

**UPDATE OF MINERAL LAND CLASSIFICATION  
FOR PORTLAND CEMENT CONCRETE-GRADE  
AGGREGATE IN THE SAN GABRIEL VALLEY  
PRODUCTION-CONSUMPTION REGION, LOS  
ANGELES COUNTY, CALIFORNIA**

**2010**



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*Department of Conservation*

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ANGELES COUNTY, CALIFORNIA**

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**2010**

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## EXECUTIVE SUMMARY

This report updates information presented in a classification report on portland cement concrete-grade (PCC) aggregate in the San Gabriel Valley Production-Consumption (P-C) Region first published in 1982. That report was published by the California Department of Conservation's Division of Mines and Geology (now California Geological Survey) as Special Report 143, Part IV (SR 143, Part IV) – *Mineral Land Classification of the Greater Los Angeles Area, Part IV, Classification of Sand and Gravel Resource Areas, San Gabriel Valley Production-Consumption Region* (Kohler, 1982).

Sand and gravel deposits having material suitable for use as PCC aggregate are classified in this update report. Deposits suitable for lower grades of aggregate use, such as asphaltic aggregate, base, subbase, and fill were not considered in this classification process because of their general abundance in the San Gabriel Valley P-C Region. However, PCC aggregate in the region meets specifications for these lower aggregate products.

Information from SR 143, Part IV was used to assist the State Mining and Geology Board (Board) in a subsequent process called *designation*. Designation is the formal recognition by the Board, of lands containing mineral resources having regional or statewide significance that are needed to meet future demands. The Board's designation of lands in the San Gabriel Valley P-C Region was published in 1984 as SMARA Designation Report No. 3 (California Department of Conservation, 1984). This update classification report does not change that designation.

The following conclusions are reached in this updated report:

- As of January, 2009, seven mines, operated by five different mining companies, were producing PCC-grade aggregate in the San Gabriel Valley P-C Region. In addition to PCC-grade aggregate, these mines also produce a full range of lower aggregate grades for such products as asphaltic concrete and base.
- The anticipated consumption of aggregate in the San Gabriel Valley P-C Region for the next 50 years (2009 through the year 2058) is estimated to be 911 million tons, of which 638 million tons must be PCC quality.
- Since 1980, permitted PCC-grade aggregate reserves have increased from 280 million tons (an 19-year supply using the 1980 to 2030 projection) to 328 million tons (a 20-year supply using the updated 2009 through 2058 projection)
- About 27 percent, or 1,234 acres, of the 4,642 acres of lands designated by the Board in 1984 has been lost to land uses incompatible with mining. This equates to 435 million tons of PCC-grade aggregate resources lost.
- Since the 1984 designation of PCC-grade aggregate resources in the San Gabriel Valley P-C Region, 435 million tons of aggregate resources underlying 1,234 designated acres have been lost to urban development and land filling and another 406 million tons of aggregate resources have been depleted due to aggregate mining. This has reduced the

- designated PCC-grade aggregate resources by about 35 percent, from 2,402 million tons to 1,561 million tons.
- Four additional aggregate resource areas totaling 281 acres and containing 311 million tons of aggregate resources have been identified during the updating of the P-C Region. These areas are not designated.

## PART I - INTRODUCTION

In 1982, a report titled “Mineral Land Classification of the Greater Los Angeles Area, Part IV, Classification of Sand and Gravel Resource Areas, San Gabriel Valley Production-Consumption Region” (Kohler, 1982) was published by the California Division of Mines and Geology (predecessor to the California Geological Survey or “CGS”). It will be referred to in this update report as SR 143, Part IV. In SR 143, Part IV, approximately 580 square miles covering central Los Angeles County were classified for portland cement concrete-grade (PCC) aggregate (see Figure 1). The region is covered by all or part of 20 U.S. Geological Survey 7-1/2 minute quadrangle maps as shown on Figure 2.

Subsequent to the publication of SR 143, Part IV, and completion of an Environmental Impact Report (California Department of Conservation, 1983) the State Mining and Geology Board (Board) designated 4,643 acres within the San Gabriel Valley Production-Consumption (P-C) Region in 1984 as having mineral resources of statewide or regional significance (California Department of Conservation, 1984).

This report presents a reevaluation and update of SR 143, Part IV and a review of the areas designated by the Board, for the benefit of local lead agencies in the San Gabriel Valley P-C Region (see Table 1 for a list of lead agencies). This report is intended as an update to and not a replacement for SR 143, Part IV. In addition, this report does not alter the previous designation of lands in the San Gabriel Valley P-C Region.

### BACKGROUND

SR 143, Part IV and this update were conducted by the State Geologist as specified by the Surface Mining and Reclamation Act (SMARA) of 1975. SMARA was passed by the California State Legislature in response to the loss of significant mineral resources due to urban expansion, the need for current information concerning the location and quantity of essential mineral deposits, and to ensure adequate mined-land reclamation. To address mineral resource conservation, SMARA mandated a two-phase process called *classification-designation*.

The objective of the classification-designation process is to ensure, through appropriate local lead agency policies and procedures, that mineral materials will be available when needed and do not become inaccessible as a result of inadequate information during the land-use decision-making process.

SMARA mandates that the Board develop guidelines for mineral land classification. The Board adopted SMARA guidelines on June 30, 1978 and revised them in 2000. The guidelines are available on the California Department of Conservation website at <http://www.consrv.ca.gov/SMGB/Guidelines/ClassDesig.pdf>.

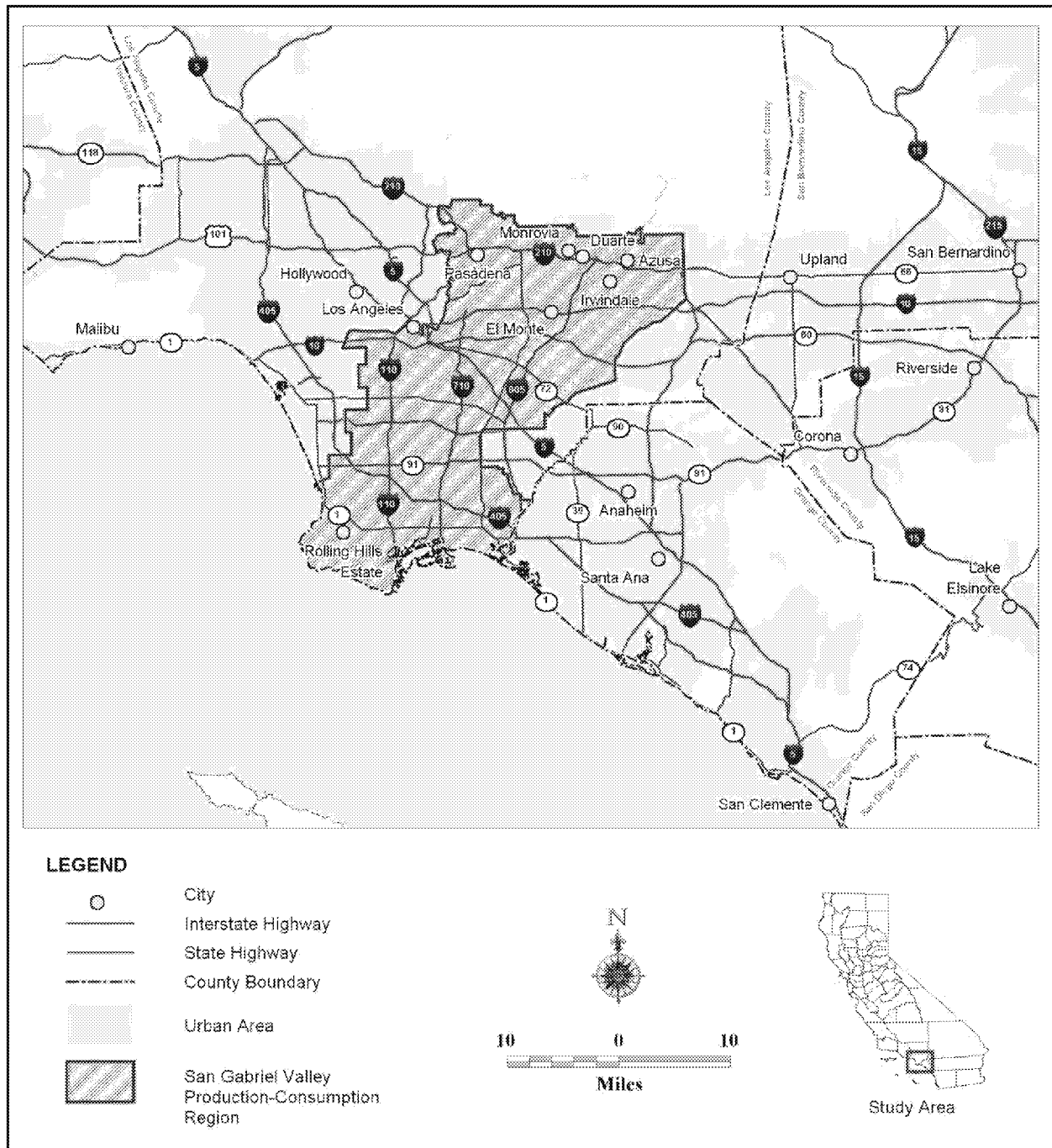
The guidelines require the State Geologist to classify specified areas into Mineral Resource Zones (MRZs). The guidelines also require that classification reports for construction aggregate resources include the following additional information: (1) the location and estimated total quantity of construction aggregate in areas with land-uses compatible with potential mining; (2)

limits of the market area that these potential resources would supply; and (3) an estimate of the total quantity of aggregate material that will be needed to supply the area for the next 50 years.

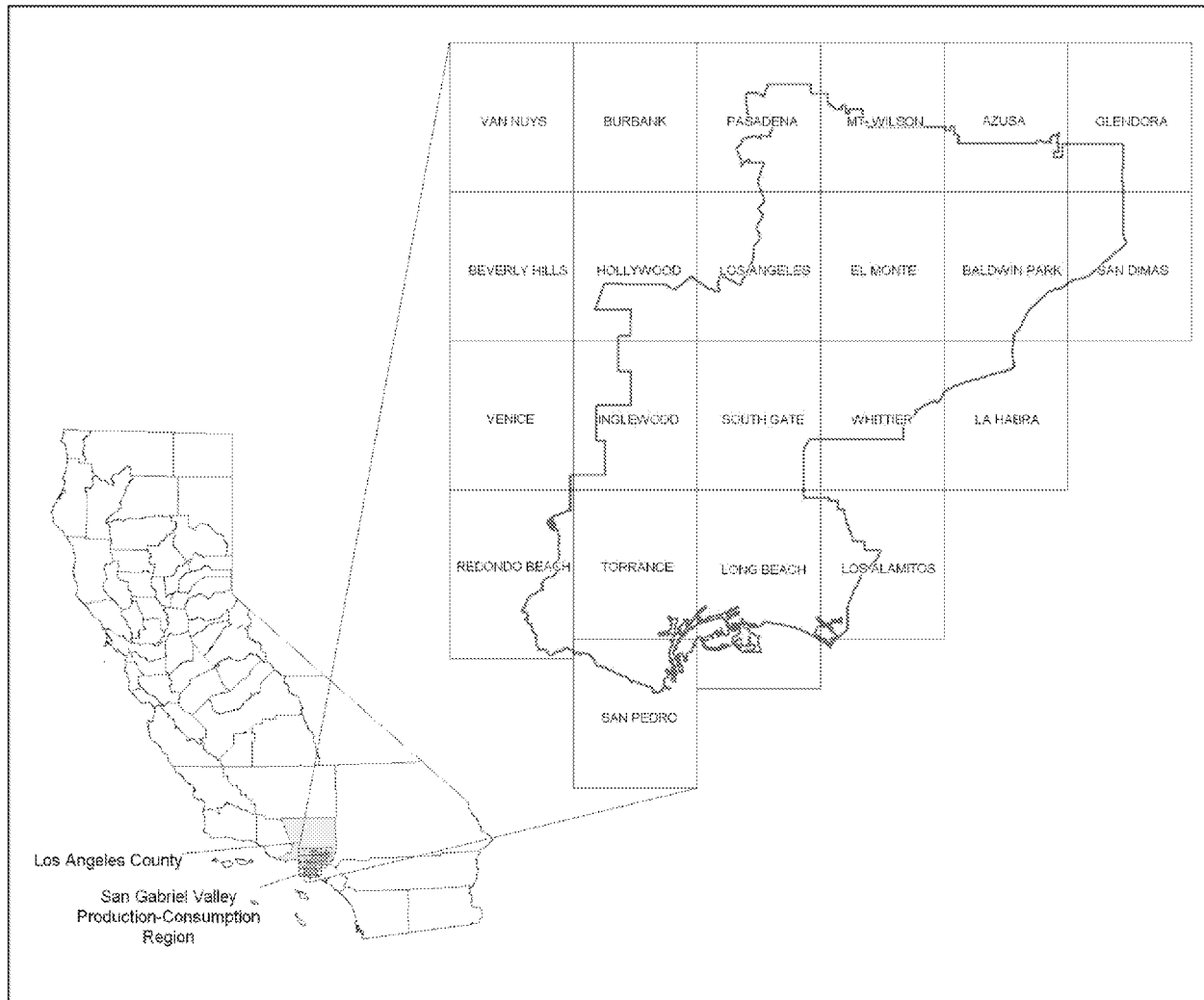
## OVERVIEW OF CLASSIFICATION

The classification of construction aggregate resources involves the six distinct but interrelated steps that are listed below.

1. Determination of Study Boundary: Study areas may be a county, a portion of a county, or a Production-Consumption (P-C) Region that may contain parts of one or more counties. P-C Regions are selected such that the majority (95 percent) of the construction aggregate produced in the region is consumed in the region.
2. Establishment of Mineral Resource Zones (MRZs): Based on geologic appraisals, lands within the study area were classified in SR 143, Part IV as MRZ-1, MRZ-2, MRZ-3 or MRZ-4. In this update report, this MRZ classification has been retained and is shown on Plate 1. This classification system is discussed in Part II of this report. The geologic appraisals include a study of pertinent geologic reports and maps, and field investigations of geologic units exposed in outcrops and at active and inactive mines and quarries.
3. Identification of Sectors: Lands known to contain significant aggregate resources (areas classified as MRZ-2 in Step 2 above) are evaluated to determine if current uses of these lands preclude mining. Areas currently permitted for mining and areas found to have land uses compatible with possible mining are identified as *Sectors*.
4. Calculation of Resource Tonnages within Sectors: Investigation and analysis of on-site conditions, measurement of the areal extent of deposits, drill-hole information, waste-material percentages, and deposit densities are used to calculate total tonnages of aggregate reserves (deposits in land owned or controlled by an aggregate producer and permitted for mining) and resources (all deposits of aggregate, including the permitted reserves) within each Sector.
5. Forecast of 50-Year Needs and the Life Expectancy of Current Reserves: The total tonnage of aggregate needed to satisfy the estimated demand in the study area over the next 50 years is based on multiplying the projected population over that period with the average annual per-capita rate of total aggregate consumption from 1980 to the time of the study. Results of this forecast are used to determine the life expectancy of the study area's current reserves.
6. Identification of Alternative Resources: Alternative sources of aggregate are identified and briefly discussed.



**Figure 1. General location map of the San Gabriel Valley P-C Region.**



**Figure 2. Index map of U.S. Geological Survey 7-1/2 minute quadrangles covering the San Gabriel Valley P-C Region.**

Although the San Gabriel Valley P-C Region boundary was originally drawn in the late 1970's to include 95 percent of the aggregate production of the region, marketing patterns have changed so that this is no longer true. It is estimated from producer information that approximately **30 percent** of the region's aggregate production in 2008 was exported beyond the P-C Region boundary. Some or all of this may have been offset by imports from neighboring P-C Regions. There are two factors that may have led to this increase in inter-regional aggregate commerce. Depleting aggregate reserves in metropolitan areas such as Orange County and northern San Diego County may have caused increased exports from the San Gabriel Valley P-C Region into those regions, and consolidation of ownership may have led to longer hauls to company-owned concrete batch plants both inside and outside of the P-C Region.

Classification of the San Gabriel Valley P-C Region was done with regard to the suitability of the material for use as PCC aggregate. Materials suitable only for asphaltic aggregate, base, subbase, and fill were not classified because of their abundance in the region.

## **OVERVIEW OF DESIGNATION**

This update report contains the classification step of the two-phase process provided by SMARA. The designation phase follows the receipt and acceptance of this classification report by the SMGB. Designation is the formal recognition by the Board, after consultation with lead agencies and other interested parties, of areas containing mineral deposits of regional or statewide significance. Procedures for the designation of lands containing significant mineral deposits are specified in Section II.2 of the Board's Guidelines for Classification and Designation of Mineral Lands (<http://www.consrv.ca.gov/SMGB/Guidelines/ClassDesig.pdf>).

The Board previously designated lands in the San Gabriel Valley P-C Region in a report titled "Designation of Regionally Significant Construction Aggregate Resource Areas in the Orange County-Temescal Valley and the San Gabriel Valley Production-Consumption Regions: SMARA Designation Report No. 3" (California Department of Conservation, 1984). This update report reviews the current land uses of the previously designated areas, but does not alter that designation.

## **LEAD AGENCY RESPONSE TO CLASSIFICATION**

The Board, upon receipt of the classification information from the State Geologist, transmits the classification report to the appropriate lead agencies and makes it available to other interested parties. Within 12 months of receipt of the report, each lead agency must develop and adopt mineral resource management policies to be incorporated in its general plan. These policies will:

1. Recognize the mineral land classification information, including the classification maps transmitted to the lead agency by the Board.
2. Emphasize the conservation and development of identified mineral deposits.

Lead agencies (Los Angeles County and incorporated cities) that have jurisdiction within the San Gabriel Valley P-C Region are shown in Table 1. The information in this update and the revised projection of aggregate needs in the region should be used by the lead agencies in evaluating the effectiveness of their current mineral resource management policies and in planning for future construction aggregate demands in their jurisdictions. These plans should be updated if necessary.

<b>Lead Agencies within the San Gabriel Valley P-C Region</b>	<b>Active Mine Operations within Lead Agency's Jurisdiction</b>	<b>Land Designated for PCC-Grade Aggregate within Lead Agency's Jurisdiction</b>	<b>Land Classified MRZ-2 within Lead Agency's Jurisdiction</b>
<b>Los Angeles County</b>			*
Alhambra			
Arcadia	*	*	*
Azusa	*	*	*
Baldwin Park		*	*
Bell			
Bell Gardens			
Bellflower			
Bradbury			
Carson			
Cerritos			
Commerce			
Compton			
Covina			*
Cudahy			
Downey			
Duarte		*	*
El Monte		*	*
Gardena			
Glendale			
Glendora		*	*
Hawaiian Gardens			
Hawthorn			
Hermosa Beach			
Huntington Park			*
Industry			*
Inglewood			
Irwindale	*	*	*
La Canada Flintridge		*	*
La Habra Heights			
Lakewood			
La Puente			
Lawndale			
Lomita			

**Table 1. Lead agencies in the San Gabriel Valley P-C Region (county and incorporated city governments) showing those with active mines, designated lands, or lands classified MRZ-2 within their jurisdiction.**



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CONCRETE-GRADE AGGREGATE IN THE SAN GABRIEL VALLEY  
PRODUCTION-CONSUMPTION REGION, LOS ANGELES COUNTY,  
CALIFORNIA

<b>Lead Agencies within the San Gabriel Valley P-C Region</b>	<b>Active Mine Operations within Lead Agency's Jurisdiction</b>	<b>Land Designated for PCC-Grade Aggregate within Lead Agency's Jurisdiction</b>	<b>Land Classified MRZ-2 within Lead Agency's Jurisdiction</b>
Long Beach			
Lynwood			
Manhattan Beach			
City of Los Angeles			*
Maywood			
Monrovia	*	*	*
Montebello			
Monterey Park			
Norwalk			
Paramount			
Pasadena		*	*
Pico Rivera			
Rancho Palos Verdes			
Palos Verdes Estates			
Redondo Beach			
Rolling Hills			
Rolling Hills Estates		*	*
Rosemead			
San Dimas			*
San Gabriel			*
San Marino			
Santa Fe Springs			
Sierra Madre			*
Signal Hill			
South El Monte			*
South Gate			
South Pasadena			
Temple City			*
Torrance		*	*
Vernon			*
Walnut			
West Covina			*
Whittier			

**Table 1 continued.**



## PART II – MINERAL LAND CLASSIFICATION OF AGGREGATE IN THE SAN GABRIEL VALLEY P-C REGION

This section of the report contains information concerning the location, quality, and quantity of aggregate resources in the San Gabriel Valley P-C Region.

### MINERAL RESOURCE ZONES

As set forth in Section 2761 (b) of SMARA, the State Geologist shall classify land solely on the basis of geologic factors and without regard to existing land use. Areas subject to mineral land classification studies are divided by the State Geologist into various Mineral Resource Zone (MRZ) categories that reflect varying degrees of mineral resource potential. When SR 143, Part IV was written, the nomenclature for mineral land classification consisted of four categories – MRZ-1, MRZ-2, MRZ-3, and MRZ-4. Since then, the nomenclature has been expanded to include subdivisions of the MRZ-2 and MRZ-3 categories into “a” and “b” subcategories, as explained in the Board’s Guidelines for Classification and Designation of Mineral Lands under Section I, part 3. The original categories for mineral land classification were retained for this update report. Following is a brief description of the four MRZ categories used in this update report:

- MRZ-1:** Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.
- MRZ-2:** Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists. This zone shall be applied to known mineral deposits or where well-developed lines of reasoning, based upon economic-geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high.
- MRZ-3:** Areas containing known or inferred mineral occurrences of undetermined mineral resource significance.
- MRZ-4:** Areas where available information is inadequate to assign any other classification.

### CLASSIFICATION CRITERIA

To be considered *significant* for the purpose of mineral land classification, a mineral deposit, or a group of mineral deposits that can be mined as a unit, must meet marketability and threshold value criteria adopted by the Board(<http://www.consrv.ca.gov/SMGB/Guidelines/ClassDesig.pdf>)

Threshold values are intended to indicate in a general way the approximate minimum size of a mineral deposit that will be considered significant for classification and designation. The criteria vary for different minerals depending on (1) whether they are strategic or non-strategic minerals, (2) their uniqueness or rarity, and (3) their commodity-type category (metallic minerals or industrial minerals). For example, to be considered significant, the threshold value of the first marketable product for a metallic ore deposit (such as a gold deposit) is \$1,250,000 1998-dollars,

\$2,500,000 1998-dollars for an industrial mineral deposit (such as a diatomite or clay deposit), and \$12,500,000 1998-dollars for a construction aggregate deposit (such as a sand and gravel or crushed-stone deposit). In order to adjust the threshold value of construction aggregate to reflect 2008 dollars, the values were multiplied by an inflation factor of 1.38. This factor was determined by dividing the U.S. Department of Labor's (California Department of Finance, 2008), estimated Consumer Price Index (CPI) for 2008 (225.6) by the CPI for 1998 (163.7). The resulting value is \$17,250,000. Construction aggregate sells for about \$15 per ton in the San Gabriel Valley P-C Region; therefore, \$17,250,000 equates to about 1.1 million tons of aggregate material.

### **REEVALUATION OF MINERAL LAND CLASSIFICATION FOR PCC-GRADE AGGREGATE IN THE SAN GABRIEL VALLEY P-C REGION**

Mineral Land classification of the San Gabriel Valley P-C Region is presented in two reports. The initial report, SR 143 Part IV was published in 1983 and includes a complete set of classification maps covering the entire P-C region. In 1988, a subsequent report OFR 88-23, presented a reclassification of about 233 acres in the north eastern portion of the P-C Region – the Fish Canyon Quarry area, from MRZ-3 to MRZ-2. This area is shown on Plate 3 as sector J.

Since the 1988 report, no new construction aggregate resource areas have been identified and no areas within the San Gabriel Valley P-C Region have been reclassified. This is largely because most of the P-C Region is heavily urbanized, leaving little land for the development or exploration new aggregate resources.

Since the classification of the P-C Region presented in the two above mentioned reports, about 1,234 acres of land containing about 435 million tons of aggregate resources are considered lost to mining because they have been urbanized, filled, or are in the process of being filled. The aggregate resources in these areas are also considered lost and they are discussed in the following section. These areas have not been reclassified because there are still deposits of aggregates beneath the fill and urban areas.

### **REEVALUATION OF PCC-GRADE AGGREGATE RESOURCES IN THE SAN GABRIEL VALLEY P-C REGION**

A reevaluation of PCC-grade aggregate resources in the San Gabriel Valley P-C Region is presented in this section of the report. The reassessment was conducted on the basis of a quantitative evaluation of suitable PCC-grade aggregate resources classified as MRZ-2.

#### **Concepts Used in Identifying Aggregate Resource Sectors**

The State Geologist is responsible for identifying and calculating the amount of aggregate resources contained in areas classified as MRZ-2. Recognizing that there are lands within these areas that have already been urbanized, and therefore the mineral resources within them have a limited opportunity for conservation, development, and utilization, the State Geologist further limits the aggregate resource calculations to areas within "Sectors".

Sectors are areas that have been classified as MRZ-2 by the State Geologist, and that have current land uses deemed compatible with potential mining based on criteria provided by the

Board. Compatible land uses are defined as those that are non-urbanized or that have very low-density residential developments (one dwelling unit per ten acres or less), land without high-cost improvements, and land used for agriculture, grazing, or open space. Urbanization and/or incompatible land uses are defined as improvements of high cost, such as high-density residential developments, intensive industrial developments, commercial developments, and major public facilities.

Mineral land classification, which is done without regard for current land use, results in a delineation of the resource areas on maps; but this by itself does very little to put into perspective the resource base that is available to meet the future needs of a region. Sectors are used to focus the attention of land-use planners and local governments on the areas that remain accessible for mineral extraction. The State Geologist calculates the available resources of each Sector and identifies the amount of remaining resources that have been permitted for mining. Resources that have been permitted for mining are termed “reserves.” The calculated aggregate reserves and resources of all the Sectors within a P-C Region are compared with the Region’s forecasted 50-year aggregate need of that P-C Region for the particular mineral resource.

Each Sector, or group of Sectors, meets or exceeds the Board’s threshold value, and each Sector may be considered for designation as an area of regional or statewide significance by the Board pursuant to SMARA. The Board only considers areas in Sectors for designation.

For this update, the determination of land use as non-urbanized was based on conditions of the lands as of August 2008. The land use was determined by reference to satellite imagery, field reconnaissance, and consultation with local planners.

The Board’s criteria for creating Sectors focuses on the apparent suitability of the land for mining and does not take into consideration land commitments (other than approved tracts or specific plans) that may have been made restricting the accessibility of some of the Sectors for mining. It is possible, therefore, that the available resources calculated by the State Geologist may be overestimated.

#### **Resource Sectors Identified in SR-143 Part IV**

In SR 143, Part IV, all lands in the San Gabriel Valley P-C Region classified as containing significant aggregate resources (MRZ-2) and not precluded from mining by incompatible land uses, were identified as eight Sectors – A, B, C, D, E, F, H, and I totaling 6,309 acres. These sectors are shown on Plates 4.3 and 4.4 and discussed on pages 10 through 13 in SR 143 Part IV. Sectors A-E all lie within the San Gabriel Valley Alluvial Fan and include both in-stream and off-stream deposits of the San Gabriel River. Sectors F and H identify aggregate deposits lying within washes draining the San Gabriel Mountains to the north, and sector I delineates a sandstone deposit along the northeastern flank of Palos Verdes Hills. This deposit was being mined in 1980 when the original report was completed. As of 1980, a total of 4,340 million tons of aggregate resources including 280 million tons of reserves existed within these eight sectors.

## Designated Resource Sectors

In August 1984, the SMGB designated 4,643 acres of the original sectors identified in SR 143 Part IV which included all of Sectors A, H, and I and portions of Sectors B, C, D, E and F as containing regionally significant aggregate resources. Table 2 shows the number of acres for each of these designated sectors. Any reference to sectors for this updated report refers to the designated sectors. **The following is a discussion of the designated sectors (Sectors A, H, and I) and designated portions of sectors (Sectors B, C, D, E, and F)**

### Sector A

Sector A comprises 867 acres located in the cities of Azusa and Irwindale and in unincorporated Los Angeles County. It is underlain by PCC-grade alluvial aggregate deposits of the San Gabriel River, San Gabriel Alluvial Fan, Fish Canyon and Van Tassel Canyon. Deposit thickness ranges from about 30 feet at the northernmost portion of the sector at the mouth of the San Gabriel River Canyon, to over 600 feet in the southern portion of the sector where Vulcan Materials Company operates its Reliance plant and mine. Vulcan also operates the Fish Canyon Quarry, the southern portion of the site lying within Sector A. Owl Rock Products Company also mined and processed aggregate within the sector up until 1992.

### Sector B

Located in the city of Azusa, this 307-acre-1.5 mile long strip of land occupies a portion of the San Gabriel River Channel. The sector contains underlying deposits of PCC-grade alluvial sand and gravel ranging in thickness from about 60 feet at the northernmost portion of the sector to over 400 feet in the southern part. No aggregate operations exist in Sector B and there are no reserves. Historically, alluvial material has been extracted from this portion of the channel for maintenance purposes but has not been sold for making PCC aggregate.

### Sector C

Sector C comprises about 693 acres of the western portion of Santa Fe Flood Control Basin and spillway located within the city of Irwindale. The sector contains underlying deposits of PCC-grade alluvial sand and gravel exceeding 600 feet. No aggregate mining is currently taking place in Sector C but there has been historical aggregate mining.

### Sector D

Sector D consist of six separate pieces of land totaling 1,619 acres lying within the city limits of Irwindale, Monrovia, and Arcadia. Most of this land is owned or controlled by aggregate companies and are sites of present day or past aggregate mining activities. The land is underlain by San Gabriel Valley Alluvial Fan deposits of PCC-grade sand and gravels ranging in thickness from less than 200 feet in the far western and southern portions of the sector, to more than 600 feet in the northeastern areas. Four mining companies currently operate four aggregate mines and plants within Sector D – United Rock Products Corporation's Pit 3; Vulcan Materials Company, Western Division's Durban Pit; Peck Road Sand and Gravel Company's Peck Road Pit; and Hanson Aggregates PSW Inc's Livingston Graham-El Monte Pit. These operations are further described in Part III of this report, Aggregate Production in the San Gabriel Valley P-C Region.

### Sector E

This sector comprises 784 acres of land lying east of the Santa Fe Flood Control Basin within the cities limits of Irwindale and Azusa. The sector is underlain by San Gabriel Valley Alluvial Fan PCC-grade sand and gravel deposits exceeding 600 feet in depth. CEMEX Construction Material's Azusa Quarry is the only aggregate mine currently operating within sector E. Several of the past mining sites within the sector are either filled or are in the process of being filled, including a portion of CEMEX's Azusa Quarry. The city of Irwindale has constructed an office complex on one of the filled sites.

### Sector F

This sector comprises 46 acres of land located in the Eaton Wash Flood Control Basin. (unincorporated Los Angeles County). Aggregate deposits within the basin are about 50 feet deep. Approximately 35 percent of the alluvial material underlying sector F is coarse material and the remainder is sand, silt, and clay. Mining of the wash has taken place periodically for the purposes of channel maintenance. PCC-grade sand along with other products requiring lower specifications, has been produced from the wash material in sector F. Based on past uses of the rock, an estimated 40 percent of the alluvial material in the wash is suitable for making PCC aggregate. There are no active mine operations in sector F and there are no reserves.

### Sector H

The sector comprises 204 acres lying within the Arroyo Seco Wash located north of Devils Gate Dam. The wash has been mined periodically to a maximum depth of about 30 feet to provide channel maintenance for the Los Angeles County Flood Control District. The aggregate removed was sold for a variety of uses including PCC aggregate. Drill hole data indicates that the sector contains sand and gravel deposits to a depth of 100 feet below the present day channel surface. Since there is little information on the quality of material below 30 feet, this depth was used for resource calculations. There is no active mine operation in sector H and there are no reserves.

### Sector I

Covering about 123 acres along the northeastern flank of Palos Verdes Hills in the cities of Rolling Hills Estates and Torrance, Sector I is underlain by a deposit of poorly consolidated, medium to fine grained San Pedro Sandstone that is exposed for a distance of about two miles and is about a half mile in width. The sandstone meets specifications for PCC-grade sand but has almost no coarse material (1-2 percent) so it cannot be considered an independent source of PCC-grade aggregate. Most of the sector occupies the site of the closed Chandlers Palos Verdes Mine which produced PCC sand as well as plaster, masonry, and gunite sand from the early 1900's up until the mid 1980's. The mine site is currently being utilized as a landfill but there are plans underway to develop the site into a 119 home subdivision. There are no permitted aggregate resources at the site. An unmined portion of the sector lying totally within the city limits of Torrance contains unpermitted resources.

## **Designated Resources**

Designated aggregate resources determined for the San Gabriel Valley P-C Region differ from the original aggregate resources identified in SR 143 Part IV because portions of Sectors B, C, D, E, and F were not designated. By assuming that the tonnage of resources lost was proportional to the area lost to mining, new resource calculations were made. This was done by determining the percentage of land for each sector that was not designated and subtracting this same percentage from the original resource tonnage determined for that Sector in SR 143 Part IV. When doing these calculations, tonnage of aggregate mined from the time original resource calculations were made (beginning of 1980) to the time of designation 1984, was not subtracted from the total resource. Consequently five years of production (1980-1984) had to be subtracted when calculating remaining designated resources in the P-C Region.

Table 2 shows the aggregate resources identified in the designated Sectors. At the time of designation in 1984, a total of 2,402 million tons of aggregate resources existed in the eight designated sectors.

## **Lost and Depleted Designated Resources**

Since the 1984 designation of PCC-grade aggregate resources in the San Gabriel Valley P-C Region, 435 million tons of aggregate resources underlying 1,234 designated acres of land have been lost to urban development and land filling and another 406 million tons of aggregate resources have been depleted due to aggregate mining. This has reduced the designated PCC-grade aggregate resources by about 35 percent, from 2,402 million tons to 1,561 million tons.

### Resources lost due to urbanization

In 1984, there were 2,402 million tons of designated resources (including reserves) in 4,643 acres of designated land lying within the San Gabriel Valley P-C Region. Since designation, about 413 acres of land containing 153 million tons of designated aggregate resources have been lost to future mining due to urban development of these lands. This amounts to about 6 percent of the 1984 designated resources. These areas shown of Plate 3 are combined with the areas lost due to land filling.

### Resources lost due to land filling

In addition to resources lost due to urban development, approximately 282 million tons or 12 percent of the 2,402 million tons of designated resources have been lost to land filling of previously mined pits. This land amounts to about 821 acres or about 18 percent of the 4,643 acres of designated land. Current acceptable fill materials consist of inert waste such as operational silts from the producers processing operations, broken concrete, asphaltic concrete, tile, masonry brick or block, concrete block, glass, and ceramics. All of these filled pits still contain underlying aggregate deposits but they are no longer considered to be aggregate resources because the overlying fill has rendered them uneconomic. These areas, shown on Plate 3 are combined with the areas lost due to urbanization.



Designated Sector	Area (acres)	Area lost due to urbanization (acres)	Area lost due to land filling (acres)	1984 Designated Resources (million tons)	Resources lost due to urbanization (million tons)	Non permitted resources lost due to land filling (million tons)
<b>A</b>	867	181	82	362	43	24
<b>B</b>	307	12	0	200	8	0
<b>C</b>	693	42	0	602	36	0
<b>D</b>	1,619	150	241	730	52	64
<b>E</b>	784	27	395	450	14	179
<b>F</b>	46	0	0	4	0	0
<b>H</b>	204	0	0	35	0	0
<b>I</b>	123	1	103	19	0	15
<b>TOTAL</b>	<b>4,643</b>	<b>*413</b>	<b>*821</b>	<b>2,402</b>	<b>*153</b>	<b>*282</b>

\*A total of 1,234 acres (413+821 acres) of designated aggregate resource land has been lost due to urbanization and land filling resulting in a loss of 435 million tons (153+282 million tons) of aggregate resources.

**Table 2. Designated sectors showing designated resource land and aggregate resources lost to urbanization and land filling.**

#### Depletion of resources due to mining

Aggregate mining conducted in the P-C Region since 1980 – the completion date of Special Report 143 Part IV – has caused a depletion of 406 million tons of aggregate resources during the 29 year period from 1980 through 2008.

#### **Total Designated Resources**

In order to get the total aggregate resource lost since designation, the tons lost due to urbanization (153 million) land filling (282 million) and mining (406 million), are subtracted from the designation resource (2,402 million) – the total remaining **designated** aggregate resource amounting to 1,561 million tons (see Table 3).

<b>Million tons</b>	<b>Resources</b>
2,402	Designated resources as of 1980
-153	Resources lost due to urbanization
-282	Non permitted resources lost due to land filling
-406	Resources lost due to mining (1980-2008 production)
<b>1,561</b>	<b>Total Designated Resources Remaining as of January 2009</b>

**Table 3. Remaining designated resources in the San Gabriel Valley P-C Region as of January 2009.**

### **Non Designated Sectors**

This updated report identifies four newly identified aggregate resource sectors that were not previously designated. These are identified on Plate 3 as Sectors J, K, L, and M. Sector J is a new sector delineating land that has been reclassified in OFR 91-14 from MRZ-3 to MRZ-2 (Miller, 1994). Sectors K, L, and M delineate land that was classified MRZ-2 in SR 143 part IV, but was not included as part of a sector. The non designated sectors are described below:

#### Sector J

Sector J comprises one parcel of land totaling 289 acres covering most of the land referred to as the Fish Canyon Quarry site, an active mine operated by Vulcan Materials Company. The sector also includes 55 acres not held by Vulcan Materials. Located in the San Gabriel Mountains, northeast of San Gabriel Creek in the city of Azusa, sector J is underlain by Mesozoic granitic and metamorphic rocks that meet specifications for PCC-grade aggregate. Unlike the San Gabriel Valley Fan deposits containing alluvial aggregate material, the Fish Canyon site is a hard rock deposit consisting largely of Mesozoic granitic and metamorphic rocks. At the time of designation and when the original classification report was written for the P-C Region, the Fish Canyon site was classified MRZ-3 because no data indicated that the rock at the site was of sufficient quality to be classified MRZ-2 for PCC-grade aggregate. In June, 1988, Azusa Rock Inc. petitioned the SMGB to reclassify the quarry site MRZ-2 for PCC-grade aggregate. At that time, the petitioner submitted aggregate test data to the SMGB indicating that a large portion of the rock at the quarry met specifications for PCC-grade aggregate. Consequently, CGS staff had sufficient information to reclassify this area from MRZ-3 to MRZ-2. The reclassified area was not given a sector name at that time. Resources (including reserves) for this area total 311 million tons. Reserves for sector J are confidential.

#### Sector K

Sector K includes a two-acre unmined parcel of land located adjacent to the east side of Sector E in the city of Azusa. It is currently owned by CEMEX and is considered part of the company's Azusa Quarry site. The land now defined as sector K was classified MRZ-2 in SR 143 Part IV but at that time it was considered unavailable to mining and was not included as part of Sector E. Consequently it was not designated. A reevaluation of the land indicates that it can be mined in conjunction with the active CEMEX Azusa Quarry. The resources and reserves in Sector K are proprietary.

Sector L

Sector L includes a small nine acre unmined parcel of land located adjacent to the south side of Sector E in the city of Azusa. The western half of the sector is currently owned by CEMEX and is considered part of the company's Azusa Quarry site. The land now defined as sector L was classified MRZ-2 in SR 143 Part IV but at that time it was considered unavailable to mining and was not included as part of Sector E. Consequently it was not designated. A reevaluation of the land indicates that it can be mined in conjunction with the active CEMEX Azusa Quarry. The resources and reserves in Sector L are proprietary.

Sector M

Sector M is a five acre strip of land located in the city of Irwindale that was formerly occupied by Buena Vista Street. The land now defined as sector M was classified MRZ-2 in SR 143 Part IV but at that time it was considered unavailable to mining because Buena Vista Street occupied this space. In 2004, United Rock Products paid to realign Buena Vista Street so that it could mine the land underlying Sector M in conjunction with the United Rock Product's Pit #2. The resources and reserves in Sector L are proprietary.

**Non-Designated Resources**

Non designated resources lie within the four additional sectors that were added for this updated report and are described in the Non Designated Sector section. Table 4 is a summary of these non designated aggregate resources for the San Gabriel Valley P-C Region.

<b>Non Designated Sectors</b>	<b>Area (acres)</b>	<b>Resource (million tons)</b>
<b>J</b>	289	311
<b>K</b>	2	P
<b>L</b>	9	P
<b>M</b>	5	P
<b>TOTAL</b>	<b>305</b>	<b>&gt; 311</b>

P = Proprietary

**Table 4. Non designated resources in the San Gabriel Valley P-C Region.**

**Aggregate Reserves**

Aggregate reserves are aggregate deposits that have been determined to be acceptable for commercial use, exist within properties owned or leased by aggregate companies, and have permits allowing mining of aggregate material. A permit is a legal authorization or approval by a lead agency, the absence of which would preclude mining. For the purposes of this report, all aggregate reserves must meet specifications for PCC-grade aggregate. The terms reserves and permitted aggregate resources are used interchangeably for this updated report. It is important to note that aggregate reserves are included in all aggregate resources given in this update report.

As of January 2009 approximately 328 million tons of PCC-grade aggregate reserves have been determined to exist within the San Gabriel Valley P-C Region on both designated and non-designated land. All of the reserves lie within the seven active mining operations that are operated by five companies. These operations are shown on Plate 2 and are described in the preceding section, *Part III Aggregate Production in the San Gabriel Valley P-C Region*. Only sectors D and E of the eight designated sectors (described in *Designated Sectors* section) contain aggregate reserves. All four of the non designated sectors (described in the *Non Designated Sectors* section) contains reserves, yet individual tonnages cannot be given without divulging confidential producer information.

Reserve tonnages were determined from information provided in reclamation plans and use permits issued by the lead agencies. When information was inadequate to make reliable independent calculations, CGS staff used reserve estimates provided by mine operators or owners. These data were checked against rough calculations made by CGS staff, and any major discrepancies were discussed with the mine operator or owner. All reserve calculations are current as of January 2009.

The PCC-grade aggregate reserves have increased 17 percent from 280 million tons as of 1980 (see SR 143, Part IV), to 328 million tons as of 2009. During this same period of time, aggregate production in the P-C Region amounted to 406 million tons or 129 million tons more than the total reserves calculated as of 1980. Based on the actual production shown in Table 5, the 280 million tons of reserves would have been depleted by the year 1998 if no new reserves were added to the P-C Region. Obviously, new reserves were added to the P-C Region to sustain the production during the 29 years since the original reserves were calculated. Assuming the 1980 reserve tonnage calculation and the production data are correct, an additional 454 million tons of aggregate reserves were added to the P-C Region from 1980 to 2009. This tonnage is calculated by subtracting the 1980 reserves of 280 million tons from the actual amount of aggregate produced, getting a difference of 129 million tons which is added to the 2009 reserves of 328 million tons to get 454 million tons. Most of the new reserves were added when deeper mining was permitted in the existing pits and from the reclassification of the Fish Canyon Quarry area in 1988.

The determination of aggregate reserves is an important aspect of the classification report. By comparing reserves of a P-C Region to that region's 50-year aggregate demand, an estimate can be made of the regions need for aggregate. This comparison is made in *Part IV* of this report under the *Comparison of the 50-year Aggregate Demand with Current PCC-grade Aggregate* section.

## **PART III – AGGREGATE PRODUCTION IN THE SAN GABRIEL VALLEY P-C REGION**

### **OPERATING MINES**

As of January 2009, the following five companies operated seven mines producing PCC-grade aggregate in the San Gabriel Valley P-C Region:

- Heildleberg Cement DBA Hanson Aggregates West, Inc. (one mine site)
- CEMEX Construction Materials (one mine site)
- Vulcan Materials Company (three mine sites)
- S.L.S. & N Inc., DBA Peck Road Sand and Gravel Company (one mine site)
- United Rock Products Corporation (one mine site with two pits)

Following are brief descriptions of the above company's operations:

#### **CEMEX Construction Materials**

CEMEX Construction Materials (A subsidiary of CEMEX) currently produces construction sand and gravel at their 243 acre **Azusa Quarry** and plant site located in the cities of Azusa and Irwindale, Los Angeles County. Mining has taken place to 215 feet below ground elevation. The site was first mined in the 1920's and has had numerous owners since then. CEMEX has mined the property since 2001 when the company purchased it from Southdown Inc. (DBA Transit Mixed Concrete). The aggregate deposit is a mixture of gravel, sand, silt and clay forming the San Gabriel Alluvial Fan derived from the San Gabriel Mountains to the north. Gravel clast are fresh, largely durable, quartz diorite, granodiorite, granite gneiss, and schist. The ratio of gravel to sand is about 2:1. Silt and clay, make up about 10 percent of the deposit. The only rock product produced at the site is PCC aggregate. CEMEX operates a concrete batch plant on site. Approximately 112 acres of the mined pit is currently being used as a landfill.

#### **United Rock Products Corporation**

United Rock Products Corporation currently operates two pits, both about 110 acres, and an aggregate processing plant located wholly within the city of Irwindale. PCC-grade sand and gravel from the San Gabriel Alluvial Fan is mined from both of the pits. The southernmost pit, **Quarry II**, is permitted to be mined down to 310 feet below ground surface (BGS) while the northern pit **Quarry III**, can be mined to a maximum depth of 220 feet. The sand and gravel is excavated from both pits by a clam-shell dredge and is transported by conveyors to United Rock's processing plant where it is crushed, sized and washed. Most of this processed rock is then transported via conveyor to the on-site concrete batch plant or one of two asphalt plants.

#### **Vulcan Materials Company, Western Division**

Vulcan Materials Company operates three mining operations within the P-C Region. The northern most site is the **Fish Canyon Quarry** comprising 186 acres located in the city of Azusa along the southern flanks of the San Gabriel Mountains. The quarry has been in operation since

1954. Vulcan Materials currently operates the quarry under the name Azusa Rock Inc. The excavated material at the Fish Canyon site consist largely of unweathered quartz diorite which appears to be in fault contact with highly weathered biotite and hornblende gneiss. The quartz diorite meets specifications for PCC-grade aggregate while the gneiss is only suitable for making Class II Base or aggregate products of lower specifications. After primary crushing takes place at the quarry site, the rock is loaded on to conveyors and transported about 2.4 miles to Vulcan's Reliance plant where it is further crushed, screened, and washed. Most of the rock is then either fed into the Vulcan Reliance concrete batch plant or sold for base.

Vulcan's **Reliance** operation consist of two adjoining active pits, a plant site, and a closed pit that is currently being filled. PCC-grade alluvial sand and gravel from the San Gabriel Alluvial Fan has been mined and processed from the Reliance operation since the early 1900's. The Reliance plant is located wholly within the city limits of Irwindale, The facility includes a crushing, screening and washing operation in addition to a concrete batch plant and a asphalt plant. The plant site also includes a recycled aggregate processing facility. Vulcan's two adjoining Reliance pits straddle the Irwindale-Azusa boundary. The pit located in Irwindale is called the Reliance Irwindale (AKA Azusa Largo) pit and the pit located in Azusa is the Reliance Azusa pit. The 207-acre Irwindale pit is currently being mined to a permitted depth of 200 feet below ground surface. The 49-acre Azusa pit has not been mined since 1999 yet there are still aggregate reserves remaining. Mining at the southern Reliance pit named Reliance II, ceased in 1990 and the pit is being backfilled with waste fines from the Irwindale pit. The Reliance II pit is currently filled to a depth of about 100 feet. The aggregate resources in this pit are considered lost.

Vulcan's 334.6-acre **Durban** operation is located about 4.5 miles to the southwest of its Reliance site and is wholly within the city limits of Irwindale. The site includes two adjacent pits as well as an aggregate processing facility, a ready mix concrete plant, and an asphalt products plant. PCC-grade aggregate is mined at the Durban operation from San Gabriel Alluvial Fan deposits. Mining is conducted both above and below the groundwater which averages about 219 feet in elevation. The current permitted mining depth is 200 feet BGS although some areas have been mined down to 211 feet BGS. Vulcan is currently in the process of obtaining a permit to extend its mining depth to 440 feet BGS which will more than double the current reserves if approved.

### **Heidleberg Cement, DBA Hanson Aggregates PSW Inc.,**

Hanson Aggregates operates a 492-acre sand and gravel mine and plant located in the cities of Irwindale and Arcadia. Known for many years as Livingston Graham, El Monte, Hanson currently operates the mine under the name **Irwindale**. The mine has changed ownership several times since first opening in 1909. The latest change occurred in 2007 when Hanson PLC was purchased by the current owner, Heidleberg Cement. PCC-grade sand and gravel is mined from a 300-acre pit that is currently permitted to be mined to a depth of 350 BGS. All mining is currently taking place below the water table using a clam shell dredge. The average water table depth is about 100 feet BGS. An aggregate processing plant, concrete batch plant, and several operations buildings lie on 72 of the 492 acres. Under current conditions of the mining permit, this area cannot be mined.

**S.L.S. & N Inc., DBA Peck Road Sand and Gravel Company:**

The Peck Road Sand and Gravel Company currently mines PCC-grade sand and gravel at their 23-acre **Peck Road Pit** located in the city of Irwindale. Mining is currently taking place using a 13 cubic yard bucket dredge to a maximum depth of about 250 feet. The Peck Road site was first mined in the 1920's and has had numerous owners since then. The current owner has mined the property since 1987. The aggregate deposit is a mixture of gravel, sand, silt and clay forming the San Gabriel Alluvial Fan consisting of about 50 percent coarse fraction, 45 percent sand, and about 5 percent silt and clay or waste. Gravel clast are primarily of fresh durable, quartz diorite, granodiorite, and granite gneiss.

S.L.S. & N Inc. also operates a construction demolition disposal site and aggregate recycling facility in the city of Monrovia located adjacent to and west of the Peck Road pit. About 300,000 tons of aggregate base rock was produced at this facility in 2008 from recycled demolition waste.

**PCC-GRADE AGGREGATE PRODUCTION SINCE 1980**

Aggregate production in the San Gabriel Valley P-C Region since Special Report 143 Part IV was completed amounted to 407 million tons (see Table 5). Aggregate production data was obtained from three sources. Earlier years from 1980 to 1990 were collected from records of the U.S. Department of the Interior's Bureau of Mines (now part of the U.S. Geological Survey). The U.S. Bureau of Mines' records were compiled from responses to voluntary questionnaires sent annually, or biennially, to all known mine operators. Each producer was requested to divulge the production from each of their producing properties for the preceding year. The accuracy of these figures depends on the accuracy of the producers' responses. For the years 1991 through 2008, annual mine production data from the California Department of Conservation's Office of Mine Reclamation were used.

YEAR	AGGREGATE PRODUCTION (tons)	POPULATION	PER CAPITA CONSUMPTION (tons)
1980	13,650,000	3,828,440	3.57
1981	13,837,000	3,887,862	3.56
1982	11,345,000	3,947,284	2.87
1983	13,926,000	4,006,706	3.48
1984	16,164,000	4,066,128	3.98
1985	17,728,000	4,125,550	4.30
1986	20,428,000	4,184,972	4.88
1987	19,730,000	4,244,394	4.65
1988	19,939,000	4,303,816	4.63
1989	19,296,000	4,363,238	4.42
1990	14,941,000	4,422,663	3.38
1991	13,178,000	4,429,706	2.97
1992	14,042,000	4,436,752	3.16
1993	12,427,000	4,443,798	2.80
1994	10,480,000	4,450,844	2.35
1995	15,133,000	4,457,890	3.39
1996	11,585,000	4,464,936	2.59
1997	11,798,000	4,471,982	2.64
1998	13,663,000	4,479,028	3.05
1999	15,830,000	4,486,074	3.53
2000	12,988,000	4,493,128	2.89
2001	14,084,000	4,540,107	3.10
2002	13,426,000	4,587,086	2.93
2003	13,330,000	4,634,065	2.88
2004	11,538,000	4,681,045	2.46
2005	12,183,000	4,728,024	2.58
2006	11,498,000	4,775,003	2.41
2007	10,316,000	4,821,982	2.14
2008	8,266,000	4,868,961	1.70
	Total = 406,749,000		Average = 3.2

Average per capita = 3.2 tons /person from 1980-2008

**Table 5. Aggregate production, population, and per capita consumption in the San Gabriel Valley P-C Region during the years 1980 through 2008.**



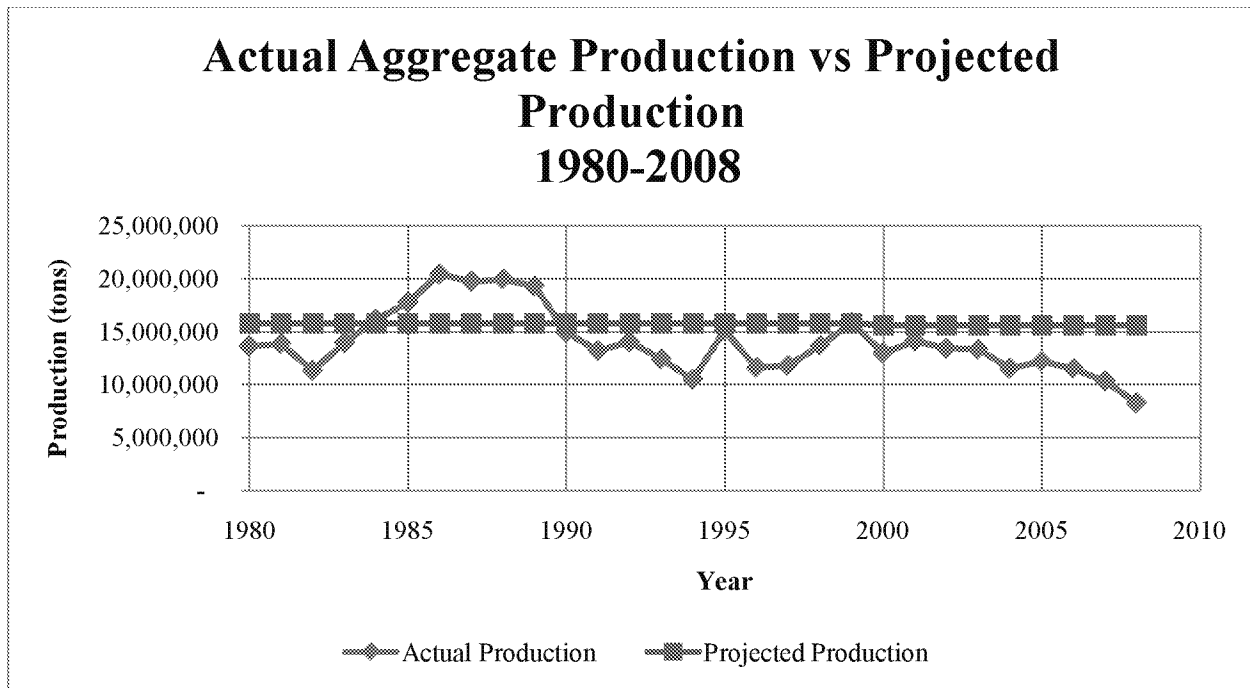
## **PART IV – UPDATED 50-YEAR DEMAND OF AGGREGATE IN THE SAN GABRIEL VALLEY P-C REGION**

The SMGB, as specified in its guidelines for classification and designation of mineral land (California State Mining and Geology Board), requires that mineral land classification reports for regions containing construction materials classified as MRZ-2 include "An estimate of the total quantity of each such construction material that will be needed to supply the requirements of both the county and the marketing region in which it occurs for the next 50 years. The marketing region is defined as the area within which such material is usually mined and marketed. The amount of each construction material mineral resource needed for the next 50 years shall be projected using past consumption rates adjusted for anticipated changes in market conditions and mining technology." This section contains the revised estimate of aggregate needs for the San Gabriel Valley P-C Region projected to the year 2058.

### **CORRELATION BETWEEN AGGREGATE PRODUCTION AND POPULATION**

Past studies of production-consumption regions in California have shown a correlation between the amount of aggregate consumed and the population of the market area (Anderson and others, 1979). An aggregate report for Los Angeles County (Miller, 1994) contains a statistical analysis of aggregate consumption versus population suggesting that roughly two-thirds of the variation in aggregate consumption could be attributed to population variation. The fact that large market regions such as Los Angeles County show a correlation between aggregate production and population indicate that population is a major factor in determining aggregate consumption in many areas. Other factors, such as major public construction projects can randomly add large amounts of aggregate to consumption figures. The economy also has a strong influence on aggregate demand, but the simple factor of population was selected because it most influences aggregate demand over time.

A comparison of the projected aggregate demand for the San Gabriel Valley P-C Region from SR 143, Part IV and actual production data for the period of 1980 through 2008 is shown in Figure 3. The projected demand for this 29-year period amounted to 441 million tons. Actual aggregate production in the Region for these same years was 406 million tons – a difference of about 35 million tons or about 8 percent.



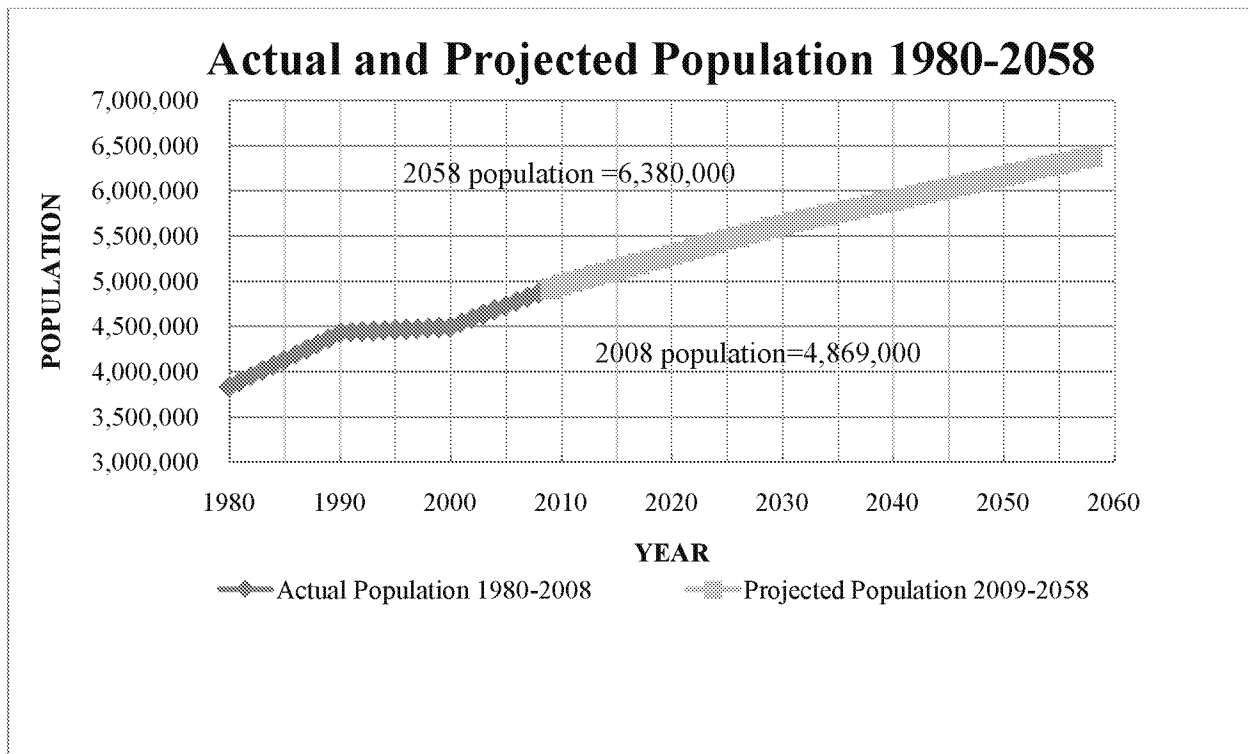
**Figure 3. Comparison of projected demand from Special Report 143, Part IV with actual PCC-grade aggregate production, 1980-2008.**

Population data for the San Gabriel Valley P-C Region for the years 1980 to 2000 were obtained from census tract data provided by the U.S. Census Bureau (2008) for the 1980, 1990 and 2000 censuses. Complete census tracts within the P-C Region were summed with the population of partial tracts. The population of partial tracts was equated to be the same percentage as the included area. The population statistics between census years are interpolated and the population for the years 2001 to 2008 were extrapolated. The average per capita aggregate consumption rate for the years 1980 through 2008 was 3.2 tons per person per year (see Table 5). This rate was used for projecting future aggregate demands.

#### **POPULATION PROJECTION FOR THE SAN GABRIEL VALLEY P-C REGION THROUGH THE YEAR 2058**

Population projections for the San Gabriel Valley P-C Region for the years 2009 through 2058 are shown in Table 6. The first step in determining these projections was to calculate a ratio of the Region's 2000 population (latest U.S. census tract data) to the total 2000 population for Los Angeles County. This ratio is then multiplied by the projected Los Angeles County population for the years 2010, 2020, 2030, 2040, and 2050 to determine the P-C Region's population for these same years. Yearly population estimates were then interpolated from the bracketing 10-year projected population numbers and extrapolated for the years 2051 through 2058. The population projections for Los Angeles County are from official projections published by the California Department of Finance's Demographic Research Unit (California Department of Finance, 2008).

The population of the San Gabriel Valley P-C Region is projected to increase from 4,916,000 in 2009 to 5,734,000 in 2058.



**Figure 4. Population of the San Gabriel Valley P-C Region (1980-2008) and population projection to 2058.**

#### **PROJECTED AGGREGATE DEMAND FOR THE SAN GABRIEL VALLEY P-C REGION THROUGH THE YEAR 2058**

A simple analysis using projected population and annual per capita consumption rate, derived by methods described in preceding sections, was used to forecast the aggregate demand of the San Gabriel Valley P-C Region through the year 2058 ( see Table 6). The calculated annual per capita consumption rate of 3.2 tons (from Table 5) was multiplied by the projected annual population for each year through the year 2058.

The result of this projection shows that an estimated 911 million tons of aggregate will be needed to satisfy future demand in the San Gabriel Valley P-C Region through the year 2058. Of this total, it is estimated by producers in the region that approximately 70 percent, or 638 million tons, will be used in PCC, with the remainder being used in other construction aggregates.

#### **COMPARISON OF THE 50-YEAR AGGREGATE DEMAND WITH CURRENT PCC-GRADE AGGREGATE RESERVES**

The total PCC-grade aggregate reserves of 328 million tons in the San Gabriel Valley P-C Region are projected to last 20 years (through the year 2028). If all of the PCC-grade aggregate reserves were used exclusively for PCC aggregate, the supply would theoretically last 28 years. In reality, 30 percent of the PCC-grade aggregate reserves will likely be used for lower grade aggregate products, and a depletion date of 2028 is more realistic. However, even this date may be

optimistic. An important consideration is that the aggregate reserves may not all be minable under the present permits because of economic or operating restrictions or because of expiration dates that may not allow reserves to be completely mined.

Comparing regional needs to available reserves and resources demonstrates the construction aggregate resource issues confronting the region. This includes the need to plan carefully for the use of lands containing these resources and the need to consider the permitting of additional aggregate resources in the region as currently permitted deposits are depleted.

Table 7 is a summary of present aggregate resources and estimated future aggregate demands for the San Gabriel Valley P-C Region. The projected lifespan of the aggregate reserves assumes that mining of these reserves will continue to be permitted until the reserves are depleted. In addition, should unforeseen events occur, such as massive urban renewal, reconstruction in the wake of a disaster, or major economic recession, the demand for construction aggregate in the San Gabriel Valley P-C Region could change considerably, which could alter the lifespan of aggregate reserves in the region.

YEAR	PROJECTED POPULATION	*PROJECTED AGGREGATE DEMAND (tons)	YEAR	PROJECTED POPULATION	*PROJECTED AGGREGATE DEMAND (tons)
2009	4,915,940	15,731,009	2035	5,761,208	18,435,865
2010	4,962,921	15,881,347	2036	5,788,174	18,522,158
2011	4,995,941	15,987,010	2037	5,815,141	18,608,451
2012	5,028,960	16,092,673	2038	5,842,107	18,694,742
2013	5,061,980	16,198,336	2039	5,869,073	18,781,034
2014	5,095,000	16,303,999	2040	5,896,038	18,867,322
2015	5,128,019	16,409,662	2041	5,922,951	18,953,442
2016	5,161,039	16,515,325	2042	5,949,863	19,039,562
2017	5,194,059	16,620,988	2043	5,976,776	19,125,682
2018	5,227,079	16,726,651	2044	6,003,688	19,211,802
2019	5,260,098	16,832,314	2045	6,030,601	19,297,922
2020	5,293,120	16,937,984	2046	6,057,513	19,384,042
2021	5,326,445	17,044,625	2047	6,084,426	19,470,162
2022	5,359,771	17,151,267	2048	6,111,338	19,556,282
2023	5,393,097	17,257,909	2049	6,138,250	19,642,402
2024	5,426,422	17,364,551	2050	6,165,163	19,728,523
2025	5,459,748	17,471,193	2051	6,192,075	19,814,642
2026	5,493,073	17,577,834	2052	6,218,993	19,900,778
2027	5,526,399	17,684,476	2053	6,245,900	19,986,882
2028	5,559,724	17,791,118	2054	6,272,813	20,073,002
2029	5,593,050	17,897,760	2055	6,299,725	20,159,122
2030	5,626,376	18,004,405	2056	6,326,638	20,245,241
2031	5,653,343	18,090,697	2057	6,353,550	20,331,361
2032	5,680,309	18,176,989	2058	6,380,463	20,417,481
2033	5,707,275	18,263,281	<b>Total 50-year demand = 910,611,000 tons</b>		
2034	5,734,242	18,349,573			

**Table 6. Projected population and aggregate demand in the San Gabriel Valley P-C Region (2009-2058).**

PCC-Grade Aggregate Reserves	<b>328 Million Tons</b>
Projected 50-Year Construction Aggregate Demand (all aggregate grades)	<b>911 Million Tons</b>
Projected 50-Year Demand for PCC Aggregate	<b>638 Million Tons</b>
Estimated Years Until Depletion of Current PCC-Grade Aggregate Reserves	<b>20 Years</b>
Estimated Depletion Date of PCC-Grade Aggregate Reserves	<b>2028</b>

**Table 7. Summary of PCC-grade aggregate resources, PCC-grade aggregate reserves, and projected 50-year demand for the San Gabriel Valley P-C Region**

### **ALTERNATIVE SOURCES OF AGGREGATE IN THE SAN GABRIEL VALLEY P-C REGION**

Potential sources of PCC-grade aggregate, in addition to those deposits classified MRZ-2 exist within and near the San Gabriel Valley P-C Region. The potential sources within the region are in areas that are classified as MRZ-3 and include areas underlain by Holocene alluvial deposits, Tertiary sedimentary deposits, and crystalline rocks. SR 143, Part IV contains a description of these deposits in the section titled “Alternative Sources of Aggregate.”

Sources outside of the San Gabriel Valley P-C Region are the production areas in the neighboring San Fernando Valley P-C Region to the west, the Claremont Upland P-C Region to the east, and the Orange County P-C Region to the south. The additional transportation costs incurred by bringing in aggregate from these other areas could increase the price of construction aggregate in the San Gabriel Valley P-C Region.

### **RECYCLED AGGREGATE**

The most recycled materials in California, by weight, are asphalt and concrete. During the past two decades, there has been a steady increase in the production of construction-grade material in the state, from recycled inert demolition debris such as concrete rubble and slab asphalt rubble. Recycling programs that recover demolition rubble, significantly help reduce the waste-stream going into landfills and also extend the life of existing aggregate mines. However, recycled

aggregate generally is not suitable for use as PCC-grade aggregate. The bulk of the recycled material is used for aggregate base. Without a change in technology that will enable aggregate companies to make the material suitable for use in PCC aggregate, there will not be a significant effect on the mining of new aggregate deposits and the projection of future demand for raw aggregate materials will not change significantly.

In the San Gabriel Valley P-C Region, inert demolition debris is being used for the production of recycled aggregate base material as well as for the filling previously mined pits. The estimated tonnage of recycled aggregate produced from the demolition debris in 2008 was about 600,000 tons. Currently, there are three facilities within the San Gabriel Valley P-C Region producing recycled aggregate. They are located at Peck Road Sand and Gravel Company's Peck Road site, United Rock Products Corporation's Plant site, and Vulcan Materials Company's Durban site.





## PART V – CONCLUSIONS

Since aggregate resources lands within the San Gabriel Valley P-C Region were designated in 1984, about 413 acres of land (nine percent of the 1984 designated land) containing 153 million tons of aggregate resources (six percent of the 1984 designated resources) have been lost to mining due to urbanization. Another 821 acres of land (18 percent of the 1984 designated land) containing 282 million tons of aggregate resources (12 percent of the 1984 designated resources) have been lost due to land filling. Together, a total of 1,234 acres of designated land has been lost, amounting to **27** percent of the total 1984 designated land and 435 million tons of designated resources have been lost amounting to **18** percent of the 1984 designated resources.

In addition to the 435 million tons of aggregate lost due to urbanization and land filling, 406 million tons of aggregate has been lost due to mining and consequent consumption. Together, the lost resources amount to 841 million tons or **35** percent of the 1984 designated aggregate resources of 2,402 million tons. As of January, 2009, designated aggregate resources lying within the San Gabriel Valley P-C Region total 1,561 million tons.

As of January 2009, the total designated and non designated PCC-grade aggregate resources for the P-C Region, amount to 1,872 million tons. There are eight designated aggregate resource sectors within the P-C Region, Sectors – A, B, C, D, E, F, H, and I, containing 1,561 million tons of designated aggregate resources and four new sectors J, K, L, and M containing another 311 million tons of aggregate resources.

Based on available historic population and production data, and population projections, the San Gabriel Valley P-C Region will need to produce 911 million tons of aggregate during the next 50 years. Of this projected demand, approximately 70 percent, or 638 million tons, must be suitable for use in PCC. The presently permitted aggregate reserves of 328 million tons are projected to last until the year 2028 or 20 years from the present. This is approximately 36 percent of the projected construction aggregate demand of the next 50 years. A major downturn in the state's economy, like the current recession, will likely result in existing reserves lasting longer than predicted. Conversely, a boom in the economy may result in reserves being depleted sooner than predicted. Also, if a major earthquake or other unforeseen catastrophic events occur in the region, necessitating reconstruction, reserves may run out sooner than predicted.

The following table (Table 8) summarizes and compares this updated report's findings pertaining to aggregate classification, supply, and projected demand, to conditions that existed 29 years ago when the original classification report (Special Report 143, Part IV) was completed.

**Table 8. Comparison of Special Report 143, Part IV to this updated report (Special Report 209)**

	Special Report 143, Part IV	Special Report 209
<b>Area Classified MRZ-2</b>	<b>41,624 Acres</b>	<b>41,913 Acres</b>
<b>Area within Sectors</b>	<b>6,309 Acres</b>	<b>4,932 Acres</b>
<b>Identified PCC-Grade Aggregate Resources*</b>	<b>3,060 Million Tons</b>	<b>1,872 Million Tons</b>
<b>PCC-Grade Aggregate Reserves*</b>	<b>280 Million Tons</b>	<b>328 Million Tons</b>
<b>Projected 50-year Aggregate Demand</b>	<b>780 Million Tons</b>	<b>911 Million Tons</b>
<b>Projected 50-year PCC Aggregate Demand</b>	<b>Not determined</b>	<b>638 Million Tons</b>
<b>Estimated Number of Years Until Reserves* are Depleted</b>	<b>18 Years</b>	<b>20 Years</b>
<b>Estimated Depletion Date of Reserves*</b>	<b>1998</b>	<b>2028</b>
<b>Calculated Per Capita Aggregate Consumption</b>	<b>4.5 Tons</b>	<b>3.2 Tons</b>

\* Reserves are aggregate deposits that have been determined to be acceptable for commercial use, that exist within properties owned or leased by aggregate producing companies, and for which permits have been granted to allow mining and processing of the material. Resources include reserves as well as all potentially usable aggregate materials that may be mined in the future, but for which no permit allowing mining has been granted.

† SR 143, Part IV and the designation report (California Department of Conservation, 1984).

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