State of California
Department of Conservation

MINING AND GEOLOGY BOARD

ANNUAL REPORT

1987

Mount Shasta from the northwest looking southwest. Shastina cone is on the right.

THE RESOURCES AGENCY
GORDON K. VAN VLECK
SECRETARY FOR RESOURCES

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN
GOVERNOR

DEPARTMENT OF CONSERVATION
RANDALL M. WARD
DIRECTOR

State of California

MINING AND GEOLOGY BOARD

ANNUAL REPORT

1987

BOARD MEMBERS:

James A. Anderson – Chairman

Arthur Darrow

Dennis Hansberger

DeWayne Holmdahl

J. H. Jack Lucas

R. Gary Miller

Jack Streblow

1416 9th Street. Room 1326-2

Sacramento, CA 95814

COVER PHOTO:

U. S. Geological Survey photo, January 1985.

ACKNOWLEDGEMENTS

SPECIAL THANKS TO THE U.S. GEOLOGICAL SURVEY FOR THE COVER PHOTO AS WELL AS THE PHOTO ON THE EL SOBRANTE LANDSLIDE, TO JAMES POMPY OF THE DIVISION OF MINES AND GEOLOGY FOR THE PHOTO ON THE CALMAT MINING OPERATION/STRAWBERRY FIELDS RECLAMATION PROJECT, THE DIVISION OF MINES AND GEOLOGY'S PUBLIC INFORMATION AND PUBLICATIONS UNIT FOR THE MAP DEPICTING PROGRESS OF THE CLASSIFICATION-DESIGNATION PROGRAM, TO ROSS MARTIN FOR COMPILATION OF THE 1986 NON-FUEL MINERAL PRODUCTION IN CALIFORNIA PIE CHART, TO CASEY BRANDSON OF ALLEN BRAND ASSOCIATES FOR THE PHOTO OF THE U.S. BORAX MINING OPERATION, AND TO JANET SMITH FOR THE DRAWINGS ON LANDSLIDE TYPES AND FEATURES.

ABSTRACT

The State Mining and Geology Board has broad policy responsibilities for earth science, mineral resource conservation, mining, and geologic hazards. The Board also establishes policy that guides the implementation of the Alquist-Priolo Special Studies Zones Act, which addresses the hazards of ground rupture from active faulting, and for the Landslide Hazard Identification Act, which provides for a state-local cooperative mapping program to identify landslide-prone areas in the path of urbanization. During the 1986-87 fiscal year, the Board took a number of actions fulfilling these responsibilities.

The Board co-sponsored, with the Department of Conservation, two Mined Land Reclamation Workshops, and toured 29 mining reclamation sites throughout California.

The Board continued work toward completion of the designation of aggregate resources in eight metropolitan areas in the State, which include the Claremont-Upland, San Bernardino, Saugus-Newhall, Palmdale, North San Francisco Bay, South San Francisco Bay, Monterey Bay, and Fresno Production-Consumption Regions.

Six classification reports (Yuba City-Marysville Production-Consumption Region; Northeast Quarter of the Needles 1 x 2 Degree Quadrangle; Camino and Mokelumne Hill 15-Minute Quadrangles, Northern Portion of the Kingman 1 x 2 Degree Quadrangle; Ash Meadows, Big Dune, Eagle Mountain, Funeral Peak, Pahrump, Ryan, Stewart Valley 15-Minute Quadrangles, and High Peak 7 1/2-Minute quadrangle) and one petition (Coast Rock Products' Sand and Gravel Deposit along the Sisquoc River) were reviewed and transmitted to affected lead agencies.

The Board adopted policy resolutions amending interim criteria for mineral resource management policies, and for the reclamation program.

Thirty-two maps of new and revised Special Studies Zones were reviewed and issued pursuant to the provisions of the Alquist-Priolo Special Studies Zones Act.

James A. Anderson

CHAIRMAN'S COMMENTS

This year has been a very satisfying and productive year for the State Mining and Geology Board. Among the Board's accomplishments were the certification of ordinances for thirteen additional cities, the adoption and transmittal of six mineral land classification reports for both urban and nonurban areas, the review of a petition, and the designation of seven production-consumption regions.

The designation of the seven regions, located throughout the Bay Area and Southern California, was a milestone for the Board. Designation is an important process because it provides basic technical data on locations and the amount of resources in those locations that are important to society. Rapid urbanization in the Bay Area, in particular, was threatening an irretrievable loss of important mineral resources, thus, the Board took on the monumental task of simultaneous designation action in multiple regions. The Board had visited these areas during the classification process and when designation was considered, not more than six months to a year later, large areas had already been lost to urbanization. Designation assures that information regarding the really important resources will be used by local decision makers in the land use planning process.

Mining reclamation is an important issue for the mining operator, local government, and the Board. All activities in society should be compatible with each other, and mining reclamation is one of those activities that, with proper planning and technical knowledge early on, can be and should be a way to assure that mined land is as acceptable in its end use as it was prior to mining. For this reason, the Board supported AB 747. This bill assures that all vested mining operations will obtain approval of reclamation plans for areas mined after January 1, 1976.

This year also brought changes in Board membership. Outgoing members Thomas M. Cromwell and Dorothy Steller were recognized for their significant contributions to the State of California through their service on the Board.

Mr. Cromwell served as Chairman of the Classification-Designation Committee and led the designation work for the Bay Area and Southern California. His expertise in having worked with operating mines and his knowledge of what is practical with regard to public policy decisionmaking greatly assisted the Board in reaching its final determinations. Mr. Cromwell also served as a member of the Reclamation and Policy Committees.

Ms. Steller served as Chairman of the Education Committee and in that capacity advanced the efforts of the Board in getting information on the importance of minerals and the capability of harvesting minerals to the public through early education. Ms. Steller also served as a member of the Geohazards Committee, the Legislation, Government and Public Relations Committee, and the Policy Committee.

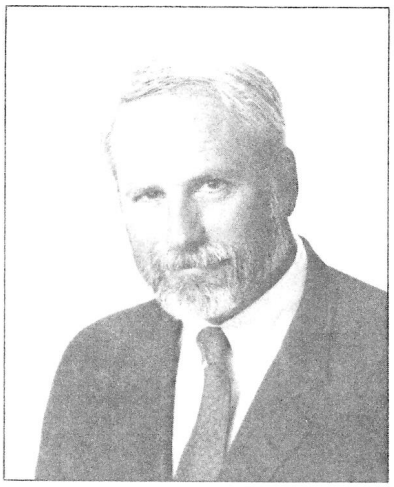
Two new members, R. Gary Miller and Jack Streblow, were welcomed to the Board.

Mr. Miller, a landscape architect for R. Gary Miller & Associates, serves as the Board's landscape architect representative. He is a member of the California Council of Landscape Architects and the Association of Environmental Professionals. He received his bachelor's degree in history from California Polytechnic Institute, Pomona, and his master's degree in public administration from the University of Southern California.

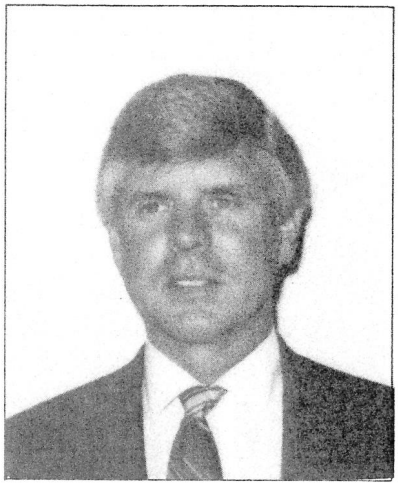
Mr. Streblow, a self-employed management consultant, serves as the Board's mineral resource conservation, development, and utilization member. He is a member of the American Concrete Institute, the Prestress Concrete Institute, and the Structural Engineers Association. He received his bachelor's degree in business administration from the University of the Pacific.

The Board Members and I look forward to serving the State in the coming year.

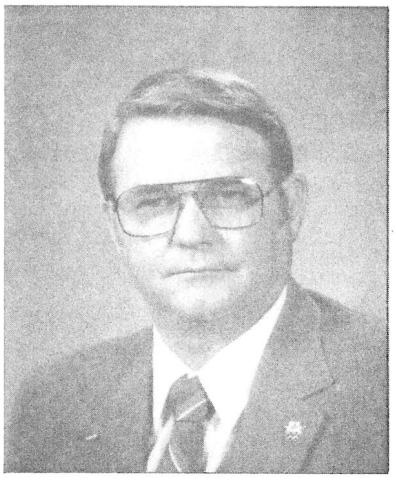
STATE MINING AND GEOLOGY BOARD MEMBERS



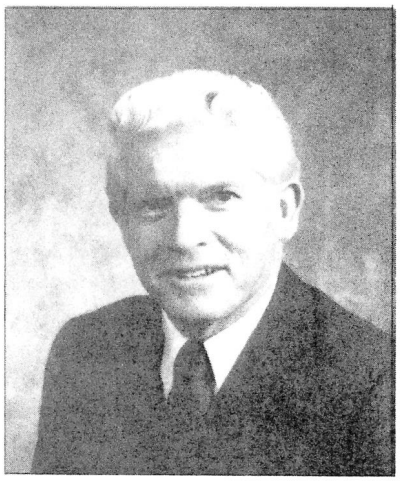
Arthur Darrow



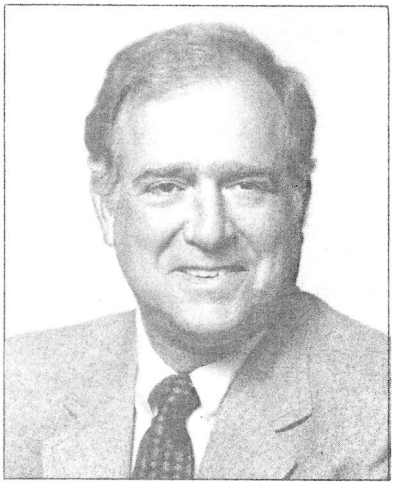
Dennis Hansberger



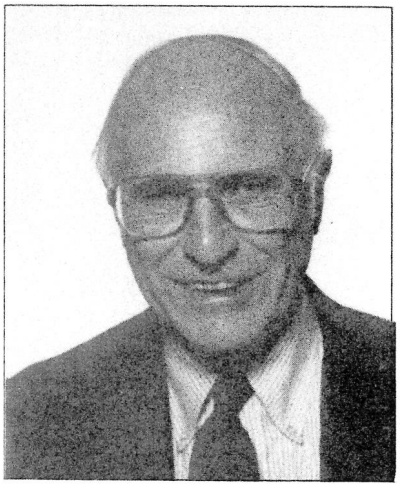
DeWayne Holmdahl



J.H. Jack Lucas



R. Gary Miller



Jack Streblow

TABLE OF CONTENTS

Part I.

INTRODUCTION

A. State Mining and Geology Board, Organization and Responsibilities

The State Mining and Geology Board is composed of nine members appointed by the Governor for four-year terms. By statute, the Board is comprised of individuals with specified professional backgrounds in geology, mining engineering, environmental protection, chemical engineering, urban planning, landscape architecture, mineral resource conservation, seismology, and one public member.

The Board has broad policy responsibilities under the Surface Mining and Reclamation Act of 1975 for establishing and maintaining State policy for surface mining and reclamation and for the conservation and development of mineral resources.

The Board represents the State's interest in the development of information necessary to the understanding and utilization of the State's terrain, and seismological and geological information pertaining to earthquake and other geological hazards. General policy for the State's geological survey, the Department of Conservation's Division of Mines and Geology, is established by the Board. These responsibilities recognize the impacts that California's complex geology, large amounts of federally managed lands, high mineralization, and potential for geologic hazards have on the State's economy, land use, and public safety.

The Board has policy responsibilities for the Alquist-Priolo Special Studies Zones Act. Under this Act, hazardous fault zones are delineated by the State Geologist. This information is provided to local government to assure that structures for human occupancy are not built across such faults. In addition, the Board establishes guidelines and priorities that enable the Department of Conservation's Division of Mines and Geology to carry out provisions of the Landslide Hazard Identification Program (AB 101, Moore, Statutes of 1983).

To enable the Board to meet its responsibilities, six permanent committees have been established. These include the Policy Committee, the Reclamation Committee, the Classification-Designation Committee, the Education Committee, the Geohazards Committee, and the Legislation, Government and Public Relations Committee. The Board is assisted by a three-person staff.

Part II.
MAJOR BOARD ACTIONS

A. Mined Lands Reclamation and Mineral Resource Conservation

California's Surface Mining and Reclamation Act (SMARA) is the State's solution to resolve two seemingly contradictory demands--the need for a continuing supply of mineral resources, and the assurance that significant adverse impacts of mining will be mitigated. SMARA created a program that assures the reclamation of mined lands and provides mineral information for local management of mineral resources needed for the future.

1. Summary of Reclamation Planning in California

Within the Department of Conservation's Division of Mines and Geology (DMG), there currently exists a Mined Lands Reclamation Program to carry out many of SMARA's reclamation provisions. The Board sets policy for this and other DMG programs, and is the agency responsible for certifying local surface mining and reclamation ordinances as being in compliance with State law.

Cities and counties having active mines within their jurisdiction are designated as lead agencies under SMARA. There are approximately 90 such agencies in California at the present time. Ordinances adopted by city councils and boards of supervisors that have been certified by the State Mining and Geology Board provide the regulatory framework within which mining activities are carried out. These ordinances incorporate the requirements of SMARA and reflect the policies of the Board. They may also contain additional, more restrictive requirements deemed necessary by a lead agency to ensure effective reclamation within its particular jurisdiction.

A mining operator is responsible under SMARA for the preparation and submission of a reclamation plan to the lead agency. Approval of this plan is required before mining can begin. The reclamation plan includes information on the site, the mineral commodity, the mining method, processing requirements, and the specifics of the reclamation program to be undertaken.

Who is subject to SMARA? With the exception of specified exemptions and provisions for vested operations, "...no person shall conduct surface mining operations unless a permit is obtained from, and a reclamation plan has been submitted to, and approved by, the lead agency for such operation..." Lead agencies are defined as cities, counties, and public agencies with permitting jurisdiction over a surface mining operation.

How is the Act implemented? California's approach to reclamation planning is to include the mining operator, local government, and the State as active participants in the process. This stresses a cooperative approach rather than an adversarial one, and resources and knowledge are combined to create cost-effective and environmentally sound reclamation plans. The operator's financial interest and investment are considered as well as community, regional, and statewide interests in mineral resource conservation and land-use planning.

Surface mining and reclamation ordinances adopted by lead agencies that have been certified by the Board provide the regulatory framework within which mining activities are carried out. These ordinances incorporate the requirements of SMARA and reflect the policies of the Board adopted as regulations. Lead agencies may adopt ordinances that contain additional, more restrictive requirements than those provided by SMARA or State policy, to assure effective reclamation within their particular jurisdictions.

What happens if an agency does not have a certified ordinance? In the absence of a certified lead agency surface mining and reclamation ordinance, the Board is empowered with the authority to review and approve reclamation plans to assure that the mined lands reclamation objectives of SMARA are met. Reclamation plans approved by the Board as such are not subject to modification at a later date by the lead agency with permitting jurisdiction, but may be amended by the Board. Recent amendments (Chapter 975, Statutes of 1987) require the Board to return these reclamation plans for lead agency administration once a Board-certified ordinance is in place.

What is the role of the mining operator? A mining operator is responsible under SMARA for the preparation and submission of a reclamation plan to the lead agency. Approval of this plan by the lead agency is required before mining can begin. The reclamation plan includes information on the site, the mineral commodity, and the specifics of the reclamation program to be undertaken.

Vested rights. Section 2776 of the Act exempts persons who have obtained a vested right to conduct surface mining operations prior to January 1, 1976, from the requirement to obtain a permit from the lead agency under Section 2770, but does not exempt them from the requirement to file with the lead agency for operations to be conducted after January 1, 1976. All persons who conduct surface mining operations on or after January 1, 1976, are subject to the Act's reclamation provisions, whether such operations were commenced prior to that date or not.

Record Keeping. To ensure statewide consistency for record keeping, the Board established policy requiring lead agencies to forward copies of each permit and approved reclamation plan to DMG. The Mined Land Reclamation Program is responsible for maintaining complete files of these records.

SMARA also requires that lead agencies notify the State Geologist of the filing of an application for a permit to conduct surface mining operations, which provides a mechanism for alerting the Mined Land Reclamation Program that the final reclamation plan will be forthcoming should the project be approved.

Technical Assistance. Finally, Section 2774(c) provides that "...On request of a lead agency, the State Geologist shall furnish technical assistance to assist in the review of reclamation plans." Technical assistance is provided by the State through the Reclamation Program staff, which consists of technical expertise necessary for the review of reclamation plans.

2. Certified Ordinances

Throughout the year, the Board adopted the following 13 resolutions certifying cities' surface mining and reclamation ordinances as being in compliance with State policy governing the regulation of surface mining and reclamation in California:

- Resolution #86-4 was adopted by the Board in August 1986, certifying the City of Oceanside's Ordinance #86-32, adopted August 27, 1986.

- Resolution #86-6 was adopted by the Board in October 1986, certifying the City of Healdsburg's Ordinance #788, adopted July 21, 1986.

- Resolution #87-1 was adopted by the Board in January 1987, recertifying the County of San Bernardino's Ordinance #2943, #3027, and #3094, adopted on July 8, 1985; April 14, 1986; and December 1, 1986; respectively, to supercede Ordinance #2062.

- Resolution #87-5 was adopted by the Board in March 1987, certifying the City of Auburn's Ordinance #831, adopted November 10, 1986.

- Resolution #87-6 was adopted by the Board in March 1987, certifying the City of San Jacinto's Ordinance #810, adopted January 20, 1987.

- Resolution #87-7 was adopted by the Board in March 1987, certifying the City of Corona's Ordinance #1835, adopted March 4, 1987.

- Resolution #87-8 was adopted by the Board in March 1987, certifying the City of Banning's Ordinance #895, adopted March 11, 1986.

- Resolution #87-11 was adopted by the Board in May 1987, certifying the City of Sutter Creek's Ordinance #232, adopted March 17, 1987.

- Resolution #87-12 was adopted by the Board in May 1987, certifying the City of Yreka's Ordinance #619, adopted March 19, 1987.

- Resolution #87-15 was adopted by the Board in July 1987, certifying the City of Vista's Ordinance #87-16, adopted April 19, 1987.

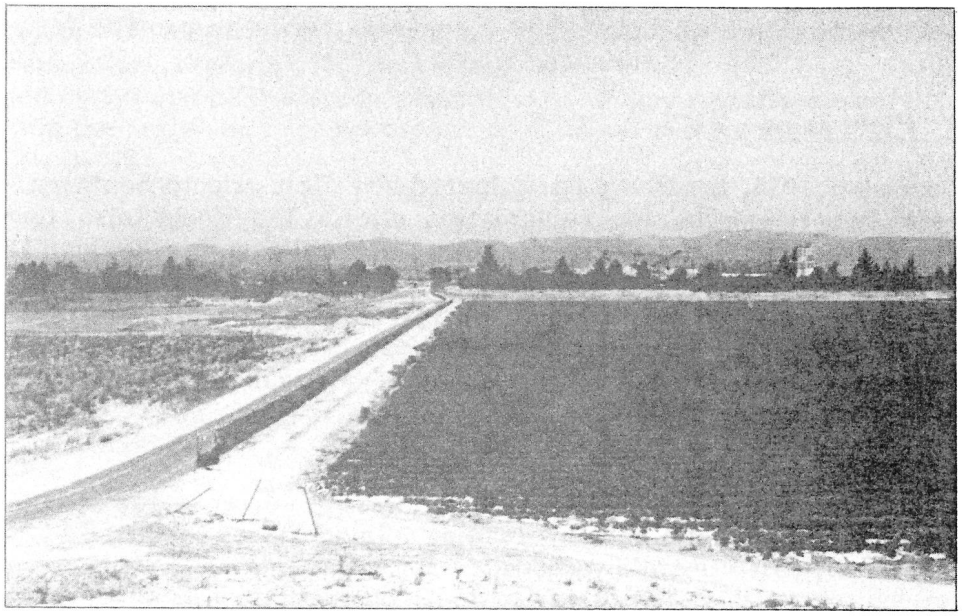
- Resolution #87-16 was adopted by the Board in July 1987, certifying the City of Vista's Ordinance #87-79, adopted June 19, 1987.

- Resolution #87-17 was adopted by the Board in July 1987, certifying the City of Palmdale's Ordinance #669, adopted June 11, 1987.

- Resolution #87-18 was adopted by the Board in July 1987, certifying the City of Palmdale's Ordinance #568, adopted April 28, 1987.

3. Reclamation Workshops

On April 29, 1987 and May 6, 1987, surface mine reclamation planning workshops were conducted in Sacramento and Ontario, respectively. The workshops were designed for city and county planners, mine operators, and other individuals engaged in the preparation or review of surface mine reclamation plans, and were well attended by representatives of each group. The workshops covered the critical elements of a reclamation plan, issues of slope and land configuration, in-stream mining, groundwater hydrology, and revegetation.



CalMat Mining operation (saticoy) in the background. Reclaimed land on the right (strawberry field) and unreclaimed land on the left. (Courtesy of James Pompy.)

4. Reclamation Plan for Palmdale Sand and Gravel

In January 1987, the Board adopted Resolution #87-2, assuming responsibility as the lead agency for approval of the Palmdale Sand and Gravel Reclamation Plan, in the absence of a certified local agency ordinance, pursuant to the Surface Mining and Reclamation Act, Section 2774.5(c). The Board accepted such responsibility because the City's surface mining and reclamation ordinance had not yet been adopted or certified.

On December 23, 1986, the reclamation plan submitted by Palmdale Sand and Gravel was deemed complete for the purposes of review. The Board resolved that an appropriate environmental document be prepared for the project and submitted for Board consideration and certification according to all applicable provisions of law. A public hearing was held in March 1987 in Palmdale to receive testimony on the proposed approval of the reclamation plan.

The plan called for the existing site to be left in its natural state, at the end of the mining operation, with the exception of the mined pits. These pits will have stable slopes and concrete drainage channels to eliminate erosion of the side slopes. The potential uses of the remaining pits could be a wildlife refuge area, a public recreation area or a storm water retention area.

At the March 1987 regular Board meeting, Resolution #87-10 was adopted by the Board approving the reclamation plan with a modification and amendment that the Palmdale Sand and Gravel Company work out an agreement with the Department of Conservation for a method of guaranteeing funds for completion of the reclamation project. A Sinking Fund Agreement was entered into by the Department of Conservation and Palmdale Sand and Gravel Company and recorded in May 1987. The agreement requires that a specified amount per ton be accumulated in an account over a ten-year period to provide for reclaiming the site.

5. Board Field Trips

In December 1986, the Board participated in a field trip to Southern California to tour twenty-one mining reclamation sites. The Board also toured eight mining reclamation sites in five Northern California counties in June 1987.

These tours provided an opportunity for participants to see first-hand the practical aspects of reclamation technology. The tours also impressed upon participants how lands can be reclaimed to a useable condition after mining projects have been completed.

6. Summary of Classification-Designation Program

California is one of the nation's leading mining states in terms of both value and diversity of minerals produced--approximately 805 active mines and quarries produce about $2 billion worth of non-fuel minerals annually.

In the early 1970's, the Department of Conservation's Division of Mines and Geology (DMG) estimated that California would face a $17 billion loss of mineral resources by the year 2000 if present land uses continued. This projected loss represents almost nine years of the State's current mineral production.

California is faced with increasingly difficult land use decisions. Mining is not compatible with most other land uses. Conflicts between homeowners and quarry operators are common at public hearings. In the public view, other land resources such as agricultural lands, timber stands, and sensitive ecological or scenic areas can be more valuable than the underlying mineral deposits. Competition for land use priorities is intense. Unfortunately, many land use decisions are made without considering whether mineral resources are present. Mineral resources thus lost are rarely located or recovered later.

In an effort to remedy this problem, SMARA provides for a mineral lands inventory process termed "classification-designation", which jointly involves State and local government. Information on the location of important mineral deposits is developed by the DMG through the process of mineral land classification. This information is used by the Board in designating those deposits that are of economic significance to a region, the State, or the nation. Local government uses this information in developing mineral resource management policies and in making land-use decisions to assure the conservation and development of these resources.

During the first phase of this program, classification, the State Geologist is responsible for preparing a geologic inventory of selected mineral commodities within a defined study region. Major objectives of a classification report include: (1) identifying the market area of the commodity (a production-consumption region); (2) projecting the future (50-year) needs for the commodity within the study region; and (3) geologically classifying the lands within the region as to the presence or absence of the commodity.

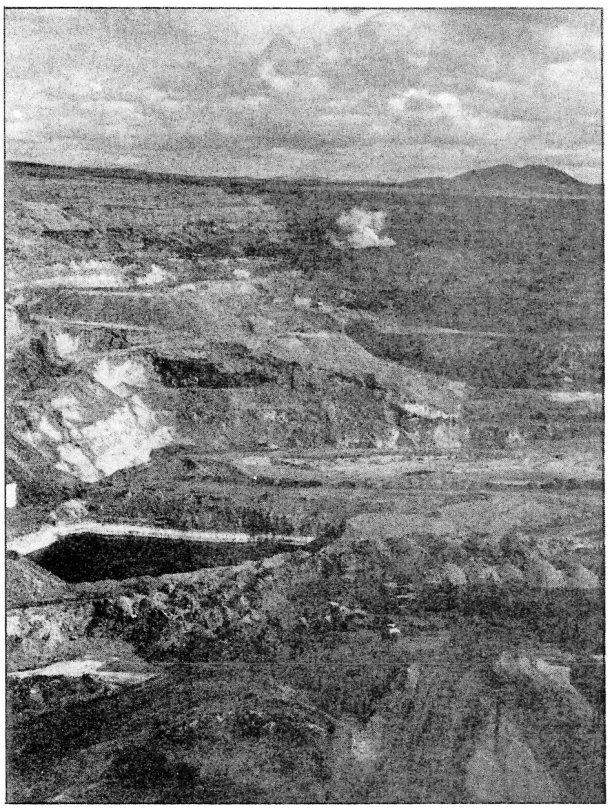
The State Geologist classifies mineral lands solely on the basis of geologic factors. Existing land-use, by statute, is not considered. Classification of an area as a Mineral Resource Zone-2 (MRZ-2) indicates the existence of a deposit that meets certain criteria for value and marketability. The classification report also describes other categories of mineral resource zones -- MRZ-1, 3, and 4. The first two of these categories are used to indicate if an area contains no resources (MRZ-1) or contains potential but presently unproven resources (MRZ-3). Areas where it is not possible to assign any of these categories are classified MRZ-4.

In many regions, large portions of the areas classified as MRZ-2 are already committed to various urban uses, which limit access to the underlying resources. As an aid to local planning agencies, classification reports prepared for metropolitan areas also identify MRZ-2 quality deposits, or portions of these deposits, that have not been preempted by incompatible land uses such as urbanization. These non-urbanized areas, called resource sectors, are important because they contain resources that remain potentially available for future use. The identification of resource sectors also facilitates estimating the volume of aggregate material that is available in the production-consumption (P-C) region. Resource sectors are typically considered for designation by the Board.

Once the classification report has been completed, the Board may choose to proceed with the second step in SMARA's mineral lands identification process -- designation of those deposits that are of regional or statewide significance. In contrast to classification, which inventories mineral deposits without regard to land use, the purpose of designation is to identify those deposits that are of prime importance in meeting the future needs of the study region and that remain available from a land use perspective.

The first mineral commodity selected by the Board for classification by the State Geologist in urban and urbanizing areas was construction aggregate -- sand, gravel, and crushed rock. While its importance is often overlooked, sand and gravel is an essential commodity in society. As construction materials, sand and gravel are key components of products such as Portland cement concrete, asphaltic concrete, railroad ballast, stucco, road base, and fill. Aggregate normally provides 80 to 100 percent of the material volume in these products. Portland cement concrete, in turn, is used in a number of building materials such as concrete blocks and pipes, foundation pilings, precast concrete beams, and tilt-up concrete walls. In total, aggregate as a basic construction material has ripple effects throughout the economy. The availability of aggregate is essential, for example, to the construction industry. Developers, building and highway contractors, cement manufacturers, asphalt producers, construction workers, and truck drivers are dependent, either directly or indirectly, on a ready supply of reasonably priced construction aggregate. Therefore, the availability of aggregate deposits and their proximity to markets are critical factors in the strength of the State's economy.

With the passage of SB 1300 in 1979, the State also initiated mineral land classification studies in the highly mineralized Sierra Nevada and the California Desert Conservation Area, where focus is on the potential for minerals other than construction aggregate in more rural areas of the State.



U. S. Borax Mining Operation
(Courtesy of Allen Brand Associates)

Progress of Classification–Designation Program

Index map of California, showing location and status of Aggregate Production–Consumption Region being classified and/or designated in the Urban SMARA Program as of June 30, 1987.

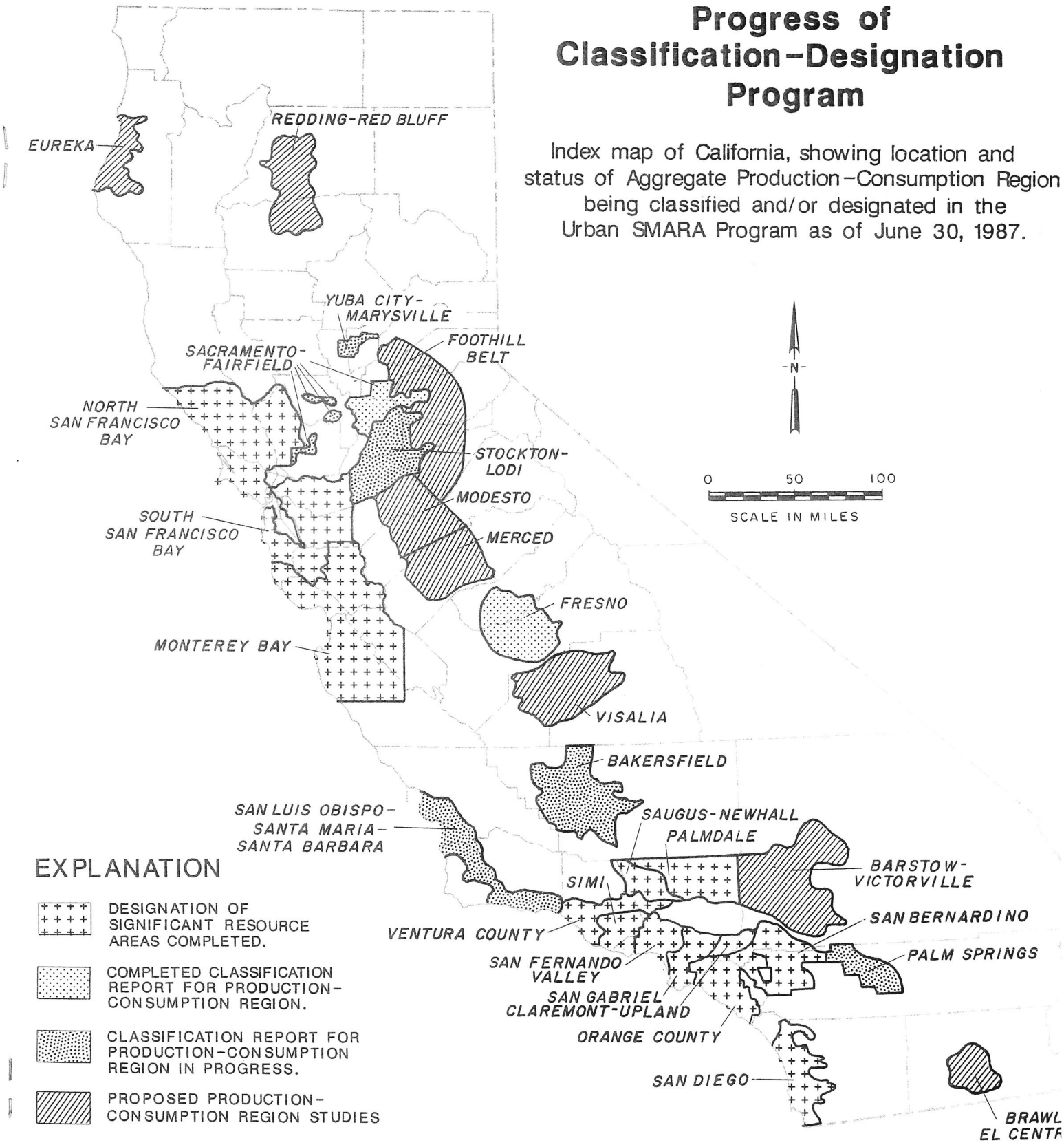


Figure 1. Status of the City SMARA Classification - Designation Program, June 30, 1987.

7. Mapping Priorities for Urban and Nonurban Classification

The Board adopted, by Resolution #87-3 in January 1987, the following schedule of priorities for the classification of mineral lands in urban and nonurban areas of the State. The schedule, which had not been updated since 1982, was prepared by the Department of Conservation's Division of Mines and Geology (DMG) staff at the Board's request. The Board recognized the necessity of updating the schedule to reflect current needs and statewide urbanizing trends, as well as the necessity of initiating mapping of industrial minerals while balancing the need to complete mapping of construction aggregate commodities.

Urban Classification Program

Priority 1 Areas

Yuba City-Marysville
Bakersfield
Palm Springs
Stockton-Lodi
San Luis Obispo-Santa Maria-
Santa Barbara

Priority 2 Areas

Modesto
Merced
Visalia
Foothill Belt
Barstow-Victorville

Priority 3 Areas

Redding-Red Bluff
Brawley-El Centro
Chico
Eureka

Classification of Industrial Minerals

Southern California
Northern California

Industrial Minerals Mapping

General Industrials
Computer Development

Ten-Year Updates for Construction Aggregate

San Fernando
Ventura
Orange
San Gabriel
San Diego
San Francisco

Nonurban Classification Program

Priority 1 Areas

CALIFORNIA DESERT:

Kingston Peak-Clark Mtn-Roach Lake-Horsethief Springs-Shenandoah Peak
Turtle Mtns-Savahia Peak-Whipple Mtns-Parker Dam-Rice-Vidal-Parkes-Black Peak
Old Dad Mtn
Kerens-Flynn-Colton Well
Soldier Pass-Magruder Mtn-Waucoba Wash-Dry Mtn-Last Chance Range-Ubehebe Crater-New York Butte-Ubehebe Peak-Panamint Butte
Pinto Basin-Coxcomb Mtns-Palen Mtns-Midland-McCoy Spring-Sidewinder Well-Chuckwalla Mtns-Hayfield-Cottonwood Spring
Bristol Lake-Cadiz Lake-Cadiz Valley-Dale Lake
Manly Peak-Wingate Wash-Confidence Hills-Shoshone-Tecopa-Quail Mtns-Leach Lake
Borrego-Kane Spring-Neiland-Carrizo-Plaster City-Brawley-Jacumba-Coyote Well-Heber
Quartz Peak-Picacho-Ogilby-Picacho Peak-Laguna
Little Lake-Inyokern-Saltdale-El Paso-Cuddleback Lake
Daggett-Newberry-Ord Mtns-Rodman Mtns

FOOTHILL BELT-MOTHERLODE:

Camino
Mokelumne
San Andreas
Valley Springs
Saddle Mtn
Wheatland
Grass Valley
Gridley
Bangor

Priority 2 Areas

Other areas not covered by Urban Classification Program

A schedule for mapping Identified Mineral Resource Areas in California was also proposed by existing DMG staff, to be completed within the Mineral Resource Assessment Program (MRAP), as a means to more readily identify mineralized areas of the state for local planning purposes prior to their being lost to incompatible land use decisions. This schedule was adopted in January 1987 as Resolution #87-4. It was resolved that the MRAP activities would be limited to review of current mining activities; maintenance of mineral property report files; maintenance of active mines computer list; response to public inquiries; conducting 10 Wilderness Study Area reviews; conducting critical commodity studies in areas of high unemployment where the potential for development of mineral deposits is high; preparation of 13 Identified Mineral Resource Area maps beginning with the San Bernardino sheet, showing all active mines, known significant mineral deposits, all known prospects, and all inactive mines; and preparation of six mineral commodity reports, for Fiscal Year 1987-88.

8. Completion of Urban Classification Reports

a. Yuba City-Marysville Production-Consumption Region

The Board accepted, in July 1987, an urban classification report for the Yuba City-Marysville P-C Region. The P-C region boundaries encompass all major urbanizing areas (with a population of 10,000 or more), and associated areas projected for future urbanization within the marketing areas of the Yuba River production district.

The major findings of the report, entitled "Mineral Land Classification: Portland Cement Concrete-Grade Aggregate in the Yuba City-Marysville Production-Consumption Region", are:

- The estimated total amount of available PCC-grade aggregate resources in the 145-square-mile Yuba City-Marysville Production-Consumption Region is 2.3 billion tons. These resources, in areas classified MRZ-2, are located within two sectors, A and B, which are subdivided into 18 subsectors. The total area covered by these sectors is approximately 23 square miles.

- Based on the projected population growth and the calculated average annual per-capita consumption rate of 5.4 tons per person determined from the years 1964-1984, approximately 26.5 million tons of aggregate would be needed for the Yuba City-Marysville P-C Region to meet its local needs to the year 2035. This is well below the current reserve tonnage of 1.26 billion tons that the study area contains. Thus, the reserves that are contained within the Yuba City-Marysville P-C Region are more than adequate to supply the urbanizing area with PCC-grade aggregate for the 50-year foreseeable future. Because of the large volume of PCC-grade aggregate in Yuba City-Marysville, those resources should be seriously considered as alternative resources for the large market areas in Sacramento and the San Francisco Bay area. There are significant exports of aggregate to the Sacramento area at present and an increase is likely in the future.

9. Completion of Nonurban Classification Reports

The past year reflects significant progress for mineral inventory studies in nonurban areas. The Board has assigned the highest priority for classification in the nonurban program to the Sierra Nevada Foothills and the California Desert Conservation Area (CDCA). This program is focused on these areas because of their known mineral wealth and because both regions are subject to land-use actions that could conflict with the development of important mineral resources -- the Sierra Nevada Foothills because of urbanization, and the CDCA because of on-going federal planning and land use decisions.

a. Northeast Quarter of the Needles 1 x 2 Degree Quadrangle

The Board accepted and formally transmitted, in October 1986, a nonurban classification report, for the Northeast Quarter of the Needles 1 x 2 Degree Quadrangle located in the CDCA, which encompasses about 405 square miles of land. The study area is located near the southern border of

the Great Basin in an area referred to as the Mojave Desert. Major findings of the report are:

- The only hydrothermal mineralized zone which has been determined to contain significant inferred resources of gold is the Cherokee Mine area, situated in the southern Sacramento Mountains about one-half mile southeast of Monumental Pass. This area, which totals approximately 0.4 square miles, has been classified MRZ-2b for base and precious metals.

- Two magnesite deposits in the vicinity of Eagle Peak have been classified for the highest Mineral Land Classification of MRZ-2. These are areas that are believed to contain significant mineral deposits or areas in which there is a high likelihood for the presence of significant mineral deposits. The largest of these two, the Needles deposit, is believed to contain significant measured and indicated reserves, while the smaller Capitan deposit is believed to contain significant inferred resources.

- Fourteen areas classified MRZ-3a and totaling eighty square miles have been classified as having favorable environments for the occurrence of hydrothermal deposits of gold, silver, copper, lead, zinc, and barite. Approximately 0.9 square miles of this land lies within the Chemehuevi Mountains Wilderness Study Area (WSA), which is the only WSA located within the limits of the study area for this report. Some of the most significant of these areas classified MRZ-3a are: a fifty square mile northeast trending gold, silver, copper, and barite mineralized belt extending from the South Pass area northeast to the southern Dead Mountains, a 14 square mile mineralized zone in the northeastern Sacramento Mountains, and a mineralized zone in the vicinity of Eagle Peak situated along a major detachment fault. Most of the hydrothermal mineralization found within the study area appears to have an association with widespread detachment faulting.

- Several areas classified MRZ-3a represent favorable geologic settings or environments for the occurrence of specific industrial minerals. It includes a twelve square mile area along the east side of the Dead Mountains and a 1 1/2 square mile area situated along the northeastern side of the Chemehuevi Mountains which have been found to contain montmorillonite clay, a small barite deposit located in the northcentral flanks of the Sacramento Mountains, and a silica deposit situated along the southeastern end of the Chemehuevi Mountains.

b. Camino and Mokelumne Hill 15-Minute Quadrangles

The Board accepted and formally transmitted, in March 1987, a nonurban classification report, for the Camino and Mokelumne Hill 15-Minute Quadrangles located in the Sierra Nevada foothills region in the Counties of El Dorado, Amador, and Calaveras. Major findings of the report are:

- Most of the aeromagnetic anomalies located on the Camino quadrangle evidently are caused by intrusive igneous rocks. The largest of these anomalies are associated with relatively magnetic basic and ultrabasic rocks, but other anomalies are related to rocks of granitic

composition. However, at least one anomaly examined on the ground ("HD") appears to represent a mineralized area in the Shoo Fly Complex that could have some potential for deposits of economic value. Another magnetic anomaly ("SPR") evidently is caused at least in part by a magnetite-bearing zone--possibly a contact or hydrothermal replacement type of deposit--also in the Shoo Fly Complex. Although there are no known prospects associated with this zone, the rocks marked by the magnetitic anomaly might also have some potential for mineral deposits.

- An aeromagnetic anomaly, located near Old Fort Jim, evidently represents ultramafic rocks (serpentinite). This anomaly was not investigated on the ground, but the aeromagnetic data probably serve to outline the location of the largest masses of the serpentinite. These rocks could be a source of chromite or talc.

- Ground magnetic surveys in two areas not related to aeromagnetic anomalies found that frequently there are local magnetic anomalies at the contacts between intrusive rocks of Mesozoic age and rocks of the Shoo Fly Complex. These anomalies indicate an increase in magnetite which may be skarn or another type of mineralization. Therefore, ground magnetic measurements might be used to help locate geologic contacts of this kind in the area, and in some cases, these measurements also might be useful in the search for mineral deposits along the contact.

c. Northern Portion of the Kingman 1 x 2-Degree Quadrangle

The Board accepted and formally transmitted, in May 1987, another nonurban classification report, for the Northern Portion of the Kingman 1 x 2-Degree Quadrangle located in the CDCA. The area of these quadrangles encompass about 405 square miles of land.

The area represented by the Northern Portion of the Kingman 1 x 2-Degree Quadrangle is located near the southern border of the Great Basin in an area referred to as the Mojave Desert.

Land use jurisdiction in this area is the responsibility of the County of San Bernardino and the Bureau of Land Management. Major findings of the report include:

- Areas in which significant measured or indicated mineral reserves (MRZ-2a) are in evidence include a hydrothermal gold deposit on the eastern slope of the Clark Mountains, a bentonite deposit in Tertiary lake beds near Kingston Wash, talc deposits on the northern slope of Kingston Peak, and an iron ore deposit in the northern Kingston Range. The hydrothermal gold deposit occurs in an area where a Cretaceous rhyolite breccia pipe has intruded Precambrian gneiss and hydrothermal fluids have silicified, sericitized, and mineralized the rhyolite and rhyolite breccia. The talc and iron ore deposits occur where diabase sills intrude carbonate rock of the Precambrian Crystal Springs Formation.

- One area has been classified as containing significant inferred mineral reserves (MRZ-2b). It includes talc deposits that are currently undeveloped within the Crystal Springs Formation on the northern slope of the Kingston Range.

- This area exhibits favorable geologic settings for several types of mineral deposits which include: precious and base-metal hydrothermal deposits, base-metal contact metasomatic deposits, carbonate rock, barite, gypsum, talc, bentonite and fluorite. These have been classified MRZ-3a.

d. Ash Meadows, Big Dune, Eagle Mountain, Funeral Peak, Pahrump, Ryan, Stewart Valley 15-Minute Quadrangles and High Peak 7 1/2-Minute Quadrangle

The Board accepted and transmitted, in January 1987, another nonurban classification report, for the Ash Meadows, Big Dune, Eagle Mountain, Funeral Peak, Pahrump, Ryan, Stewart Valley 15-Minute Quadrangles and High Peak 7 1/2-Minute Quadrangle located in Inyo County. This study covers the southeast quarter of the Death Valley 1 x 2 degree sheet, which encompasses all or portions of seven 15-minute quadrangles and one 7 1/2-minute quadrangle.

The major findings of the report are:

- Four areas containing borate deposits and three areas containing deposits of zeolites, hectorite, and bentonite, respectively, have been classified for the highest mineral land classification of MRZ-2a.

  These are areas that are deemed to contain significant deposits or areas in which there is a high likelihood for the presence of significant mineral deposits. The six areas classified MRZ-2a contain significant measured and indicated resources, while the one area classified MRZ-2b is deemed to contain significant inferred borate resources. Collectively, the four areas classified MRZ-2a for borates, represent the largest known resource of calcium borates outside of the Death Valley National Monument.

- Several areas classified MRZ-3a represent favorable geologic settings or environments for the occurrence of specific industrial minerals. These include: an area lying between Eagle Mountain and Ash Meadows along the west side of the Resting Spring Range which has been found to contain zeolites and bentonitic clays, an area east of the Funeral Mountains known to contain bentonite and hectorite, a deposit of salines located at Alkali Flat, deposits of zeolite, pumice, and perlite located within the Greenwater Range, deposits of carbonate rock in the Nopah, Resting Spring Range, and Funeral Mountains, and a barite deposit along the eastern side of Greenwater Valley.

- Six areas have been classified MRZ-3a as having favorable environments for the occurrence of hydrothermal deposits of silver, lead, zinc, copper, and barite. Some of the most

significant of these are: a twenty-mile-long mineralized zone containing silver, gold, copper, and barite, extending from Greenwater southeast to Miller Spring which has potential for a copper porphyry or disseminated gold-silver deposit, the Baxter Mine, High Chicago Mine, and Copper Hill prospects in the Resting Spring Range, and the Nancy-Ann (Shaw) Mine in the Nopah Range. With the exception of the Greenwater District, most of the hydrothermal mineralization found within the study area appears to have an association with, and spatially confined to, the widespread Mesozoic thrust faults which exist in the Nopah and Resting Spring Ranges.

- Two areas (Ryan to the Amargosa River and Chicago Valley) classified MRZ-3b comprise a large percentage of the study area and are believed to contain undiscovered borate resources which may occur in favorable geologic settings or where mineral discoveries have not yet been made.

- Mineral land classification of the northern Kingman 1 x 2 degree quadrangle provides local government agencies with information regarding the presence or likely occurrence of mineral deposits in land within their jurisdiction. Future policy decisions made for land use in the study area can be made with a better understanding of underlying mineral significance or potential. Results of this study could be of value to individuals and industry by targeting areas favorable for mineral exploration.

10. Classification Reports Prepared in Response to Petitions

Mineral deposits threatened by incompatible land uses that may prevent mining may be brought to the Board's attention by petition. To qualify for a petition, the subject deposit(s) must meet a certain economic threshold and be faced with an imminent land-use threat related to urbanization.

As with all other classification reports, lead agencies are required by SMARA to incorporate this information into the local general planning process.

a. Coast Rock Products' Sand and Gravel Deposit Along the Sisquoc River

During the past year, the Board has accepted one new petition for classification.

The petition was accepted in August 1986, from Coast Rock Products Inc. for classification of sand and gravel deposits along the Sisquoc River, Santa Barbara County, as part of the ongoing urban classification efforts in a combined San Luis Obispo-Santa Maria-Santa Barbara P-C Region.

The land use threat to these deposits was cited as proposed placement of a pipeline at a shallow depth (20 feet), which would preclude sand and gravel extraction in the affected area.

In January 1987, the Board approved a mineral land classification study, and informally transmitted the State Geologist's preliminary report, "Mineral Land Classification of a Portion of the Sisquoc River, Santa Barbara County, California, Portland Cement Concrete Aggregate", to Santa Barbara County for their information and use until the region study was completed. The major findings of the preliminary report conclude:

- That significant high quality PCC-grade aggregate resources exist in these properties which meet the threshold and suitability criteria established by the State Mining and Geology Board for inclusion into the MRZ-2 category.

- The loss of these resources would negatively impact both the availability and the cost of construction aggregate in the market area they serve.

The findings of this report will be included in the classification study for the San Luis Obispo-Santa Maria-Santa Barbara P-C Region.

11. Designation of San Francisco-Monterey Bay Areas; Claremont-Upland and San Bernardino Regions; and Saugus-Newhall and Palmdale Regions

During the 1986-87 fiscal year, the Board continued work on the designation of major metropolitan areas of the state, seven production-consumption regions, which include the San Francisco-Monterey Bay areas; Claremont-Upland and San Bernardino regions; and the Saugus-Newhall and Palmdale regions. The intent behind this coordinated effort was to bring the Board's mineral inventory procedures in line with the completion of classification reports by DMG statewide -- a major benefit being the completion of designation of rapidly urbanizing areas in a more timely fashion.

Proposed designation regulations were released in October 1985 for public comment. Public hearings were held on November 15, 1985 in Palm Desert and on January 31, 1986 in Santa Rosa to accept testimony and comments on proposed designation regulations for the seven production-consumption regions. Additional public hearings were held on March 18, 1986 in San Jose and March 19, 1986 in Santa Cruz to accept additional testimony on the South San Francisco Bay and Monterey Bay Production-Consumption Regions.

The Classification-Designation Committee met in April 1986, to develop recommendations for the designation of aggregate resources by the full Board for the Claremont-Upland, San Bernardino, Saugus-Newhall, and Palmdale P-C Regions in Southern California, and the North San Francisco Bay P-C Region in Northern California. These recommendations were considered at the July 1986 meeting of the full Board, and the modified proposal resulting from comments received for these regions was distributed for an additional 15-day public comment period in mid-July 1986.

The Classification-Designation Committee met in July 1986 and prepared recommendations for the designation of aggregate resources by the full Board for the South San Francisco Bay and Monterey Bay Production-Consumption regions. The modified proposal for these regions was also sent out for an additional public comment period, following an August Board meeting.

1986 NONFUEL MINERAL PRODUCTION IN CALIFORNIA

(Value in Thousands of Dollars)

State total 1986: $2,269,449 (est.)
(Value in thousands)

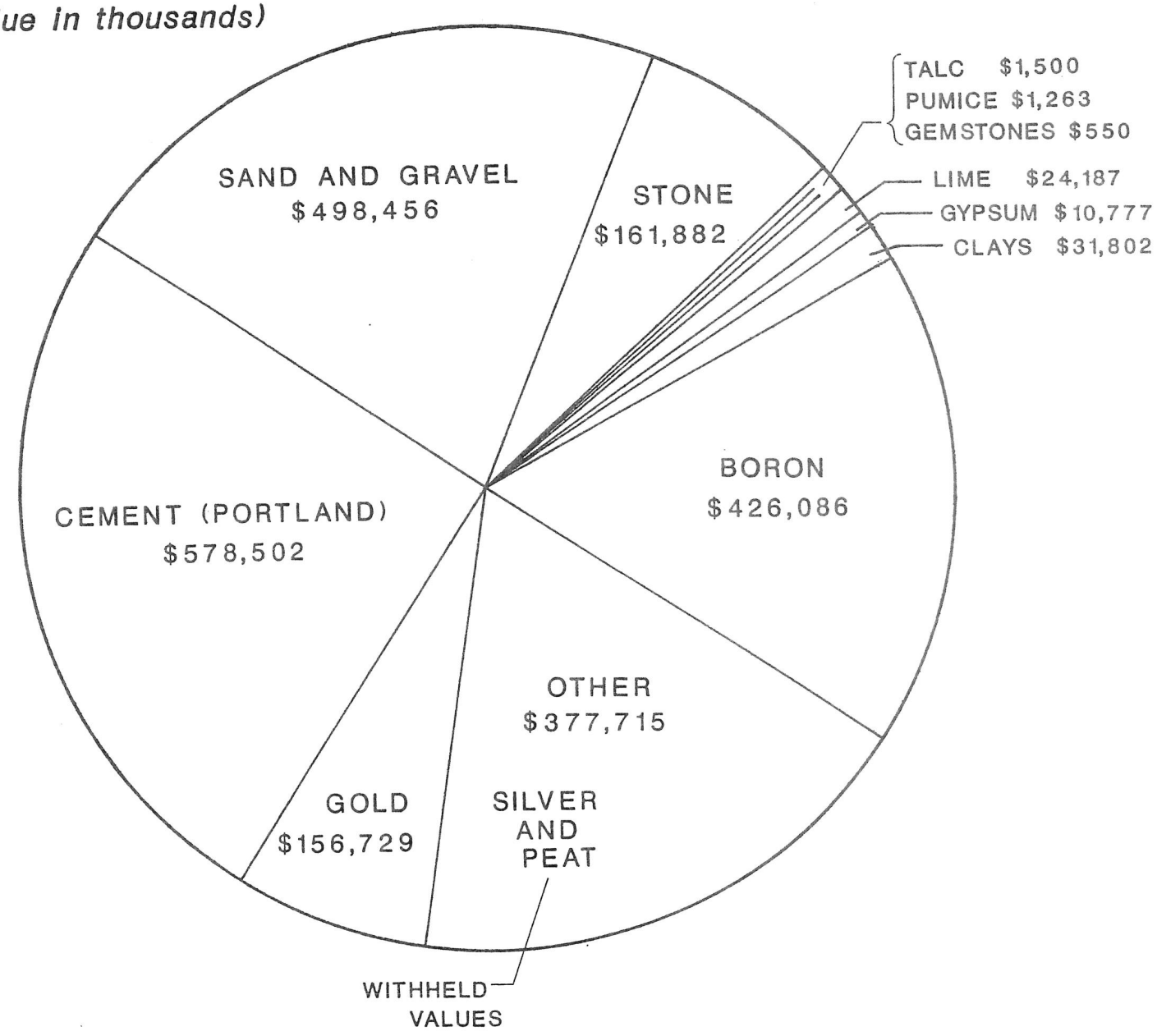


Figure 2. Combined value of asbestos, calcium chloride, cement (masonry), clays (fire clays), copper, diatomite, feldspar, iron ore, lead, magnesium compounds, molybdenum, perlite, potassium salts, rare-earth concentrates, salt, sodium carbonates, sodium sulphate, tungsten ore and concentrate, wollastonite, and withheld values.

Source: U.S. Bureau of Mines Minerals Yearbook 1986, Volume II.

Throughout the designation proceedings, which is a formal rulemaking process, members of the Board, and in particular the Classification-Designation Committee, met with individual homeowner and industry groups, local government and state officials, and responded to citizen inquiries in an attempt to understand the concerns of all interested parties towards development of an informed decision. The designation process for these seven regions was completed in October 1986--Resolution #86-7 was passed by the Board, formally designating important mineral resource areas in the seven production-consumption regions.

12. Designation of the Fresno Production-Consumption Region

In July 1986, the Board determined that the Fresno P-C Region would be the next priority area for designation action. A tour of the P-C region and a workshop were held in Fresno in May 1987 to initiate the designation process.

The P-C region encompasses the entire metropolitan area of Fresno, Clovis, and Sanger and surrounding areas anticipated by the Office of Planning and Research and/or the local lead agency to urbanize in the next 10 to 30 years; outlying towns such as Madera, Selma, and Kingsburg; rural areas not anticipated to urbanize but which are sparcely populated and consume aggregate from the San Joaquin and Kings Rivers; and the two resource areas. The eastern boundary of the area roughly matches the break in slope between the foothills and the Sierra Nevada Mountains, and follows census tract boundaries, to allow use of existing census and other population data for forecasting.

The Fresno P-C Region covers an area of 1,400 square miles, of which 39 square miles (3% of the total area) were classified MRZ-2. Only 31 square miles (2% of the total area) have been sectorized as having current land uses which do not preclude mining. Almost 3-1/2 square miles of the sectorized areas are currently under mining permits.

One-hundred million tons of aggregate were available as reserves at the end of 1984. This amount includes reserves on both rivers, and was calculated assuming that all material currently permitted and under lease to an aggregate company would be mined.

Approximately 141 million tons of resource (including reserves) exist within the San Joaquin River flood plain, nearly 2 billion tons of resource (including reserves) are contained within the Kings River flood plain. Total resources in the Fresno P-C Region are over 2.1 billion tons. The total 50-year demand for the region is 268 million tons. This indicates that current reserves, as calculated, will provide a 21-year supply to the Fresno area.

13. Local Agency Use of Classification-Designation Reports

Once a classification or designation report has been received by local lead agencies (cities and counties), SMARA requires that these agencies establish mineral resource management policies, to be incorporated into their general plans, that: (1) recognize the mineral information provided by the State; (2) assist in the management of land use that affects areas of statewide or regional significance (designated areas); and (3) emphasize the conservation and development of identified mineral deposits.

While SMARA contains a specific mandate requiring development of mineral resource management policies that will implement the mineral resource conservation objectives of SMARA, it leaves little guidance as to how these policies should be structured. To address this issue, the Board, in May 1985, adopted interim criteria to assist lead agencies in the development of mineral resource management policies.

Resolution #86-1, adopted in January 1986, amended Resolution #85-15 to increase the number of implementation measures that ought to be utilized by lead agencies to effectively carry out the mineral resource conservation provisions of SMARA.

Information available in classification and designation reports is being used with increasing frequency by local agencies in planning studies and permit decisions. For example, during the past year, mineral resource information developed by the classification-designation program was used in at least 29 local agency environmental documents. These documents are monitored carefully by the Department of Conservation to insure that factual information on classified and/or designated areas is brought before local decision-makers.

Information on mineral resources was included for project decisions in the Cities of Anaheim, Fontana, Chula Vista, Folsom, San Diego, Los Altos Hills, Pacifica, Ventura, Oxnard, and Santee, as well as in the Counties of Alameda, Fresno, Sacramento, Madera, El Dorado, Sonoma, San Diego, and San Bernardino.

The cities and counties who have adopted mineral resource management policies to date in response to receipt of classification and/or designation information are the cities of Amador, Anaheim, Auburn, Banning, Chula Vista, Colfax, Fremont, Fresno, Gilroy, Healdsburg, Ione, Marina, Oceanside, Pasadena, Plymouth, Sacramento, San Diego, San Jose, Scott's Valley, Sonora, Sutter Creek, Upland, Vallejo, Ventura, Victorville, and Yorba Linda; and the counties of El Dorado, Fresno, Madera, Nevada, Orange, Placer, Riverside, Sacramento, San Bernardino, San Mateo, Santa Cruz, Sonoma, and Yolo.

14. Appeals

An applicant whose request for a permit to conduct surface mining operations in an area of statewide or regional significance has been denied by a lead agency or any person who is aggrieved by the granting of a permit to conduct surface mining operations in an area of statewide or regional significance, may appeal to the Board. The board may decline to hear an appeal if no substantial issues are raised or if the subject of the appeal is not within the jurisdiction of the Board (i.e., the area has not been designated). If the Board agrees to hear an appeal, a public hearing is held within 30 days of the filing of the appeal, or such time as agreed upon by the Board and the person filing the appeal, in the jurisdiction of the lead agency which processed the original application.

a. Appeal on Behalf of the City of Rancho Cucamonga Concerning the Day Creek Sand and Gravel Mining Operation and Reclamation Plan (Fourth Street Rock Crusher), San Bernardino County

The Board received its first appeal under this provision from the City of Rancho Cucamonga. The City appealed the County of San Bernardino's action to approve a mining operation and reclamation plan for the Day Creek Sand and Gravel operation in the Day Creek area. The University of California joined in the appeal.

The Board declined to accept the appeal because the area in question had not been designated by the State Mining and Geology Board at that time.

15. Legislation

a. Assembly Bill 747

The Board and the Department, in an attempt to identify which surface mining operations were still lacking an approved reclamation plan pursuant to the provisions of SMARA, became aware that many vested rights operators did not have approved reclamation plans because of confusion about the requirements of the vested rights provisions. Many operators had complied with the majority of the required elements of a reclamation plan, but had not received the required approval or met every condition.

To address these problems, the Board and the Department sponsored legislation (Assembly Bill 747) by Assemblyman Byron Sher, requiring existing surface mining operations with vested rights without an approved reclamation plan to submit a plan to the lead agency not later than March 31, 1988. An appeals process was included to address potential cases of failure to act on submitted plans by the lead agency or denial on the basis of issues other than reclamation plan requirements.

Further, a provision was added to require the Board to return reclamation plan approval and monitoring responsibilities to local lead agencies upon adoption of a certified surface mining and reclamation ordinance in those cases where the Board had served in a lead agency capacity.

This bill was signed into law by the Governor on September 23, 1987 and chaptered as Chapter 975, Statutes of 1987. The bill takes effect January 1, 1988.

b. Assembly Bill 168

Assembly Bill 168, by Assemblyman William Leonard, amends Section 12306.5 of the Education Code and exempts the provisions regarding the payment of potash royalties to the Trona Joint Unified School District and the Kern Community College District from the requirement that the first $2,000,000 of federal mining royalties received by the State be deposited in the Surface Mining and Reclamation Account and provides for the allocations to be made by the Controller instead of the Treasurer. Before this bill was passed, existing law required the Treasurer to apportion federal mining royalties for potash deposits located in the Trona Joint Unified School District and the Kern Community College District according to a specified formulation.

This bill was signed into law by the Governor on July 6, 1987 and chaptered as Chapter 124, Statutes of 1987. The bill takes effect immediately as an urgency statute and is retroactive to July 1, 1986.

c. Senate Bill 1310

Senate Bill 1310 by Senator Robert Presley appropriates funds for the payment of claims to local government entities for reimbursement of costs incurred as a result of state-mandated local programs. This bill is important because for the first time it appropriates funding for payment of these claims from the Surface Mining and Reclamation Account.

The bill was signed into law by the Governor on September 28, 1987 and chaptered as Chapter 1270, Statutes of 1987. The bill takes effect immediately as an urgency statute.

B. Geohazards

1. Summary of Board Responsibilities for Geohazards in California

California's propensity for geologic hazards -- earthquakes, landslides, volcanism -- underscores the importance of understanding these phenomena and their potential effects upon our society. In 1973, the Division of Mines and Geology estimated that the cost of these hazards from 1970 to 2000, if current land-use practices continue, would amount to $38 billion. To foster a better understanding of these hazards, the Board represents the State's interest in developing and disseminating related geologic information through the State's geologic survey -- the Division of Mines and Geology (DMG).

The Board is also charged with more specific responsibilities under such laws as the Alquist-Priolo Special Studies Zones Act and the recently enacted Landslide Hazard Identification Act.

2. The Alquist-Priolo Special Studies Zones Act

The Alquist-Priolo Special Studies Zones Act provides for the mapping of active faults by DMG under policies established by the Board. Maps of these faults -- Special Studies Zones -- are provided to local government for their land-use planning and decision making. The Act prohibits construction of structures for human occupancy, as defined, across the trace of an active fault.

Thirty-two (32) official maps (listed below) of new and revised Special Studies Zones were issued pursuant to the provisions of the APSSZA July 1, 1986.

1.	Mustang Peak	12.	Burro Mountain	23.	Santa Paula Peak
2.	Crevison Peak	13.	Piedras Blancas	24.	Fillmore
3.	Pacheco Pass	14.	San Simeon	*25.	Beverly Hills
4.	San Luis Dam	*15.	Stockdale Mountain	*26.	Hollywood
5.	Los Banos Valley	*16.	Parkfield	*27.	Inglewood
6.	Ortigalita Peak NW	*17.	Cholame Hills	28.	Torrance
7.	Ortigalita Peak	*18.	Cholame Valley	*29.	Long Beach
8.	Three Sisters	*19.	Cholame	*30.	Los Alamitos
*9.	Tres Pinos	20.	Zaca Creek	*31.	Seal Beach
*10.	Paicoines	21.	Matilija	32.	Newport Beach
*11.	Cherry Peak	22.	Ojai		

*Revised zone map

Agencies affected by these Special Studies Zones include the cities of Carson, Compton, Culver City, Gardena, Huntington Beach, Inglewood, Los Angeles, Long Beach, Newport Beach, Seal Beach, and Signal Hill and the Counties of Fresno, Los Angeles, Merced, Monterey, Orange, San Benito, San Luis Obispo, Santa Barbara, Stanislaus, and Ventura.

These maps were released following an extensive public review period conducted throughout the latter half of the last fiscal year.

3. The Landslide Hazard Identification Act

The Landslide Hazard Identification Act (LHIA) was chaptered in September 1983, becoming effective January 1, 1984 (Chapter 997, Statutes of 1983). This Act formally recognized the problem of unstable slope hazards (landslides, mudslides, debris flows, slumps, soil creep, etc.) that occur throughout much of California. These problems have been underscored by the tragic loss of life and property due to storm-triggered slides over the past few years.

The LHIA provides for a state-local cooperative mapping program to identify landslide-prone areas in the path of urbanization. The Act requires the Director of the Department of Conservation to establish within the Division of Mines and Geology a Landslide Hazard Identification Program that is charged with developing maps of landslide hazards within urban and urbanizing areas of the State. Mapping of these areas by the Division of Mines and Geology is directed by priorities and guidelines established by the State Mining and Geology Board.

According to Section 2685(b) of the LHIA, priorities for the mapping program are to reflect the following factors in order of importance: (1) the severity of the landslide hazard, (2) the willingness of lead agencies and other public agencies to share the cost of mapping within their jurisdictions, (3) the availability of existing information, and (4) the need to supplement information used in existing landslide hazard abatement or prevention programs.

El Sobrante home destroyed by landslide, Contra Costa County, CA. U.S. Geological Survey Photo.

Areas selected for mapping for 1986-87 were: Vallejo-Cordelia, the Solano City (50 sq. mi.); South half of the Fairfield North Solano County Quadrangle; the north half of the Oat Mountain Quadrangle, Los Angeles County (30 sq. mi.); and the Puento Hills study are in Los Angeles, Orange and San Bernardino Counties, and Whittaker Peak (30 sq. mi.). Areas the Board will be considering for mapping in 1987-88 are in Lake County around Clear Lake in Northern California, and in San Bernardino County in Southern California.

A User's Guide for the Landslide Hazards Identification Mapping (LHIM) series is being prepared by DMG staff. The user's guide will explain to user groups what the LHIM series is, how it evolved, and how it might be interpreted and applied to specific needs.

An issue of prime importance to be resolved in the coming year is whether the "sunset provision", providing for elimination of the program January 1, 1989, should be extended or removed. The Board will be working closely with the Department and DMG to assess the impact of the program on local planning and mitigation efforts, as well as continued interest in participating in the program.

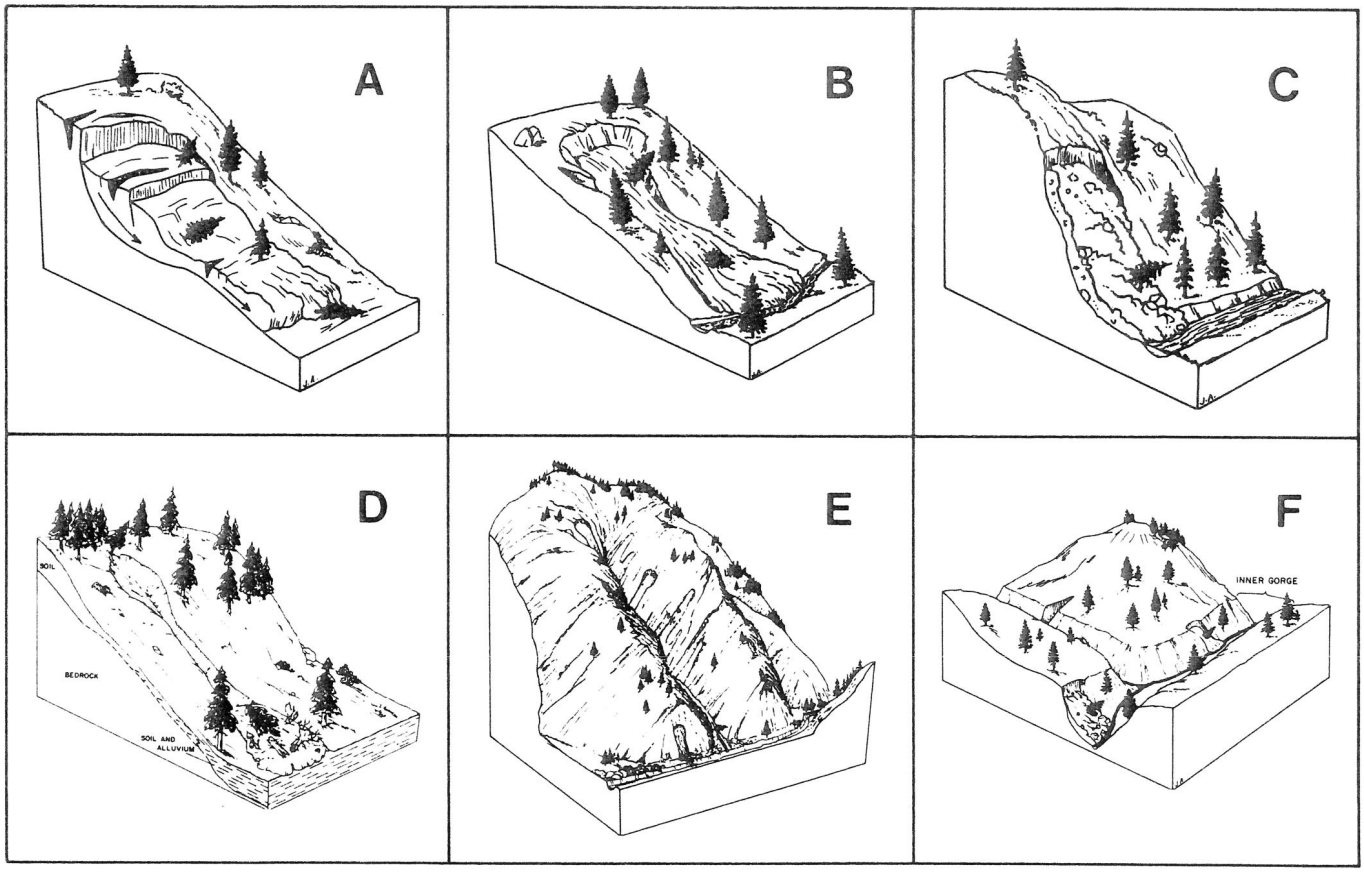


Figure 3. Landslide types and landslide related features. *Drawn by Janet Smith.*
A. Translational/rotational slide; B. Earthflow; C. Debris slide; D. Debris flow/torrent track; E. Debris slide ampitheater; and F. Inner gorge.