Excerpts from

Geology and Mineral Resources of San Diego County, California, County Report 3

By F. Harold Weber, Jr., California Division of Mines and Geology, with sections on sand and gravel, and crushed and broken stone, by Harold Weber Jr., Roy M. Kepner, Jr., et al.

California Division of Mines and Geology, San Francisco, Vol. 3, 1963

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http://archive.org/details/geologyandminer03webe

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Geology and Mineral Resources of San Diego County, California, County Report 3

By F. Harold Weber, Jr., California Division of Mines and Geology, San Francisco, Vol. 3, 1963
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(Note: Only sections that relate to building stone, aggregate, and similar stone will be presented in this document. Most of the sand, gravel, and decomposed material sections will not be presented here. To view the missing sections, tables, photographs, and maps that are not presented in this document, use the link below to read the book on the Internet Archive – Texts. Peggy B. Perazzo)
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Mineral Resources and Mining (pp. 36)

"Many mineral commodities have been produced in San Diego County, but by far the principal ones in recent years have been sand and gravel, and crushed and broken stone. The value of these commodities produced in 1959 constituted about 94 percent of the value of the total mineral output of the county. Other important commodities to be produced in recent years are dimension stone, salt, magnesium chloride, clay, pyrophyllite, and specialty sands. Important commodities produced in former years include gold (1870-1875, and 1887 to about 1900); gem minerals (especially tourmaline and kunzite; mainly 1900-1912); feldspar (1918-1943); and lithium mica (1892-1929)."

History of Mining (in San Diego County) (pp. 36-42)

"The history of mining in San Diego County might be said to have started with the discovery of San Diego Bay by Cabrillo in 1541, for one of the purposes of such voyages as Cabrillo's was to find mineral riches for Spain. Cabrillo discovered only a beautiful harbor, however, and more than 300 years was to pass before a mineral deposit in the county would be worked commercially.

"During the late 1700's and early 1800's, some non-commercial mining was done by the early Spanish settlers. These people recovered stone and adobe for construction of buildings, small dams, and walls. In addition, salt was produced by evaporation of sea water in marshes along the edge of San Diego Bay at least as early as 1869.

"During the 1840's and 1850's, emigrants from the eastern United States passed into Southern California over several trails which crossed present-day San Diego County. These trails included the Butterfield Route to Los Angeles, via Vallecito, Warner Springs, and Oak Grove; the Kearney Route to San Diego, via Vallecito, Warner Springs and Ramona; and routes along the coast and the Mexican border, approximately following respectively the routes of present U.S. Highways 101 and 80. In addition, several United States government surveys during this period traversed the county. In spite of this activity, none of the gold deposits of the county was discovered

and mined, although it is said that Indians and early-day Spanish and Mexican inhabitants recovered small amounts of gold from the deposits southeast of present-day Escondido.

"In early 1869, San Diego was a small community of only a few hundred people, but one of these was A. E. Horton, a real estate promoter. During that year, the promotions of Mr. Horton, and news of plans to build a railroad from El Paso to San Diego, began to attract people to San Diego; and by the end of the year the town was booming. Perhaps this boom was at least partly responsible for the attraction of the prospectors who discovered placer gold in the central part of the present-day county in November 1869. These men were Mike and Webb Julian and James and Drury Bailey, ex-Confederate soldiers attracted to the West following the economic collapse of the South at the end of the Civil War. About three months after the discovery of placer gold, on February 21, 1870, lode gold was discovered at a locality two to three miles east of the placer fields. On February 22, papers for the Van Wert and George Washington Claims were filed on the site, and in a small valley just south of the George Washington Claim a camp, soon to be named Julian, began to grow.

"During the spring of 1870 people seeking gold came to the Julian area by the hundreds, and consequently the Owen's, Helvetia and other deposits were discovered and developed. In addition, the search for more deposits in the area branched out. Thus, the Stonewall Jackson (Stonewall) Deposit – to be the most prolific mine in the county – was discovered in March at a point about seven miles south of Julian; and in August 1870 deposits were discovered along canyon slopes three to four miles southeast of Julian. Banner Camp arose in the canyon near these deposits, and subsequently the Bailey Brothers, Hubbard, and Golden Chariot Mines were developed. Thus, as the town of San Diego boomed so did the mining camps in the mountains to the east. By the end of 1870 an estimated 2,000 people lived in San Diego and a total of about 1,000 lived in Julian, Banner, Coleman City and other camps. In 1870 an attempt was made to have the government construct a mint at San Diego to coin gold from the hills, but this failed.

"By 1873 the population of San Diego had risen to 4,000, and that of Julian and the other gold camps to perhaps 2,000. During that year the Democratic county convention was held in Julian; Mike Julian was elected county assessor; and the citizens of Julian attempted, without success, to have the county seat moved from San Diego to their town. During 1873, the total value of gold shipped from the mining camps of the county rose to $500,000. But in December of that year, plans for the El Paso and Pacific Railroad collapsed, and the boom in San Diego was finished. During 1874, production of gold began to fall, and by the end of 1875 nearly all of the mines were idle. The population of San Diego had dropped to 1,500 or less by the end of 1874, and by 1876 probably less than 10 people lived in Julian. During the years from 1870 to 1875 the mines had yielded nearly $2,000,000 in gold, a small figure when compared to the production from the Mother Lode in Northern California, but significant in the history of San Diego County.

"The decade from 1875 to 1885 in the county was quiet. A new gold discovery was made at Dulzura in 1877, but this time no bonanza followed. Finally, however, in 1885, a railroad finally arrived in San Diego; and even though it was only a branch of the Santa Fe from Los Angeles, another boom began in the region. The population of the city rose to an estimated 40,000 during the boom's crest, which lasted from the summer of 1886 to February 1888, and then dropped to 17,000 by 1890, after the boom had ended.

"During this boom, mining was very active in the county. In 1887, stone was quarried for Sweetwater Dam – the first large dam constructed in the county. In 1886, Robert W. Waterman, Governor of California from 1887 to 1891, purchased the Cuyamaca Rancho and the inactive Stonewall Mine, which was at the north edge of the

rancho (Photo 43). Waterman reopened the mine in 1887, and from 1888 to 1891 it yielded nearly $1,000,000 worth of gold. Waterman reportedly had paid about $75,000 for the mine. The success of this venture helped to create renewed interest in gold mining in other parts of the county. During the late 1880's and 1890's several mines were reopened in the Julian district, including the Owens and Helvetia (Photo 41); and several previously overlooked deposits in the district were discovered and developed. Also during this period, the Shenandoah and other deposits near Mesa Grande were worked; and the Cleveland-Pacific and additional deposits near Escondido were active.

"Photo 41…**Helvetia mine, Julian district, about 1900**; view south. Site of old shaft is at upper left. Shaft sunk in 1887 is beneath tallest part of mill building. From Union Title and Trust Company Historical Collection, courtesy Mrs. Ida Wellington, San Diego." (pp. 129)

"Photo 43. **Stonewall mine and mill, about 1900; view southeast**. From Union Title Insurance and Trust Company Historical Collection." (pp. 134)

Photo 44. Stonewall mine and mill, about 1900, view southwest. During a short period beginning in 1898, tailings left from prior mi operations were processed to recover gold not previously recovered. Tailings were scooped up with scrapers attached to horses and transport mill in background. From Union Title Insurance and Trust Company Historical Collection.

"Photo 44. **Stonewall mine and mill, about 1900; view southwest**. During a short period beginning in 1898, tailings left from prior mining operations were processed to recover gold not previously recovered. Tailings were scooped up with scrapers attached to horses and transported to mill in background. From Union Title Insurance and Trust Company Historical Collection." (pp. 134)

"During the late 1880's, the Waterman family also undertook two other important ventures. One was the planning of the San Diego and Cuyamaca Eastern Railroad from San Diego to Cuyamaca, and by 1888 its construction to Foster, the ultimate destination. The other venture was the construction of the Cuyamaca Dam on the Cuyamaca Rancho and a flume to carry water from the reservoir the dam created to San Diego. The flume was dedicated in December 1889.

"**The construction of the railroad enabled a new phase of the mining industry to begin in the county – large-scale quarrying of stone**. In 1888 the Simpson-Pirnie Company opened a quarry adjacent to the railroad south of Lakeside, and was to operate it until 1932. The company quarried blocks of granite which were transported by rail to the company yard in San Diego where they could be processed and distributed for sale as riprap and rubble, later as paving blocks, and beginning in 1898, as polished monument and building stone. In 1894, stone quarried from the Waterman Deposit at Foster was used to construct the jetty at the entrance to San Diego Bay. By 1900 several other dimension stone producers had begun to operate in the Foster-Lakeside area.

"Also in 1888, a brick plant was constructed in Rose Canyon adjacent to the Santa Fe Railroad. A stack was built on the property which, until it fell recently, was referred to as the 'leaning stack' of the Union Brick Company, which moved to the site about 1912 (Photo 23). In 1889 a cement plant to be built on the Jamul Ranch was being planned by the Jamul Portland Cement Company. The company began production in early 1891, but operated only for a few months. The company's product is said to have been unable to compete with portland cement being shipped to San Diego from England by water. In addition, by then the prosperous effects of the boom of 1886-1888 had ended. This attempt was only the second to produced portland cement in California. The remnants of the kilns still stand (Photo 52)…."

"In the 1890's, as gold mining declined, the mining of minerals from pegmatite deposits began. In 1892 production of lithium mica (lepidolite) began at the Stewart Deposit near Pala. In the late 1890's gem mining was introduced with production of gem-quality tourmaline and spodumene from deposits near Pala, and tourmaline and other minerals from the remarkable Himalaya and other deposits near Mesa Grande. Deposits near Ramona, Rincon and in other areas were also being worked and yielded small quantities of gems. The deposits were mined most ambitiously from about 1901 to 1912, and between 1902 and 1910 yielded about $1,300,000 worth of gem minerals. The production of gems dropped considerably after 1911, with the fall of the Chinese dynasty that had favored tourmaline as a gem stone, and with a corresponding drop in prices.

"As the population of the county gradually increased during the early 1900's, production of sand, gravel and stone, for use in construction, also increased. Several of the present-day rock product companies began operation during this period, including the Jamacha Sand and Gravel Company in 1906, and the Mission Rock Company (now part of the Daley Corporation), in 1913.

"During the period before World War I, from 1910 to 1915, mineral production was relatively low. During this period, also, several wells were drilled along the coast in an unsuccessful search for petroleum. In 1912, the Union Brick Company moved from downtown San Diego to its present location in Rose Canyon. During the mid-1910's production began of magnesium salts from sea water bittern, but in 1916 both the salt and magnesium chloride operations at the south end of San Diego Bay were washed out by the flood caused by the break of the Otay Dam. The salt works was rebuilt soon, but magnesium salts were not produced again until late 1919 or early 1920, when the California Chemical Company resumed the operation.

"During the years 1917 to 1919, when the United States was most affected by World War I, mineral production increased several fold in the county, mainly because of production of potash (see Table 1 and Figure 3).* During the war, foreign sources of potash to the United States were cut off, its priced increased about ten-fold, and production of the commodity from kelp was made economically possible. About $3,400,000 worth of potash was produced in the county from 1916 to 1919, of which nearly $3,000,000 was produced by four companies from 1917 to 1918. Also during the war, foreign sources of pebbles used in grinding mills were cut off, and production of these from beaches of San Diego County started in 1915, and was to continue until 1949. A rise in the price of copper, from about 13 cents per pound in early 1914 to about 27 cents per pound by 1916, enabled two small copper deposits in the county to be worked between 1915 and 1919. These were shut down in 1919 when the price returned to normal. In 1917, small quantities of molybdenum, strontium minerals, and possibly tungsten also were mined in the county. From 1918 to 1920, the Stewart Mine reached its maximum yield of lithium mica, and in 1918 feldspar was first produced in the county.

(**Note:** To view **Table 1**, use the link below to "The Geology and Mineral Resources of San Diego County,"* 1963, available on the Internet Archive – Texts, pp. 40-43.) http://archive.org/details/geologyandminer03webe

* "Figure 3. **Graph comparing yearly value of mineral production in San Diego County with growth in population, 1910 to 1957**." (pp. 38) *(See "The Geology and Mineral Resources of San Diego County," 1963, on the Internet Archive – Texts, pp. 38.)* http://archive.org/details/geologyandminer03webe

"In the early 1920's, after a brief economic letdown following World War 1, the population and mineral production of San Diego County continued to grow. By then metal mining had almost stopped, but large tonnages of sand, gravel and stone, and other non-metallic minerals were being produced. The production of clay became significant, when in about 1919 Standard Oil Company of California and General Petroleum Company began to produce bentonite from deposits near Otay, for use in petroleum refining, and Pacific Clay Products began working a deposit near Carlsbad.

"In 1921, a predecessor of Standard Sanitary Manufacturing Company began to mine feldspar and quartz from a deposit near Campo. The company constructed a mill to process the rock mined at a site adjacent to the San Diego and Arizona Eastern Railroad (Photo 32). This railroad had been completed in 1919, to at last link San Diego and the Imperial Valley. The deposits was to be the principal source of feldspar in California from 1921 through 1942. Other feldspar producers also began operation in the county during the early 1920's, and gem mining continued on a small scale. In 1923, Nelson and Sloan began production of sand and gravel on the Otay River bed. **At this time, also Fenton-Sumption-Barnes merged with the Independent Stone Company to become Fenton-Parker Company (which was to be renamed H. G. Fenton Material Company in the early 1930's). From 1921 to 1923, marble for buildings and monuments were quarried from the Verruga Deposit near Ranchita.** During the early and mid-1920's several more wells were drilled unsuccessfully for oil. In 1923 the California Chemical Company of Chula Vista was purchased by National Kellestone Company and was known thereafter as the California Chemical Corporation. This corporation began to produce bromine, in addition to magnesium chloride, in 1926.

"Photo 32….**Pacific mill, just east of Cameron Corners and adjacent to San Diego and Arizona Eastern Railroad**. Feldspar and quartz from the Pacific mine, about 5 miles to the northwest, were milled here until 1943. The Campo Milling Corporation operated the mill in the early 1950's.) (pp. 76)

"During the mid- and late-1920's production of sand and gravel, dimension stone, and clay reached remarkable heights (see Table 1* and Figure 3). In 1928, Crystal Silica Company began production of high quality quartz sand from a deposit near Oceanside. But this was the last year in which lithium mica

was produced from the Stewart Deposit. In 1929, V. R. Dennis' Canyon Rock Company began operations at its present site north of Grantville.

With the beginning of the depression in 1929, mineral production of the county dropped markedly and continued low through the 1930's (see Fig. 3). In 1932, the Simpson-Pirnie Company, which had produced dimension stone continuously in the county since 1888, stopped operation. During the 1930's gold mines were reactivated at Julian, but generally with little success. Small gold deposits south of El Cajon were worked; and from 1939 to 1942 several deposits south of Pine Valley were worked for gold with minor success. In 1937, the Beryllium Alloys Company began to develop a supposed large Beryllium-bearing deposit near Vista, but no ore was mined. **Also in 1937, Caudell and Johnson began producing sand, gravel, and stone in the San Diego region,** and the operations of the California Chemical Corporation at Chula Vista were taken over by Westvaco Chlorine Products Corporation.

(**Note:** To view **Table 1**, use the link to "The Geology and Mineral Resources of San Diego County," 1963, available on the Internet Archive – Texts, pp. 40-43.)* http://archive.org/details/geologyandminer03webe

"During World War II, as during World War I, mineral production rose sharply in San Diego County. During World War II, the rise in production was caused mainly by the increased output of sand, gravel and stone for use in military construction in the coastal area. Tungsten also was produced, between 1941 and 1945, from the Pawnee and other deposits; strontium minerals were produced at the Roberts and Peeler deposit, south of Ocotillo Wells; molybdenum ore was mined briefly at the Lippner Deposit at Campo; and optical calcite for use in gun sights was mined at the Hilton Deposit on the east side of the Santa Rosa Mountains. In 1942 the Pacific Feldspar Mine near Campo was shut down, reportedly because the operator could not compete in wages with the U.S. Army which hired civilians to work on a military base at Campo. In 1944, the Friday nickel-bearing deposit near Julian was investigated by the United States Government as a possible source of nickel, for use at the newly completed Kaiser Steel Plant at Fontana, but the deposit was found to be too small.

"Near the end of the war, military construction ceased, and in 1945 mineral production dropped markedly. Subsequently, however, as the population of San Diego and environs continued to grow, housing and other construction were needed. Consequently, output of sand and gravel rose from only 475,000 tons in 1945 to more than 4,000,000 tons in 1954 (Fig. 4).* By that year both civilian and military construction were consuming large amounts of these commodities. In 1945 recovery of pyrophyllite began from deposits near Rancho Santa Fe, and production of crushed stone for use as roofing granules began from deposits near Rancho Santa Fe and in the southeast part of the county. In the late 1940's, a small quantity of peat also was produced.

"* Figure 4. **Graph showing relationship between yearly production of sand and gravel in San Diego County and growth of population**." (pp. 39) *(See "The Geology and Mineral Resources of San Diego County," 1963, on the Internet Archive – Texts, pp. 39.)* http://archive.org/details/geologyandminer03webe

"From about 1950 to 1956, a government purchase program for tungsten stimulated development and mining of several such deposits in the county, including the Pawnee and Payoff. During the early- and mid-1950's uranium prospecting also was popular in the county, but only radioactive minerals in pegmatite deposits were found, and no ore was uncovered. During the mid- and late-1950's large quantities of broken stone was being used for construction of both civilian and military sea front projects, including the Mission Bay Park. Gem minerals also were produced in the county during the 1950's: kunzite was mined at Pala; garnet at Ramona;

and in 1958 tourmaline again was being mined at the famous Himalaya mine in the Mesa Grande district. But the real highlight of San Diego County's mineral industry during the postwar period was the growth in production of sand, gravel and stone, and the leading producers of these commodities: Caudell and Johnson; H. G. Fenton Material Company; Nelson and Sloan; Canyon Rock Company; Daley Corporation; H. W. Rohl Company; and others."

Mineral Production (pp. 42 – 44)

"The total value of the mineral production in San Diego County from 1870 to the end of 1959 is estimated to be about $125,000,000, of which slightly more than $75,000,000 was recorded from the end of World War II through 1959 (Fig. 3 and 4). In 1959 the total value of mineral output was about $14,489,600, to place San Diego 14th among the counties of California (California Division of Mines, Mineral Information Service, October 1960, p. 5, 7.)

"The recorded amount and value of mineral commodities produced annually in the county from 1880 to 1959 are shown herein on Table 1*…."

(**Note:** To view **Table 1**, use the link to "The Geology and Mineral Resources of San Diego County," 1963, available on the Internet Archive – Texts, pp. 40-43.)* http://archive.org/details/geologyandminer03webe)

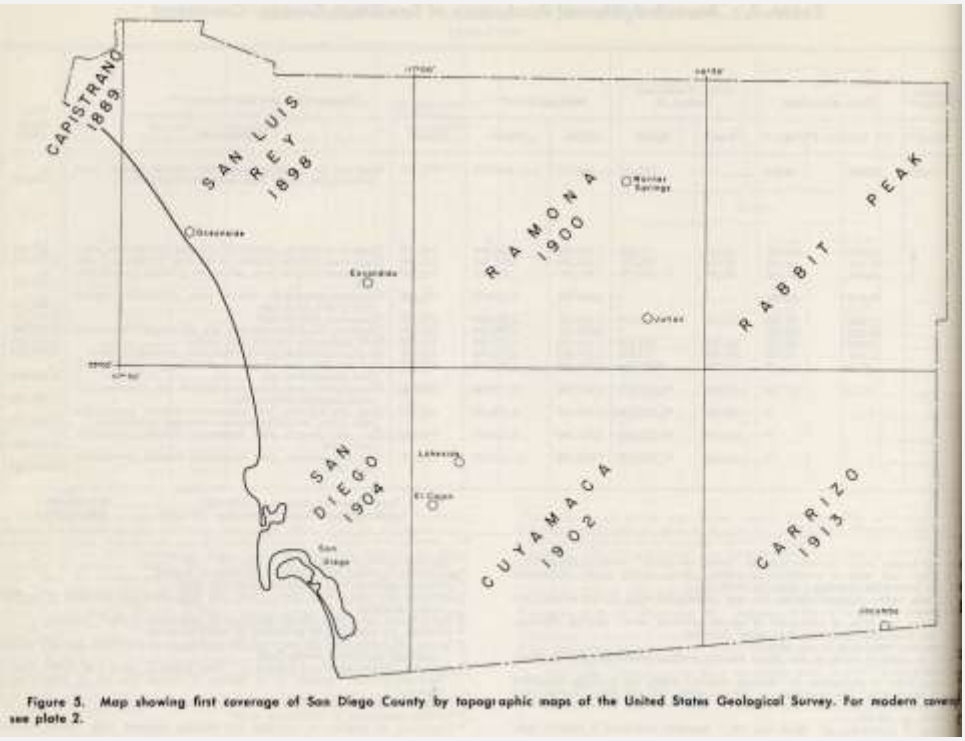

Figure 5. Map showing first coverage of San Diego County by topographic maps of the United States Geological Survey. For modern coverage see plate 2.

"Figure 5. **Map showing first coverage of San Diego County by topographic maps of the United States Geological Survey.** For modern coverage see plate 2."* (pp. 44)

* "Plate 2. **Map of San Diego County Showing Topographic map coverage and geologic mapping adapted for Plate 1**." (pocket at end of book) *(See "The Geology and Mineral Resources of San Diego County," 1963, on the Internet Archive – Texts, at end of book.)* http://archive.org/details/geologyandminer03webe

Land Ownership and Entry (pp. 43 – 47)

(This section will not be covered in this document. To view the above section, use the link to "The Geology and Mineral Resources of San Diego County," 1963, available on the Internet Archive – Texts, pp. 43-47.)
http://archive.org/details/geologyandminer03webe

Water For Mining Operations (pp. 47)

(This section will not be covered in this document. To view the above section, use the link to "The Geology and Mineral Resources of San Diego County," 1963, available on the Internet Archive – Texts, pp. 47.)
http://archive.org/details/geologyandminer03webe

Previous Descriptions of Mineral Deposits (pp. 47)

"Descriptions of mineral deposits and mining activities in San Diego County have been provided by the California Division of Mines and Geology (which before 1928 was named the California Mining Bureau) since 1886. Early, rather short descriptions and accounts were provided in the annual reports of the State Mineralogist by Hanks (1886), Goodyear (1888, 1890), Preston (1890), Storms (1893), and Crawford (1894, 1896). The annual reports were not published from 1896 to 1916, but in 1902 a tabulated list of the mines in the county prepared by Hubon as published as a Register of Mines. In 1914, a comprehensive report entitled "Geology and Mineral Resources of San Diego and Imperial Counties" by F. J. H. Merrill was published separately by the bureau, then reprinted in its 14th report, which was published in 1916. Reports on mining in the county were prepared between 1921 and 1943 by W. B. Tucker, of the Mining Bureau's Los Angeles office, which was created in 1920. The most detailed and comprehensive of these reports was published in 1925. R. J. Sampson assisted Tucker, and prepared reports from 1930 and 1943.

"The last general report on the county was written by Tucker, assisted by C. H. Reed of the San Diego Mining Bureau, and was published in 1939. Since 1943 the San Diego County Division of Natural Resources has prepared yearly a short summary of the mining activity in the county.

Descriptive reports of particular deposits, districts, or commodities have been written by Hudson (1922), Donnelly (1934), Creasey (1946), Hoppin and Norman (1950), Jahns and Lance (1950), Durrell (1953), Jahns and Wright (1951), Hanley (1951), Cleveland (1960), and others. Short descriptions or notations of San Diego County deposits are given in California Division of Mines Bulletin 176, "Mineral Commodities of California," which was published in 1957. Additional references concerning mineral deposits and mining activity are provided in the subject bibliographies entitled "Mineral Resources and Mining" and "Pegmatites" at the back of the text."

Mineral Production (pp. 47 – 48)

"The principal mineral commodities of commerce, and selected mineral-use groups, as they apply to the mineral industry of San Diego County, are discussed below in alphabetical order.* In these discussions data is provided on the character and distribution of deposits, the history of mining operations, the methods of mining and milling, products and value of production, and other material. Descriptions of the deposits, and of present and former mining operations, follow the pertinent commodity discussions, either within the text, or in tabulated lists. Also in the tabulated lists are names and descriptions of claims, groups of claims, prospects and mills. Synonyms are given in the lists for all types of entries, and are cross indexed.

"Those descriptions within the tabulated lists, that are initialed 'R.M.S.' were prepared by Richard M. Sewart.

"The following mineral commodities are not known to occur in the county: barite, cadmium, chromium, mercury, platinum, sulfur, talc and soapstone, and titanium.

"For readers unfamiliar with the subdivision of the township and range system, as used herein to describe location and property holdings, diagrams illustrating its use are given in the 'Legal Guide for California Prospects and Miners'* published by the Division of Mines and Geology. Ownership data provided in the report are changeable and should be confirmed with the offices of the San Diego County Recorder (unpatented property). Full descriptions of all references cited within the text or tabulated sections are given in the 'Collective Bibliography' at the back of the text."

** *Legal Guide for California Prospects and Miners* (1973), is available on the Internet Archive – Texts at: http://archive.org/details/legalguideforcal40cali

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***Note:** Only some of the following stone-related sections included in the book will be included in the following portion of this transcription. If you wish to read about the other subjects that were excluded in this transcript-tion of the book, "Geology and Mineral Resources of San Diego County," you can read the book on the Internet Archive – Texts. Peggy B. Perazzo http://archive.org/details/geologyandminer03webe*

Abrasives (pp. 48)

"The beaches between Oceanside and San Diego were the principal sources of pebbles for grinding in California from 1915 to 1949 (Troxel, 1957, p. 27). During the early years of production an important locality was the beach near Bird Rock, south of La Jolla (Bradley, 1917, p. 80). Later, the principal localities were the beaches between Carlsbad and Encinitas, and especially at Ponto. John Momand, of Carlsbad, recovered pebbles for grinding and filtering from Ponto Beach and other localities from 1929, or before, to 1949. His output of the latter years was purchased mainly by the Crystal Silica Company for use in filtering systems (see Ponto Beach under 'Sand and Gravel, and Crushed and Broken Stone').

"The pebbles marketed for grinding ranged in diameter from three to six inches, and were sold for $65 per short ton (Troxel, 1957, p. 27). They were composed mainly of silicified metamorphic and igneous rock types. Porcelain balls generally now have replaced pebbles for grinding, but for businesses where they have not, pebbles must be purchased from Midwest United States or foreign sources.

"Garnet, which is used as the abrasive for some types of sandpaper, is found in very small proportions in pegmatite dikes (see 'Gem Minerals') and in tactite bodies (see 'Tungsten'). At the present time, however, none of the deposits in the county are potential sources of garnet for use as an abrasive.

"An undeveloped deposit of volcanic ash (pumicite) occurs north of Borrego Springs (see Pompai group under 'Volcanic Ash' in tabulated list.) Volcanic ash is used as a mild abrasive."

(NOTE: To view the table that lists the deposits in San Diego from which "Abrasives," see pp. 48 in this book on the Internet Archive at the following link.) http://archive.org/details/geologyandminer03webe

Calcite (Optical Grade) (pp. 52)

"Calcite (calcium carbonate) is one of the most common minerals in the earth's crust. In San Diego County it occurs as the principal constituent of limestone deposits at Dos Cabezas, and near Ranchita, Jacumba, Pine Valley, and Jamul. However, deposits that contain large clear crystals (Iceland spar) of optical or suboptical grade are very rare, and only two such deposits have been mined in California (Wright, 1957b, p. 99). One of these deposits is the Hilton, in the northeastern part of San Diego County, which was operated during World War II for suboptical grade material used in gun sights. Since that time, optical calcite has been replaced partly by polaroid in the manufacture of optical objects (Wright, 1957b, p. 99).

Hilton Deposit*

(* The following description was taken mainly from an unpublished U.S. Geological Survey report written in 1944 by Cordell Durrell.)

"**Location:** S. ½ Sec. 14, S. ½ Sec. 15, T. 10 S., R. 8 E., S.B.M.; low on the east side of the Santa Rosa Mountains, about eight miles due west of Truckhaven, which is in Imperial County. The deposit can be reached by a fair but steep dirt road from the Truckhaven-Borrego Valley trail. The turnoff for the mine is about eight roadmiles west of Truckhaven. **Ownership:** Undetermined (1957). C. Jack Frost, Banning, and Robert R. Dye, Indio, owned five claims in 1947.

"The Hilton deposit was discovered in 1936, and worked sporadically until 1942 by John Hilton and Mr. Heather, who mined small quantities of unusual, thin, tubular calcite crystals which were sold as optical material. In 1942, the property was purchased by Calcite Operators, Incorporated, Thermal, which was managed by Arnold Hoffman. Calcite Operators worked the deposit from October 1942 to October 1943. During this period the corporation employed as many as 30 men and held about 25 claims. The operation was resumed for a short time, on a small scale, in 1944 by C. Jack Frost and Robert R. Dye, former employees of Calcite Operators. The deposit has been idle since 1944.

"About 6,800 pounds of sub-optical grade calcite was accepted by Polaroid Corporation of Cambridge, Massachusetts, from material mined and shipped from the deposit during 1942-1944 (Durrell, 1944, p. 23). The calcite accepted was used in the manufacture of ring gunsights.

*(NOTE: To view the table that list the deposits in San Diego from which "**Calcite (optical)**" were obtain, see pp. 52 in this book on the Internet Archive at the following link.)*
http://archive.org/details/geologyandminer03webe

"Indicated reserves in the deposit were estimated by Durrell to be about 3,000 tons of useable calcite, to a depth of 48 feet.

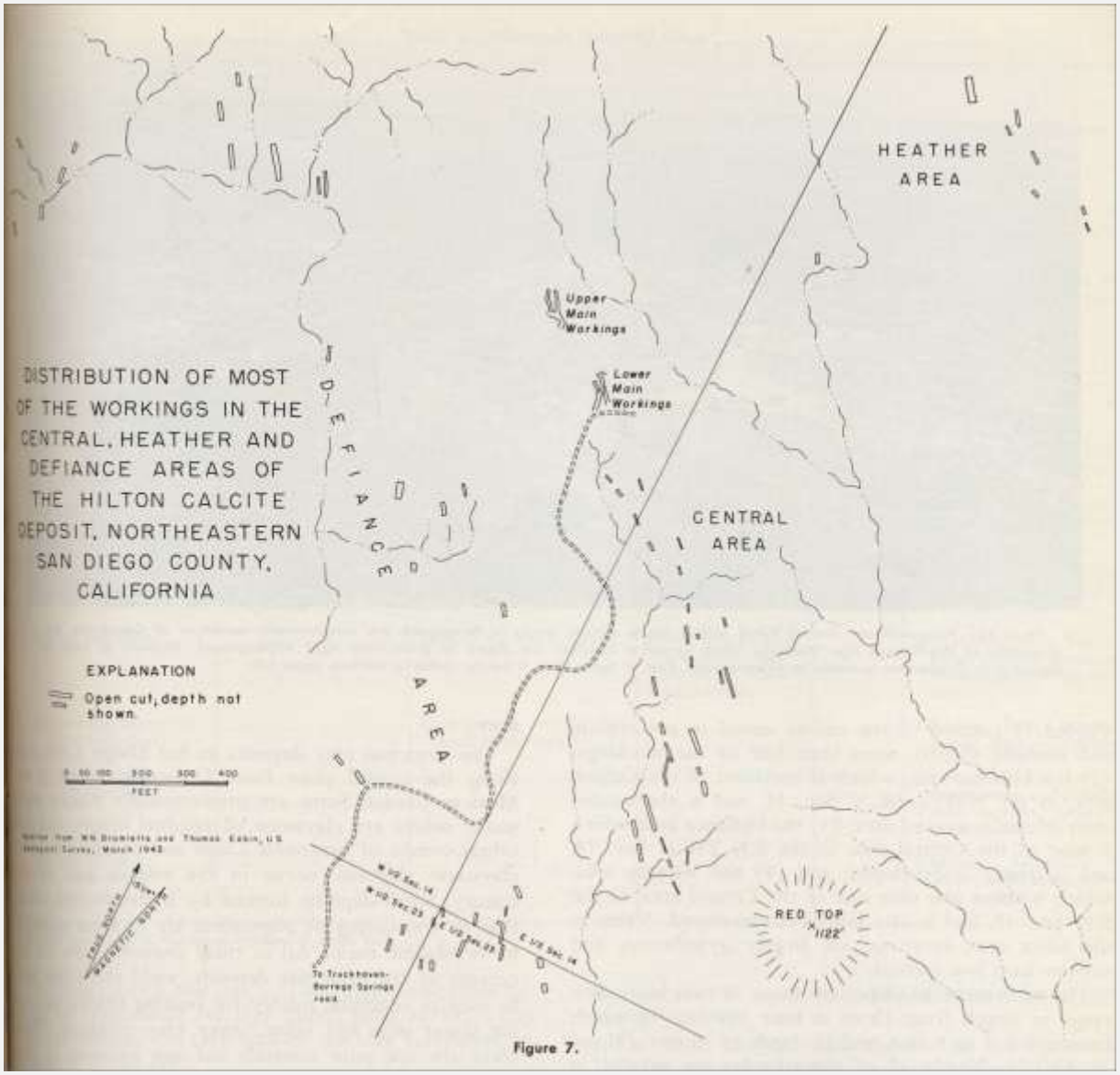
"The suboptical grade calcite occurs with common calcite and gypsum as veins which filled joints in the Canebrake conglomerate of Mio-Pliocene age (Dibblee, 1954, Pl. 2). This formation underlies much of the badland which extends eastward from the Santa Rosa Mountains. In the area of the Hilton deposit the rocks are mainly thick-bedded conglomeratic sandstone which strikes northeastward and dips generally from 15º to 20º southwest (Photo 24). The joints that contain calcite strike N. 25 º - 45 º W., and range in dip from 65 º southwest to nearly vertical. They have a maximum length of about 300 feet. Most of the suboptical grade calcite occurs in cavities (or 'pockets') at intersections of joints, with elongation of the cavities generally extending down the lines of intersection of the joints. The pockets are quite variable in size; one of the largest mined, as described by Durrell (1944, p. 11), was 22 feet long, 14 feet deep, and slightly more than two feet in maximum width. The useable calcite occurs mostly as basal plates which are as much as 18 inches in diameter and less than one-half inch in thickness. Growth lines and cleavages, either developed, or incipient, are common defects.

Photo 24. View southwest toward Hilton optical calcite deposit. Rocks in foreground are conglomeratic sandstone of Canebrake conglomerate, of Mio-Pliocene age. Workings, which consist of trenches, are shown in center and right middleground. Segment of road to deposit from Truckhaven is shown at extreme right. Part of Salton Sea is barely visible at extreme upper left.

"Photo 24. **View southwest toward Hilton optical calcite deposit**. Rocks in foreground are conglomeratic sandstone of Conebrake conglomerate, of Mio-Pliocene age. Workings, which consist of trenches, are shown in center and right middleground. Segment of road to deposit from Truckhaven is shown at extreme right. Part of Saltan Sea is barely visible at extreme upper left." (pp. 54)

"Four areas of calcite mineralization were designated and described by Durrell (1944) as follows: (1) the **Central area**, in the center of the S. ½ Sec. 14, which has yielded 75 percent of the calcite mined in the region, and contains slightly more than half of the workings; (2) the **Heather area**, which is northeast of the Central area, in the NW. ¼ SE. ¼ Sec. 14, and is the second most intensely worked area; (3) the **Defiance area**, which is west of the central area, in the S. ½ SW. ¼ Sec. 14, and is largely undeveloped; and (4) the **Victory area**, which is about one mile east of the Central area, in the S. ½ Sec. 15, and is also largely undeveloped. Veins in the latter area, however, are largely gypsiferous, and cavities have not formed.

"The veins were developed by about 75 trenches which range in length from 10 to a least 100 feet, in width from about 4 to 5 feet, and in depth to 30 feet (Photo 24, Fig. 7). Nearly all of the trenches are parallel to the strikes of the veins."



"Figure 7. **Distribution of most of the workings in the central, Heather and Defiance areas of the Hilton calcite deposit, northeastern San Diego County, California**" (pp. 53)

Granite (pp. 167)

"See herein under **'Stone, Dimension'** and **'Sand and Gravel, and Crushed and Broken Stone.'**"

Limestone and Dolomite (pp. 173-185)

"Although limestone and dolomite have many uses, deposits in San Diego County have been worked mainly as sources of crushed and broken stone for use as roofing granules, poultry grit, and decorative stone.

Geologic Occurrence (of limestone and dolomite)

"The largest and most accessible deposits of limestone in San Diego County are exposed in a group of low hills near Dos Cabezas siding of the San Diego and Arizona Eastern Railroad, in the southeast part of the county (Photo 46, Figs. 41, 42). These deposits consist of irregular and disconnected bodies of crystalline limestone and magnesian limestone which are interlayered chiefly with biotite schist and minor quartzite of preCretaceous age. The rocks are intruded widely and irregularly by diorite, by relatively large bodies of quartz diorite (tonalite), and by dikes of granite pegmatite and aplite. The metamorphic rocks are folded and faulted, but generally strike northeast and dip moderately to the northwest. The limestone bodies vary widely in size and shape.

"Photo 46. **Aerial view north-northwest, showing Dos Cabezas area and vicinity**. Layers of Crystalline limestone (ls) with quartzite and schist are intruded by tonalite (quartz diorite,†) and overlain partly by volcanic flows (Alverson andesite, v), Elsinore fault strikes northwest along base of south side of Coyote Mountain. Parts of Fish Creek gypsum deposits are exposed along crest of ridge just to right of Fish Creek." (pp. 173)

"The deposits have been worked intermittently and on a small scale as a source of roofing granules, poultry grit, and decorative stone. The two principal properties in the area are the Golden State and Heathman, which are described below. Two very small deposits, the Mary Jane and one unnamed, are described in the accompanying tabulated list.

"Additional crystalline limestone occurs on San Ysidro Mountain, in the northeast part of the county. These deposits include the Verruga, which was worked from 1921 to 1923 for building and monument stone, and the Sentenac, which is undeveloped (Fig. 39). The White Peak property, which encloses part of the Verruga Deposit, was worked briefly in the 1940's and 1950's for roofing granules.

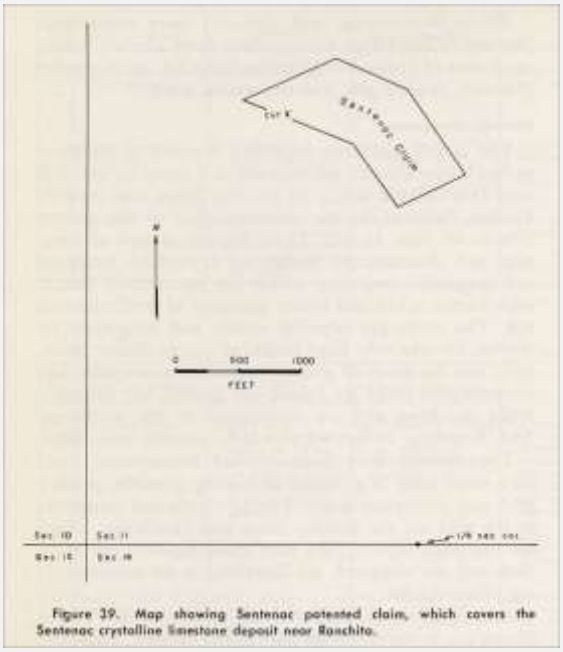


Figure 39. Map showing Sentenac patented claim, which covers the Sentenac crystalline limestone deposit near Ranchita.

"Figure 39. **Map showing Sentenac patented claim, which covers the Sentenac crystalline limestone deposit near Ranchita**." (pp. 174)

"Caliche is calcite-rich material that forms by evaporation near the surface of certain arid and semiarid regions. Caliche or Caliche-like deposits are limited to the southwestern part of San Diego County. The richest and best known of these is the Jamul Ranch Deposit, which in 1891 was the source of the raw material for a small cement plant in Jamul Creek Canyon (see description below). This effort to produce cement, the second in California, failed. Two additional deposits of caliche – Kuebler Ranch and Lakeside – are described in the tabulated list. Small quantities of Caliche from the Lakeside Deposit were used as a soil conditioner during the 1920's.

"The only deposit of dolomite in the county that has been described is the Elliott Deposit, near the eastern boundary of the county, on the south slope of the Coyote Mountains (see description below). This deposit was worked briefly as a source of roofing granules in the early 1950's. The White Cap Deposit, east of Jacumba, consists of magnesium limestone, and also has been worked as a source of roofing granules. The Deer Park Deposit, north of Pine Valley, ranges in composition from limestone to magnesian limestone, a small quantity of this rock was used at the Stonewall Gold Mine before 1900.

"Additional deposits of crystalline limestone occur as layers in the thick section of metasedimentary rocks exposed on the steep southwest slope of the Santa Rosa Mountains, in the northeast corner of the county (Dibblee, 1954, p. 21). These deposits are undeveloped.

Possible Uses (of limestone)

"Cement that is now consumed in San Diego County is purchased from producers in Riverside and San Bernardino Counties. The plants nearest to San Diego are at Crestmore (Riverside Cement Company) in Riverside County, and at Colton (California Portland Cement Company), in San Bernardino County. Limestone deposits near which cement plants to serve the San Diego area possibly could be located, are at Dos Cabezas in southeastern San Diego County, and in the Coyote Mountain in western Imperial County. The Dos Cabezas deposits are within one mile of the San Diego and Arizona Eastern Railroad, and the deposits in Imperial County are within eight or nine miles north of the railroad. The reserve of the Dos Cabezas deposits are undetermined, but a possible cement plant that would consume this rock would require reserves of about 25,000 to 30,000 tons of limestone for each 100,000 barrels of cement (376 pounds) to be produced, plus additional silica- and aluminum-rich rock, and gypsum (from information furnished by Bowen, 1957a, p. 117, 119; 1957b, p. 303). In 1957, the six cement plants in Southern California ranged in annual capacity from about two to six million barrels (C. H. Gray, California Division of Mines, personal communication, 1958). The cost of such plants is estimated to be about $12 per barrel in annual capacity, or $1,200,000 for each 100,000 barrels (Bowen, 1957b, p. 303).

"Limestone also is used as concrete aggregate, as an agricultural mineral, and as an additive to acid soils. The soils of Southern California are mainly alkaline, however.

Elliot Deposit (dolomite)

"**Location:** Secs. 26, 27, 34, and 35, T. 15 S. R. 8 E. S.B.M.; about 5 ½ miles north of Dos Cabezas, on the south flank of the western part of the Coyote Mountains.

"**Ownership:** Fred M. Elliot, c/o Mac's Store, Manzanita, Pine Valley Post Office; Rena Rath Elliot, 433 Juniper Street, San Diego 1; and James Elliot, San Diego, own two unpatented association placer claims which covers 320 acres (1957).

"The Elliot family located the White Dolomite Numbers 1 and 2 Claims in 1924. These claims comprise the W. ½ W. ½ SE. ¼, S. ½ N. ½ SW. ¼, and the S ½ SW. ¼ Sec. 26; the SE. ¼ SE. ¼ Sec. 27; the NE. ¼ NE. ¼ Sec. 34; and the N. ½ NW. ¼ Sec. 35 (Fig. 40.) The deposit has been worked only briefly, during 1952-1953, as a source of roofing rock. It is within Anza-Borrego Desert State Park.

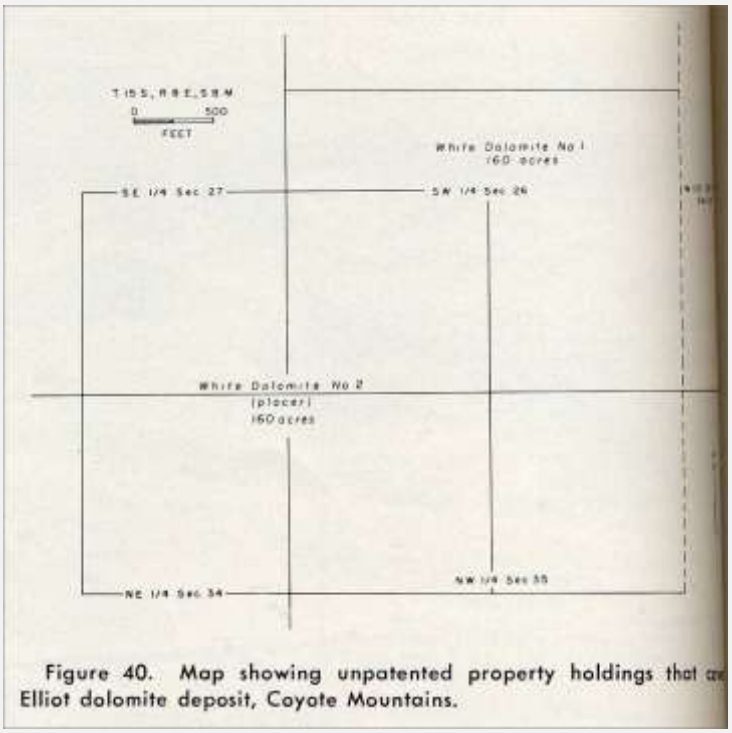


Figure 40. Map showing unpatented property holdings that cover the Elliot dolomite deposit, Coyote Mountains.

"Figure 40. **Map showing unpatented property holdings that cover the Elliot dolomite deposit, Coyote Mountains**." (pp. 174)

"The Elliot property covers part of a body of preCretaceous metamorphic rocks which underlies the southwest side of the western part of the Coyote Mountains. The rocks consist mainly of interlayered biotite schist and crystalline dolomite which are cut by pegmatite dikes. The Elliot workings develop a layer of dolomite that is perhaps several hundred feet thick, and at least several hundred feet long, which strike east-northeastward and dips about 40º to the northwest. The dolomite contains a small proportion of thin layers of biotite schist. In the workings the dolomite is generally milky-white, although impure strata contain contact minerals such as red-brown garnet and green diopside. Where the dolomite has been mined, its texture is medium- to coarse-grained.

"Following is an analysis of a sample from the Elliot Deposit collected by O. E. Bowen, Jr., of the Division of Mines and Geology and analyzed by Abbott Hanks, Inc., San Francisco in June 1955: SiO_2, 0.26 percent; Fe_3O_4, 0.09 percent; Al_2O_3, 0.15 percent; CaO, 31.08 percent; MgO, 20.71 percent; and P_2O5, 0.06 percent. In addition to roofing rock this material might be used as a refractory, as agricultural dolomite, concrete aggregate, ballast, road metal, or road base.

"Principal development is an oval, bench-like cut about 10 to 20 feet wide, 10 to 20 feet high and 30 to 40 feet long, low on the steep southern slope of the Coyote Mountains (Photo 47). During 1951, the Milroy Roofing Company, of South Gate, worked the deposit for about six months in an attempt to produce roofing rock. Several thousand tons of dolomite was quarried which consisted mainly of talus composed of angular fragments of white dolomite as large as 10 feet in diameter. In March 1957 only a small shack and a loading bin remained on the property.

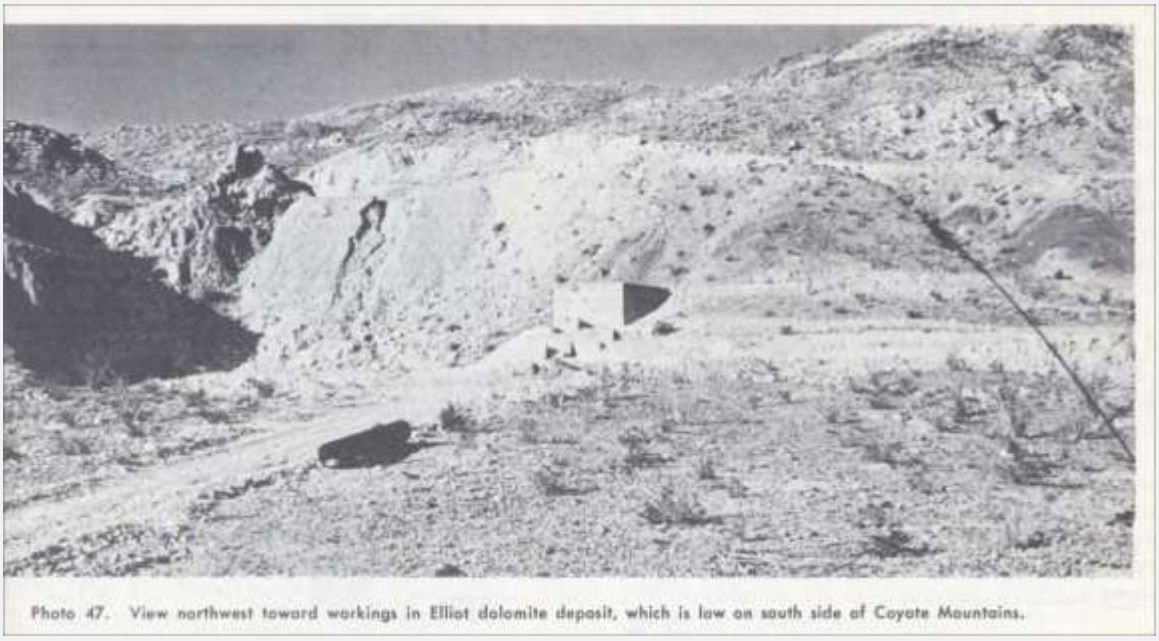


Photo 47. View northwest toward workings in Elliot dolomite deposit, which is low on south side of Coyote Mountains.

"Photo 47. **View northwest toward workings in Elliot dolomite deposit, which is low on south side of Coyote Mountains**." (pp. 175)

Golden State (Dos Cabezas Marble Placer) Deposit

"**Location:** W. ½ Sec. 23, T. 16 S., R. 8 E., S.B.M.; in the southeastern part of the county, about one mile northeast of Dos Cabezas. Within Anza-Borrego Desert State Park. **Ownership:** B. A. Sweet, Pine Tree Portland Cement Company, Escondido, owns all but a small part of two northeast-trending, essentially end-to-end patented claims which cover 37.97 acres, name in the middle of the W. ½ Sec. 23 (Fig. 41). Small parts of the claims are held by C. I. Smith and others, c/o 408 A Rodriguez, Watsonville (1957).

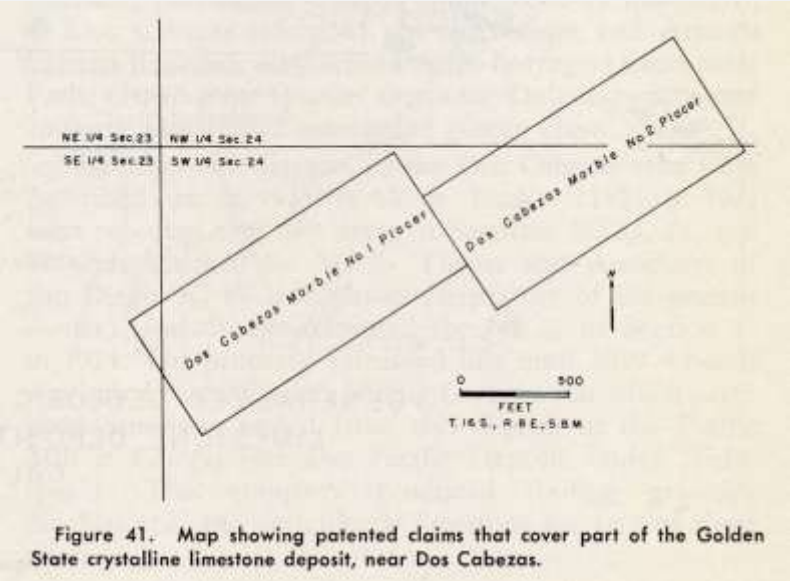
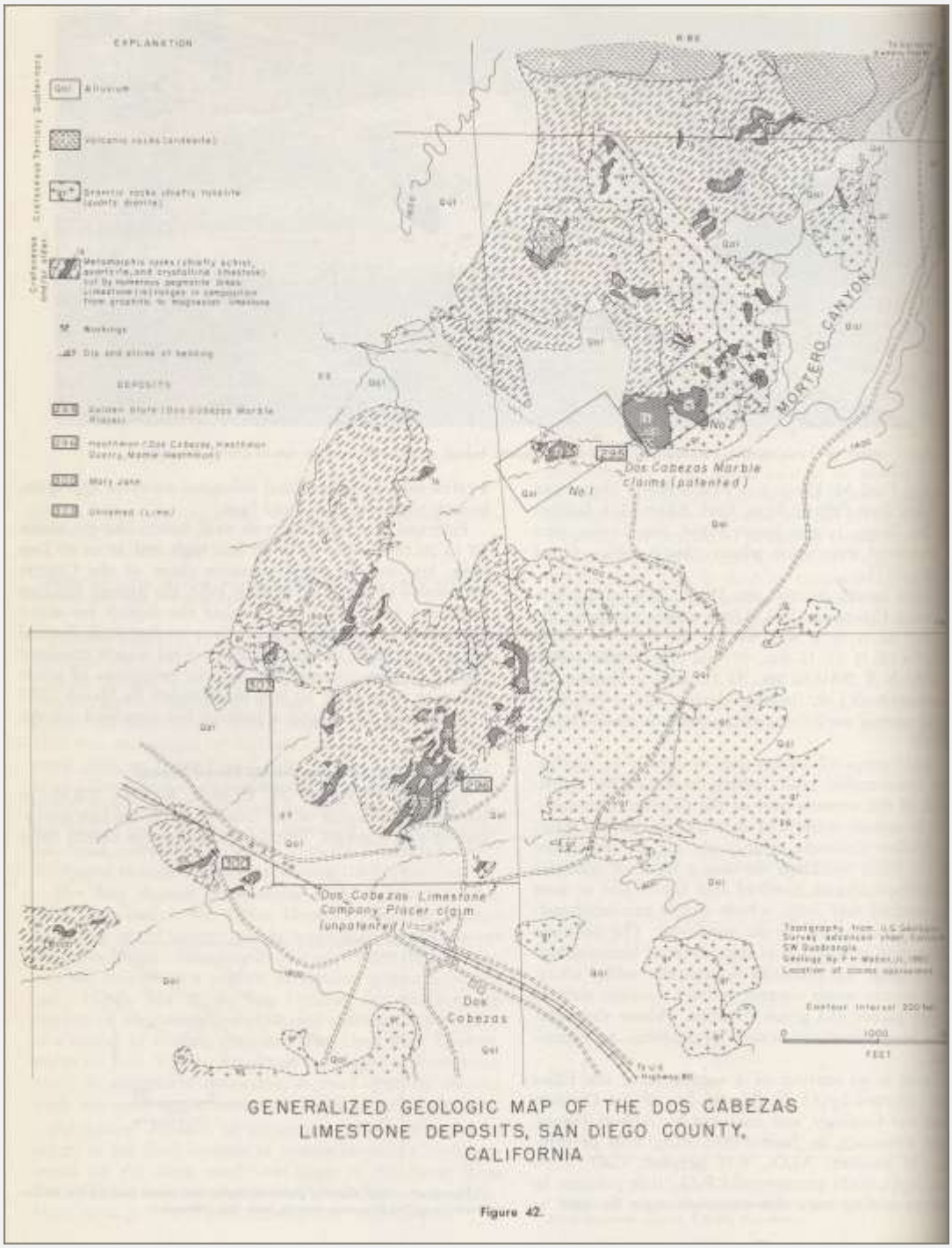


Figure 41. Map showing patented claims that cover part of the Golden State crystalline limestone deposit, near Dos Cabezas.

"Figure 41. **Map showing patented claims that cover part of the Golden State crystalline limestone deposit, near Dos Cabezos.**" (pp. 175)

“The Golden State Deposit was probably first prospected in the 1920’s, and was worked most recently about 1950, as a source of crushed stone for use as roofing granules. The present owner leased the property in 1957 with Ed Roberts of San Diego, and purchased it in 1957. He contemplated using the deposit as a source of limestone for a proposed cement plant in southeastern San Diego County or southwestern Imperial County. In May, 1960 the property was idle and there was no equipment on it.

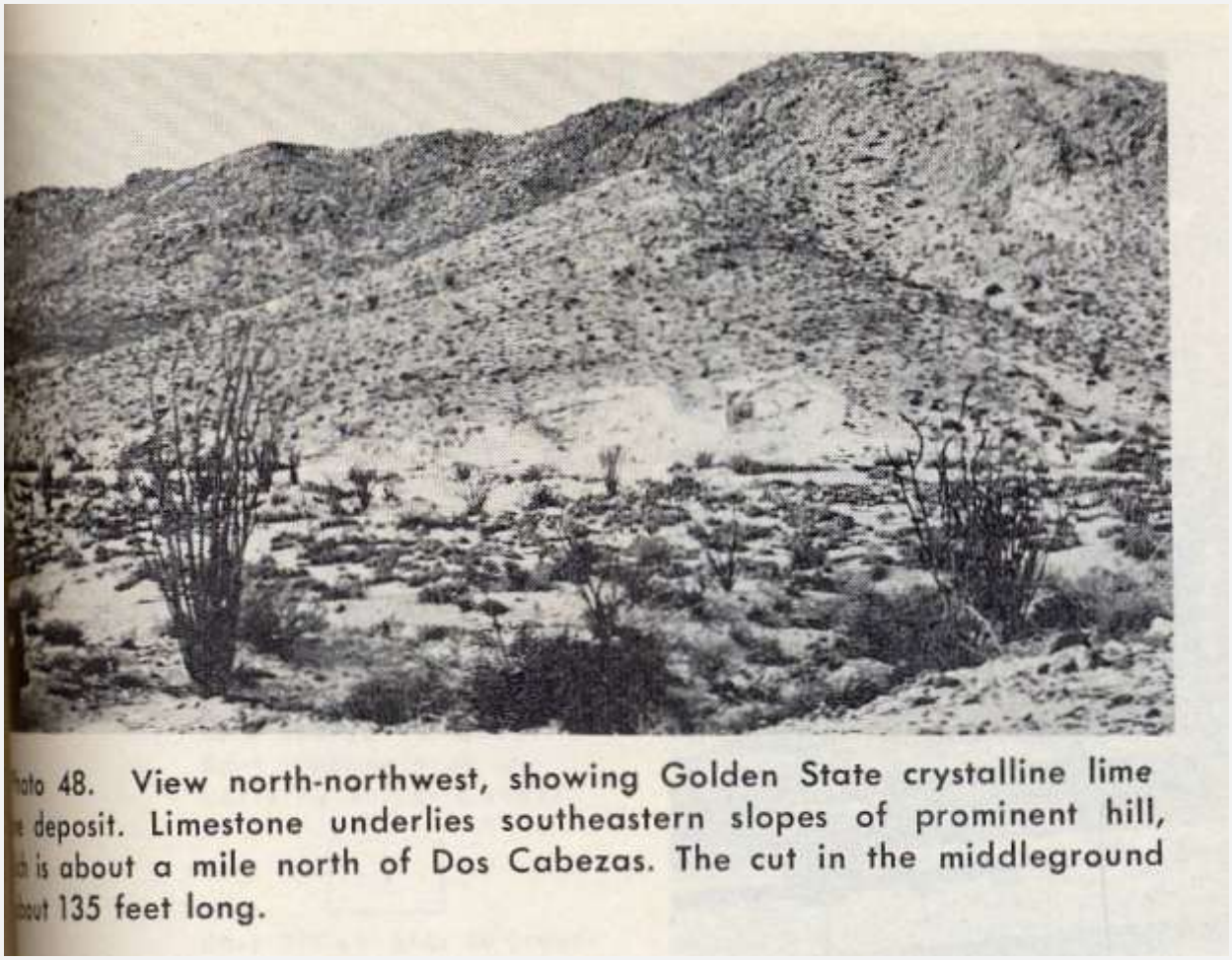
“The Golden State property lies in the northeastern part of the area that encloses the Dos Cabezas Limestone Deposits, as shown in Photo 46 and Fig. 42. The rocks in the northeastern part of the area consist chiefly of interlayered biotite schist, subordinate crystalline carbonate rocks, and minor quartzite which are intruded widely, but irregularly, by diorite. Cretaceous quartz diorite, and dikes of granite pegmatite. The Golden State property contains the largest body of carbonate rocks in the district. This body, which consists of limestone and subordinate magnesian limestone, is exposed along the south slope of a north- to northwest-trending ridge which dominates the middle of Section 23 (Photo 48). The body is very crudely hourglass-like in plan, with its long axis trending east along the ridge slope. The bedding of the deposit strikes east-northeastward and dips 50º -80º northwest, into the slope. The body is about 900 feet long, and ranges in thickness from about 75 to 450 feet. It is bordered on the east by quartz diorite, on the north by quartz diorite and diorite, and on the south and west by alluvium. Additional, smaller carbonate bodies enclosed by quartz diorite lie to the northeast of the main body.



GENERALIZED GEOLOGIC MAP OF THE DOS CABEZAS LIMESTONE DEPOSITS, SAN DIEGO COUNTY, CALIFORNIA

Figure 42.

"Figure 42. **Generalized Geologic Map of the Dos Cabezas Limestone Deposits, San Diego County, California**." (pp. 176)



hoto 48. View north-northwest, showing Golden State crystalline lime
e deposit. Limestone underlies southeastern slopes of prominent hill,
h is about a mile north of Dos Cabezas. The cut in the middleground
bout 135 feet long.

"Photo 48. **View north-northwest, showing Golden State crystalline limestone deposit.** Limestone underlies southeastern slopes of prominent hill, which is about a mile north of Dos Cabezos. The cut in the middleground is about 135 feet long." (pp. 177)

"About 600 feet southwest of the main body, in the most southwesterly part of the property, is a low, isolated outcrop which consists of carbonate bodies interlayered with other metamorphic rocks. The largest of these bodies is about 250 feet long and 150 feet in maximum width.

"Limestone and magnesian limestone of the Golden State property are thinly to thickly bedded and are very resistant to erosion. Rocks of limestone composition are fine- to very coarse-grained and range in color from white to pale gray. The gray color is most commonly caused by graphite which is disseminated sparsely and finely through the calcite. Some limestone beds contain thin, dark-gray bands which are composed of a relatively large proportion of graphite with calcite; less common are pale orange bands which are composed of finely disseminated garnet in calcite. Rocks of magnesian limestone composition generally are fine- to medium-grained and cream-colored. A sample that was taken by the writer across the widest part of the main carbonate body contained the following percentages of its principal constituents (analysis by Twining

Laboratories, Fresno, June 1960): CaO, 46.51 percent; MgO, 7.35 percent; SiO_2, 3.27 percent; Al_2O_3, 0.79 percent; Fe_2O_3, 0.19 percent; and P_2O_5, 0.29 percent.

"The principal workings of the property consist of two shallow cuts at the southern edge of the main body. These cuts have a combined length of about 210 feet. The oldest working on the property is a small, shallow cut at the western part of the north edge of the main body. Additional workings consist of a few minor cuts and pits in the most southwesterly deposits.

"The main body of the Golden State property comprises the principal reserves of carbonate rocks in the district. Relatively large tonnages of this body could be mined by open pit methods, and it is assumed that limestone of the same composition extends down the dip of the body, and probably beneath the alluvium which lies to the west and south.

Heathman ("Dos Cabezas, Heathman Quarry, Mamie-Heathman) Deposit

"**Location:** NE. ¼ Sec. 27, T. 16 S., R. 8 E., S.B.M.; southeast part of the county, about ¼ to ½ mile north of Dos Cabezas siding of the San Diego and Arizona Eastern Railroad; now within Anza-Borrego Desert State Park. **Ownership:** Charles Dunston, Dulzura, owns one 160-acre unpatented association placer claim (1958).

"The limestone deposits in the Dos Cabezas area were described first in 1925 by W. B. Tucker (1925, p. 370) who reported that 480 acres in Sections 22, 23, 26, and 27 were claimed by M. A. Turner and Associates of San Diego. R. W. Heathman (stepfather of the present owner) and others, relocated the NE. ¼ of Section 27 in 1924. The property remained idle until 1950 when it was leased to the Campo Milling Corporation which processed limestone mined from this deposit in the Pacific Mill at Campo (see also Pacific Deposit, under 'Feldspar'). This company produced roofing granules, chicken grit, and agricultural limestone for two or three years.

"Most recently the property was leased to Don Weaver, of Jacumba, who mined about 5,000 tons of limestone from it. Most of this material was crushed, screened and bagged adjacent to the railroad at Dos Cabezas (Photo 49). About two-thirds of the material mined was ground to minus 1/8 inch, plus 10-mesh, and marketed in Southern California as roofing granules. The rest was ground to minus 10-mesh and sold as poultry grit in San Diego. The property was mostly idle from early 1957 until early 1960, when Weaver began mining limestone from it for use as decorative stone in San Diego region.

"Photo 49. **View north across limestone milling equipment at Dos Cabezos siding toward Heathman crystalline limestone deposits in low hills in background.** Principal quarry (photo 50) is visible just to left top of wooden loading ramp." (pp. 178)

"The Heathman property lies within the area covered by the Dos Cabezas limestone deposits which are shown herein on Fig. 42 and Photo 46. The property includes a group of low, closely adjacent hills which are underlain by irregularly layered biotite schist, subordinate crystalline limestone, and minor quartzite. These rocks are cut by irregular intrusive bodies of diorite and quartz diorite and thin dikes of granite pegmatite and aplite. The layered rocks, which are of preCretaceous age, most commonly strike north-northeastward and dip moderately to steeply west-northwest. The limestone layers are irregular in plan and vary widely in dip, length and thickness. Those layers that have been mined range in dip from about 30º -55º northeast, in thickness from 40 to more than 100 feet, and in length from less than 300 to about 1,000 feet. The limestone is fine- to very coarse-grained, and ranges in color from white, to white with alternating gray bands composed of calcite and finely disseminated graphite, or alternating pale orange bands composed of calcite and finely disseminated garnet. Uncommonly to sparsely distributed in the limestone are thin layers of schist and thin layers of tactite composed chiefly of red-brown garnet and green diopside.

"The following average composition was calculated from analyses of four random-type samples collected by O. E. Bowen, Jr. of the Division of Mines and Geology, from the quarry described above: (analyses by Abbott Hanks, Inc., San Francisco, June 1955): SiO_2, 3.46 percent; Fe_3O_4, 0.03 percent; Al_2O_3, 2.46 percent; CaO, 50.68 percent; MgO, 0.96 percent; and P_2O_5, trace. In addition to roofing rock, decorative rock, and chicken grit, rocks of this composition might be used as steel flux (if it does not descrepitate when heated) as agricultural limestone, concrete aggregate, ballast, and road base. Because of the presence of the intrusive rocks, and zones of biotite schist within the limestone layers, these deposits must be mined selectively.

"The deposit has been worked mainly from two quarries, about 500 feet apart, which are about one-fourth mile north of Dos Cabezas. The larger of the two quarries is about 125 to 150 feet long, about 50 to 75 feet in maximum width, and 20 to 30 feet high along its main face (Photo 50). Additional workings comprise three

shallow cuts, two of which lie about one-fifth mile northeast of the main quarries, and one which lies about one-fourth mile to the west. (Also see 'Unnamed (Lime)' in the tabulated list.)

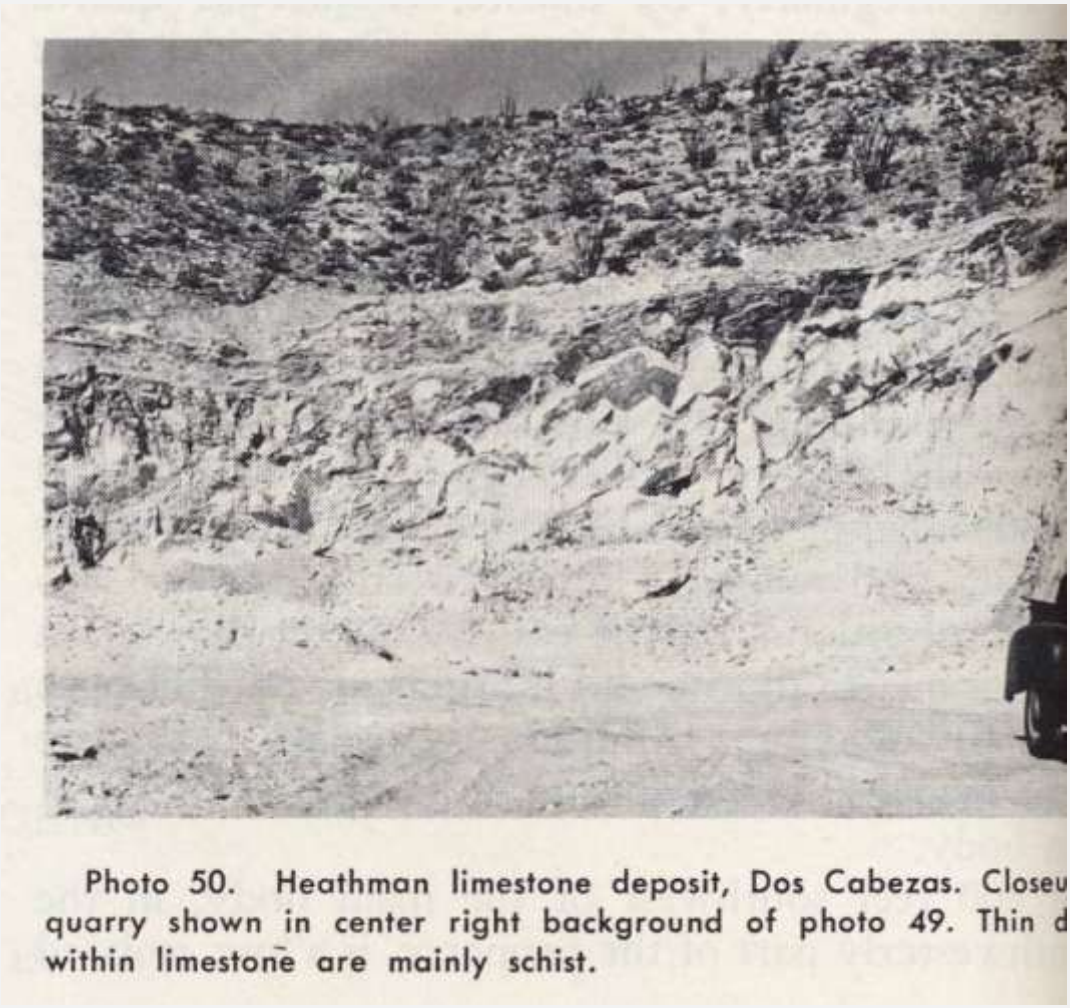


Photo 50. Heathman limestone deposit, Dos Cabezas. Closeu
quarry shown in center right background of photo 49. Thin d
within limestone are mainly schist.

"Photo 50. **Heathman limestone deposit, Dos Cabezes.** Closeup of main quarry shown in center right back-ground of photo 49. Thin dark layers within limestone are mainly schist." (pp. 178)

Jamul Ranch (Jamul Portland Cement Co.) Deposit

"**Location:** Near the center of the E. ½ Sec. 27 (projected), T. 17 S., R. 1 E., S.B.M.; about 18 miles east-southeast of San Diego City Hall, on the Jamul (Daley) ranch. The deposit is on the mesa-like crest of a group of low hills, about 2 ½ miles by dirt road and trail south-southwest of the ranch headquarters. Ownership: Daley (George R. Daley) Enterprises, Murphy Canyon Road, San Diego (1957).

"The Jamul Portland Cement Company was organized in 1889 to manufacture portland cement. In 1891 this company placed into operation on the Jamul Ranch a small plant of 150 barrels per day capacity (Irelan, 1890, p. 309-310; Storms, 1893, p. 383). The venture lasted less than one year, however. Apparently the cost of transport between the plant and San Diego was higher than had been anticipated; thus the price of the cement was not competitive with that of portland cement shipped from England to San Diego via water. This enterprise represented the second attempt in California to produce portland cement. The site of the plant is on the east side

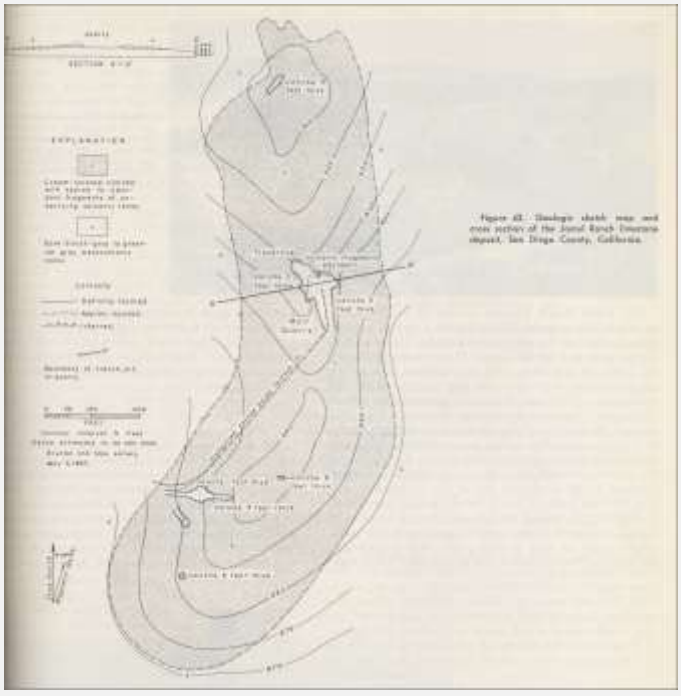
of Jamul Creek Valley, about 700 yards west-northwest of the deposit from which the raw material was supplied.

"The Jamul Ranch Deposit consists of a thin mantle of caliche-like material which lies on a gently humped surface underlain by metavolcanic rocks (Fig. 43). The deposit is about 1,400 feet long, 350 feet in average width, and ranges in thickness from less than one foot on the edges to between six and eight feet in the middle. Approximately 85,000 tons of material remain in the deposit (calculation based on an average thickness of six feet through the north-trending crest and an average density of 2.0). The carbonate rock is cream-colored, commonly porous, and poorly indurated (Photo 51). It most resembles Caliche, although the origin is not obvious. In a single exposure at the northwest end of the northern quarry (Fig. 43) the material has a travertine-like appearance. Throughout the deposit the carbonate rock is mixed with angular fragments of the underlying metavolcanic rocks which consist of dark grayish-green, dark grayish-blue and dark-gray meta-andesite and meta-basalt. These fragments are sparse to abundant and range in length from less than one inch to three feet.

"Following are analyses of samples collected from the deposit by O. E. Bowen, Jr., of the California Division of Mines and Geology (analyses by Abbott Hanks, Inc., San Francisco, June 1955).

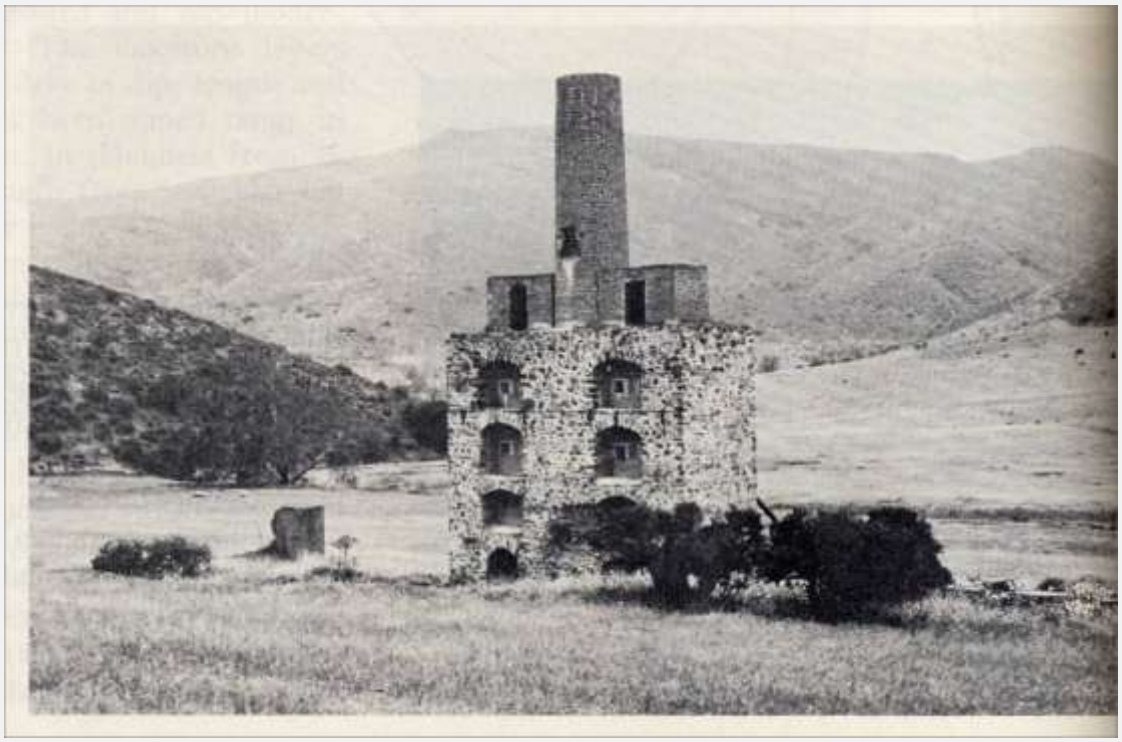
	SiO_2	**Fe_3O_4**	**Al_2O_3**	**CaO**	**MgO**	**P_2O_5**
North quarry	8.32%	0.28	1.16	48.49	1.23	0.02
South quarry	13.34	0.61	3.20	44.24	1.40	0.15

"The deposit is developed by a north-northwest trending (north) quarry about 160 feet long near the center of the deposit, and an east-trending, partially quarried trench (south quarry) about 140 feet long near the southwest boundary (Fig. 43). There are also two 50-foot exploratory pits. A road bed that resembles the bed of a narrow gauge railroad extends from the north quarry to the plant site and north along the east slopes of Jamul Creek Valley.



"Figure 43. **Geologic sketch map and cross section of the Jamul Ranch limestone deposit, San Diego County, California**." (pp. 179)

“The remnants of the old cement plant remain on the property (Photo 52). These consist mainly of a large stone and brick structure which houses three vertical kilns, each about 6 ½ feet in diameter (Bowen, 1954). The structure is 35 feet high and the stack extends another 30 feet. The kilns were probably wood-fired. A few yards to the north of the structure are the remains of five pot kilns, each also about 6 ½ feet in diameter.



“Photo 52. **Remains of kiln of Jamul Cement Company plant, Jamul Creek Valley, 1957**.” (pp. 180)

Verruga (Verruga Marble) Deposit

“Location: Center E. ½ W. ½ Sec. 10, T. 11 S., R. 4 E., B.M.; 2 ¾ miles west-northwest of Ranchita store, low on the southwestern slope of San Ysidro Mountain. Ownership: Constance J. Ehrnke, 543 E. Grand Ave., Escondido, owns one patented 20-acre placer claim which comprises the SW. ¼ SE. ¼ NW ¼ and NW. ¼ NE. ¼ SW. ¼ Sec. 10 (1958).

“The Verruga Deposit was first worked from 1921 to 1923 when the Verruga Marble Company, of San Diego, quarried limestone from it for use as building stone, finished stone (or marble) produced by the company was used in the construction of several buildings in San Diego, for the Lee Highway Milestone opposite the U. S. Grant Hotel, also in San Diego. The quarried stone was cut and polished on the property. The operation ceased reportedly because transportation costs of $8 per ton from the quarry to the railroad at Lakeside proved too high (Tucker, 1925, p. 372). More recently, the part of the deposit covered by the White Peak property, which is described in the accompanying tabulated list, was worked for crushed stones as roofing granules. The Verruga Deposit consists of two nearly parallel, elongate bodies of crystalline limestone which cut a west-southwest trending interfluve. The more westerly body strikes north-northeastward, and the more easterly one north-northwestward. The distance between the bodies widens southward from about 250 feet at the north to 600 feet

at the south. Both are enclosed in schist and dip about 75º to the west. The more westerly of the bodies the more extensively developed. It is exposed nearly continuously along its strike for about 1,200 feet, and ranges in width from less than 25 to probably no more than 100 feet. At the south end it is about 25 to 30 feet thick. The limestone is white to pale bluish-gray, dense, and coarse- to very coarse-grained. The body was worked along its southeastern edge from two small quarries which are about 150 feet apart. Each of the quarries trends northward. The more southerly one is about 150 feet long and its face has a maximum height of about 30 feet (Photo 53.) A short inclined shaft was sunk from a point at the base of the face. The more northerly quarry is about 75 feet long and its face has a maximum height of about 25 feet. An inclined shaft also was sunk from a point at the base of the face of this quarry. The part of the limestone body opened by this quarry is interlayered with a band of schist about five feet thick.

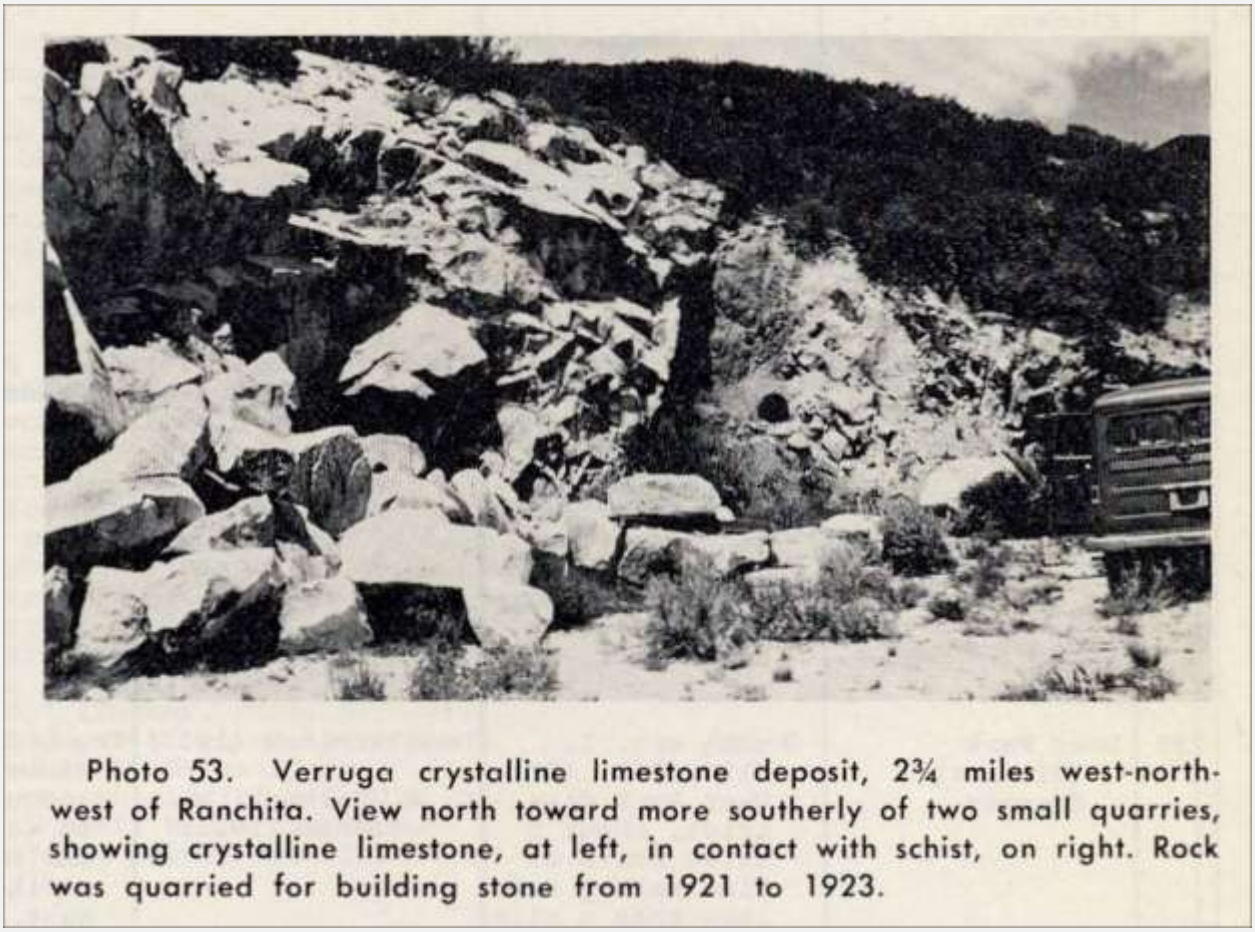
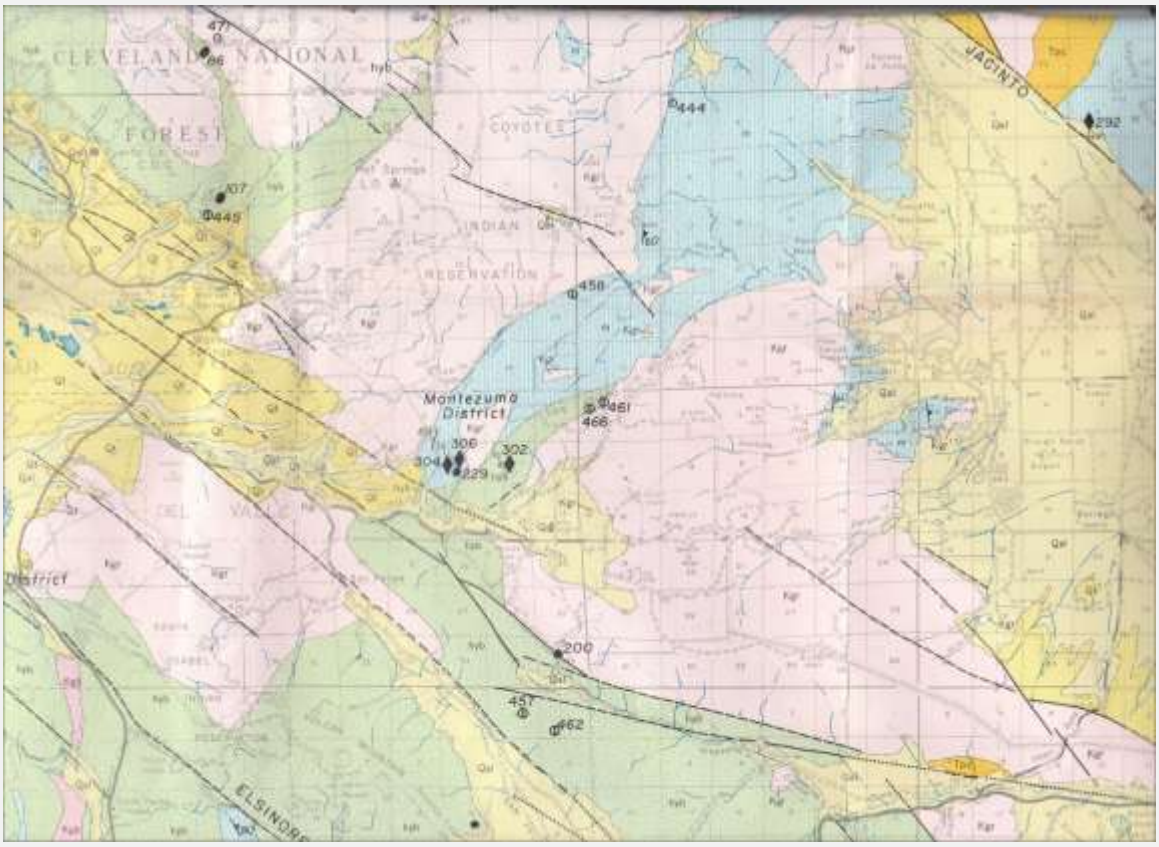


Photo 53. Verruga crystalline limestone deposit, 2¾ miles west-northwest of Ranchita. View north toward more southerly of two small quarries, showing crystalline limestone, at left, in contact with schist, on right. Rock was quarried for building stone from 1921 to 1923.

"Photo 53. **Verruga crystalline limestone deposit, 2 ¼ miles west-northwest of Ranchita. View north toward more southerly of two small quarries**, showing crystalline limestone, or left, in contact with schist, on right. Rock was quarried for building stone from 1921 to 1923." (pp. 181)

"The more easterly body is about 750 feet long and as wide as 100 feet. Its northern part is covered by the White Peak property."



The above map section shows the Montezuma District, which is a portion of Plate 1, "Geology and Mineral Resources of San Diego County, California, compiled by F. Harold Weber, Jr., 1958-59, Base map adapted from Map of San Diego County, by California State Division of Forestry, 1957 (large, folded loose in the back pocket of the book)

Note: *A larger version of the Montezuma District section is available on our web site at the link below:*
http://quarriesandbeyond.org/states/ca/quarry_photo/ca-san_diego_maps.html

List of Quarries/Deposits shown in the above Montezuma section of Plate 1:

(Below is a list of the quarries shown in the Montezuma section of the Plate 1 map. For more detailed information on the quarries listed below: (1) Search for the quarry names in this pdf document, (2) Visit the "Ranchita" section of our web site at the first link below, or (3) Read the book online on the Internet Archives at the second link below. Peggy B. Perazzo)
http://quarriesandbeyond.org/states/ca/quarry_photo/ca-san_diego_photos_7.html
http://archive.org/details/geologyandminer03webe

* **Verruga Marble Deposit/Quarry (#304)**, located north of Montezuma Valley (pp. 184)
* **Volk Deposit** (See "White Peak Claim") (pp. 184)
* **White Cap (Blockman Deposit), east of Jacumba (#305)**, located east of Jacumba (pp. 184)
* **White Peak Claim (Volk Deposit) (#306)**, located 2 2/3 miles west-northwest of Ranchita store on the south slope of San Ysidro Mountain. (pp. 184)

"Following are chemical compositions calculated from analyses of six samples collected from the western body (described above) by O. E. Bowen, Jr., and C. H. Gray, Jr., Division of Mines, and analyzed by Abbott A. Hanks, Inc., San Francisco (June 27, 1957). (1) The first composition is based on an average of analyses of four samples collected from the more southerly of the two quarries. (2) The second is an analysis of a single sample collected from near the western margin of the western body. (3) The third is an analysis of a single sample collected from the more northerly of the two quarries."

	SiO_2	Fe_3O_1	Al_2O_3	CaO	MgO	P_2O_5
(1)	0.20	0.05	0.05	55.42	0.27	0.14
(2)	1.51	0.17	0.39	47.16	6.44	0.02
(3)	0.14	0.04	0.04	55.18	0.33	0.51

"In addition to having been a source for dimension stone, the deposit might be considered as a possible source of lime for use in the manufacturing of glass, although most users prefer rock that contains no more than 0.02 percent ferric oxide. Rock from the deposit would probably average 0.05 percent, or more, ferric oxide. Other uses for the deposit might also be considered. However, it is too small to be considered as the source of limestone for a cement plant."

White Cap (Blackman) Deposit

"**Location:** W. ½ Sec. 11, T. 18 S., R. 8 E., S.B.M., about three miles due east of Jacumba, adjacent to the Mexican border. **Ownership:** Bryan H. Hathaway, 4567 Florida St., San Diego 16, holds one unpatented 20-acre placer claim (1958).

"The White Cap Claim covers a small deposit of limestone which crops out of nearly flat terrain. Although the claim was located in the early 1940's, the deposit has been known for many years and was discussed briefly by Tucker (1925, p. 372). Crushed stone, for use as roofing granules and poultry grit, has been produced from white rock in the deposit by J. H. Hubble, Jacumba, during the mid-1940's and by Don Weaver, Jacumba, in 1951. Weaver selectively mined about 1,000 tons of white magnesian limestone which was ground to minus three-eighths inch, plus 10-mesh in a crude mill on the property. The mill was nearly intact in March 1957. Its capacity is about five tons per hour.

"This deposit consists of a lens of crystalline magnesian limestone, with minor proportions of tactite, in schist. The lens strikes N. 30º W. and dips 60 º to 75 º west. It is between 500 and 600 feet in length and between 100 and 150 feet in maximum width. The limestone ranges from pure white, through white with speckled-gray bands, to pale gray. The tactite is an alteration of silica-rich strata in the limestone. It is gray-green, very fine grained, and composed mainly of diopside, red-brown garnet, and minor quartz. These rocks have been cut by small bodies of quartz diorite.

The following average composition was calculated from analyses of four random-type samples collected by O. E. Bowen, Jr., of the Division of Mines and Geology from this deposit (analyses by Abbott Hanks, Inc., San Francisco in June 1955): SiO_2, 0.64 percent; Fe_3O_4, 0.11 percent, Al_2O_3, 0.35 percent; CaO, 38.36 percent; Mgo, 14.28 percent; and P2O5, trace.

"Development consists of several shallow cuts and trenches."

*(NOTE: To view the table that list the deposits in San Diego of "**Limestone (dolomite)**," see pp. 182-184 in this book on the Internet Archive at the following link.) http://archive.org/details/geologyandminer03webe)*

Orbicular Gabbro (pp. 201)

"Three deposits of orbicular gabbro are described in the tabulated list below. The rock is discussed more generally herein under 'Gem Minerals' and under 'Gabbroic Rocks' in the section on 'Sand and Gravel, and Crushed and Broken Stone.' See also under 'Gabbroic Rocks' in the section on 'Geologic Features.'"

*(NOTE: To view the table that list the deposits in San Diego County of "**Orbicular gabbro**," see pp. 201 in this book on the Internet Archive at the following link.) http://archive.org/details/geologyandminer03webe)*

Crushed and Broken Stone (pp. 230-252)

"Crushed stone is an important aggregate material and also is used as road base, roofing granules, poultry grit and drain rock. Broken stone is used mainly as riprap (see section on 'Products and Marketing'). The sources of crushed and broken stone are described below.

"**Granitic Rocks**. Partly decomposed granitic rocks near metropolitan areas of the county are a source of 'decomposed granite' ('DG'), which is used as fill material, road base and drain rock. Granitic rocks also are a major source of the broken stone used as riprap , and have been a source of small quantities of the crushed stone used mainly for roofing granules.

"A large part of the interior of San Diego County is underlain by partly decomposed granitic rocks (see Pl. 1). Because of the low cost of decomposed granite, however, deposits of commercial interest occur only along the western edge of the exposed part of the batholith in Southern California, between 8 and 20 miles of the coast and within a few miles of the centers of consumption. Deposits of granitic rocks suitable for use as sources of decomposed granite are weathered deeply, probably to depths ranging from 10 to 100 feet or more. Residual boulders of undecomposed rock generally are common throughout most of the commercial deposits. In San Diego County the granitic unit that commonly is the most deeply weathered is the Green Valley tonalite, which is exposed widely in the western part of the batholith (see section on 'Geologic Features.').

"In 1958, decomposed granite was being obtained commercially from 22 deposits by 17 companies, many of which were construction companies that used their production solely in their own construction projects. In the San Diego region, six deposits were active in the hills south of El Cajon, four in the hills south of Lakeside, two near Poway, and one in the Mission Gorge area (for names of operators, see accompanying tabulated list). In the northwest region of the county, five deposits were being worked in 1958 near Vista, three near Escondido, and one near San Marcos. In addition to the company-operated pits, a moderate number of small 'DG' pits were being operated sporadically by the County of San Diego for use mainly in road work. The State of California was operating one pit for the use of firms holding state contracts.

“Decomposed granite generally is excavated with bulldozers which rip the surface of the deposits, then shove or carry the loose material to bunkers, where it is stored for processing or loaded for transport. Residual boulders are shoved to one side of the property (Photo 74).

“Photo 74. **Decomposed granite operation at Jamacha Junction of San Diego Cement Company subsidiary of Caudell and Johnson; view southwest**. Tractor scrapers shave ‘DG’ into bunker (left); oversize boulders are discarded in area shown at right edge of photograph. From bunker, material is either transported by belt to mill shown above, or used without processing.” (pp. 230)

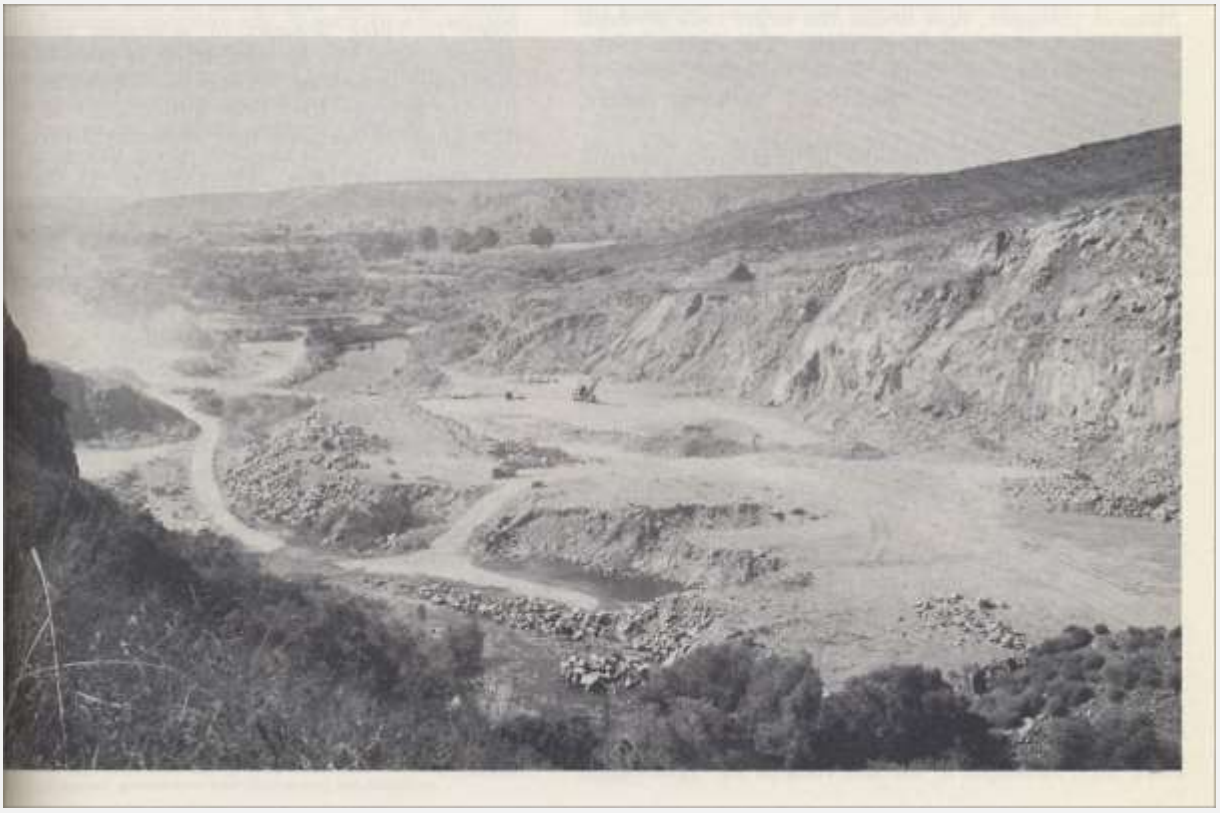
“The degree to which decomposed granite is processed depends on the products each operator sells. If the material is marketed as fill it is sold generally without any treatment. For other uses it may be screened, and at the Caudell and Johnson operation (Photo 74) at Jamacha Junction, the excavated fragments are broken down with a jaw crusher. Because most decomposed granite deposits are superficial, operators use portable processing equipment which can be disassembled quickly and moved to other sites.

“Relatively unweathered granitic rocks of Cretaceous age have been the source of a major proportion of the broken stone quarried in the county for use as riprap; they also have been a source of small quantities of crushed stone used for roofing granules and poultry grit (see Campo Milling Company, Hatfield Creek Quarry, and A.G. Foster in accompanying tabulated list.)

“During the mid- and late-1950’s two deposits of granitic rocks were quarried for riprap, both by the J. R. Stringfellow Company, of Riverside. These deposits are the Marron Quarry, near Oceanside; and the Meadowlark Ranch Quarry, north of Rancho Santa Fe. The former quarry was operated only for a short period in the mid-1950’s because it yielded fragments only as large as 10 tons, and the operator needed 20-ton fragments for construction of a jetty. The Meadowlark Ranch Quarry, which was opened in 1957 to replace the Marron quarry, yields fragments that range from five pounds to 20 tons.

"**Metavolcanic Rocks**. Metavolcanic rocks in the southwestern part of San Diego County are mainly a source of (1) crushed stone for use as bituminous and portland cement aggregate; and (2) broken stone, for use as riprap. In addition, small tonnages of these rocks have been used as roofing granules and very small quantities as decorative stone (see also in the section on 'Products and Marketing'). The geology of the metavolcanic rocks is described in the section on 'Geologic Features.'

"Two companies – Canyon Rock Company (V. R. Dennis) and K. H. Golden Company – currently produce crushed stone from metavolcanic rocks. Both operators work deposits in the Mission Gorge area, north of Grantville. Canyon Rock Company has operated a quarry in this area since 1929, and now produces both crushed and broken stone. It is the only operator in the county that produces all of the so-called standard sizes of coarse aggregate from metavolcanic rocks (see 'Aggregate' in section on 'Products and Marketing'). All other operators that produce all of the standard sizes of aggregate utilize the constituents of the Poway conglomerate. Canyon Rock Company works its quarry by benching, using blast holes drilled as deep as 150 feet with wagon drills (Photo 75). The quarried stone is processed by use of a primary jaw crusher, screens, secondary jaw crusher, classifiers, cone crushers, log washers, and final classifiers. Plant capacity is about 200 tons per hour. K. H. Golden Co. Inc., produces three sizes of crushed stone for use as aggregate in bituminous concrete.



"Photo 75. **Canyon Rock Company operation of V. R. Dennis at Mission Gorge**; **view southwest**. Company produces sand from bed of San Diego River (left background) and crushed stone from massive metavolcanic rocks shown in quarry walls. Mission Valley is at left in distant background."

"During the early part of the century the Independent Stone Company produced large quantities of aggregate from a deposit of metavolcanic rocks near Spring Valley (see description in accompanying tabulated list). This company, through mergers, became the H. G. Fenton Material Company, now one of the larger rock products

companies in the San Diego region. During the 1910's and 1920's the San Diego Stone Company produced crushed stone products from the Sweetwater quarry near Sweetwater Dam.

"During the 1940's, exposures of gray-green metavolcanic rocks a few miles northeast of Rancho Santa Fe were quarried for use as roofing granules (see Calavera Rock Company, and Carmean and Greenstone quarries in accompanying tabulated list). A deposit of similar rocks near Carlsbad has been a source of small quantities of decorative stone (see Evans Point Deposit in accompanying tabulated list).

"Near Dulzura a deposit of hydrothermally altered, yellow-brown to brick-red metavolcanic rocks has been prospected as a possible source of decorative stone (see Dulzura in accompanying tabulated list).

"**Volcanic Rocks of Tertiary Age**. Small quantities of crushed stone for use as roofing granules have been produced sporadically near Jacumba from a layer of brick-red to grayish-pink lapilli tuff of Miocene age (also see section on 'Geologic Features'). As the lapilli of this rock average less than one inch in diameter and are poorly cemented, the rock can be mined easily without blasting, by use only of a bulldozer with ripper attached. The material mined has been prepared for sale simply by crushing (see Weaver Deposit in Accompanying tabulated list). Attempts to use this rock as an 'agricultural mineral' and as aggregate for concrete blocks have failed. It apparently is too reactive to be used as concrete aggregate, and the State Board of Chemistry has ruled that for agriculture the material can be sold only as 'soil amendment.' (See Weaver Deposit and McGuffie Foundation in accompanying tabulated list.)

"A body of dacite, east of Oceanside, yielded crushed stone for use as concrete aggregate and road base during a short period in the 1930's (see Calavera Rock Company in accompanying tabulated list).

"**Crystalline Limestone and Dolomite**. Several operators occasionally have worked deposits of crystalline limestone in San Diego County as sources of crushed stone for use as white roofing granules and poultry grit. These deposits are the Heathman and Elliot Deposits near Dos Cabezas, the White Cap Deposit near Jacumba, and the White Peak Deposit near Ranchita (for descriptions of deposits, see section on 'Limestone – Dolomite'). The Heathman Deposit also has been worked for decorative stone.

"**Shale of Tertiary Age**. In some localities in California, shale has been used as fill material. Shale exposed in San Diego County (Rose Canyon shale in coastal area and several units in desert area) is not hard enough to be considered as a source of crushed stone (see also 'Shale, Expansible').

"**Gabbroic Rocks**. National Quarries, Inc., Escondido, has sold some dark bluish-gray gabbro for use as decorative stone (see description in text under 'Dimension Stone'). Three deposits of orbicular gabbro in the county might also be considered as possible sources of decorative stone (see section on 'Orbicular Gabbro'). Roofing granules have been a byproduct of the Escondido Quarries operation near Harmony Grove.

"**Pegmatite Deposits**. The White Butte Pegmatite Deposit, south of Boulevard, and the Rose Quartz Deposit near Mesa Grande, have been worked for small quantities of quartz for use as decorative stone in gardens and in walls. Other deposits that contain appreciable quantities of quartz, some with a pale pink tinge, are described herein under 'Quartz and Quartzite.'

"Some types of pegmatite, especially 'line rock,' may prove desirable as decorative stone (see section on 'Gem Minerals'). Pegmatite was used for this purpose in the construction of the Singing Hills Country Club.

"**Dumortierite-Bearing Rock**. A dike-like body, south of Alpine, that contains lavender dumortierite, is a possible commercial source of decorative stone (See Dehesa Dumortierite Deposit in section on 'Kyanite, Sillimanite, Andalusite, Dumortierite and Topaz").

Products and Marketing

"The following sand and gravel, and crushed and broken stone products were marketed in San Diego County in 1958: concrete aggregate, riprap, fill material, road base, roofing granules, drain rock and decorative stone.

Aggregate*

(* Aggregate is divided into two principal size ranges: fine aggregate and coarse aggregate. Fine aggregate is composed of sand-size particles which range in diameter from 200-mesh to ¼-inch, and coarse aggregate is composed of particles larger than ¼-inch. Fine aggregate is subdivided into interior plaster sand (No. 4 to 0) and portland cement concrete sand (1/8-inch to 0). The range and proportion of sizes of fine and coarse aggregate for individual uses and jobs is determined by various sets of standard and special government and commercial specifications.)

A large part of the processed sand and gravel, and crushed stone produced in San Diego County is used as aggregate in portland cement concrete and bituminous concrete (asphalt). A part of the processed sand produced also is marketed as aggregate for interior plaster. The average price of fine aggregate (sand) marketed in the county in 1957 ranged from $0.75 to $1.50 per ton plus delivery charge. The Woodward Sand Company, however, was selling a relatively high quality plaster sand for $1.80 per ton. The Crystal Silica Company markets a very high quality plaster sand. In 1959, concrete sand produced at the Otay operation of Nelson and Sloan was selling for $2 per ton, while plaster sand that was being produced cheaply by the same company from the Tia Juana River bed was sold for $1 per ton. Most of the fine aggregate produced in the county consists of processed sand obtained from river and streambed deposits. A small proportion is obtained from the Poway conglomerate, and a very small proportion from the San Onofre breccia, and from sandstone of Eocene age.

"The following sizes of coarse aggregate, or coarse and fine aggregate combined, are produced most commonly in the county: 3/4-inch to dust; 1/8-inch to 5/8-inch ('pea gravel'); minus 5/8-inch to 1 inch (variously called 5/8-in or ¾-inch); 1 inch to 1 ½ inches; 1 ½ inches to 2 ½ inches; and 2 ½ inches to 3 inches (produced infrequently). Only the five largest companies produce all of these sizes of aggregate. The sizes used most commonly for portland cement concrete are ¾-inch to 1 ½ inches; and for bituminous concrete are ¾-inch to dust. In 1957 the price of coarse aggregate in San Diego County ranged from $1.50 to $1.80 per ton, plus delivery charge. Coarse aggregate for use in portland cement concrete consists mainly of processed gravel obtained from (1) the Poway conglomerate and its derivatives, and (2) riverbed deposits. "Aggregate for use in bituminous concrete consists mainly of processed sand and gravel from the Poway conglomerate and its derivatives and crushed stone processed from metavolcanic rocks. Some bituminous aggregate is produced from riverbed deposits. Ideally crushed stone is considered too harsh (too angular) for use as portland cement concrete aggregate, but a substantial proportion of the crushed stone production of one operator in the county –

Canyon Rock Company – is used for this purpose. Most sizes of coarse aggregate produced in the county consist chiefly of fragments with at least one artificially broken face.

"The total production of aggregate of some companies, and a large proportion of some of the others, is used in adjacent bituminous (black top) and portland cement concrete mix plants. For example, H. G. Fenton Material Company produces 'Pre-Mixed Concrete' at its Mission Valley operation.

Riprap

"In 1957, nearly 250,000 tons of riprap, valued at almost $1,000,000, was produced in San Diego County (San Diego County Division of Natural Resources, 1957, p. 20). During that year at least 95 percent of the stone produced was used in the Mission Bay Park Project to construct jetties and to cap or line the sides of man-made islands.

"Fragment size and classification of stone used for riprap generally are different for each job. Classes A and B stone used for shore facing in the Mission Bay Park Project range in size as follows: Class A, 1 pound to 1 ½ tons; Class B, 1 pound to 3 tons; with specified percentages of sizes within the general classes. Blocks to face the Mission Park jetty ranged from 7 to 20 tons; the core of the jetty was constructed of quarry-run material, with the largest pieces as heavy as five tons.

"During the 1950's, riprap also was used in San Diego County in construction of the 10th Avenue mole pier; the San Diego River Flood Control Project; Sutherland Dam north of Ramona; and in naval seafront projects. In 1957, J. R. Stringfellow Company, of Riverside, was the principal producer of riprap in the county.

"In the past, large quantities of riprap have been used in construction of dams and for waterfront projects. Included with these are the Sweetwater Dam, 1887; El Capitan Dam, 1933-35; and the San Diego breakwater, 1894. For the breakwater, A. F. Babcock obtained riprap from a deposit of granite rocks near Foster. The Simpson-Pirnie Company, which was active from 1887 to 1932, produced riprap and rubble as well as dimension stone (it is described in the section on 'Dimension Stone'). National Quarries, Incorporated, one of the larger producers of dimension stone in the county, has sold granite for use as riprap in seafront projects at Camp Pendleton.

"In San Diego County riprap is produced from quarries in granitic and metavolcanic rocks which generally are not far from the marketing destination of the product. In 1958 the principal sources of riprap in the county were the following quarries: Meadowlark Ranch, near Rancho Santa Fe; Canyon Rock Company, Mission Gorge; and Fletcher quarries, Mission Gorge (see description in accompanying tabulated list).

"Riprap is quarried by use of various blasting techniques, including coyote hole blasting for obtaining larger material. The rock is loaded for transport with large tractors, shovels, and cranes. The cost of riprap depends on several factors, including size range, minimum and maximum sizes, and the variety of sizes of rock required. The average price of riprap in San Diego County in 1957 was about $4 per ton, including transportation and emplacement.

Fill Material

"Large tonnages of untreated decomposed granite, earth and sand are used as fill. In 1957, the average price of unprocessed decomposed granite for this use was about $0.50 per ton in San Diego County.

Road Base

"Large tonnages of processed gravel, crushed stone, and decomposed granite are used as road base in the county. Road base is a low cost commodity which commonly consists of three-fourths inch minus crusher-run material.

Roofing Granules

"Roofing granules have been produced from several sources in the county. The only production in 1959 was from a deposit of reddish lapilli tuff from Jacumba. In 1957, roofing granules also were being produced by grinding rejected bricks fired by the Union Brick Company (see also in section on 'Clay'). Granules have been a byproduct recently at the black granite (gabbro) dimension stone operation of Escondido Quarries. Relatively large quantities of gray-green granules were produced from exposures of metavolcanic rocks near Rancho Santa Fe from about 1940 to 1946. It is said that one of the reasons for lack of continuing success of this operation was that the gray-green color of the product was not readily acceptable at that time. White granules have been produced from crystalline limestone and dolomite at several localities. Granules also have been produced from relatively unweathered light granitic rocks (for descriptions of deposits see under 'Sources of Material, and Methods of Mining and Treatment').

Decorative (Ornamental, Garden) Stone

"The red rose quartzite, used mainly as facing, also is used as decorative stone (see description in tabulated list under 'Dimension Stone'). Small quantities of gray-green metavolcanic rocks, bluish-gray gabbro, and milk-white and pale-pink quartz have been used as decorative stone. Orbicular gabbro and some pegmatite (especially 'line rock') may prove more desirable in the future for this use. (For descriptions of these deposits see herein under 'Sources of Material, Methods of Mining and Treatment.')

Poultry Grit

"Poultry grit has been produced in San Diego County from crystalline limestone and from nearly unweathered granitic rocks.

Drain Rock

"Small tonnages of crushed stone, including decomposed granite, of 1 ½ inches minus, crusher-run material is used as drain rock.

Reserves

"Adequate sources of rock products will remain close to the advancing edge of metropolitan San Diego and its suburbs. As possible sources of sand there will be: (1) the bed of the upper part of the lower San Diego River; (2) the bed of the upper Sweetwater River; (3) the bed of the upper San Dieguito River; and (4) the quartz-sandstone of Eocene age which is exposed widely along the coast.

"As possible sources of sand and gravel, the Poway conglomerate and younger rocks derived from it probably are suitable at many localities. These localities include the upper part of Rose Canyon and the most westerly south-trending tributary of Los Penasquitos Canyon, near Sorrento."

*(NOTE: To view the table that lists the deposits in San Diego County for "**Sand and Gravel, and Crushed and Broken Stone**," see pp. 234-251 in this book on the Internet Archive at the following link.)*
http://archive.org/details/geologyandminer03webe)

Stone, Dimension (pp. 255-268)

"In 1958, granite and quartzite were being produced in San Diego County for use as dimension stone. The production of granite was by far the larger of the two and constituted one of the leading mineral industries in the county. This stone was being quarried by five companies from a total of eight quarries. During the year a single deposit of quartzite was being worked. During the 1920's, marble was quarried briefly from a single deposit for use as dimension stone.

Granite* (pp. 255-261)

(* "The term 'granite' is used commercially, and in this section of the report, to include any plutonic rock with a granitic texture.")

The production of granite for use as dimension stone has been a leading part of the mineral industry of San Diego County since 1898. Granite had been produced previously in the county, but only for use as riprap and rubble. The production of granite for use as dimension stone has risen from 6,588 cubic feet, valued at $4,875, in 1898, to a high in 1959 of 34,700 cubic feet valued at slightly more than $168,000 (San Diego County Division of Natural Resources, 1960, p. 14). In 1959, San Diego County was the leading source of granite for use as dimension stone in the State.

"The production of granite in the county has fluctuated markedly in the past. Periods of low production occurred during the 1910's, the early 1930's, and the early 1940's; periods of high production occurred during the early 1900's, the 1920's and from 1945 to 1960 (the present).

"About 37 granite quarries have been opened in the county since 1888. In 1958, five companies were working a total of eight of these quarries. The oldest and longest continuously operated granite-producing company in the county was the Simpson-Pirnie Granite Company which was active from 1888 to 1932. The most productive companies in 1958 were Escondido Quarries, Inc. and National Quarries, Inc. (see descriptions below).

"The most complete discussion of the granite industry of San Diego County is provided by Hoppin and Norman (1950, 19 p.)

Geology of the Deposits

"Granite is quarried in the county from bodies of gabbro and quartz diorite (including granodiorite) which are part of the batholith of Southern California (see description herein under 'Geologic Features'). Dimension stone produced from gabbro generally is termed 'Black Granite,' and ranges in color from dark gray, through dark bluish-gray, to very dark gray; stone produced from quartz diorite or granodiorite generally is called 'Gray Granite' or 'Silver-gray Granite,' and generally is pale gray in color. All but one of the present dimension stone operations lie along the western edge of the batholith, relatively close to centers of population and lines of transportation.

“Black granite is produced in the county from the San Marcos gabbro, which occurs as irregular bodies as much as several miles in maximum surface dimension (see Pl. 1). Most of the present output is from deposits in the Escondido and Vista areas. Formerly it was quarried from deposits in the Bernardo area. An exceptionally dark-colored stone is produced at quarry in the Pala area (descriptions of these areas are in section below named ‘Summaries of Areas’). Commercial black granite consists of large residual boulders of hard, fine- to medium-grained gabbro which are set in soft, partly decomposed gabbro (Photo 78). Workable boulders for use in making surface plates (which are used to calibrate delicate instruments) range in size from 5 to 25 feet, where plates 5 to 6 feet long are produced; boulders for use in making headstones and markers can be as small as 3 or 4 feet. The optimum diameter for boulders is perhaps eight feet (Roy Kepner, personal communication, 1958).

“The light-colored (gray) varieties of commercial granite are produced from pale gray quartz diorite and granodiorite, which compose a large part of the batholith of Southern California. In mid-1958 gray granite was quarried from only one locality; the National Quarries quarry at Foster (Lakeside-Foster-Santee area), near which are many inactive quarries (Photo 79). Gray granite has been quarried in the past from a deposit near La Cresta, and many years ago from deposits in the Grossmont-La Mesa area (see descriptions of areas below). The most suitable deposits generally consist of massive, ledge-like outcrops. Distinct jointing, sheeting, and fracturing patterns in the rocks cause them to be amenable to block quarrying (Hoppin and Norman, 1950, p. 15). Joint blocks vary considerably in size, and range in width from 1 foot to 10 feet. Sheeting surfaces generally are parallel to the ground surface, and the distance between sheets ranges from one-half foot to six feet.

"Photo 78 (right) **Residual boulders of gabbro (black granite) in weathered gabbro at locality near Vista**. Photo by Mary Hill." (pp. 256)

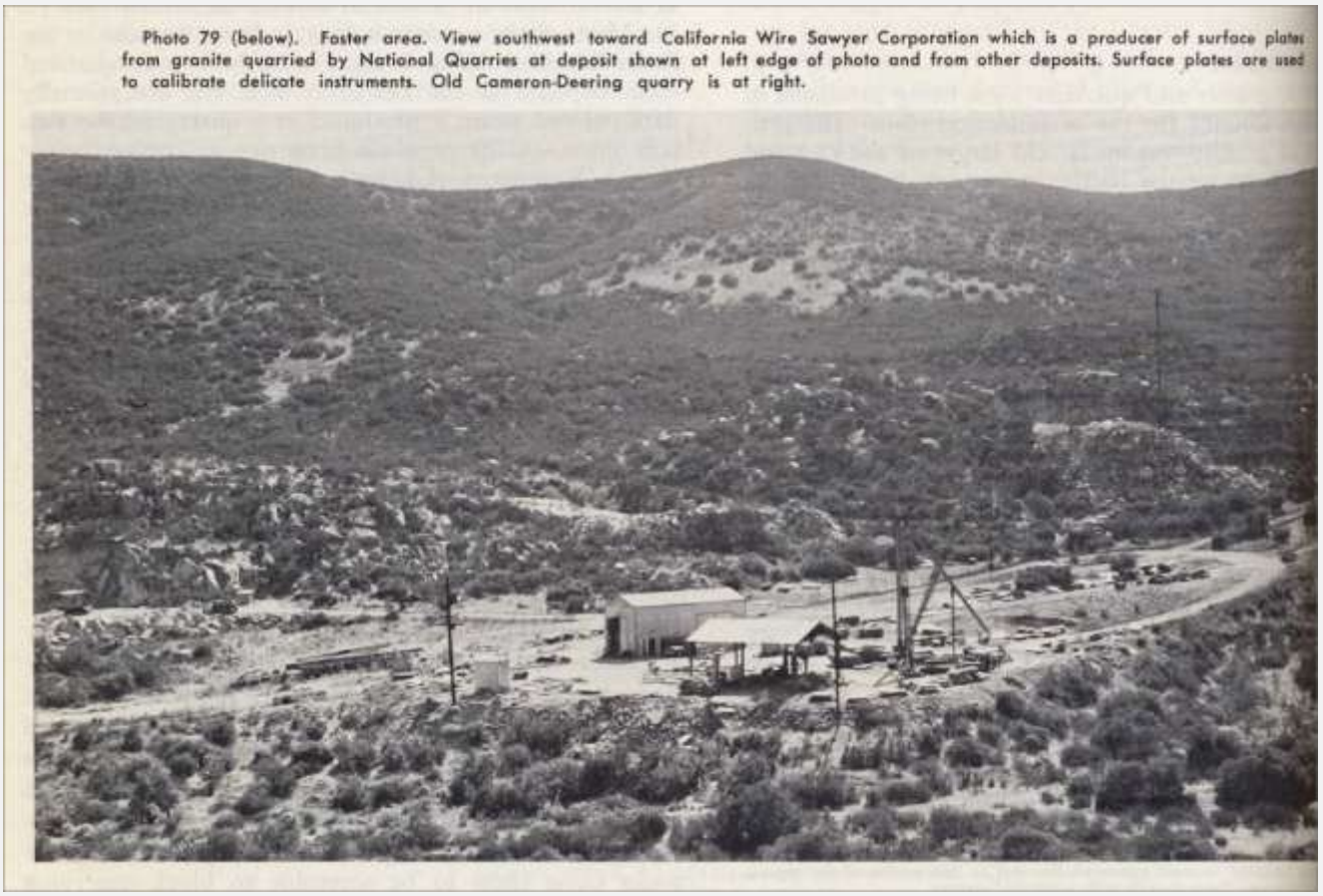
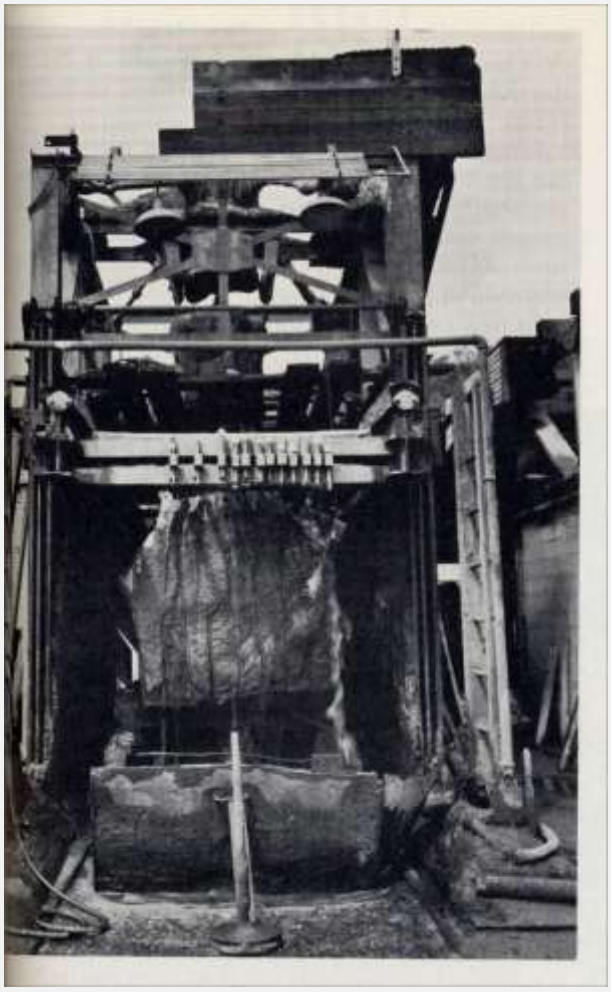


Photo 79 (below). Foster area. View southwest toward California Wire Sawyer Corporation which is a producer of surface plates from granite quarried by National Quarries at deposit shown at left edge of photo and from other deposits. Surface plates are used to calibrate delicate instruments. Old Cameron-Deering quarry is at right.

"Photo 79. **Foster area. View southwest toward California Wire Sawyer Corporation which is a producer of surface plates from granite quarried by National Quarries at deposit shown at left edge of photo and from other deposits**. Surface plates are used to calibrate delicate instruments. Old Cameron-Deering quarry is at right." (pp. 256)



"Photo 80. **Cutting a block of black granite into slabs with gang saw at Escondido Quarries, Inc. operation of Pacific Cut Stone Co**. Photo by Mary Hill." (pp. 257)

Photo 81 (below). Polishing slab of black granite at Escondido Quarries, Inc. operation of Pacific Cut Stone Co. *Photo by Mary Hill.*

"Photo 81 (below). **Polishing slab of black granite at Escondido Quarries, Inc. operation of Pacific Cut Stone Co.** Photo by Mary Hill." (pp. 257)

"Future sources of granite in San Diego County probably lie near quarries that already have been worked successfully, although parts of many additional granitic bodies probably would also be suitable. Important factors to consider when contemplating development of a deposit to be used as dimension stone have been described by Goldman (1957, p. 591-592): these include hardness and workability, texture, color and strength. The mineral composition of the rock is unimportant except that deleterious iron sulfide minerals must be absent. Most presently operated quarries in the county are within a few miles of a railhead. In the future, however, deposits of a special nature, such as perhaps those with an orbicular structure, may be quarried from deposits much farther from transportation facilities than the present operations.

Quarrying and Preparation of Stone*

(* "A large part of this section is summarized from a discussion by Hoppin and Norman (1950, p. 7-8).")

"The granite quarries of San Diego County are small to moderate in size and consist of two general types: shelf quarries and pit quarries.

"(1) The '**shelf' method of quarrying** is used to recover blocks of black granite from residual boulders of gabbro. Shelf quarries consist of horizontal, benchlike excavations. Boulders in the quarry face first are drilled, then blasted. The individual parts of the blasted boulders are transported to the quarry floor, with a derrick and boom, or with a bulldozer, where they are split into crude blocks with black powder. The Valley Granite Company, Escondido, drills boulders in place, as above, or attempts to determine the 'grain' or joint system of the boulders in place, then rolls them to the quarry floor and shoots them there.

"(2) The '**pit' method** is used mainly to work massive, ledgelike deposits of light-gray quartz-diorite or granodiorite (gray granite). This method takes advantage of the jointing and other structural textural features of the rocks. In pit quarries blocks are produced *in situ* by drilling, wedging, and blasting. The blocks then are removed by a derrick and boom for processing. A single deposit of gabbro is worked by use of the 'pit' method: this is the Vista Black Deposit, which is at the bottom of a small valley.

"After quarrying, blocks are cut into slabs with gang or wire saws, then polished (Photos 80, 81). A general discussion of quarry and preparation methods used in dimension stone industry of California is given by Goldman (1957, p. 603).

Uses, Markets and Prices

"Gray granite produced in San Diego County has been used since 1898 as monument and building stone, and during the 1910's and 1920's as paving blocks. Black granite was first produced in the county in 1921, and since the end of World War II has consttiuted (sic) more than 90 percent of the granite production in the county. Black granite is used for monument, building, fencing stone, and since about 1950 as 'surface plates' for calibration of delicate instruments. About 15 percent of the total production of granite in 1957 was used to make surface plates.

"Granite produced in the county is marketed throughout the United States and in Mexico and Canada (Hoppin and Norman, 1950, p. 9). In 1955 the value of uncut granite was $4.25 per cubic foot, f.o.b. quarry in California (Goldman, 1957, p. 605). Dressed monument stone was valued at $8.50.

"In mid-1958, four companies were both quarrying and finishing granite in the county for use as dimension stone: Pacific Cut Stone Company, Alhambra (Escondido Quarries, Inc.); Allied Granite Company, Los Angeles, Pomona Granite Company, Pomona; and Valley Granite Company, Escondido. The National 'Quarries, Inc., Escondido, was producing only unfinished stone. Five companies were finishing stone only: California Wire Sawyer Corporation, Lakeside; Clemens Granite Company, El Cajon; Escondido Granite

Company, Escondido, Pyramid Granite Company, Escondido; and Southern California Granite Company, San Diego."

Summaries of Areas

"Lakeside-Foster-Santee Area (Gray Granite). Twelve known quarries have been opened in this area, which includes the towns of Lakeside, the site of Foster, and Santee. Only one of the 12 quarries was active in mid-1958, however. The quarries are in ledge-like outcroppings of massive, light-gray granitic rock which ranges in composition from quartz diorite to granodiorite. At several points operators also have worked boulders on the surface. The stone produced in the area most commonly is marketed as 'Lakeside Silver-Gray Granite.'

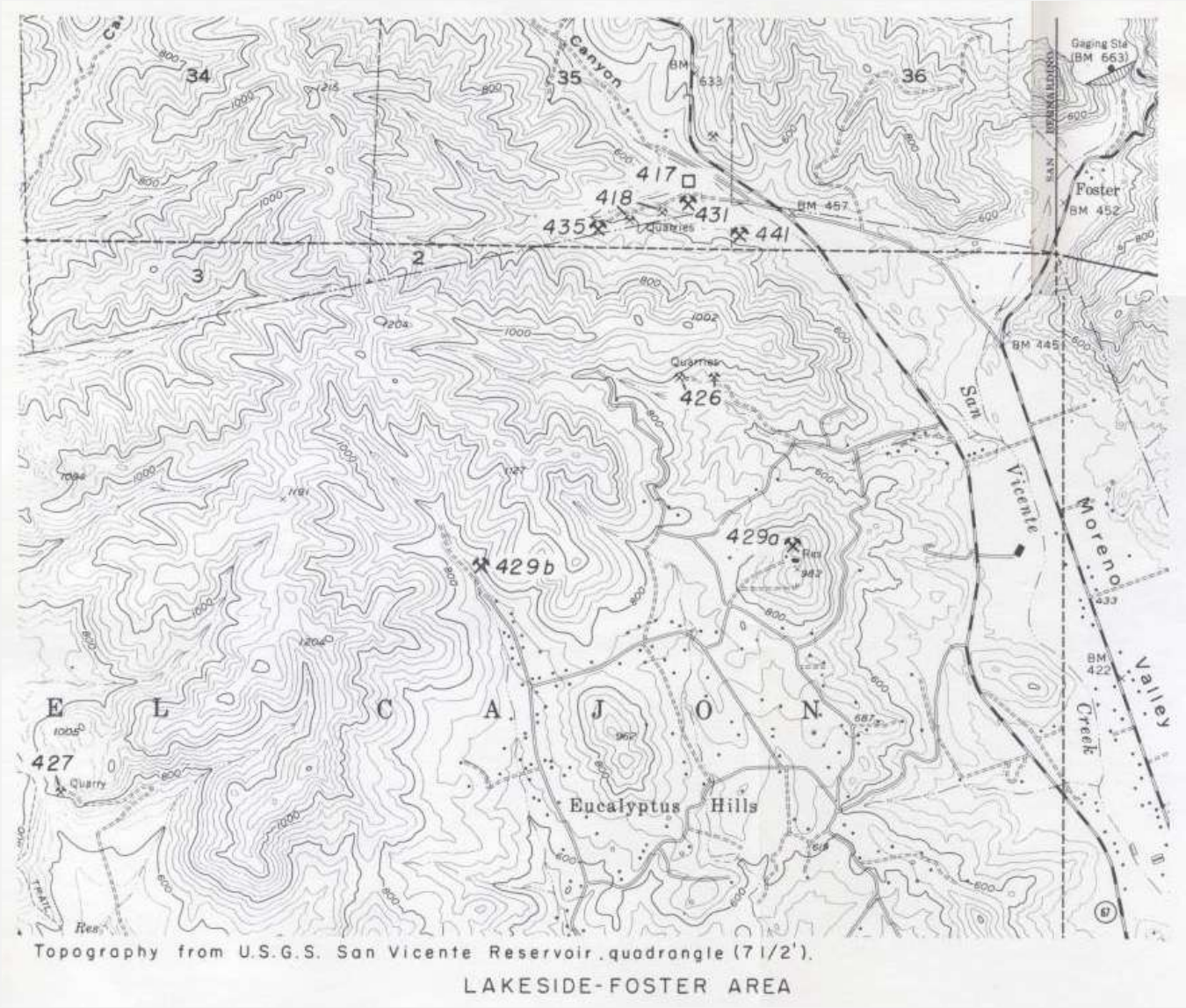
"Two of the quarries are near Santee, alongside the now-abandoned route of the San Diego and Cuyamaca Eastern Railroad which ran from San Diego to Foster. The more westerly of these two quarries was opened in 1888 by the Simpson-Pirnie Company, and worked by this company until 1932. It was probably the first granite quarry opened in San Diego County. The company produced riprap and rubble from 1888 to the early 1900's, paving blocks from about 1890 (?) to the mid-1920's, and monument and building stone during the period from at least as early as 1898 to 1932. The more easterly quarry was opened by Jose Covas in 1900 and worked by him until 1926, then by American Marble and Granite Company until 1941.

"A single quarry about 3 ½ miles northwest of Lakeside was operated by several firms and individuals between 1924 and 1949 (?). It was opened by McKoon and last operated by Matson Deering (see description in accompanying tabulated list under McKoon).

"Eight of the 12 quarries are near the site of Foster, which was the station at the north terminus of the San Diego and Cuyamaca Eastern Railroad. The sites of the original quarries were selected mainly because of the proximity to the railroad. The oldest known workings in the area were opened by the Waterman Granite Company in the very early 1900's at a point about one mile west of Foster. Two other quarries – one adjacent to, and the other about one-fourth mile west of the Waterman workings – were opened by the Simpson-Pirnie Company between 1906 and 1915 and worked by this company until 1932, then by Cameron-Deering in 1945 and 1946. The larger of these quarries now is considered by local operators to be too deep to be worked profitably (see description under Cameron-Deering in accompanying tabulated list).

"The Southern California Granite Company worked a quarry which is three-eighths of one mile west of the Waterman workings from 1919 to 1936. Simpson-Pirnie opened two more side-by-side quarries about 1 ½ miles southwest of Foster, worked them briefly in the late 1910's, then leased them to McGilvray, Raymond Corporation which worked them from 1921 to 1935. Other operators near Foster were W. A. Meyer (1922-1930) and Andrew Lehnberg (1912? To 1915? Or 1920?).

"Since 1955 a new quarry has been operated near Foster by National quarries. This company sells stone to California Wire Sawyer Corporation which since 1955 has operated a finishing plant adjacent to the quarry (Photo 79).



The map of the Lakeside-Foster Area above, is a portion of
Plate 10. "Granite Quarries in the Lakeside-Foster, Escondido, and Vista Areas, San Diego County, California"
(a loose map located at the back cover of the book)

If you would like to view a large version of this map, use the link below on our web site.
Peggy B. Perazzo
http://quarriesandbeyond.org/states/ca/quarry_photo/images/geology_mineral_resources_san_diego_co_rpt_3_1963/ca-geo_min_res_san_diego_co_pl_10_complete_granite_qurries_lakeside-foster_escondido_vista_areas_co_rpt_3_1963.jpg

"**Escondido Area (Black Granite)**. Seven quarries are clustered in an area of slightly more than one quarter square mile which is about 3 ½ miles southwest of Escondido. The quarries are on the north and south slopes of a short, narrow canyon which cuts a narrow, north-trending hill composed of San Marcos gabbro. The deposits quarried in the area consist of large residual boulders of fine- to medium-grained, dark gray to dark bluish-gray gabbro (Photo 82). Stone from these deposits is used for building, monuments, and surface plates.

"Photo 82. **Escondido-Quarries, Inc., Harmony Grove**. **Residual boulders of gabbro (black granite)** are blasted, then worked downward toward quarry floor which is west (left) of area photographed. Boulders are as large as 25 feet in diameter. Photo by Mary Hill." (pp. 259)

"The first quarry in the area was opened by John Stridsberg who worked this, and later one other quarry, from 1923 until his death in 1952. Three quarries were active in mid-1958. One of these was the largest granite quarry in the county, which was being operated by Escondido Quarries, Inc. (see description below). The other two active quarries were being worked by the Valley Granite Company.

"**Vista Area (Black Granite)**. The 10 quarries in the Vista area are within 3 ½ to 4 miles east to northeast of Vista, on the southwest tip of the San Marcos Mountains, and in Gopher Canyon, on the northeast side of the mountains. The material quarried is obtained from hard, residual boulders of San Marcos gabbro which is fine- to medium-grained and dark gray to dark bluish-gray (Photo 83). Stone produced in the area is used for monuments, building, and surface plates. It is marketed generally under such a name as 'Vista Black Granite.'

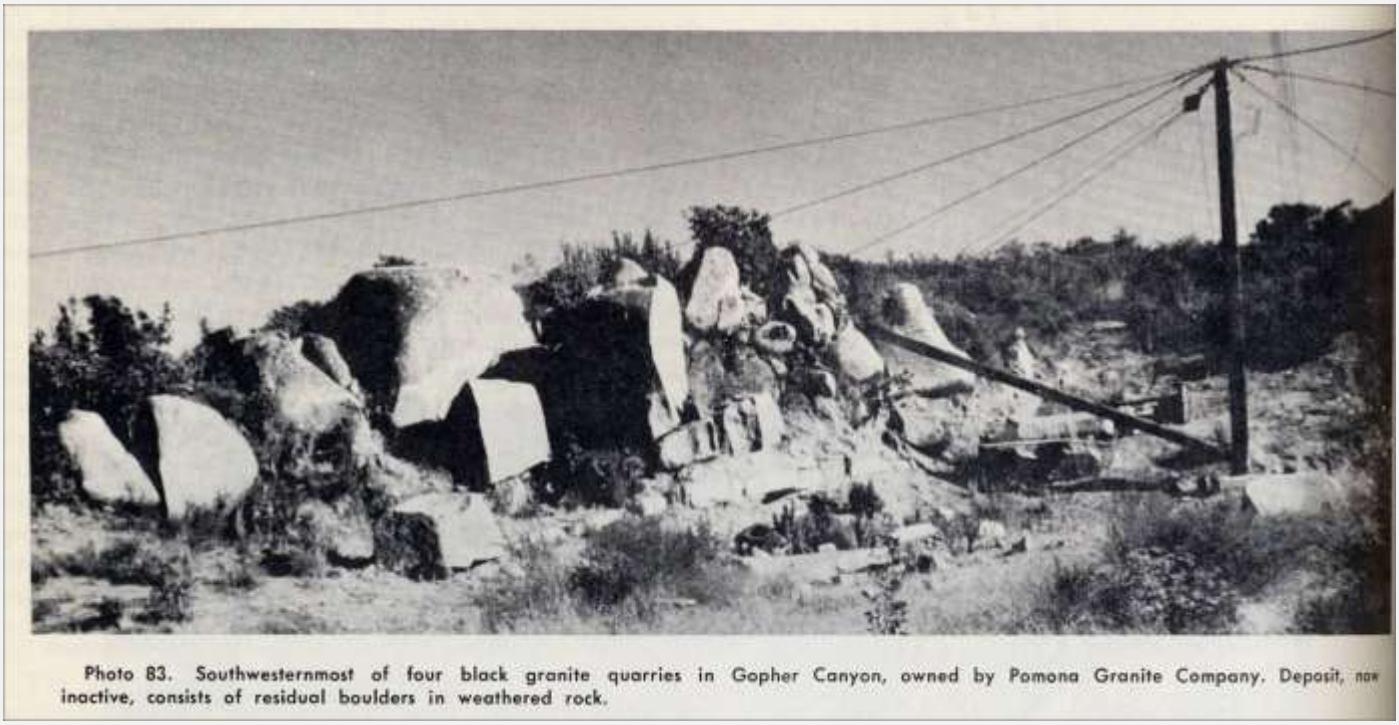


Photo 83. Southwesternmost of four black granite quarries in Gopher Canyon, owned by Pomona Granite Company. Deposit, now inactive, consists of residual boulders in weathered rock.

"Photo 83. **Southwesternmost of four black granite quarries in Gopher Canyon, owned by Pomona Granite Company**. Deposit, now inactive, consists of residual boulders and weathered rock." (pp. 260)

"The first quarry in the Vista area was opened by Pete Matson in 1938, and was worked by him and various partners until 1952. Since 1938 nine other quarries have been opened, and in 1958 two of these were active: one was the National Blue Granite quarry, being operated by the Pomona Granite Company; the other was the Vista Black Quarry, being operated by National Quarries (see description below). Other operators in the area have been Fellows and Clutter (1945-46); California Cut Stone and Granite Company (1945 to 1947); and Texas Quarries (1944).

The above map section shows the Vista/San Marcos Area. This map is a portion of Plate 10, "Granite Quarries in the Lakeside-Foster, Escondido, and Vista Areas," California (folded loose in the back pocket of the book)

Note: *If you would like to see a larger version of the Vista/San Marcos Area section, use the link below on our web site in the San Diego Maps section at this link. Peggy B. Perazzo*

http://quarriesandbeyond.org/states/ca/quarry_photo/images/geology_mineral_resources_san_diego_co_rpt_3_1963/ca-geo_min_res_san_diego_co_pl_10_complete_granite_qurries_vista_area_co_rpt_3_1963_r.jpg

(See the next page for a list of quarries shown in the Vista / San Marcos area of the Plate 10 map.)

List of Quarries/Deposits shown in the Vista / San Marcos area map from Plate 1 on the previous page:

(Below is a list of the quarries shown in the Vista/San Marcos- portion of the Plate 1 map. For more detailed information on the quarries listed below: (1) search for the quarry names in this pdf document, (2) visit the "Vista" section of our web site at the first link below, or (3) read the book online on the Internet Archives at the second link below. Peggy B. Perazzo)
http://quarriesandbeyond.org/states/ca/quarry_photo/ca-san_diego_photos_10.html
http://archive.org/details/geologyandminer03webe

* **Fellows and Clutter Quarry (#422)**, located "3 miles east of Vista at the head of small north-northwest trending valley on the west side of the San Marcos Mountains" (dark gray granitic rocks – San Marcos gabbro). (pp. 263)
* **Galbraith Quarry (#423)** , located "about 4 miles east-northeast of Vista, on the east side of the San Marcos Mountains" (Residual boulders of dark-gray granitic rocks (San Marcos gabbro) (pp. 263)
* **Pete Matson Quarry (Matson and Kouns, Matson and McDonald Quarry) (#425)**, located "about 4 miles east of Vista, at the north end of Twin Oaks Valley" ("Dark gray granitic rocks (San Marcos gabbro). (pp. 264)
* **Merriam Quarry (#428)**, located "about 4 miles east of Vista, at north end of Twin Oaks Valley" ("Dark-gray granitic rocks (San Marcos gabbro).") (pp. 264)
* **National Blue Granite Quarry (#430)**, located "about 4 miles northeast of Vista, in the South Fork of Gopher Canyon" ("Dark-gray granitic rocks (San Marcos gabbro) which comprise large residual boulders.") (pp. 265)
* **Pomona Granite Co. Quarries (#432)**, located "about 4 miles northeast of Vista, on the southwest side of the South Fork of Gopher Canyon." (pp. 265)
* **Texas Quarries Quarry (#437)**, located "about 4 miles east-northeast of Vista, in the South Fork of Gopher Canyon ("Dark-gray and bluish-gray gabbroic rocks (San Marcos gabbro). Rock is finer-grained than 'Vista black granite' which is produced by National Quarries from California Cut Stone and Granite Co. quarry." (pp. 266)
* **Vista Black Granite Quarry (#440)**, located "about 3 miles due east of Vista, near the bottom of a small west-southwest trending canyon ("Dark gray granitic rocks (San Marcos gabbro) which comprise large residual boulders.") (pp. 267)

"**Pala Area (Black Granite)**. The Magee Quarry, which is northeast of Pala, has been operated intermittently from 1923 to the present. The rock quarried here is very dark gray gabbro, one of the darkest stones in the county. In mid-1958 the quarry was being operated by the Allied Granite Company, Los Angeles.

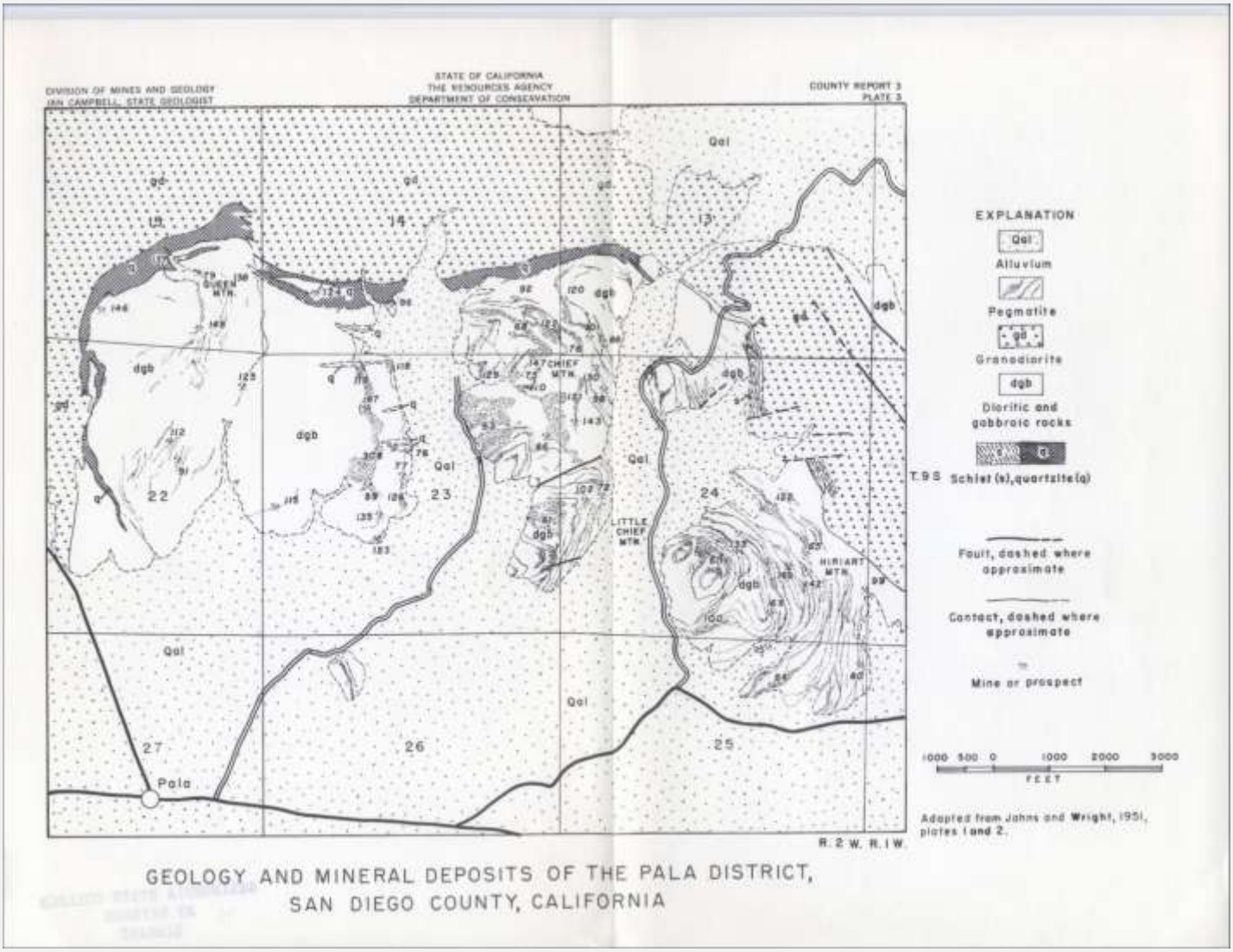


Plate 3: "Geology and Mineral Deposits of the Pala District, Diego County, California"
(loose map in the pocket of the book in the back)

Note: *A larger version of the above map is available on our web site at the following link:*
http://quarriesandbeyond.org/states/ca/quarry_photo/images/geology_mineral_resources_san_diego_co_rpt_3_1963/ca-geo_min_res_san_diego_co_pl_3_geo_min_res_pala_dist_map_co_rpt_3_1963.jpg

"**La Cresta Area (Gray Granite)**. Two adjacent quarries near La Cresta were operated by the Clemens Granite Company from 1945 to 1955. These quarries are in light gray granitic rocks.

"**Bernardo Area (Black Granite)**. The site of the settlement of Bernardo is near the point where the north shore of Lake Hodges intersects U.S. Highway 395, about 4 ½ miles south of Escondido City Hall. The two quarries in the area were worked for dark gray gabbro in the 1920's. Only one of these could be located during the present investigation: this was the quarry of the Bly Stone Company which was worked from 1921 to 1924. The other quarry, that of W. E. Vandeventer, was worked from 1921 to 1925.

"**Grossmont – La Mesa Area (Gray Granite)**. Two quarries were operated during the early 1900's in the La Mesa – Grossmont area: These are the Charles Moore Quarry which was operated from 1908 to 1913 and the Pacific Electric Company Quarry which was operated during the 1910's. Output from the latter operation was used only as paving blocks.

Marble

"The Verruga Crystalline Limestone Deposit, near Ranchita, was worked in the 1920's for marble used for building stone and for monuments (see description under 'Limestone-Dolomite').

Quartzite

"In mid-1958 the Red Rose Quartzite Deposit near Suncrest, was being worked for stone used as facing (see description below).

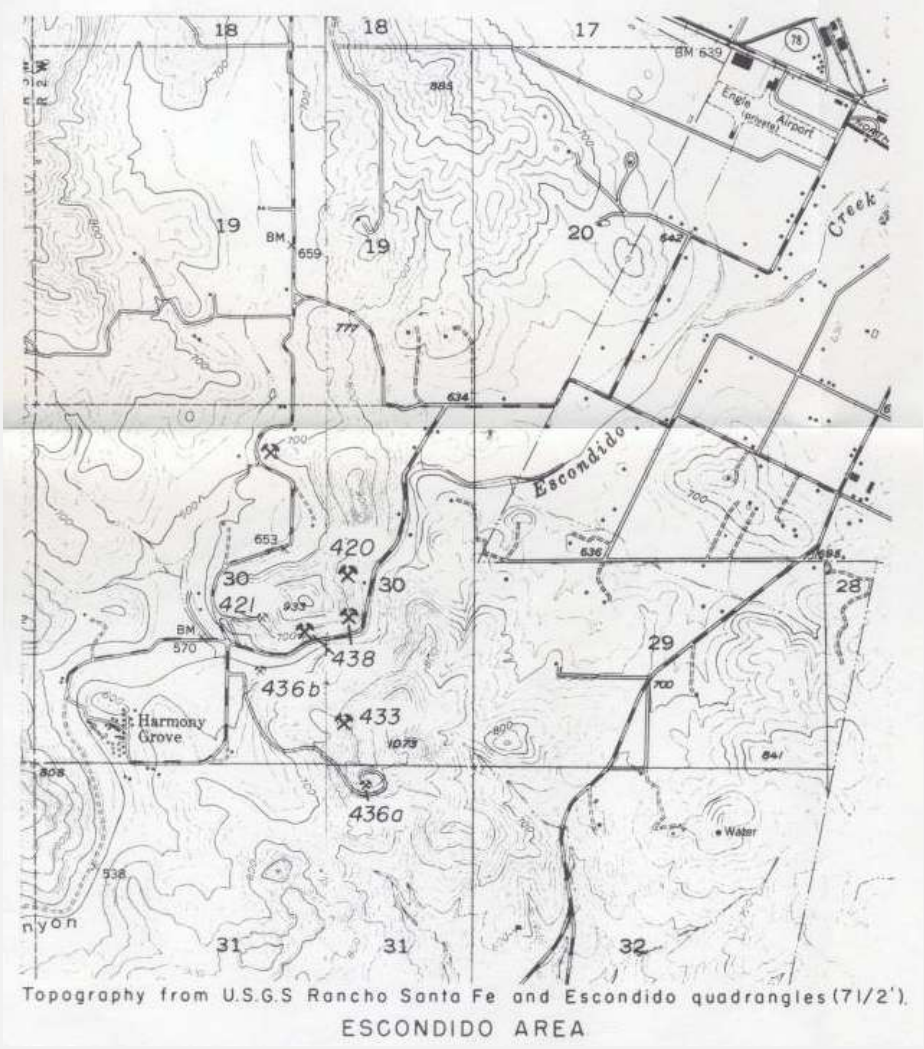
Escondido Quarries, Inc. (Pacific Cut Stone and Granite Co.)

"**Location:** W. ½ NW. ¼ SE. ¼ Sec. 30, T. 12 S, R. 2 W., S.B.M.; near Harmony Grove, about 3 ½ miles southwest of Escondido City Hall. **Ownership:** The quarry is operated by Escondido Quarries, Inc., P.O. Box 155, Escondido, which is controlled by Pacific Cut Stone and Granite Co., P.O. Box 30, Alhambra. Pacific also controls Clovis Quarries at Academy, in Fresno County (1958). In 1958 the company had under lease the Stridsberg Crystal Black Quarry (see description in accompanying list).

"Pacific Cut Stone and Granite Co. has quarried 'black granite' from its property near Harmony Grove since 1936 (Hoppin and Norman, 1950, p. 7). The company now probably quarries between one-quarter and one-half of the dimension stone output in the county and is the leading producer of this stone in the county.

"The company quarries large residual boulders of San Marcos gabbro which are surrounded by partly decomposed gabbro (Photo 82). The boulders range in diameter from less than 3 to about 25 feet. Only boulders larger than five feet are processed. The gabbro is fine- to medium-grained n texture and very dark gray ('black').

"The deposit is developed by a quarry on the southwest part of a west-trending, elongate hill. The face of the quarry trends northwestward and opens to the southwest. It is about 125 feet long and 70 feet high (Goldman, 157, p. 595). Boulders in the face first are blasted loose, excavated, then rolled down to the quarry floor. There they are split into crude blocks by blasting with black powder. The blocks are cut into slabs by two gang saws (Photo 80) or a four-strand wire saw. The gang saws cut about 1 ½ inches per hour. The slabs are finished at the plants of Pacific Cut Stone and Granite Co. in Alhambra. Los Angeles County, and in Clovis, Fresno County. The finished stone is marketed for use as surface plates, and as 'Black Diamond Granite' for use as monuments and facing.



The above map section shows the Escondido Area, which is a portion of the Plate 10 map, "Granite Quarries in the Lakeside-Foster, Escondido, and Vista Areas, San Diego County, California," compiled by F. Harold Weber, Jr., 1958-59, Base map adapted from Map of San Diego County, by California State Division of Forestry, 1957 (folded loose in the back pocket of the book)

Note: *A larger version of the Escondido Area section is available on our web site in the San Diego Maps section at this link:*
http://quarriesandbeyond.org/states/ca/quarry_photo/images/geology_mineral_resources_san_diego_co_rpt_3_1963/ca-geo_min_res_san_diego_co_pl_10_complete_granite_qurries_escondido_area_co_rpt_3_1963_r.jpg

(A list of quarries shown in the Plate 10 map regarding the Lakeside-Foster, Escondido, and Vista Areas can be found on the next page.)

List of Quarries/Deposits shown in the above Escondido area of Plate 10:

Below is a list of the quarries shown in the Escondido portion of the Plate 10 map. For more detailed information on the quarries listed below: (1) search for the quarry names in this pdf document, (2) visit the "Escondido" section of our web site at the first link below, or (3) read the book online on the Internet Archives at the second link below. Peggy B. Perazzo
http://quarriesandbeyond.org/states/ca/quarry_photo/ca-san_diego_photos_1.html
http://archive.org/details/geologyandminer03webe

* **Ebony Black Diamond Granite Co. (Stockdale Granite Quarry) (#420)**, located "about 3 miles west-southwest of Escondido, near Harmony Grove. A few hundred ft. north-northeast of the Valley Granite co. quarry" ("Dark-gray granitic rocks (San Marcos gabbro) which comprise large residual boulders.") (pp. 263)
* **Escondido Quarries, Inc. (Pacific Cut Stone and Granite Co.) (#421)**, located "Near Harmony Grove, southwest of Escondido." (pp. 263)
* **Don Potts Quarry (#433),** located "about 3 ½ miles southwest of Escondido, near Harmony Grove." ("Dark-gray granitic rocks (San Marcos gabbro).") (pp. 264)
* **John Stridsberg Quarries (#436a & 436b)** John Stridsberg "(o)perated two quarries near Harmony, about 3 miles west-southwest of Escondido: (436a) Superior Black Quarry, and (436b) Crystal Black Quarry ("Dark-gray granitic rocks (San Marcos gabbro) which comprise residual boulders.") (pp. 266)
* **Valley Granite Co. Quarries (#438)**, located "near Harmony Grove, about 3 miles west-southwest of Escondido." ("San Marcos gabbro.")

National Quarries (Johnson Brothers)

"**Location:** Escondido region. The locations of the deposits worked by the company are described below. **Ownership:** Johnson Brothers, 923 Park Hill Drive, Escondido (1958).

"National Quarries has quarried granite in San Diego County since 1945, and now ranks second in the county in granite production. The company markets only unfinished stone, which is sold wholesale to finishers: especially to (1) California Wire Sawyer Corporation, Lakeside, which produces surface plates; and (2) Pyramid Granite Co., Escondido, which produces monument stone and surface plates. The unfinished stone also is shipped to Los Angeles and as far east as Minnesota. A small proportion of stone quarried by the company is marketed as riprap and as decorative (ornamental) stone.

"In mid-1958 National quarries was operating two quarries and producing stone that ranged in color from 'black,' through 'blue,' to 'Lakeside Gray.' Black to blue stone was being obtained from the Vista Black (California Cut Stone Co.) Quarry which is about three miles due east of Vista (see description in accompanying tabulated list). Lakeside Gray stone was being produced at a quarry opened in 1955 adjacent to the finishing plant of the California Wire Sawyer Corporation at Foster, in the center of the SE. ¼ SE. ¼ Sec 35, T. 14 S., R. 1 W., S.B.M. In addition to these quarries, National Quarries had an option to lease the Texas Quarries in Gopher Canyon, about four miles east-northeast of Vista (see description in tabulated list).

"National Quarries also has worked the following quarries in the county (see descriptions in accompanying tabulated list): (1) National Blue Granite quarry, in Gopher Canyon, 4 miles northeast of Vista, operated 1946-

1952; (2) Magee quarry, 3 ¼ miles east-northeast of Pala, operated 1946-1957; and (3) Matson quarry, in Gopher Canyon, 4 miles east of Vista, operated 1952-1957.

Red Rose Quarry

"**Location:** S. ½ SW. ¼ Sec. 35, T 15 S., R. 1 E., S.B.M.; about three-fourths of one mile northeast of La Cresta. **Ownership:** A. Carlsen, 625 La Cresta Heights Road, El Cajon (1958).

"Small tonnages of stone quarried at this deposit are marketed as rubble in the San Diego area under the name 'Red Rose Quartzite' (Goldman, 1957, p. 602). The stone is used mainly in walls and as facing.

"The deposit consists of red, iron-oxide stained quartzite which occurs as a pendant in granitic rocks (Goldman, 1957). The rock is massive, with steeply dipping joint planes. The blocks are blasted, pried loose, then split with plugs and feathers. In 1958, the quarry face was about 250 feet long, and 30 feet high at its highest point; the quarry floor was 100 feet wide at its widest point."

Please Note:

To view the tables listed below, use the link below to read this book on the Internet Archive: http://archive.org/details/geologyandminer03webe.

The tables include the following column headings: Name of claim, mine, or group; Location; Owner (Name, address); and Remarks and references.

"**Stone, dimension (granite)**" (pp. 262-267)

"**Stone, dimension (marble)**" pp. 267

"**Stone, dimension (quartzite)**" pp. 267

(Excerpts from the Bibliographies are listed on the following pages.)

NOTE: *Only some of the titles listed in "Igneous and Metamorphic Rocks" Bibliography will be presented in this document. If you would like to view the omitted titles and the other bibliographies in the book, you will find the book on the Internet Archive – Texts, pp. 283-309. Peggy B. Perazzo*
http://archive.org/details/geologyandminer03webe

Excerpts from the Bibliographies from *The Geology and Mineral Resources of San Diego County*

Geology and Mineral Resources of San Diego County, by F. Harold Weber, California Division of Mines and Geology, San Francisco, Vol. 3, 1963.
http://archive.org/details/geologyandminer03webe

Kessler, W. H., and Hamilton, W. R., 1904, The orbicular gabbro of Dehesa, California: Am. Mineralogist, vol. 34, p. 133-140.

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