

STATE MINING AND GEOLOGY BOARD

1976 ANNUAL REPORT
to the
GOVERNOR AND THE LEGISLATURE

Adopted by the Board
January 21, 1977

State Mining and Geology Board
Department of Conservation
The Resources Agency
State of California



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THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF CONSERVATION
STATE MINING AND GEOLOGY BOARD

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January 21, 1977

Edmund G. Brown Jr., Governor of California
James R. Mills, President Pro Tempore, California Senate
Leo T. McCarthy, Speaker, California Assembly

Gentlemen:

It is my honor to submit this 1976 report of the State Mining and Geology Board, as required under section 674, Article 3, Chapter 2, and section 2717, Article 1, Chapter 9, of Division of the Public Resources Code.

Since its reconstitution under the Surface Mining and Reclamation Act of 1975, this Board first met June 16, 1976, and completed two major requirements under the Act:

1. Adopted state policy for the reclamation of mined lands, on December 21, 1976. (Entitled "Policy and Guidelines for the Reclamation of Mined Lands in California", appended to the present report.)
2. Adopted the present report, recommendations for needed geologic research projects, on January 21, 1977. (Entitled "Recommendations for Program Emphasis in the California Division of Mines and Geology", the body of the present report.)

Principal recommendations, for implementation by Division of Mines and Geology:

1. Classify mineral content of urbanizing lands
2. Surface mine reclamation research
3. Improve mineral commodity records
4. Augment earthquake hazard reduction efforts
5. Increase basic geologic studies
6. Accelerate coastal research and river sediment studies

Respectfully submitted,

Robert H. Twiss
Chairman

I. Board Actions Taken Pursuant to the Surface Mining and Reclamation Act of 1975

On December 21, 1976, the State Mining and Geology Board adopted Article I of its state policy for the reclamation of mined lands in accordance with the provisions of the Surface Mining and Reclamation Act of 1975. A public hearing was held November 16, 1976, respecting the adoption of this policy. A copy of the policy and guidelines is included as an appendix to this report.

II. Recommendations for Program Emphasis in the California Division of Mines and Geology

INTRODUCTION

The State of California presently funds a sizable program of applied and basic earth-science activity and research. The applied activities and research are distributed among the California Division of Mines and Geology and several other state agencies that are concerned with geological materials and processes, while basic research efforts are concentrated in California's universities. The scope, content, and distribution of these programs will necessarily change with time to meet new societal demands and to respond to new advances in earth sciences that can be applied to human needs.

Since the reconstituted State Mining and Geology Board began meeting in June 1976, it has reviewed existing programs in the California Division of Mines and Geology in the light of additional mandates for the Division and the Board contained in the Surface Mining and Reclamation Act of 1975. In this report the Board presents recommendations for program emphasis in the Division. The Board has decided that it is more important at this time to identify general program needs than to present a comprehensive list of recommendations for specific research projects.

The Board is concerned that the Division employ its present resources to best advantage so that the successful implementation of the Division's mandates may be accomplished. Certain programs must be expanded and new programs must be initiated if the Division and the Board are to complete their assigned tasks. The Board therefore recommends that a redirection, as well as a strengthening of effort in certain Division program areas should be made, particularly to respond to new needs in the areas of mineral resources classification and surface mine reclamation.

IMPLEMENTATION OF THE SURFACE MINING AND RECLAMATION ACT OF 1975

A. Classification of Mineral Resources

The Surface Mining and Reclamation Act of 1975 requires that areas of mineral resources potential threatened by changes in land use incompatible with mining be identified, delineated, and protected by appropriate zoning. The identification and delineation (mapping) of these areas is to be accomplished by the State Geologist and the staff of the Division and is to be approved by the Mining and Geology Board.

Policies to assist lead agencies in the preparation of their mineral resource management policies and to be included in the general plans of lead agencies can only be successful to the extent that mineral resources have been geographically and geologically identified, and some measure made of their relative value. Justification of the protection of resources by means of land use regulations depends on the availability of adequate data provided by careful geologic surveys. Various reconnaissance geophysical surveys will also be needed to complement and substantiate the geological findings. Local agencies generally lack the capability to conduct such surveys. In order to designate adequately areas of regional or statewide significance, it is essential that the location, quantity, and quality of mineral resources be evaluated, particularly in those areas of California that are subject to urban expansion. Lead agencies cannot reasonably be expected to protect and preserve resources that are not known to exist.

The State Geologist estimates that about 300 quadrangles (U.S. Geological Survey 7-1/2 minute quadrangle maps) might require mineral resource classification under the provisions of the Surface Mining and Reclamation Act. This number represents about 10 percent of the total land area in California. At the rate of one quadrangle per man-month, the 1977-78 Division staff devoted to the tasks of the Act (3 geologists and 1 administrator) might complete this work in about 8 years. This calculation assumes that no time will be spent by these individuals in working on other activities related to the Act, such as the review of reclamation plans and evaluation of petitions. This time frame is therefore an optimistic minimum, and 10 to 15 years might be a more likely estimate of the time to complete the classification. The Board feels that it is very important to provide for a faster classification program in view of the State's urgent needs.

Recommendations

- The Board makes the following recommendations:
- (1) That the known significant mineral resources in California be classified within a 3-to 5-year period;

- (2) That a program to accomplish the classification in this time frame be drafted in consultation with the Division. Such a program should consider manpower requirements, scope of investigations, methods of financing, priorities of work, input from on-going mineral resource investigations and pilot projects, cooperative studies with agencies such as the Bureau of Land Management and the U.S. Geological Survey, and similar factors.

It is the opinion of the Board that a credible effort to identify and map these mineral resource areas statewide within a reasonable time at a scale useful for zoning (1:24,000) will require the services of 12 geologists for at least 5 years. The Division has been able so far to assign 3 geologists to do this work. The Board recommends that 4 additional Division geologists be assigned to mineral resources mapping, and that authorization and funding be provided for 5 new positions, 4 in the fields of metallic and nonmetallic mineral deposits and mineral economics, and 1 in the field of applied geophysics.

B. Reclamation of Mined Lands

The Surface Mining and Reclamation Act of 1975 has created the need in California for expertise in modern methods of reclaiming mined lands. The need will arise in the lead agencies of local government that will be promulgating and administering the surface-mine reclamation provisions of the Act, and in the Division of Mines and Geology, which will be increasingly asked to provide advice and guidance to lead agencies.

State standards and guidelines for reclamation cannot be uniformly applied under all mining and terrain conditions. Lead agencies therefore need the State to provide the necessary research on reclamation guidelines for specific types of mining activities in areas where the environment is most vulnerable, such as in floodplains, waterways, and desert environments.

There is a present need in the State for a compilation of research information from public and private sources on all phases of surface mine reclamation. Although much research on this subject has already been carried out, the research results are not readily available to mine operators or to county and city officials.

Recommendations

The Board recommends that a geologist, preferably an engineering geologist, be permanently assigned to surface mine reclamation research in the Division of Mines and Geology.

C. Mineral Commodity Studies

Mineral commodities are basic to most industrial activity. A strong and varied mineral industry in California helps meet the mineral commodity needs of the State at competitive prices. It provides employment and tax income to the State from the primary mineral industries, service companies, and the user industries. Although California and the United States are increasingly dependent on foreign sources for mineral commodities, and despite the success of the Division in attracting new mineral industries to California, mineral-commodity studies have declined from the status of the most important activity of the Division in the 1950s to the position of a relatively minor program in the 1970s. In addition to recognizing the importance of mineral-commodity studies, the Board observes that the purposes of the Surface Mining and Reclamation Act of 1975 require improved records of mineral exploration and mining activity in California.

Recommendations

The Board recommends that the mineral-commodity studies of the Division be augmented by at least the 5 new positions listed in the above Recommendations for classification of mineral resources. In order to provide for improved records of mineral exploration and mining activity in California, the Board recommends the institution of improved methods for obtaining and filing such data, preferably by a computer-based system.

REDUCTION OF EARTHQUAKE HAZARDS

Recent advances in understanding (1) the processes by which earthquakes and related phenomena cause damage to buildings and structures, and loss of human lives; and (2) the geologic features and environments that are conducive to such hazards, have created optimism that much, if not most, of the damage caused by future earthquakes can be prevented. These advances include improved techniques for recognizing and mapping active faults and for predicting ground failure and strong ground motion during earthquakes. The routine application of such knowledge to the siting and design of buildings and structures will provide immediate as well as long-term amelioration of the earthquake hazard. Such studies are relatively inexpensive in comparison to the cost of alternative strategies such as earthquake prediction, and the results can be readily applied by the existing mechanisms of zoning ordinances and building codes.

The instrument networks and long-term observations by which earthquake predictions are sought are too costly to be undertaken as a major program by the Division of Mines and Geology. While the U.S. Geological Survey and the universities will undertake the major burden of research on earthquake prediction and hazard reduction in California, the Division should be encouraged to participate cooperatively in these activities. If and when the research phase of earthquake prediction is completed, the Division will logically be called upon, and therefore should be ready, to implement a routine operational system for earthquake forecasting. The Division should take a lead role in evaluating and responding to credible earthquake predictions generated by other institutions.

Two major Division programs on earthquake-hazard reduction mandated by legislation require high degrees of applied geophysical capability both in manpower and instrumentation. These programs are (1) the Fault Evaluation and Zoning Program (Alquist-Priolo Act); and (2) the Strong Motion Instrumentation Program (SMIP). The fault evaluation and zoning programs have so far been limited to the compilation of existing geological data, which are insufficient for an adequate determination of active fault traces. The SMIP has been actively installing and maintaining strong-motion instruments. The Board assigns high priority to the development of a statewide ground response map. This task will require not only data from the strong-motion instrumentation program but also detailed knowledge of near-surface geology. In the opinion of the Board, the Division needs some additional instrumentation and manpower to carry out these mandated programs.

Recommendations

For adequate implementation of the two mandated programs in earthquake hazard reduction (Alquist-Priolo Act and SMIP), the Division must acquire additional instrumentation capabilities by adding seismic recorders, wide-band seismometers, and non-destructive energy sources including those generating pure SH motions. This improved capability will also be useful in other Division programs such as mineral resource evaluation (see Recommendations for classification of mineral resources).

The Division has adequate technical personnel to carry out data analysis and interpretation for these mandated programs. However, the Board recommends the addition of 3 field assistants to expand the field programs.

ACCUMULATION AND DISSEMINATION OF BASIC INFORMATION ABOUT THE
GEOLOGY OF CALIFORNIA

One of the most important functions of the state geologic surveys is to generate, compile, interpret, and disseminate earth-science data on their respective states. In California, where the geologic formations and structures are extremely complex, these data are basic to practical work, as well as to research. Industry, government at all levels, and the universities depend on the Division of Mines and Geology for these data, and the Division is a major source supplying such data to the public. Unfortunately, the proportion of the Division effort that has been available for the generation and dissemination of basic data on California geology has been allowed to decline sharply in recent years. The present effort is not keeping pace with the rate at which revolutionary advances in earth sciences are making our present understanding of California geology obsolescent. Many of these advances have immediate application to such practical problems as the amelioration of geologic and seismic hazards and the discovery of new mineral deposits. Large areas of California remain inadequately mapped even for present needs.

Basic geologic studies in the Division should include new regional field mapping; accelerated revision of the State geologic map at the scale of 1:250,000; reports on the geology, geologic and seismic hazards, and mineral resources of each county (essentially a revival and revision of a former Division program); and augmentation of the existing Division program of special-purpose statewide maps at scales of both 1:250,000 and 1:1,000,000 showing such features as the aeromagnetic field, geologic and seismic hazards, mineral-resource potential, landslide susceptibility, and active faults.

As a specific example of the value of such a mapping program, the Board cites the need for mapping of Quaternary deposits, especially along active faults such as the San Andreas, in order to generate data on maximum credible magnitudes and recurrence intervals of earthquakes. Such information is essential for assessment of seismic hazards in California.

Recommendations

The Board recommends that the Division's programs in geologic mapping, basic geologic studies, and data compilation be increased by new funding and redirection of effort from applied studies of relatively local importance. Local government should be encouraged to increasingly assume the major burden of local studies.

UNDERSTANDING OF COASTAL PROCESSES AND OF SEDIMENTATION AND DEPOSITION IN RIVER AND BEACH ENVIRONMENTS

Increasing developmental pressures and recreational use have created a need for a better understanding of erosion and the movement and deposition of sediment along the coasts and rivers of California. In addition to improved definition of the hazards these processes create for buildings and structures, these studies will be required for the wise management of the discharge of effluents into coastal waters, and the protection of wildlife habitats.

Recommendation

The Board recommends that this priority be addressed by two joint research programs: (1) a coastal studies program administered by the Division and the Department of Navigation and Ocean Development; and (2) a river sedimentation study administered by the Division and the Department of Water Resources.

IMPROVEMENT OF TECHNICAL SUPPORT AND DIVISION FACILITIES

In the areas of technical support, the Board recognizes that the Division of Mines and Geology, as a geotechnical service agency, needs an in-house machine shop and electronic shop to maintain and develop instruments required to support the activities assigned to it by legislative mandate. A machine shop and an electronic shop are vital links by which problem-solving ideas can be transformed into workable reality.

The Board believes that the present work space allocated to the Division is inadequate and that the scattering of Division facilities in different locations in Sacramento hampers the effectiveness of Division operations.

Recommendations

The Board recommends that one machinist and one electronic engineer be added to the Division staff. The Board also recommends the establishment of in-house machine shop and improved electronic shop facilities for the Division and expansion of the space allocated for the Division. The Board urges that the scattered elements of the Division in Sacramento be consolidated into a single location.

