Nirma LTD., an Indian owned soap and detergent maker and one of the world's largest producers of synthetic soda ash. SVM pumps brine from Searles Dry Lake to its facilities at Trona, San Bernardino County where about 2 million tons of soda ash, sodium sulfate, and boron minerals are produced annually. The acquisition of SVM makes Nirma the third largest producer of boron in the world and places the company among the leading world producers of soda ash.

## **METALS**

Gold dominated California's metal production in 2007 – comprising over 99% of the value of the state's metals production. Despite increasing gold prices during the year, California's gold production continued to decline in 2007. Annual production amounted to about 19,400 ounces – a 10% decrease from 2006 production of 21,600 ounces. Gold value was \$13.0 million for 2007 almost unchanged from the value in 2006 of \$13.1 million. Gold production for 2008 is expected to increase dramatically because of the reopening of Western Goldfields Inc's. Mesquite Mine in Imperial County.

Minor production from existing leach pads continued during 2007 at the Mesquite Mine in Imperial County and Canyon Resources Corporation's Briggs Mine, Inyo County. Mining ceased at these properties in 2001 and 2004, respectively. In addition to the Mesquite and Briggs mines, placer gold is produced from Cal Sierra Development Inc.'s Yuba River gold dredging operation in Yuba County and as a by-product mineral from numerous sand and gravel mines located in the northern and central part of the state. California also has several small underground gold mines that mainly produce specimen gold including gold in quartz matrix for jewelry.

Western Goldfields, Inc. commenced new mining activities in 2007 at its Mesquite Mine and plans to bring the mine back into full production in 2008. Once in full operation, the company estimates annual gold production will be between 155,000 and 165,000 troy ounces. The Mesquite Mine has not been worked since 2001 when the former owner, Newmont Mining Corporation, ceased mining because of dropping gold prices. The mine was purchased in 2003 by Western Goldfields which has been working on re-opening it for the last four years. A 100,385-foot drilling program conducted by Western Goldfields in 2006-2007, combined with prior exploration, has identified an estimated 2.8 million ounces of gold reserves at the Mesquite Mine. An additional 1.5 million ounces of measured and indicated resources were also identified. Follow-up

drilling in 2008 at the Brownie Hill and Vista deposits is expected to identify additional ore zones. As of December, 2007, Western Goldfields has mined about 900,000 tons of new ore containing approximately 12,500 ounces of gold that has been placed on newly constructed leach pads. The first gold pour from the new operations took place in January 2008.

Canyon Resources Corporation initiated a 10,000-foot drilling program in December 2007 focusing on the Cecil R gold deposit; an unpermitted property located four miles north of the companies Briggs Gold Mine, Inyo County. The Cecil R deposit lies within a shallow dipping oxidized detachment zone located below an upper plate cover of unconsolidated gravels. Exploration at the Cecil R deposit conducted in 2006 demonstrated in-place gold mineralization of 5.75 million tons of ore with an average grade of 0.024 ounces/ton. The drilling program will also include at least three exploratory drill holes at the Briggs Mine along a high-grade ore zone associated with the Goldtooth Fault. Drilling completed in 2006 indicated that this zone contains 0.8 million tons of high-grade gold ore averaging 0.215 ounces/ton and is blanketed by a lower grade zone containing 4.2 million tons of ore averaging 0.049 ounces of gold /ton. Also, another 22 million tons of gold ore averaging 0.022 ounces per ton has been identified in the vicinity of the existing open-pits of the Briggs Mine. Canyon Resources plans to begin mining these three ore zones by both underground and open pit methods in 2008 or 2009.

Sutter Gold Mining Inc. completed phase I and began phase II of an 18,000-foot drilling program during 2007 at its Sutter Gold project in Amador County. The fully permitted project comprises 535 acres along a 3.2-mile segment of the Mother Lode belt and includes the site of historic Lincoln Mine. Phase I assays were reported as positive demonstrating excellent continuity of the Comet veins. Sutter Gold is waiting on the completion of phase II drilling and subsequent financing before mining commences. The mine is currently opened for tours.

Emgold Mining Corporation continued the permitting process in 2007 to reopen the historic Idaho Maryland gold mine located in the town of Grass Valley, Nevada County. Workshops were held during the year to educate the public and to gain local support for the project. Emgold has identified measured and indicated gold resources of 472,000 ounces. A key component of the proposed Idaho Maryland Mine project is an on-site manufacturing facility that will use waste rock for the production of ceramic products.

Silver is produced as a by-product of gold production and makes up less than 1% of California's total metal production. Iron ore mined in California is used in the production of portland cement and is considered an industrial mineral.

## **INDUSTRY ORGANIZATIONS**

The California Construction and Industrial Materials Association (CalCIMA) was formed in January 2007 by joining the memberships of four previous associations – California Mining Association, Construction Materials Association of California, Southern California Rock Products Association, and Southern California Ready Mixed Concrete Association. CalCIMA is a statewide trade association made up of producers, suppliers, and service providers for industrial materials.

## **THE CALIFORNIA GEOLOGICAL SURVEY**

The California Geological Survey's (CGS) Mineral Land Classification Project, a mandate of the Surface Mining and Reclamation Act, continued to provide lead agencies with mineral resource maps that have proved to be of great value in land-use planning and mineral resource conservation. To date, CGS has completed mineral resource studies in about one third of the state. During the year, CGS completed an updated classification project in the Palm Springs area, Riverside County, identifying an additional 6,638 acres of land containing an estimated 472 million tons of PCC-grade aggregate resources. An updated classification project was also completed in the Claremont-Upland area located in San Bernardino and Los Angeles counties. Classification work is currently taking place in the North San Francisco Bay area (Marin and Napa counties), and in San Joaquin, San Bernardino, and Kern counties. These reports are scheduled for completion in 2008.



Freighter delivering 79,200 tons of high-grade construction aggregate from Polaris Minerals' Orca Quarry on Vancouver Island, British Columbia to the San Francisco Bay area market. Aggregate is off loaded to barges at a rate of 4,500 tons per hour. The cost of shipping a ton of aggregate 1,000 miles by freighter is about equivalent to the cost to transporting it 25 miles by truck in the Bay area. **Photo courtesy of Polaris Minerals.**





San Rafael Rock Quarry located about six miles east of San Rafael on the southwest side of San Pablo Bay in Marin County. Construction aggregate and rip rap are produced from Franciscan Assemblage greywacke. The 100-year old quarry has been operated by Dutra Construction Company since 1986. The quarry's location on San Pablo Bay allows for easy transport of rock via barge for river and delta construction projects including levee repairs. Rip rap as large as 4 feet in diameter is excavated from the quarry. The barge loading facilities can be seen in the foreground. **Photo courtesy of Dutra Construction Company.**

Amount and value of non-fuel mineral production for 2005, 2006, 2007. <sup>1,2</sup>

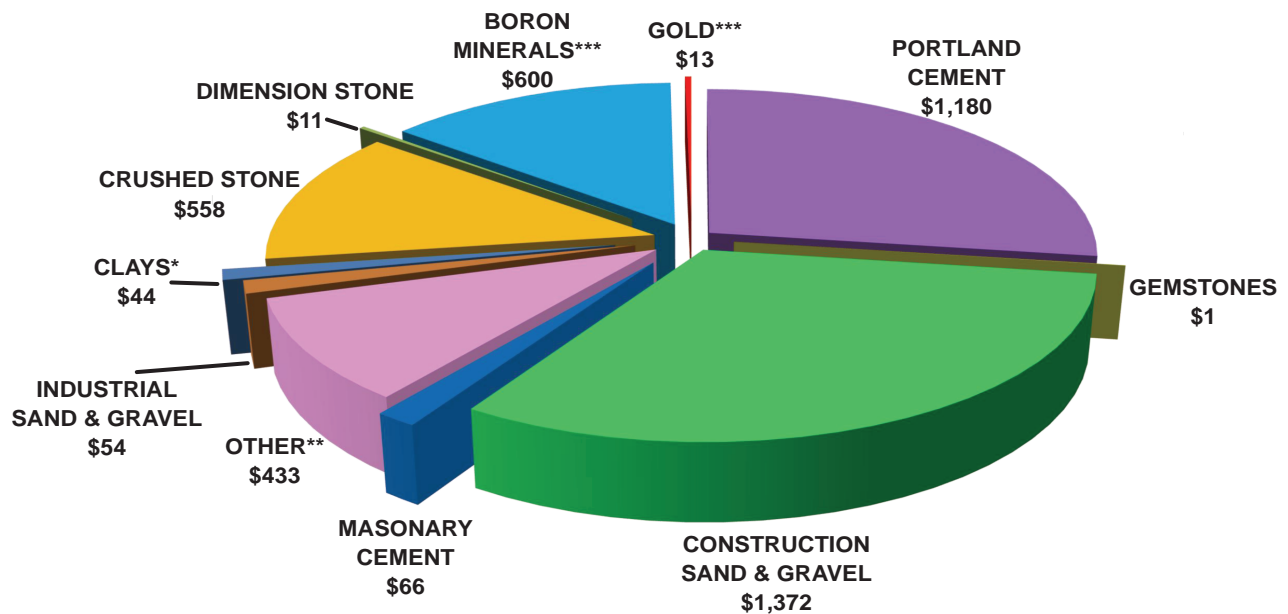
Mineral		2005		2006		2007 <sup>P</sup>	
		Quantity	Value (thousands \$)	Quantity	Value (thousands \$)	Quantity	Value (thousands \$)
Boron (B <sub>2</sub> O <sub>3</sub> )	short tons	674,700	713,000	W	W	W	<sup>e</sup> 4600,000
Cement							
Masonry	short tons	<sup>e</sup> 765,100	<sup>e</sup> 80,600	<sup>e</sup> 769,500	<sup>e</sup> 89,500	<sup>e</sup> 566,000	<sup>e</sup> 65,800
Portland	short tons	<sup>e</sup> 12,749,300	<sup>e</sup> 1,130,000	<sup>e</sup> 12,017,300	<sup>e</sup> 1,190,000	<sup>e</sup> 12,017,300	<sup>e</sup> 1,180,000
Clays:							
Bentonite	short tons	22,000	2,200	26,500	2,500	26,500	2,500
Common	short tons	1,114,600	16,600	820,100	7,600	793,800	7,500
Fullers Earth	short tons	208,400	W	W	W	W	W
Gemstones		NA	1,100	NA	1,000	NA	1,000
Gold <sup>3</sup>	troy ounces	<sup>4</sup> 65,300	<sup>4</sup> 29,000	<sup>4</sup> 21,600	<sup>4</sup> 13,100	<sup>4</sup> 19,400	<sup>4</sup> 13,000
Sand and gravel:							
Construction	short tons	179,956,700	1,442,900	168,571,100	1,522,900	143,285,300	1,372,100
Industrial	short tons	2,239,200	60,400	1,843,400	57,800	1,821,300	53,800
Silver <sup>3</sup>	troy ounces	<sup>4</sup> 5050	<sup>4</sup> 40	W	W	W	W
Stone:							
Crushed	short tons	59,862,400	454,700	60,544,900	644,300	47,675,400	558,100
Dimension	short tons	45,200	10,200	44,400	10,000	46,600	11,300
Total combined and W values			331,400		1,090,100		433,000
<b>Total annual value-all minerals</b>			<b>4,272,100</b>		<b>4,628,800</b>		<b>4,300,000</b>
<sup>1</sup> Production as measured by mine shipments, sales, or marketable production (including consumption by producers). <sup>2</sup> Quantity and value data are rounded to the nearest 100 units except for 2005 silver (rounded to nearest 10 units). <sup>3</sup> Recoverable content of ores, etc. <sup>4</sup> Data from California Department of Conservation, California Geological Survey. <sup>P</sup> Preliminary. <sup>e</sup> Estimate. NA=Not available. W=Withheld to avoid disclosing company proprietary data; value included with "combined value" data.							

Modified from unpublished U.S. Geological Survey (USGS) data, subject to change; official USGS final 2006 data will be published in the California chapter of the USGS Mineral Yearbook, Area Reports: Domestic 2006, Volume II.

# CALIFORNIA NON-FUEL MINERAL PRODUCTION 2007

Total Value \$4.3 Billion

VALUES IN  
MILLIONS OF  
DOLLARS



\*CLAYS Includes:  
bentonite, common, fire, kaolin, and fuller's earth

\*\*OTHER Includes:  
diatomite, feldspar, gypsum, iron ore, lime, magnesium compounds, perlite, pumice and pumicite, salt, silver, soda ash, sodium sulfate, talc, and zeolites

\*\*\* Data from California Geological Survey

Information modified from preliminary unpublished U.S. Geological Survey (USGS) data and subject to change; Official USGS final 2007 data will be published in the California Chapter of the USGS Mineral Year Book, Area Reports: Domestic 2007, Volume II.