MINERAL INFORMATION SERVICE

A PUBLICATION OF THE CALIFORNIA DIVISION OF MINES AND GEOLOGY

VOLUME 19 NUMBER 7

N

E W

S

Go and catch a falling star

STATE OF CALIFORNIA ▪ THE RESOURCES AGENCY ▪ DEPARTMENT OF CONSERVATION ▪ DIVISION OF MINES AND GEOLOGY

MINERAL INFORMATION SERVICE

State of California — Edmund G. Brown, Governor
The Resources Agency — Hugo Fisher, *Administrator*
Department of Conservation — DeWitt Nelson, *Director*
Division of Mines and Geology — Ian Campbell, *Chief*
Headquarters office: Ferry Building, San Francisco 94111

Branch offices:

Los Angeles: Los Angeles State Office Building, Room 1065, 107 South Broadway, 90012

Redding: State Building, 2135 Akard Street, 96001

Sacramento: 1416 9th St. (9th and O Sts.) 95814

MINERAL INFORMATION SERVICE is designed to report on the progress of earth science in California, and to inform the public of discoveries in geology and allied earth sciences of interest and concern to their lives and livelihood. It also serves as a news release on mineral discoveries, mining operations, statistics of the minerals industry, and new publications. It is issued monthly by the California Division of Mines and Geology. Subscription price, January through December, is $1.00.

Other publications of the Division include the Annual Report of the State Geologist; the Bulletin, Special Report, Map Sheet, and County Report series; the Geologic Map of California; and other maps and publications. A list of the Division's available publications will be sent upon request. Communications to the Division of Mines and Geology, including orders for publications, should be addressed to the San Francisco office.

MARY R. HILL, *Editor*

58th REPORT OF THE STATE GEOLOGIST

A triennial volume, the "Fifty-eighth Report of the State Geologist," for the fiscal years beginning in July 1960 and ending in June 1963 has recently been sent to depository libraries and institutions.

Four articles are contained in the volume: "Mineral commodities in California during 1960, 1961, and 1962, with some preliminary figures for 1963," by Fenelon F. Davis; "Activities of the Division of Mines and Geology, 1960-63," by Ian Campbell and staff; "Activities of the U. S. Geological Survey in California, 1962–63," by Charles A. Anderson; and "Directory of mineral producers in California for 1960, 1961, and 1962," by Fenelon F. Davis and Harold B. Goldman.

A limited supply of the 209-page report is available for purchase at $3.00 plus tax, bound in paper covers.

MINERAL INFORMATION SERVICE HISTORICAL VOLUME 1 REPRINTED

In response to numerous requests, the Division of Mines and Geology has reprinted a small supply of volume one of this magazine. Originally issued in 1948 as a mimeographed newsletter, the reprinted volume is of interest for those who are concerned with mineral history, or for those libraries and individuals who wish to complete their files of *Mineral Information Service*.

The volume may be purchased only in its entirety (no individual copy requests, please!) for $2.00, plus 8¢ tax.

Volume two may be made available later, if there is sufficient demand.

KCL DECISION

"Prospectively valuable" vs. "Known to be valuable"

In these days of what seems to be constantly changing (or reinterpreted) mining law, the following case and its solution should be of considerable interest.—Edit.

FILE MEMORANDUM

December 6, 1965

Ryan Prospect KCL #14

During 1957 Kern County Land Company located 25 calcium borate lode mining claims in the Death Valley Area of Inyo County, California. Following the discovery of colemanite and associated minerals KCL proceeded with mineral surveys and patent applications on 22 mining claims. In August 1963, patents were issued on 13 claims, each with a U. S. Leasing Act mineral reservation. This reservation was included because of the occurrence of the complex minerals ulexite and probertite along with colemanite mineralization. Subsequent to the patent applications the U. S. Geological Survey classified ulexite and probertite as sodium which is subject to the leasing act and determined that these minerals were prospectively valuable.

In September 1963, a formal application for patent reformation was filed. In addition to other objections KCL maintained in this situation the leasing act reservation applies only where the lands are *known* to be valuable for leasing act minerals. By a decision in February 1964, the Department of Interior rejected the request. In April 1964, a suit was filed by KCL in the U. S. District Court in Fresno.

After a review of the law, the special circumstances which applied to Death Valley, and this case, the Department of Interior issued a revised decision titled "On Reconsideration." The Department concluded that it is clear that "prospectively valuable" and "known to be valuable" for leasing act minerals cannot be equated.

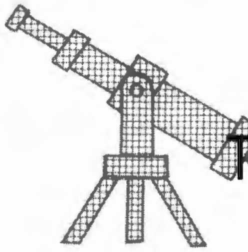
Following this decision reformed patents were issued and a difficult problem resolved. This is an illustration where government and industry can resolve their problems when responsible segments carefully study the facts and circumstances.

CARL B. WILSON, JR.
Kern County Land Company

IAN CAMPBELL TO BE DIRECTOR

As we go to press, Governor Edmund Brown has announced that he has accepted the resignation of DeWitt Nelson, Director of the Department of Conservation. Mr. Nelson intends to return to his Alma Mater, Iowa State University, at Ames, Iowa, as a professor in the field of conservation.

Governor Brown has indicated his intention to appoint the Chief of this Division, Ian Campbell, to be Director Nelson's successor. The appointment is an interim one; a permanent appointee will be selected following the gubernatorial elections in the fall.



THE METEORITES OF CALIFORNIA

C. P. Butler *

From the year 1869 to 1965, a total of 1494 kilograms of meteoritic iron and 89 kilograms of stony meteorites has been picked up in the State of California. These represent 19 different finds, each of which has been described in the literature. Strictly speaking these meteorites belong among the mineral resources of the state, although they have no known commercial value.

Current estimates show that one meteorite a year per million square kilometers is likely to survive its plunge through the atmosphere to come to rest on the surface of the earth (Brown, 1961). California has an area of about 400,000 square kilometers, hence we should expect on the average that one meteorite should fall on the ground some place in California every two years. Iron meteorites contain a considerable amount of nickel which inhibits their rate of oxidation, so that these iron fragments do not readily rust away, but can remain on the surface of the ground for thousands of years. More than half the State of California is semi-arid, where the sparse vegetation makes it easy to see an unusual object on the ground. If the estimates are correct that hundreds of iron meteorites are scattered over the state, why is it that only seven have been discovered in nearly 100 years?

No statewide program for the recovery of meteorites has been attempted in California, with the result that those meteorites which have been found were picked up by chance. No information is readily available on how to recognize meteorites, what data to record if one is found, where to take them for identification and why they have great scientific interest. In Kansas, Nebraska, Oklahoma, Colorado, New Mexico and Wyoming however, a planned program of recovery of meteorites from the soil yielded some 2000 individual specimens over a period of 35 years (Ninninger, 1962). The success of this program, which was directed by H. H. Ninninger, was largely due to his enthusiasm and perseverance. Many research scientists in California are actively engaged in work requiring meteoritic material, but none are conducting any recovery program. These people rely for their material on the great collections in museums and universities as well as a few commercial dealers.

* Research Associate, California Academy of Sciences.

It should be noted here that one modest effort was recently made to find meteorites on the dry lake beds of southern California. This planned program did result in the discovery of 7 small aerolites on the surface of Lucerne Dry Lake in San Bernardino County (Oriti, 1965), the largest of which weighed 37 grams.

Single Lucerne Valley stone meteorite weighing 5.8 grams. ***Photo courtesy Griffith Observatory.***

One of the most striking features of the meteorites found in California is the time interval between discoveries. A casual inspection of the table accompanying this article shows that on the average, each discovery is separated in time by about 5 years. In the year 1869, there were 600,000 people living in California. In 1963, when there were about 30 times as many, the same time interval between discoveries still remains. It is not clear why the great increase in population, the increase in the number of roads leading to remote areas, and the greater mobility of the people have not resulted in more discoveries.

California has made a poor showing in the recovery of meteorites when compared with other states. Texas, with an area about twice that of California and a population of a little more than half shows a total count of 103. New York State with a population comparable to California's shows a total of 38 (Mason, 1962). Thus far, no one in California has witnessed a meteorite fall and hence none of those listed are designated "falls". It would be unfair in this connection to omit the statistics of another state which has a very high level of culture and a long period of settlement. No meteorites have been found in Massachusetts. While California and Massachusetts are poor states in these matters, interstate comparisons on the basis of area, population and climate may not be valid. Meteorites are so scarce and the number of interested people are so few, that conclusions based on chance discoveries should be viewed with caution.

Ridgecrest stone meteorite on the left; Lucerne Valley stone meteorite on the right. *Photo courtesy Griffith Observatory.*

Once a meteorite has been found, several questions arise. If the object is recovered on land belonging to an individual, ownership belongs to the holder of the deed to the land, and not to the finder. In the case of the great Willamette meteorite, litigation over the ownership was finally settled by the Oregon State Supreme Court who rendered their decision in these words (Lange, 1962);

> Meteorites, though imbedded in the earth are real estate, and consequently belong to the owner of the land on which they are found.

On the other hand, if a meteorite is found on land owned or controlled by the United States Government, under an Act of Congress, June 8, 1906, it may not be removed unless allowed by the United States Government through the Smithsonian Institution, whose permission must be obtained before a meteorite may be moved if lying on federally controlled land (Linsley, 1939).

For example the Goose Lake meteorite was discovered in Modoc County on land controlled by the U.S. Forest Service. The Smithsonian Institution granted permission to remove it and exhibit it for the first time on the campus of Mills College, Oakland, and subsequently to show it at the Golden Gate International Exposition on Treasure Island. After the fair closed, it was shipped to the U.S. National Museum where it was placed on public display.

Regardless of the disposition of the original mass of a newly found meteorite, every curator and collector is interested in procuring a slice. This interest frequently strains the limit of good behavior, but it does provide a valuable means of preserving some material for future work. Without this avid desire for a piece of a new find, we would have very little, if any, material from the early discoveries.

A classical example of this is the fate of the first meteorite found in California, the Shingle Springs meteorite from El Dorado County, which was iron, weighing about 85 pounds when first discovered by a blacksmith who tried to use it in his forge, but could not manage it. It was then taken to San Francisco where several slices were immediately cut for a dealer. The main mass however, "fell into the hands of boys shortly after its description and was lost" (Farrington, 1909). We have no way of knowing what they did with this awkward piece of rusted iron, but we can be sure they did not carry it very far away. If they did not sell it to a foundry for a few cents, they probably dropped it near by. We do know that it was last

Goose Lake meteorite at the Chabot Observatory May 8, 1939. The yard stick passes through one long cavity open at both ends. White patches are lichen on the weathered surface. The meteorite was taken to Treasure Island shortly after this picture was taken. *Photo courtesy California Academy of Sciences.*

Meteorites Found in California.

Number	Date of discovery	Name	County	Class	Weight	Present location of specimens or slices
1.	1869	Shingle Springs	El Dorado	Iron	38.5 kg	American Museum of Natural History Chicago Natural History Museum Yale University Budapest National Museum British Museum
2.	1875	Canyon City	Trinity	Iron	8.6 kg	Chicago Natural History Museum Arizona State University University of California, Los Angeles U.S. National Museum British Museum
3.	1880	Ivanpah	San Bernardino	Iron	58.3 kg	California Division of Mines and Geology Arizona State University British Museum U.S. National Museum
4.	1887	San Emigdio	Kern	Stone	36.0 kg	Arizona State University Griffith Observatory British Museum U.S. National Museum
5.	1893	Oroville	Butte	Iron	24 kg	California Academy of Sciences Chicago Natural History Museum British Museum U.S. National Museum
6.	1899	Surprise Springs	San Bernardino	Iron	1.5 kg.	Chicago Natural History Museum British Museum
7.	1908	Imperial	Imperial	Stone	4.0 g	U.S. National Museum
8.	1913	Owens Valley	Inyo	Iron	193 kg	U.S. National Museum American Museum of Natural History Arizona State University British Museum
9.	1929	Valley Wells	San Bernardino	Stone	130 g	U.S. National Museum American Museum of Natural History
10.	1936	Muroc	Kern	Stone	15 g	Griffith Observatory Arizona State University U.S. National Museum
11.	1936	Muroc Dry Lake	Kern	Stone	220 g	Arizona State University U.S. National Museum
12.	1938	Goose Lake	Modoc	Iron	1170 kg	University of Michigan Arizona State University U.S. National Museum California Division of Mines and Geology
13.	1940	Rosamond Dry Lake	Kern	Stone	850 g	University of California, Los Angeles
14.	1948	Neenach	Los Angeles	Stone	13.8 kg	University of California, Los Angeles Griffith Observatory U.S. National Museum
15.	1954	Pinto Mountains	Riverside	Stone	17.8 kg	University of California, Los Angeles Institute of Meteorites of the University of New Mexico
16.	1955	Twentynine Palms	San Bernardino	Stone	19.6 kg	Arizona State University U.S. National Museum
17.	1957	Dale Dry Lake	San Bernardino	Stone	300 g	Arizona State University
18.	1958	Ridgecrest	Kern	Stone	9.7 g	Griffith Observatory
19.	1963	Lucerne Valley	San Bernardino	Stone	100 g	Griffith Observatory

seen in the office of W. H. V. Cronise, a mining engineer who maintained offices at 409 California Street, San Francisco. It is safe to speculate that somewhere under the foundations of the great office buildings on that site there lies a beautiful specimen of meteoritic iron. Fortunately, those slices removed in 1872 have been carefully preserved and are still available.

Goose Lake meteorite immediately after it was turned over. Cavities on the bottom side are clearly visible. *Photo courtesy California Academy of Sciences.*

Had it not been cut, the Oroville meteorite, sometimes called the Butte meteorite in reference to the county where it was found, might also be listed as lost. After the fire and earthquake in San Francisco in 1906, this iron, which was in the mineral collections of the California Academy of Sciences in their great museum at 5th and Market Streets, was unaccounted for until identified in 1964 (Butler, 1964). Photographs of slices of the Oroville in the British Museum, the Chicago Natural History Museum and the U.S. National Museum when compared with scaled drawings of a cut on an unidentified meteorite still in the collections quickly established its origin. Without those original slices, removed in 1893, this specimen could not have been identified.

The best place for a meteorite is in the collection of a museum. Curators are by nature dedicated to the preservation of the objects entrusted to their care. They are notoriously reluctant to lend or give away specimens. At the same time, they are in the best position to judge the worth of a proposal to remove a specimen from the collections for study. With some exceptions, universities and colleges are much more casual about the collections which they acquire over the years by purchase and bequest.

One unfortunate case in California is the fate of the Rosamond Dry Lake stone. It was given to a private college and at this date is unaccounted for, or in less delicate words, lost. We can only hope that in the future, some inquisitive student or new professor will come across an odd rock in the collection, recognize it, and then make an attempt to determine its origin.

The largest collection of meteorites in California is the Leonard Collection at the Geophysical Institute of the University of California at Los Angeles. Prof. Fredrick C. Leonard, long a professor of astronomy at the University, acquired one of the largest private collections of meteorites which was given to the Geophysical Institute after his death.

The accompanying table gives in chronological order the meteorites found within the State of California, their names, the county where they were found, their class, and weight and where some of each may be found. No attempt was made to account for all the material of each find, nor to indicate the amount of material in each collection. There may be other collections, perhaps within the state, where other fragments of these specimens have been preserved.

In 1964, a Working Group on Meteorites was formed under the auspices of the United Nations. Their statement of purpose reads:

> Since meteorites are the only tangible material we have from the universe beyond the earth, their importance is international rather than national. The purpose of the Working Group of UNESCO is to promote the observation of meteorite falls, their recovery and conservation, and the interchange of information concerning meteorites; also to promote the wise utilization of meteorites, so as to ensure continued availability of material for future research.

This short paragraph conveys some idea of the need for more interest in the field of meteoritics. If the geologists and rock hounds could be alerted to these needs, there is reason to hope that the present rate of discovery in California of one meteorite every 5 years could be increased.

REFERENCES

Brown, Harrison. 1961. Addendum: the density and mass of meteoritic bodies in the neighborhood of the earth's orbit: Journal of Geophysical Research, vol. 66, pp. 1316–17 (April).

Butler, C. P. 1964. The missing meteorite: Pacific Discovery, vol. 17, no. 5, pp. 2–7.

Farrington, O. C. 1915. Catalogue of the meteorites of North America to January 1, 1909: National Academy of Sciences Memoir 13.

Lange, E. F. 1962. The Willamette meteorite, 1902–1962. Portland State College, Portland, Oregon.

Linsley, E. G. 1939. The giant Goose Lake meteorite from Modoc County: California Journal of Mines and Geology, vol. 35, pp. 303–312.

Mason, B. 1962. Meteorites. John Wiley and Sons, Inc., New York.

Ninninger, H. H. 1962. Researches on meteorites. Edited by C. B. Moore. John Wiley and Sons, Inc. New York. p. 217.

Oriti, R. A. 1965. Dry lakes and meteorites: The Griffith Observer, vol. 19, no. 11, pp. 150–155.

First planned search for meteorites in California. Line of students from Antelope Valley High School crossing Lucerne Dry Lake, July, 1963. One hundred students took part; one boy found a 2 gram aerolite. *Photo courtesy Howard Lieberman, Antelope Valley High School.*

METEORITES ON DISPLAY AT THE CALIFORNIA DIVISION OF MINES AND GEOLOGY MINERAL EXHIBIT

Robert A. Matthews

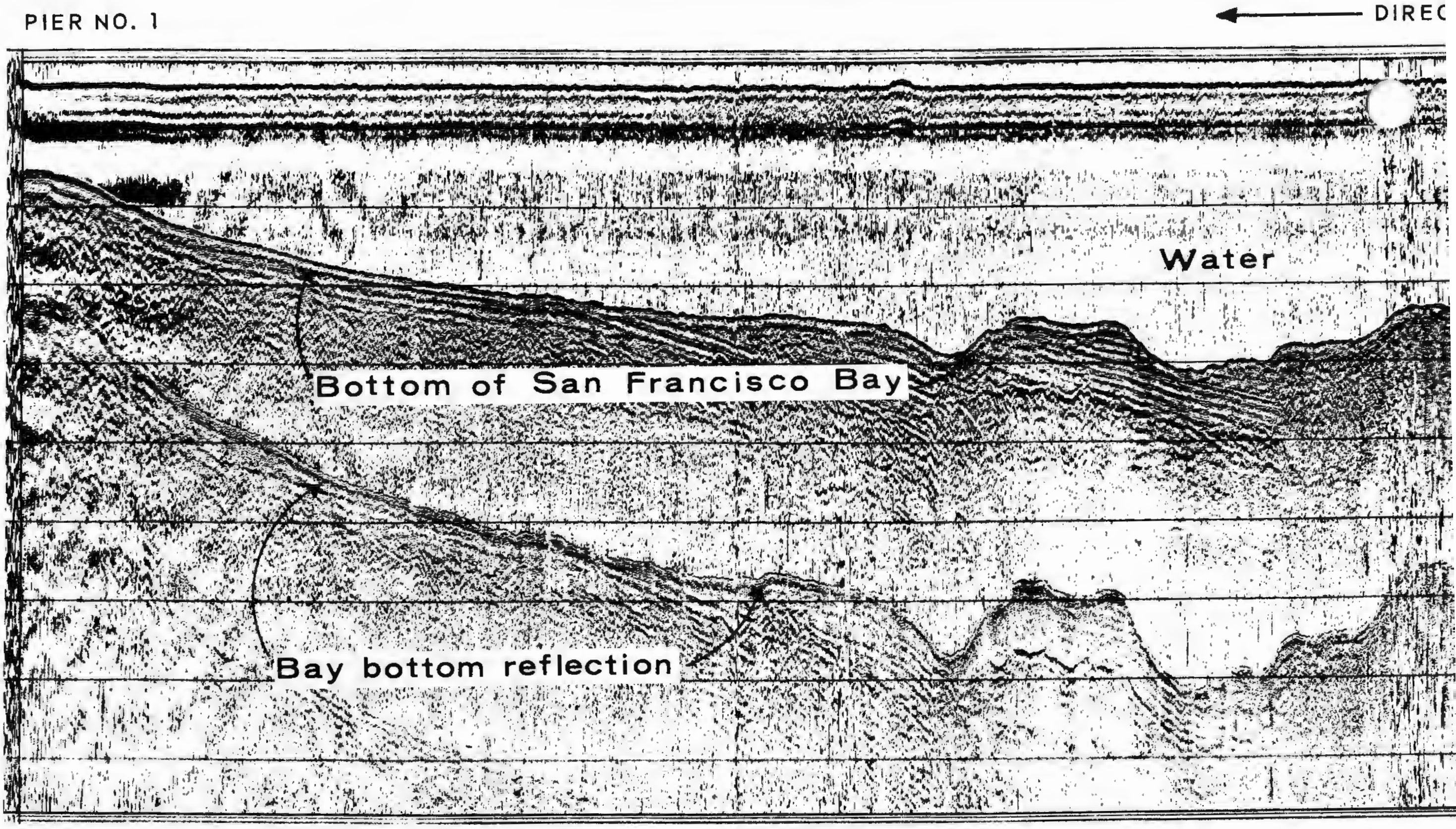
Of the 19 meteorites that have been found in California, specimens of only two are on display at the Division's mineral exhibit in the Ferry Building in San Francisco. These are the Ivanpah meteorite from San Bernardino County and a polished and etched slice of the Goose Lake meteorite from Modoc County, certainly the most famous of the California metearites and fourth largest meteorite ever found in the United States. In 1880, John Muir, famous mountaineer, conservationist, and naturalist, brought this massive Goose Lake meteorite to the attention of the State Mining Bureau.

Recently, C. P. Butler, Research Associate at the California Academy of Sciences, re-polished the Division's slice of the Brenham stone-iron meteorite, greatly enhancing the appearance of the slice and bringing out very clearly the striking olivine studded structure. He also sliced the Chilkoot meteorite and plons to polish one of the surfaces. An unusual structural feature resembling discontinuous, roughly concentric bands (like annual rings in trees) can be seen on the newly sawed surfaces. Mr. Butler is presently studying this feature which has never before been described. S. C. Cobb at Brookhaven National Laboratory is also studying the Chilkoot meteorite. From preliminary measurements of rare gases—helium, neon and argon that are largely produced by cosmic radiation impinging upon the meteorite while in outer space, he has determined the age of the meteorite as some 400 million years. This age is within the range of other iron meteorites. Some additional data ore also being collected here in the Division laboratory.

Included in the Division's meteorite display are several tektites which are siliceous glassy objects that are probably meteoric origin. These dark spheroidal and tear-drop-shaped specimens resemble obsidian but are distinctly different in chemical composition. The display olso includes a replica of the Canyon Diablo meteorite from an area near Flagstaff, Arizona. This meteorite was on display for many years in the Division's exhibit, but in 1964 was returned to the California Academy of Sciences, the original owner.

Three pieces of the Neenach stone meteorite, two of which fit together. *Photo courtesy Griffith Observatory.*

continued on page 110



"SUBBOTTOM" ACOUSTIC PROFILE

An acoustic-reflection profile of part of San Francisco Bay, covering the area from Yerba Buena Island to Pier 1, adjacent to the Ferry Building. The profile shows the configuration of the bottom of the bay at high tide (+ 5.8 feet, M.L.L.W.), on March 8, 1966. The ship commenced the profile near the Coast Guard lighthouse (see map), travelled to the west side of the San Francisco-Oakland Bay Bridge, then straight southwest to Pier 1.

The method of navigation is quite accurate, being controlled by constant electronic feedback. Optimum vessel speed seems to be about five knots; too fast a speed produces air bubbles, resulting in "holes" in the record; too slow a speed garbles the information.

The chart is made by acoustical, essentially echo-sounding, methods, utilizing a high-energy source transduced to sonic pulses. The pulses are sent through the water, penetrate into the upper layers of the bottom, are reflected back to be picked up by hydrophone, and are recorded on a continuous drum.

The energy output of the various sources (called "boomer", "pinger", "sparker") is so high that, unlike the conventional echo-sounding equipment used for determining water depth, the bottom is penetrated somewhat, and reflections from the bottom bounce back from the sea surface to the sea floor.

In the diagram above, a reflection of the bottom may be seen below the true bottom. Faults, sheers, and buried rock zones may be separated from reflections by careful inspection.

This profile was provided *Mineral Information Service* through the courtesy of R. M. Towill Company of San Francisco, who made the survey.

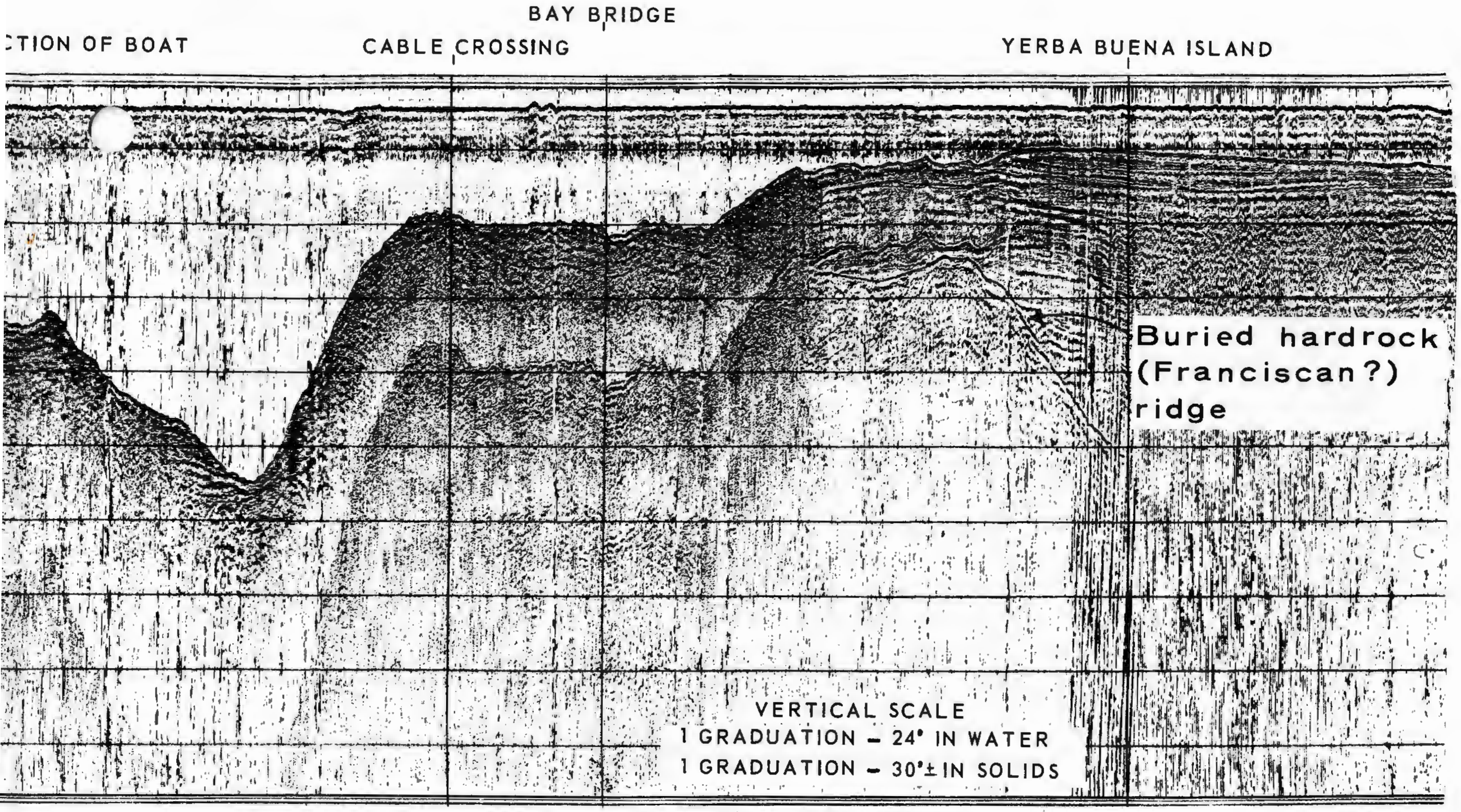
M.R.H.

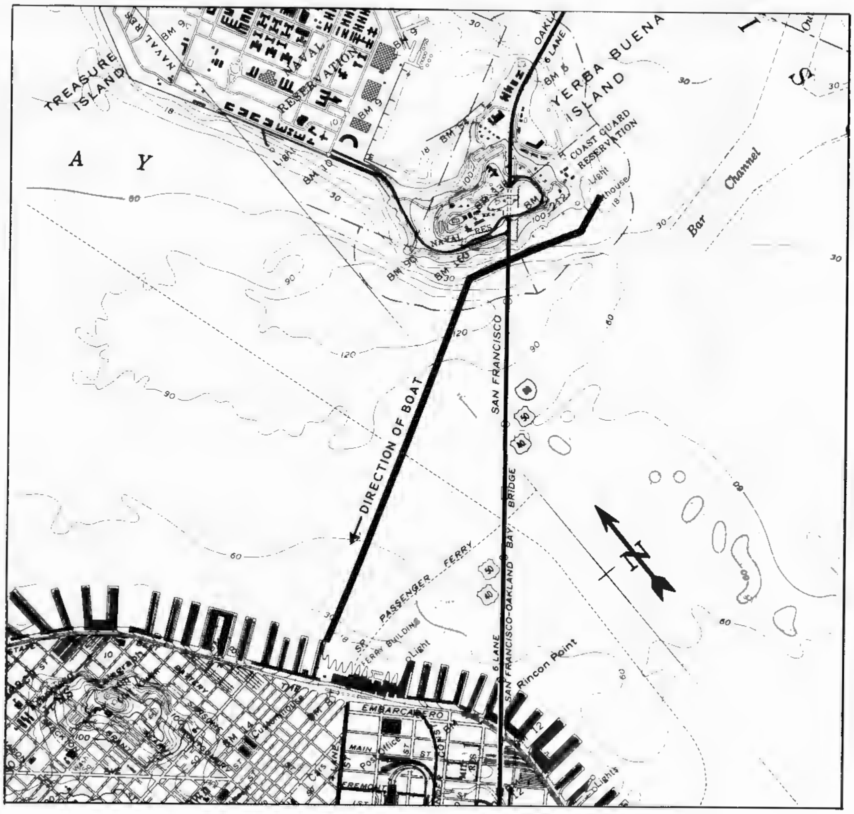
ABOUT ACOUSTIC PROFILES

Moore, David G. 1960. Acoustic-reflection studies of the continental shelf and slope off southern California. *Geological Society of America Bulletin*, vol. 71, pp. 1121–1136.

Palmer, Harold D. 1965. Geologic significance of Davis Seaknoll, Arguello Plateau, California. *Geological Society of America Bulletin*, vol. 76, pp. 379–384.

Shumway, George. 1960. Sound speed and absorption studies of marine sediments by a resonance method. Part I. *Geophysics*, vol. 25, no. 2, pp. 451–467.





Map of part of San Francisco Bay showing route along which the above acoustic-reflection profile was mode.

Meteorites in Division of Mines and Geology Mineral Exhibit.
(Display Case 54)

Date of discovery or fall	Name	Location	Class	Weight	Remarks
1880	Ivanpah (San Bernardino)	San Bernardino County, California	Iron	58.3 kg (before cut)	Ni-Fe octahedrite Widmanstatten figure.
1781*	Chilkoot	Chilkoot Inlet, Alaska	Iron	43.9 kg (before cut)	Medium octahedrite Widmanstatten figure, an unusual structure visible on sawed surfaces.
1912*	Holbrook Shower	Holbrook, Arizona	Stone	37.5 gm	Spherical hypersthene-chrondrite.
1868*	Pultusk Shower	Warsaw, Poland	Stone	19.5 gm	Slice of bronzite-chrondrite.
1866*	Knyahinya Shower	Czechoslovakia	Stone	59.9 gm	Slice of hypersthene-chrondrite.
1925 (?)	Brenham	Kiowa, Kansas	Stone-iron (Pallasite)		Olivine and nickeliferous iron.
1898	Arispe	Sonora, Mexico	Iron	2.27 kg	Slice of coarse octahedrite.
?	Salta	Argentina	Stone-iron	394 gm	Slice of pallasite (siderolite).
?	Sierra Gorda	Chile	Iron	430 gm	Slice of hexahedrite.
?	Paracale	Philippine Islands	Stone		Tektite (siliceous glass, possible meteoric origin).
?	Grimes	Texas	Stone		Tektite (siliceous glass).
1938	Goose Lake	Modoc County, California	Iron	258 gm	Slice of medium Ni-Fe octahedrite Widmanstatten figure.

*Reported fall.

A GLOSSARY OF TERMS

METEORITE. A solid body of natural material smaller than a minor planet, which enters the earth's atmosphere, falls to earth, and retains its identity.

METEOROID. A solid body, much smaller than any of the planets orbiting around the sun. All meteorites were once meteoroids.

METEORS. The streak of light seen against the sky when a meteoroid reaches an incandescecent temperature due to aerodynamic heating.

MICROMETEORITES. The individual meteorites of microscopic size picked up from the ground which have been identified by their structural or chemical nature. Most are ablation products of large meteoroids.

METEORITIC OR COSMIC DUST. The great bulk of extraterrestrial material deposited on the surface of the earth. Estimates of the annual amount of this dust vary from 5,000 to 18 million tons.

FALL. A meteorite whose fall from the sky was witnessed.

FIND. A meteorite whose fall or impact was not witnessed.

WIDMANSTATTEN FIGURES. An octahedral structure of two iron-nickel alloys produced by the difference in acid etching properties of the alloys. This structure is produced only in meteorites and not in octahedral structure of terrestrial iron or steel. This characteristic lamellar intergrowth figure is produced by etching a sawed surface of an octahedral iron or stony-iron meteorite. See accompanying photo.

GENERAL CLASSIFICATION OF METEORITES BY COMPOSITION

SIDERITES (irons). Composed mainly of nickel-iron.

AEROLITES (stones). Composed mainly of silicate minerals.

SIDEROLITES (stone-iron). Composed about equally of nickel-iron and silicate minerals.

GENERAL CLASSIFICATIONS OF METEORITES BY STRUCTURE

SIDERITES (irons)
- Octahedrites (eight-sided crystallization forms).
- Hexahedrites (cubic or six-sided crystallization forms).
- Ataxites (no distinct crystalline forms).

AEROLITES (stones)
- Chrondrites (containing grain-like inclusions).
- Achrondrites (without inclusions).

SIDEROLITES
- Pallasites (nickel-iron enclosing silicates, mainly olivine).
- Mesosiderites (equal amounts of nickel-iron and silicates, mainly pyroxene-plagioclase).

TEKTITES. A highly siliceous glassy material of probable meteoritic origin. They superficially resemble obsidian, yet are distinctly different chemically. Eight distinct local types hove been described and given geographic names.

REFERENCES

Mason, Brian, 1962, Meteorites. John Wiley and Sons, Inc., New York.
Ninninger, H. H. 1952, Out of the sky. Dover Publications, Inc., New York.

End cut on main mass of the Oroville meteorite, California Academy of Sciences. *Photo courtesy California Academy of Sciences.*

View of slice of Oroville meteorite removed in 1893, British Museum. *Photo courtesy British Museum.*

FILMS

In this column, which will appear from time to time, we hope to list films concerning the earth sciences. We would like to borrow a review print from film makers or distributors who have films for use by schools, mineral societies, technical organizations, or other groups. Please indicate the audience for which the film was prepared (i.e., primary, secondary, college, general, professional groups), how and where prints may be obtained, and the price of purchase or rental. The title, maker, and date of copyright would also be helpful.

Please address:

Mary R. Hill, Editor
Mineral Information Service
California Division of Mines and Geology
Ferry Building
San Francisco, California 94111

Reviewed here is the latest film prepared by the U. S. Geological Survey, which was released on April 1.

The Alaskan Earthquake, 1964. Produced by the U. S. Geological Survey (Creative Arts Studios, Inc.) 1966. 16 mm., color, optical sound, 22 min. Film is comprised principally of footage taken following the Alaskan earthquake of March 27, 1964 that illustrates damage and geologic features, together with various stills animated by camera motion and brief sequences of laboratory animation by drawings and models. The film is intended to show the relationship between geologic environment and damage to structures of various sorts during an earthquake. For example, the damage at Anchorage from seismic shock was far more severe than at Whittier, even though Whittier was 40 miles closer to the center of the earthquake. The reason for the difference is that the geologic foundation of Anchorage was unconsolidated gravel, sand, and clay; that at Whittier was bedrock. Whittier was, however, damaged by sea waves generated by the earthquake.

The most impressive portion of the film—to this reviewer—is a very short black-and-white sequence taken by a seaman who was able to watch and photograph part of the disaster from the unsteady deck of his ship.

A limited number of loan prints are available for free circulation to scientific and technical societies, urban planners, civil and construction engineers, colleges and secondary schools, and civic groups. Requests for bookings for lending copies or information about purchase should be addressed to Information Office, U. S. Geological Survey, Department of the Interior, Washington, D. C., 20242. The Division of Mines and Geology does not have a copy for lending or showing.

MORE ABOUT THESES

A few months ago, we asked that students preparing theses or dissertations in any of the earth science fields or related areas remember us when they come to the final stretch. May we reiterate that request, and also suggest that faculty and students urge their friends and colleagues in other disciplines to remember us, too? We would like to have copies of theses, if at all possible (we realize this may entail considerable expense); if not, please send us abstracts or summaries. We will list them in this magazine and place them in our library for public reference.

We are particularly anxious to reach students in "fringe" areas to California geology. We are interested in mining history; mineral economics; architecture—if it deals with architectural history in California or with the use of mineral materials; biology as it bears on paleontology or evolution; art history if it deals with early California artists or subjects—and so on. And, of course, all of the classic earth science fields are of interest to us: mining, metallurgy, geology, geography, mineralogy, paleontology, geophysics, geochemistry, seismology, and all of the other ologies that make up this rather unwieldy area.

In order that theses may receive a proper listing in this magazine for the benefit of all its readers, will you please address copies to:

Mary R. Hill, Editor
Mineral Information Service
California Division of Mines and Geology
Ferry Building
San Francisco, California 94111

NEW BOOKS

The following books have been received for review purposes.

Please send no money for the purchase of these; we sell only our own publications.

Natural resources of California. By the U. S. Department of Interior. Available from the Government Printing Office, Washington, D. C. 20402. 84 pp. Price 60¢. Includes illustrated chapters on water, minerals, forests, soil, fish and wildlife, Indians (!), recreation, together with the resource functions of the various agencies that make up the Department of Interior. Of interest particularly to teachers and students.

All that glisters . . . Prepared by the Ontario Department of Mines. Available from the Department. 1965. No charge. A brochure on mining in Ontario, Canada, with a handsomely colored, lithographed geologic map (Map 2103) of Ontario on the reverse. Scale 1″ equals about 75 miles. Map is especially designed for the non-technical reader.

THE HISTORY TRAIL

by ELISABETH L. EGENHOFF

Since its formation in 1962, members of Squibob Chapter of E Clampus Vitus have been actively supporting the preservation and marking of historic spots in the far southern part of the state. Naturally, they are particularly concerned that mementoes of the San Diego period of "Clampersaint Squibob" (né George H. Derby, sometime Lieutenant in the Topographical Engineers, United States Army), for whom their chapter is named, are not destroyed.* They have been instrumental in having Derby's "Honeymoon House", threatened by highway construction, moved to a safe location in San Diego's Old Town, and restored. Now they are attempting to save a bit of the Lieutenant's dike, built in 1853—the first federal flood control project in California , says Clampuncle Ben Dixon—from destruction.

It has long been recognized that, among all of California's multitudinous mineral resources, none is more important than water. With the right amount of it, we live; without it, or with too much, we do not. In deference to these facts, the Congress of the United States in 1852 appropriated $30,000 for flood control on the San Diego River. Lieutenant Derby was instructed to build a dam ["the only dam ever constructed parallel with the course of a river"] to effect that control. It took him the first four months of 1853, with the aid of his friend Charley Poole, an engineer and a West Pointer, to make a preliminary survey. August 1st, after his plans had been approved, he started the actual work of turning the river from the harbor into False Bay. Of himself and his project he wrote (in the character of *Phoenix*) ". . . I saw Lieutenant Derby, of the Topographical Engineers . . . He was sent out from Washington some months since, 'to dam the San Diego River,' and he informed me with a deep sigh and melancholy smile, that he had done it (mentally) several times since his arrival."

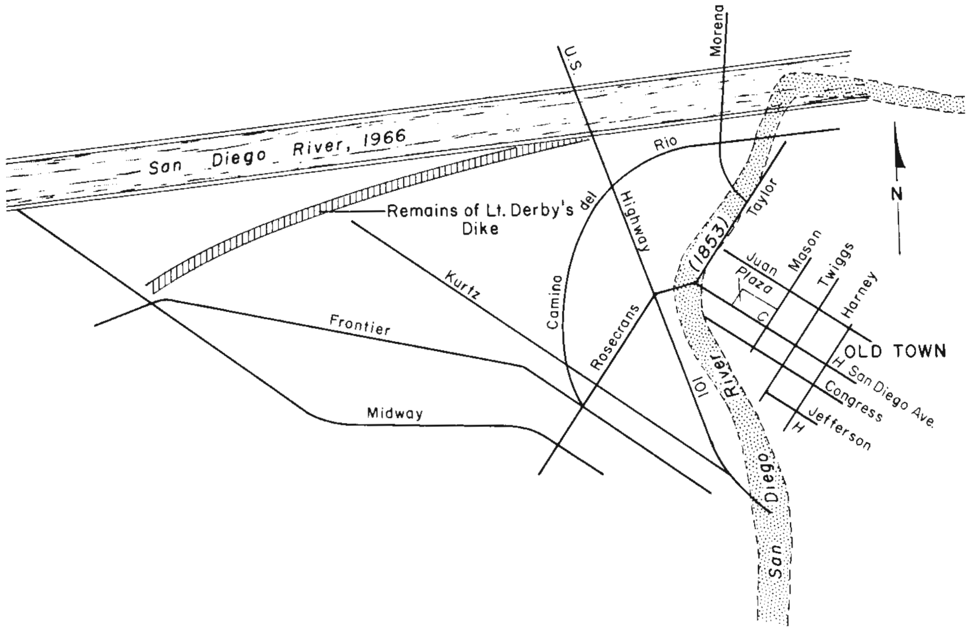
Derby ran into money problems. He requested an additional $40,000 to construct a wing-dam to control the destructiveness of future floods. Congress acknowledged the need by appropriating the money, but the bill was pocket-vetoed by President Pierce. In compliance with Derby's prediction, floods of 1856 carried most of the dike away.

But, says Uncle Ben, this was not the end. In 1875, more than a decade after Derby's death, "the Army Engineers came with $80,000 to try again—with meager success. In 1944, the War Department sent the Engineers again, with $370,000, to complete the work of Derby once and for all. The great flood control channel was finally finished in 1952—at a cost of six million dollars!"

The remaining fragment of Lieutenant Derby's "parallel dam" is now marked by Squibob Chapter's

continued on page 116

* Readers may recall that two of the famous Gold Rush humorist's writings have been published in *Mineral Information Service*, under the titles *John Phoenix* (December 1964) and *G. Squibob* (June 1965).



Map showing the location of a portion of the dike built in 1853 by Lieut. George H. Derby, which turned the San Diego River into False Bay. His home (H), which originally stood near the river when it flowed around the Pueblo, was recently moved three blocks northeast to get it out of the way of a freeway. His office was in the Courthouse (C) on the Plaza. Derby also made the first chart of the Presidio ruins, in 1853. *Map courtesy of Ben F. Dixon.*

STATE MINING AND GEOLOGY BOARD CHANGES

HUELSDONK RETIRES

After 12 years of interested and dedicated service to the State of California as a member of the State Mining Board (since last October, the "State Mining and Geology Board"), Lewis L. Huelsdonk is leaving the Board. Mr. Huelsdonk was appointed to a four-year term by Governor Earl Warren in January 1954 and was twice reappointed by Governor Edmund G. Brown.

He continues as Vice-President, Secretary, and General Manager of the Best Mines Company, Inc., of Downieville in Sierra County. For many years he was active in managing the Brush Creek Mine near Downieville, only recently shut down because of the economic difficulties of mining and producing gold at a fixed price.

Mr. Huelsdonk is widely known for his efforts in behalf of the gold mining industry in trying to secure Federal attention to improve the economic situation of the gold miner and to increase gold production in the U. S. He is greatly concerned about the declining gold reserve of the United States and was active on numerous committees considering these problems. For the past several years he has been a member of the Western Governors' Mining Advisory Council.

His father, W. A. Huelsdonk, also was an active California mining man. He invented the Huelsdonk concentrator, a machine used to recover fine gold and platinum from auriferous sand and gravel in placer deposits. It was successfully used at gold deposits throughout the Mother Lode country from Plumas County to Mariposa County. *G.B.O.*

(Left) L. L. Huelsdonk

(Right) R. H. Jahns

JAHNS APPOINTED

Governor Edmund G. Brown recently appointed Richard H. Jahns, Dean of the School of Earth Sciences, Stanford University, to a four-year term on the State Mining and Geology Board.

Dr. Jahns is a California geologist of wide reputation, noted for his eminence in several geological specialties, including industrial minerals, glacial geology, petrology, pegmatite deposits, and structural and engineering geology.

He was born in Los Angeles and educated largely in California schools. He obtained his bachelor's and doctor's degrees in geology at the California Institute of Technology, his master's degree at Northwestern University. He was an instructor at Northwestern and rose through the professional ranks to Professor of Geology at Caltech, 1946 to 1960. From 1960 to 1965 he headed the Division of Earth Sciences, Pennsylvania State University at University Park, Pennsylvania. In 1965 he returned to California to his present position as Professor of Geology and Dean, at Stanford. During most of his teaching and administrative career he has also worked with the U. S. Geological Survey, and holds the title of Senior Geologist with that organization.

Although he has published many papers in a variety of geological subjects in different parts of the country, he is perhaps best known to Californians for his significant contributions to the geology of California, such as those on the *Gem- and lithium-bearing pegmatites of the Pala district, San Diego County, California* (Division of Mines Special Report 7A), and papers on the geology of the Transverse Ranges and of the Peninsular Ranges in the Division's monumental volume, Bulletin 170, *Geology of southern California*, of which he was also editor.

The addition of Dr. Jahns to the Board is recognition of the Division's enlarged role and increasing responsibility as the state's geological survey. Dr. Jahns brings to this important policy-making Board a profound knowledge of the geology of California and an intense interest in guiding the Division to a position of better meeting the geological needs of the people of our state. He rounds out a Board composed of Californians distinguished in the fields of industrial minerals, mining, and petroleum. Other members of the Board include Chairman Philip R. Bradley, E. F. Brovelli, D. L. Marlett, and T. H. Rodgers. *G.B.O.*

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION

DIVISION OF MINES AND GEOLOGY
FERRY BUILDING
SAN FRANCISCO, CALIF. 94111

RETURN REQUESTED

SECOND CLASS POSTAGE PAID
AT SAN FRANCISCO, CALIFORNIA

continued from page 113

plaque; it stands at the end of Kurtz Street in San Diego, and it is the Chapter's hope and aim that it shall remain there. Visitors to the century-old relic are welcome; its location is shown on the accompanying map.

THE HISTORY BOOKSHELF

From the University of California Department of Anthropology comes word that their Report No. 65, *Rock Art of Owens Valley, California,* by J. C. von Werlhof, which was reviewed in the October 1965 issue of *Mineral Information Service*, ran out of print. Those of our readers whose requests could not be filled can now obtain reprint copies, price $2.00 (plus 4% sales tax for California residents), from the University of California Archaeological Research Facility, Berkeley, CA 94720.

The University of California's latest Archaeological Survey Report is No. 66, *Notes on Western Nevada Archaeology and Ethnology*, which contains: I, Analysis of a surface collection from High Rock Canyon, by Sonia Ragir and Jane Lancaster. II, Archaeology of Granite Point, Pershing County, Nevada, by Norman L. Roust. III, Washo habitation sites in the Lake Tahoe area, by Stanley A. Freed. IV, The Ophir Skull from Virginia City, Nevada, by Paulette Reichlen and R. F. Heizer. V, Two fish nets from Hidden Cave, Churchill County, Nevada, by Richard D. Ambro. 135 pp., 13 figs., 4 maps, 13 pls., 2 diagrams. Processed. Price, $2.00. Order from Archaeological Research Facility, Department of Anthropology, University of California, Berkeley, CA 94720. [The report is not distributed by the Division of Mines and Geology.]

The above University of California publications can NOT be obtained from the California Division of Mines and Geology.

ORDER FORM

SPECIAL NOTE: Bulletin 173, *Minerals of California*, is out-of-print. Please do not order it.

...........Copies, MINERAL INFORMATION SERVICE, Volume 1 (1948) at $2.00 each (full volume only).

...........Copies, 58TH REPORT OF THE STATE GEOLOGIST at $3.00 each.

...........Copies, SANTA ANA MAP SHEET, Geologic Map of California (folded in envelope with data sheet) at $1.50 each.

...........Copies, SANTA ANA MAP SHEET, Geologic Map of California (rolled in tube with data sheet, but no envelope) at $1.50 each.

...........Copies, ATLAS BINDER FOR GEOLOGIC MAP OF CALIFORNIA at $7.00 each.

NAME .... ADDRESS ....

CITY .... STATE .... ZIP ....

Address orders to the California Division of Mines and Geology, Ferry Building, San Francisco, California ZIP 94111. Checks and money orders should be made payable to the Division. No postage is required; please do not send stamps in payment. California residents please add 4% sales tax.