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ASARCO

Southwestern Exploration Division

JDS

May 18, 1987

W.L. Kurtz/J.D. Sell

Report on California
Desert Wilderness Proposal

On May 15 and 16, 1987, I attended the California Mining Trade Show sponsored by the California Mining Association in Victorville, CA.

My primary interest was to obtain the current political status on Senate Bill No. 7 (S.7). Attached to this report are fact sheets that explain S.7 in detail.

The highlights of what the guest speakers said will be discussed later, but a summary statement would be that the Sierra Club was dissatisfied with the original California Desert Plan because it did not contain enough wilderness to suit them. Their approach then was to develop a plan and have it introduced in Congress. Their plan was, in fact, with some slight modifications introduced by Senator Alan Cranston as S.7. Now a counter attack by concerned interests is being mounted to defeat or modify S.7.

The two main speakers were Mr. Gerald Hillier, District Manager of BLM, and California Congressman Jerry Lewis.

Mr. Hillier, District Manager BLM, reviewed both the original and proposed California Desert Plan, and then discussed the proposed plan. His important statements are as follows:

1. The Sierra Club wrote almost all of S.7.
2. Hillier in referring to Cranston's knowledge of the California Desert Plan said, "the man is out of touch."
3. The real concern is that if S.7 does pass in California, other states would be subject to the same approach. In other words, the BLM would be left out of any planning process.

Congressman Jerry Lewis' ((R) Apple Valley, CA) statements of interest are as follows:

1. The Sierra Club was unhappy and by using Cranston as a front man they wanted to build a fence around areas of interest to them.
2. Cranston did not contact any other California Congressmen to tell them what he was going to do. This upset the other California Congressmen, as it is considered common courtesy to communicate with each other when introducing legislation.

3. Lewis plans to introduce a bill in June to counter S.7. He did state that he may not do so because:

   A. Other interests may introduce a bill to counter S.7. He did not expand on this statement.

   B. Lack of support for S.7 may cause it to die on the vine.

   After making these statements, he said, "Never underestimate Mr. Cranston."

4. Lewis stated that Pete Wilson, Senator (R) San Diego, is not leaning toward Cranston, but Wilson is up for reelection and could ignore mining interests in hopes of getting Democratic environmentalists' votes.

Other things of interest are as follows:

1. Attached is a Victorville newspaper article giving the views expressed by First District Supervisor John Joyner whose district contains much of the land covered by the bill's East Mojave National Park.

2. The California Desert Coalition has organized a plan to attack the desert closure bill, but to date only have $30,000 of a needed $300,000 budget.

W. D. Gay

WDG:mek

W. D. Gay

It's everybody's desert.

MAY 15, 1987 • ***AN ADVISORY TO PUBLIC LANDS USERS*** • *VOL. I, NO. I*

Desert Conservation Institute
California Mining Association
1010 11th St., Suite 213
Sacramento, CA 95814

PROCEDURES FOR DETERMINING ON SMALL GOLD MINING CLAIMS IN CALIFORNIA

As Determined by U.S. Bureau of Land Management

By
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This article is an abridgment of one prepared for the California Gold Symposium, held in West Sacromento, California on October 14-17, 1985. The symposium was sponsored by the Nevada Institute of Technology, Reno, Nevada, and the California Department of Conservation, Division of Mines and Geology, Sacramento, California. The article explains the federal regulations, procedures, and practice used by the Bureau of Land Management to determine the validity of and to patent gold mining claims...*editor.*

INTRODUCTION

There are legal and technical aspects to be considered for a discovery of a valuable mineral (gold) deposit on federally administered land under federal laws and regulations. Determination of discovery and the mineral in character for placer claims is necessary. This report describes the field, laboratory, and report techniques and procedures that are used by the U.S. Bureau of Land Management (BLM) to determine discovery on mining claims and the mineral in character nature of 10-acre plots within placer mining claims.

DEFINITION OF GOLD LODE OR GOLD PLACER MINING CLAIMS

A (gold) lode mining claim is defined as a claim that covers a valuable lode, vein, ledge, tabular deposit, or other rock in place between definite walls (boundaries). Before a definition was established, miners considered a formation by which the miner could be led, or guided, to be a lode. The term lode is an alteration of the word lead, and any deposit the miner could follow was his lode (Bureau of Mines Dictionary of Mining, Mineral, and Related Terms, 1968).

Claims called placers are defined as ...including all forms of deposit, excepting veins of quartz, or other rock in place. [They] shall be subject to entry and patent, under like circumstance ond conditions and upon similar proceedings as are provided for vein or lode claims... (30 USC 35; RS 2329; Act of March 3, 1891; 26 Stat. 1097).

DISCOVERY

General

Mineral deposits on Federal land are grouped as (1) locatable deposits, (2) salable deposits, or (3) leasable deposits. This report is concerned only with locatable mineral deposits.

There are valuable deposits of minerals on Federal land which is open to exploration and location of mining claims under the General Mining Law of 1872—Act of May 10, 1872 (30 USC 22, as amended). The discovery of a valuable mineral deposit properly located under appropriate Federal and State laws is essential for a valid mining claim location. The location of mining claims comes after the discovery of minerals (43 CFR 3811.1, and 43 CFR 3831.1).

Federal statutes do not provide a definition of, or describe what constitutes, a valuable mineral deposit. The lack of a statutory definition has resulted in judicial and administrative declarations.

Prudent Person Test

The best known test of discovery was put forth in a Land Decision of the Department of Interior in 1894: *Castle v. Womble,* 19 LD 455 (1894). This famous "prudent person" test or definition of discovery of a valuable mineral deposit was given as follows:

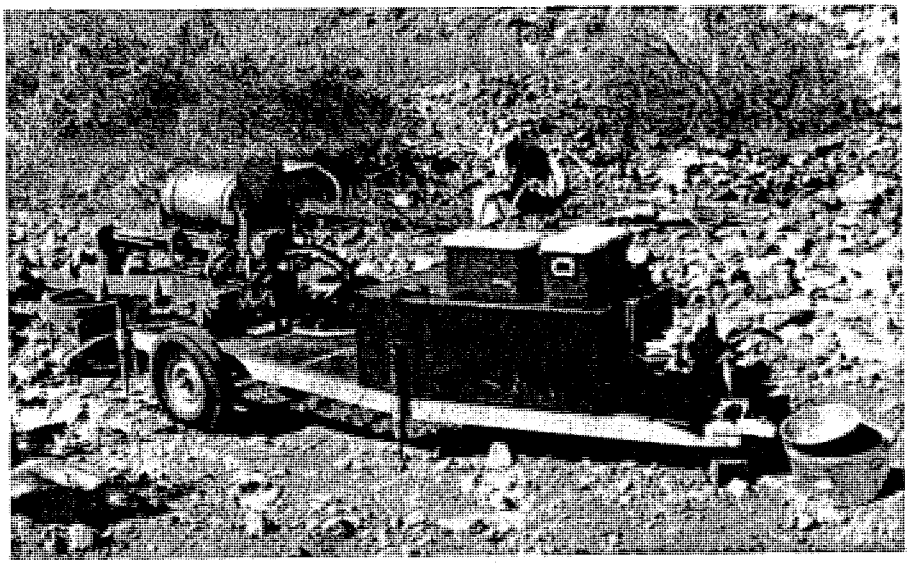
...where minerals have been found and the evidence is of such a character that a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a reasonable prospect of success in developing a valuable mine, the requirements of the statutes have been met.

Marketability Test

In 1968 the Supreme Court approved, as a complement to the prudent person test of discovery, a pre-existing concept: the marketability test. The marketability test concept has been used by the Department of Interior for widespread non-metallic minerals since *Layman v. Ellis,* 52 LD 714 (1929). In *Foster v. Seaton,* 271 F2d 836 (DC Cir. 1959) the test was further upheld.

In *U.S. v. Coleman,* 290 US 602-603 (1968) the Supreme Court ruled:

Under the mining laws Congress has made public lands available to people for the purpose of mining valuable mineral deposits and not for other purposes. The obvious intent was to reward and encourage the discovery of minerals that are valuable in an economic sense. Minerals which no prudent man will extract because there is no demand for them at a price higher than the cost of



Bureau of Land Managament placer testing equipment, the Denver Gold Saver (powered by gasoline motor). *Photos by James R. Evans, August 1985.*

extraction and transportation are hardly economically valuable. Thus, profitability is an important consideration in applying the prudent-man test, and the marketability test which the Secretary has used here merely recognizes this fact. Indeed, the marketability test is an admirable effort to identify with greater precision and objectivity the factors relevant to a determination that a mineral deposit is "valuable". It is a logical complement to the "prudent-man test" which the Secretary has been using to interpret the mining laws since 1894.

....the prudent-man test and the marketability test are not distinct standards, but are complementary in that the latter is a refinement of the former. While it is true that the marketability test is usually the critical factor in cases involving nonmetallic minerals of widespread occurrence, this is accounted for by the perfectly natural reason that precious metals which are in small supply and for which there is a great demand, sell at a price so high as to leave little room for doubt that they can be extracted and marketed at a profit.

It is clear that the consideration of economic value for metallic as well as nonmetallic minerals is now the critical factor for discovery. If there was any doubt about the above statement it should be put to rest based on a recent Federal 10th Circuit Court Decision in *Roberts v. Morton*, 549 F2d 163 (10th Cir. 1977). The Court ruled:

...It is still proper here that the Secretary "take into account the economics of the situation." The required showing by a claimant, however, is that at the time of discovery there is a market sufficiently profitable to attract the efforts of a person of ordinary prudence.

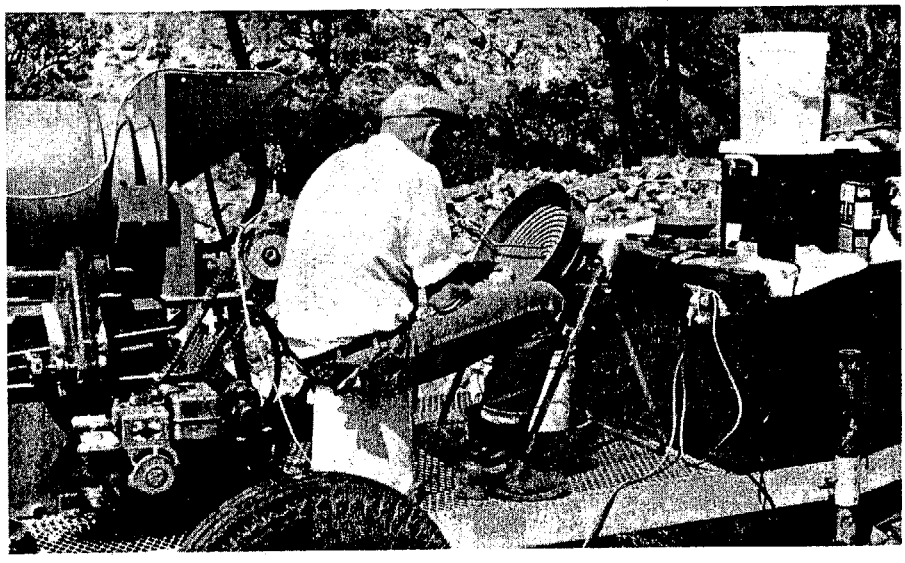
The marketability test refers to the ability to market and not to the current marketing of materials from the claim. Speculative future marketability cannot be relied on, only economic circumstances which are rationally predictable from present known facts must be used. *United States v. James J. Heldman et al*, 14 IBLA (Nov. 27, 1973); *United States v. Ethel Schell Larson and Minerals Trust Corporation*, 9 IBLA 247 (Feb. 2, 1973); *United States v. Menzel G. Johnson*, 16 IBLA 234 (July 10, 1974); *Ideal Basic Industries Inc. v. Morton C.A. Alaska* 1976, 542 F 2d 1364.

Therefore, the claimant must show that he can sell material from the claim at a profit. It is not required that he has sold or is selling material at a profit.

New Concept of Marketability Test

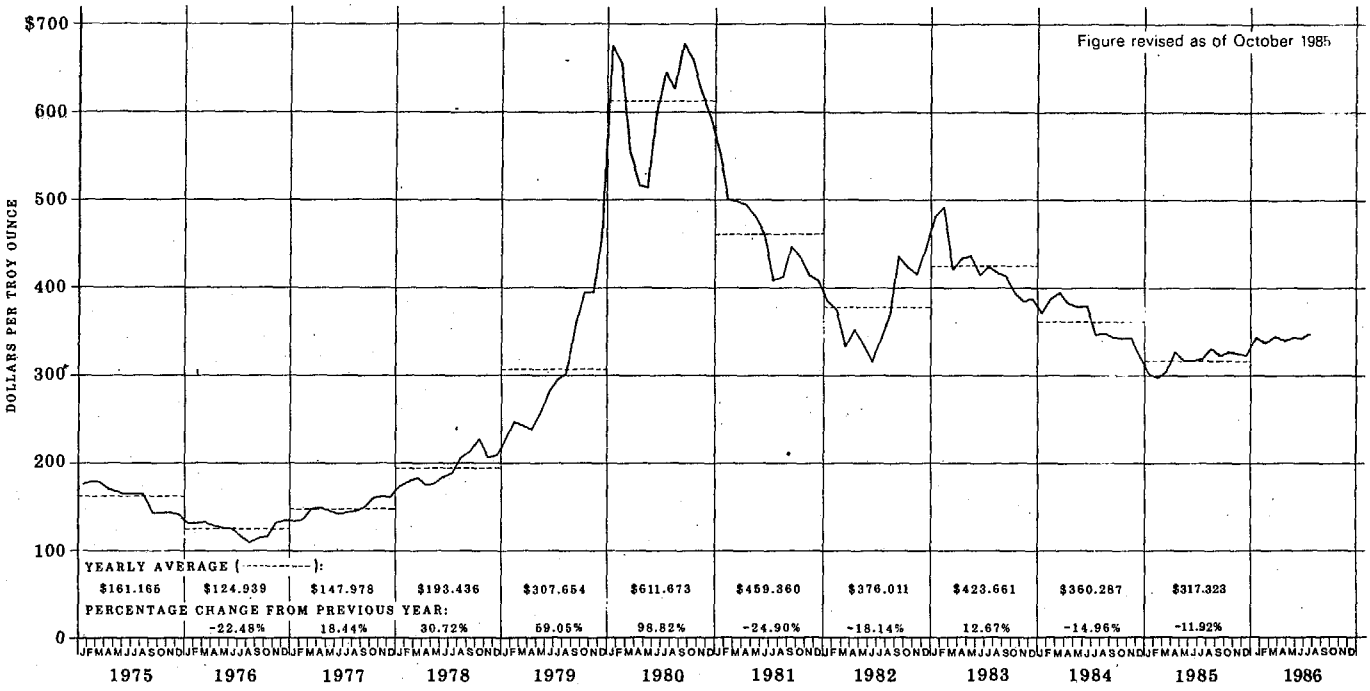
In 1983 the Interior Board of Land Appeals (IBLA) presented a long overdue concept regarding marketability. In *Pacific Coast Molybdenum*, 78 IBLA 20-29 (1983) the Board ruled:

"Present marketability" has never encompassed the examination of either cost or price factors as of a specific, finite moment of time, without reference to other economic factors. Rather, the question of whether something is "presently marketable at a profit" simply means that a mining claimant must show that, as a present fact, considering historic price and cost factors and assuming that they will continue, there is a reasonable likelihood of success that a paying mine can be developed. For example, if a claimant has located a deposit of gold which can be mined at a profit, if the price of gold is $500 an ounce, and the evidence is such that there is a reasonable likelihood of sufficient quantity and quality to justify development, that claim can be deemed valid despite the fact that on any specific day gold may be selling at $420 an ounce. This is so because a selling price of $500 an ounce for gold is both within the historic range and expectations of it reaching that level again can be justified as a present matter. On the other hand, if the deposit, because of expenses associated with mining and beneficiation, requires a selling price of $1,500 an ounce, such a claim does not exhibit present marketability. So elevated a price for gold does not represent any relevant historic range and is essentially based on speculation or unsupported hope. It may be expectation, but it is an unreasonable one given present facts. See *United States v. Denison*, 76 I.D. 233, 239 (1969).



Washing a sample concentrate in the Gold Hound. Gold flakes rise along the circular ribs toward the outlet pipe, which feeds to a collector bucket. The Gold Hound is powered by an electric generatar.

Figure 1. Average monthly and yearly gold prices with percentage change from previous year. *Handy & Harman quote in dollars per troy ounce.*



This means that a miner does not have to be concerned with the daily price quote of gold, or other commodities, but can take a perspective view of average prices over an appropriate period of time. This concept should be applied in all evaluations of discovery (and mineral in character).

From the plotted average monthly and yearly gold prices with percentage of change from previous years, it is apparent that there is a marked variation in the average price of gold, but it has not dropped below $360 per troy ounce in the past 5 years (Figure 1)*. The BLM monitors the base price of gold and will periodically update Figure 1. Even though the present price is below this, the $360 figure is within the historic price range and the price may rise again to $360 or more, in the near future.

Discovery On Each Claim

Each claim must have a discovery within its boundaries, even if two or more claims are contiguous. See *Ranchers Exploration and Development Co. v. Anaconda Co.*, 248 F. Supp. 708 (DC Utah 1965).

This concept is not new. In *Waskey v. Hammer*, 223 US 85, 91 (1912) the court ruled: "discovery without the limits of the claim, no matter what its proximity, does not suffice."

In the case of large, low grade gold deposits or other metal deposits disseminated over a wide area under numerous mining claims, it is apparent that one claim could not support the large capital investment required to develop such a deposit. A group of claims would be necessary to support an economic operation. A large deposit of certain reasonable cut-off grade with a certain number of tons is clearly necessary for a successfully developed mine. The BLM has taken a reasonable view of the problem and is not adverse to considering this concept for validity examinations.

Physical Exposure Required

Geologic inference (see the Mineral In Character section) will not support a discovery. A valuable mineral deposit must be actually and physically exposed within each mining claim (or group of claims). The mineral may be explored in trenches, cuts, shafts, adits, and drill cores. Geochemical or geophysical anomalies, unsupported and uncorrelated with physical exposures of mineral cannot be used for discovery (see BLM WO Memorandum No. 85-191, January 4, 1985).

There are a number of cases that involve the above concept. The most compelling recent one seems to be from the Federal court, where the court ruled in *McCall v. Andrus*, 628 F 2d 1188 (1980):

> ...proof of "discovery" requires a showing of an explored mineral deposit on the claim while "mineral in character" may be proved by geological inference coupled with marketability.

Most of the acceptable criteria for actual and physical exposure of a mineral is clear. The following conditions may allow drill core and/or cuttings to be acceptable for discovery.

1. Drilling is done by a reputable party or company in which the claimant has no financial or other interest.
2. Adequate and proper logs are taken and maintained.
3. Cores or cuttings are left in proper order, clearly marked for proper identification as to drill hole number, depth, and location.
4. Cores, cuttings, and logs are made available to the government mineral examiner for his inspection.
5. Assay intervals (or chemical or mineral analysis), and certificates of results from a reputable assayer, chemist, or mineralogist are made available to the government mineral examiner.
6. The examiner is allowed to spot check certain intervals of core or cuttings for accuracy of grade.

* Gold price as of October 1985.

TABLE 1. U.S. BUREAU OF LAND MANAGEMENT FIELD EXAMINATION FOR VALIDITY AND PATENT DETERMINATIONS OF MINING CLAIMS.

Pre-Exam Data Gathering Preparation and Procedures:

1. Examine case file for completeness.
2. Obtain and examine legal data, CA files, location notices, Notice of Intent (NOI) to hold or patent, assessment work forms, and encumbrances of title.
3. Check mineral survey and notes.
4. Assemble and examine tapagraphic mops, geologic maps, and air photos.
5. Assemble and examine technical references, geology, mineralization, mining, mineral economics.
6. Obtain and carry mine and trench safety orders (BLM, CSO IM CA-85-263, 4-30-85).
7. Assemble all needed field equipment.
8. Appoint party chief if more than one examiner.

Examination:

1. Meet with claimant and discuss examination procedures and practice.
2. Make diligent search for claim corners and discovery monuments.
3. Walk the claim and get a "feel" for it.
4. Prepare geologic map of claim or verify already prepared geologic maps, preferably on topographic map.
   a. Map and plot surface features—rock unit, structures.
   b. Map and plot mine works on surface—including the geology.
   c. Map and plot underground works—including the geology.
   d. Take numerous photographs-all claim corners, monuments, geologic and mining features.
5. Analyze discovery area:
   a. Pay special attention to details; ask claimant to identify areas.
   b. Prepare or check maps, sketches, conduct sampling, in appropriate manner and at appropriate scales.
6. Work up maps and sketches in field to eliminate need for a return trip. Take proper field notes in proper format.
7. Gather all information possible from claimant, such as reports on technical and economic data, costs.
8. Photograph and sketch all mill and plant facilities; obtain flow sheet if available; make one if not.
9. Write up all data in report with full disclosure for technical reviewer. Confidential data can be summarized, or pertinent parts quoted.

MINERAL IN CHARACTER, THE 10-ACRE RULE, AND PLACER CLAIMS

General

One discovery of a valuable mineral deposit per placer claim is sufficient, whether the claim is 20 acres for an individual placer claim, or 160 acres for an association of eight persons (20 acres per person). However, regulations regarding placer claims require that after discovery of a valuable deposit has been made each 10-acre plot be examined for its mineral in character nature (43 CFR 3842). Only those 10-acre plots that are mineral in character can be clear-listed for patent: *U.S. v. Meyers,* 17 IBLA 313 (1974), *U.S. v. Lara,* 67 IBLA 48, 50 (1982), and *McCall v. Andrus,* 628 F 2d 1185 (9th cir.) (1980), cert. denied 450 US 996 (1981).

The elements of a mineral in character claim are defined as follows:

> It is not essential that there be an actual discovery of mineral on the land. It is sufficient to show only that known conditions are such as reasonably to engender the belief that the land contains mineral of such quality and in such quantity as to render its extraction profitable and justify expenditures to that end. Such belief may be predicated upon geological conditions, discoveries of minerals in adjacent land, and other observable external conditions upon which prudent and experienced men are shown to be accustomed to act; *Southern Pacific Co.,* 71 ID 233 (1964).

Style

In *U.S. v. Lara* (On Reconsideration), 80 IBLA 215 (1984) the IBLA ruled:

> In determining whether each 10-acre part of a placer claim is mineral in character, the claim must be subdivided to create square 10-acre parcels, to the extent possible, regardless whether the claim, as laid out on the ground, conforms to the system of public land surveys.

Geologic Inference

Mineral in character can be determined through geologic inference (which engenders the belief). The essential ingredients are described in the following section from *U.S. v. Lundy,* A-306724 (June 30, 1967):

> ...we fail to recognize the distinction the appellant places upon "geological inference" and upon "opinion of experts" who are geologists. To infer suggests the arriving at an opinion by reasoning from known facts or evidence. Thus, it would seem that geological inference is no more than opinion of a geologist inferred or deduced from known and observed geological evidence.

Geologic inference is acceptable for mineral in character determination on each 10-acre plot within any placer claim, but inference must be from a data base and not merely an unsubstantiated opinion. The geologic inference also must show that mineral (gold) must occur in amounts that can be mined at a profit. Thus mineral in character is essentially discovery through geologic inference.

FEDERAL REGULATIONS

General

The regulations in Title 43 of the Federal Code of Regulations (CFR) are available in the government section of most libraries or at any BLM office. Part 3830 through 3870 dated October 1, 1985 are the most significant sections concerning mining claims.

PROCEDURES

Administrative Procedures

Administrative mineral patent procedures used by the BLM are outlined in Instruction Memorandum No. CA 83-294, June 2, 1983. A copy of this memorandum may be obtained from the BLM Mineral Division, California State Office (CSO), Room E-2727, 2800 Cottage Way, Sacramento, California 95825, (916) 978-4740.

Field Procedures

The BLM field examination preparations and procedures for validity and patent determinations of mining claims are outlined in Table 1. Usually the claimant is given a 30-day written notice of the field examination (by registered mail). A follow-up phone call is made to arrange a suitable time and date for the field examination. The examination date can be postponed for reasonable causes, such as illness, but the field examination cannot be postponed indefinitely.

Sampling and Laboratory Procedures

Sampling and sample processing for small gold deposits is of critical importance, as errors can result through selection of sample sites, methods of sampling, amount of sample taken, sample preparation, and assay procedures used. The following sections under 'Sampling and

Sample Preparation'; (1) small lode gold deposits, and (2) placer gold deposits, outline the procedures.

Sampling and Sample Preparation

Lode Gold Deposit

- From the discovery and adjacent areas, cut a channel or continuous chip for minimum mining width generally 4 feet; usually 2 lbs. per foot of sample for fire assay at one fire assay ton.

- Put samples in plastic or plastic lined bags and then into canvas bags, labeled inside and out. Then place into large, heavy-duty plastic bags for protection from the elements.

- Crush and grind to -20 mesh, then split into four parts. Send two samples for fire assay, retain two splits for record.

- For assay work, BLM uses several labs, including the Bureau of Mines.

Placer Gold Deposit

Wells (1968) has described placer examinations including field and laboratory procedures. Placer gold sampling, sample processing, and evaluation of results are described in a report by Evans (1983). The following summary is taken from these papers.

- Claimant should expose his best ground for sampling.

- As near as possible, sample processing should reflect the mining methods the miner is using, or is going to use.

- Samples should be collected and if necessary stored carefully in plastic 5 gallon buckets.

- Generally, an examiner should take more than one sample.

- Fire assays are not acceptable for evaluation of placer samples, because the intent is to look for recoverable rather than total gold content.

- Generally, BLM staff will utilize a miner's own dredge to sample. Examiner should be stationed at the dredge during sampling operations.

- A statistically accurate analysis of a placer sample is difficult. A placer sample should never be split. An examiner should look at and consider the whole operation. Early information from the claimant is helpful and beneficial.

- BLM staff will accept as evidence sales receipts from legitimate purchasers (but not IRS records) for sale of gold and black sands.

- If claimant indicates that platinum or other minerals are present in heavy mineral concentrate, BLM will test for it. Platinum group metals can be assayed at Bureau of Mines laboratory in Reno.

- BLM will consider historical data about an area.

It is important to keep accurate, complete, systematic, and signed records in sampling and processing gold deposits. The adequacy of records will reflect on the quality and legality of the mineral examination, and the mineral examiner. Data will be no better than the methods used and the records kept. Although the BLM examination is to certify discovery, these procedures can be used to determine reserves on a gold property, provided there are proper samples in sufficient number to block out ground by grade and cubic yards.

MINERAL REPORTS

The mineral report is the presentation of findings made during a field examination of a mineral property. It includes observations, illustrations, testing results, interpretations, and conclusions in regard to the property (Table 2). They must be complete and accurate, prepared in a clear and concise manner, and appropriate in tone. The mineral report should represent a culmination of the examiner's previous training and experience. The report should convey to others the impression of competency based on accepted professional standards.

COST FACTORS INFLUENCING DISCOVERY

For the purposes of this paper, small operations are considered to be those employing five skilled persons or less such as a drilling/mucking crew, processing and surface operations staff, and general supervisory personnel.

The discovery requirements are the same whether the operation is small or large. Technical and economic factors used to evaluate small mining oerations are essentially the same as for large operations. However, the degree of, and fluctuations in, variables affect smaller operations to a greater extent than they affect the more stable larger operations.

Some general variables which are applied as cost factors against the value of gold include exploration, mining, production, processing, refining, environmental, and reclamation costs. Specific variables include wages, investment and operating capital, taxes, grade, geologic environment, and mineralogic character.

Financial Factors

In many cases, the opportunities for creative financing schemes are not available to the small gold operator if significant investment and initial operating capital is required. An analysis of the locators financial situation may show higher costs involved in servicing loans of short term than would be expected from larger operations servicing longer term loans. This cost may push overall cost above the threshold of a positive cash flow for the mine.

Sampling Procedure Factors

Proper sampling and sample processing are critical to developing the right recovery process. It is important to obtain all information as to size distribution, grade, gangue, interfering minerals, hardness, roundness, and clay or impurity content. Also, detailed field descriptions of the deposit and surrounding area will influence recovery operations and the economics of the deposit. Critical information includes measurement of the gold bearing material and overburden; strike and dip of vein, structures and surrounding rock; mapping of important rock units; problems with reclamation, which may include identification of stockpiles or waste disposal areas, access, power and water availability; weather conditions; and land ownership patterns.

The mineral examiner cannot make a decision on a deposit unless the data are as precise and accurate as industry standards. For example, a one dimensional sampling pattern in a lode gold deposit along the exposure of a vein or structure cannot provide ore grade results to depth below the area of influence of the surface samples. A prudent decision to invest time and/or money in the project with the expectation of a return could not be made. Drilling, trenching or subsurface development would be needed to assess the quality and quantity of the deposit, thereby allowing for a three dimensional measure-

TABLE 2. TOPICS INCLUDED IN BLM MINERAL REPORTS FOR VALIDITY AND PATENT DETERMINATIONS INVOLVING MINING CLAIMS.

OUTLINE

1. Colored title page
2. Mineral report title page (BLM Form 3060-1, 7/84)
3. Contents
4. Illustrations (Listings)
5. Attachments
6. Summary
7. Conclusions and recommendations (1 or 2 pages)

INTRODUCTION

General

Purpose and Scope of Report (including date case assigned)
Dates and Scope of Field and Laboratory Examinations
Dates and Scope of Conferences with Claimant

LAND STATUS AND RECORD DATA

Appropriate documents such as location notices, proofs of labor, Notice of Intent to Patent, encumbrances, and right-of-way. Include a table showing document listings and date of final action (or status as of date of report).

PHYSICAL FEATURES AND SURFACE IMPROVEMENTS

Location, Accessibility, and Physiography
Climate and Vegetation
Surface Improvements
Water and Power Facilities

GENERAL GEOLOGY AND MINING HISTORY

Brief Description of "regional" geology, and mining history of the area or district.

GEOLOGY, MINERALIZATION, AND MINE WORKINGS AT SITE

Describe and interpret site geology, structure, and mineralization in conjunction with mine workings if applicable. Emphasize valuable minerals analyses and their relations to structure. Give field description of mine works and improvements. Describe and interpret sampling practice, data, and volume of influence of samples. Give all laboratory results. Have appropriate claim, topographic, mine works, and geologic maps. Show sketches and cross sections.

MINING, MILLING, PROCESSING, AND PRODUCTION

Describe all operations and give record of production. Show appropriate flow sheets, sketches, and tables.

ECONOMIC EVALUATION AND MARKETING

Generol
Procedures and Results
Marketing and Utilization
Economic Evaluation
Tonnage factors; determination of tons and grade. Determination of all costs and taxes. Economic evaluation method used including discount rate. Mineral in character and 10-acre rule for placers. Cite all sources of economic data. Describe profitability. Show all tables, sketches, and calculations.

REFERENCES CITED

Use U.S. Geological Survey citation format.

ment of the mines. Determination of a discovery may not be made unless the value of the near surface material is great enough to stand on its own.

Errors in estimating the gold value of a placer deposit can occur if the sample volume is small. It is especially true if the gold nuggets to be recovered are large and the distribution in the gravel is small. This "nugget" effect must be compensated for by adequate sample size, whether it is in terms of volume as in a river terrace deposit, or time as in dredging a stream channel. What is important is that output of sample material in the sample recovery circuit be sufficient to minimize the nugget effect. Although this effect can be very noticeable in a placer gold deposit, its effect also can occur in vein or disseminated deposits.

It is also important that the sample size be sufficient to minimize the effect of random distribution of gold particles within a placer deposit. For example, there are approximately 270 12-inch pans per cubic yard of dry loose gravel weighing 1.35 tons per cubic yard (determined by the authors in the Folsom Laboratory). Consider a deposit sampled by taking four 12-inch pans from the face. A variance of one 40 milligram piece of gold in the medium size range (approximately 2mm) may over or under evaluate the deposit by about $28 per cubic yard (gold at $360 per troy ounce; $0.01 per mg.). For a one-half cubic yard sample of the same deposit (135 pans), a one-piece variance would represent an over or under evaluation of $0.83 per cubic yard; a one cubic yard (270 pans) would be represented by $0.42 per cubic yard. This illustrates that sample size does have a direct effect on the gold value assigned to the sample. In addition, larger samples lessen the effect of random and low particle distribution in the sample through taking more of the deposit. About 100 pounds per linear foot of thickness and about one-half or more cubic yard of material has worked well for the authors in sampling this type of deposit (provided the samples are properly spaced).

In addition to the nugget effect, a problem with quality control in sampling occurs because of a more uneven distribution of gold value in the rock host material. Here, adequate sample size and sample distribution are a hand-in-hand requisite to a representative evaluation of the deposit. Extreme examples of vein-type distribution are seen in pocket lodes and disseminated vein-type deposits. Sampling of this type of deposit should be tailored to reflect the model identified for the type deposit encountered. Many deposits may require closely spaced samples. Fewer samples along the vein or deposit will be needed if the values are consistent in the deposit.

Sampling Analysis Factors

Critical in the analysis of the quality and quantity requirements for the prudent person test is the measurement and sampling of the deposit. As in larger operations, tons and grade of each deposit must be known in order to assess the potential for development. Assuming that a prudent person is also an investor (time and money), it is unlikely that the person will expend any resources to develop a mine without a good knowledge of the character of the deposit. Criteria by field

TABLE 3. QUALITY AND QUANTITY REQUIREMENTS FOR MEASUREMENT AND SAMPLING OF DEPOSIT, PRUDENT PERSON TEST. *From Broadhead, 1984, Bureau of Mines.*

Grade	Accuracy required	Sample size, in grams required for: -70 mesh	-100 mesh	-140 mesh	-200 mesh
0.1 oz/T	67%	18.5	6.6	2.4	.8
	90%	207.0	74.0	26.0	9.3
	95%	820.0	293.0	107.0	37.0
0.05 oz/T	67%	37.0	13.2	4.8	1.7
	90%	409.0	146.0	53.0	18.0
	95%	1638.0	585.0	213.0	73.0
0.01 oz/T	67%	185.0	66.0	24.0	8.3
	90%	2047.0	731.0	267.0	91.0
	95%	8193.0	2926.0	1067.0	366.0
0.005 oz/T	67%	370.0	132.0	48.0	17.0
	90%	4096.0	1463.0	533.0	183.0
	95%	16383.0	5851.0	2134.0	731.0

measurement and sampling of the deposit can be developed by tailoring procedures and precision of sampling and analysis to a knowledge of the gold depositional and mining/processing models.

In the analysis of lode samples, sample size also has an important effect on ore grade. Table 3 shows the relationship between ore grade, sample size required and screen mesh of the sample to achieve a predetermined accuracy of sampling. This inherent sampling error is in addition to errors of the fire assay-induced coupled plasma (ICP) procedures. Since in a proper fire assay these are usually small in comparison to the intrinsic sampling error, they can be ignored in ore grade material. For very small samples or for very low grades of ore, the various analytical errors predominate and the tables are only approximate. This table was calculated from Gy (1981) on ore sampling and assumed a particle size up to the mesh size. Consequently, for a "Carlin" type ultra fine gold ore these values overestimate the sample size required. Gy (1981) also had to make many other simplifying assumptions which do not occur in the real world, so the values should be considered only intelligent estimates (Evans and Reid, 1984).

Care must be exercised when analyzing placer concentrates. Commonly, individuals will apply fire assay, less commonly atomic absorption (AA) or induced coupled plasma (ICP) methods, to analyze their concentrates for deposit value. Because of the nature of the size distribution of particles within the deposit (fine to coarse range), the nugget effect plays an even greater role in the over or under evaluation of the deposit. In addition, when utilizing fire assay, an over evaluation occurs because recovered free gold does not include gold combined to other minerals and not recoverable by amalgamation, such as sulfides (pyrites) or gold in magnetite. The choice preferred for analysis of placer samples is amalgamation of the whole concentrate after coarse and medium gold removal, because this procedure best reflects the gravity recovery methods of free gold commonly used in placer operations. After amalgamation, fire assay of concentrates to determine gold tied to other minerals could be used. If high gold values are found in the concentrate, then hydrometallurgical methods may be used to win those values.

Care should also be exercised to avoid the nugget effect in the analytical procedures when analyzing samples, especially lode samples. For example, the choice of most mineral examiners is a fire assay when analyzing lode samples from small gold mines. However, some individuals will apply atomic absorption (AA) or induced coupled plasma (ICP) methods when assaying the total sample. In a one-ton fire assay about 29 grams of sample material are used in the analytical procedure. For AA/ICP methods, from 6 to 10 grams of sample are used, or one third to one fifth as much as used in a fire assay. Therefore, errors due to the nugget effect could be magnified from 3 to 5 times when using AA/ICP method over fire assay. For each milligram variance in a one-ton fire assay, an under or over evaluation of one ounce per ton may be realized. This same variance in the smaller AA/ICP sample would be magnified 3 to 5 times, for an over or under evaluation of 3 to 5 ounces per ton.

Industry practice should be used to develop a sampling program that best reflects the true picture of the deposit. After obtaining a better knowledge of the deposit, the prudent person will know if he should invest time and/or money in the project. It is the BLM practice to obtain all the geologic information possible prior to sampling, and to follow industry practice in sampling and analysis insofar as possible.

The mining claim boundaries must encompass the discovery and must be accurate with respect to critical discovery points. Deposits within the claim boundaries but supported by a discovery outside the claim will not support that location (*Ranchers Exploration & Development Co. v. Anaconda Co.*, 248 F Supp. 708 (DC Utah 1965)). As already discussed, conditions may indicate that the claim is mineral in character; however, without a discovery within the boundaries of the claim, it is not a valid location. In some cases surveys utilizing tape and compass, EDM or telemetric methods may be needed to position the deposit extent, improvements, or property lines in their proper perspective.

Mineral Processing Factors

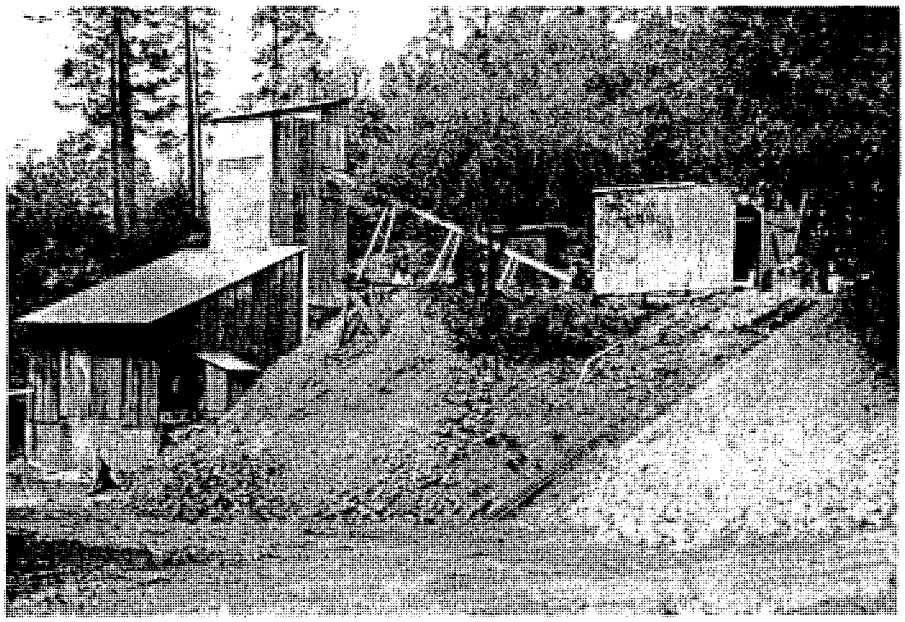
Although adequate volume control and average grade distribution has been obtained, it is necessary in many cases to further evaluate the material in order to develop the best processes of recovery for the type deposit. Material that contains free gold may need a crushing-grinding-gravity recovery circuit. If the gold is finely disseminated within the rock matrix, a leach system may be required. In many cases, an interfering mineral may increase processing and/or treatment costs above the break even point. When this occurs, without an alternative method, the realization of discovery no longer exists. Some sampling programs may require a bulk heap leach pilot plant in order to accurately assess the full potential and adequacy of a material processing scheme.

CASE HISTORIES

To illustrate the factors that influence discovery two abridged case histories are given below; (1) a small lode gold mine, and (2) a small placer gold mine.

Lode Gold Mine

The following case history concerns the Ex Cramer lode gold mine in Amador



Ex Cramer lode gold mine, Pine Grove area, Amador County, California, showing the #9 shaft, hoist house, shop, and mill.

County, California, located by P.L. and J.A. Ramm. A more detailed case history appears in Evans and others, 1985, p. 38-52.

Dimensions of the quartz vein used for the discovery in this case are of note. The vein length for the discovery is 51.5 feet, even though the known length of the vein is about 130 feet. Average vein thickness was 3.1 feet, less than the normal 4 feet used for most mining widths in adits, raises, winzes, and drifts. The claimant hand graded material underground before sending it through his processing circuit. That is, he was able to remove the wall rock from the vein material rapidly. For his small operation it was feasible to hand grade. Therefore, BLM accepted the 3.1 foot width.

The claimant indicated that this portion of the vein was the best block based on the mill run tests, which averaged 0.5 ounce of gold per ton. BLM tested this area. In this case, the small size of material blocked out was adequate to support the claimant's discovery. Critical to this determination is the fact that the claimant owned without liens all equipment necessary to mine, process, and refine the material. If capital was needed to purchase equipment, the cost may have exceeded the value of the gold vein in the identified block. In this case, more of the vein structure would have had to be sampled and "certified" in order to provide the quality and quantity needed to support the claim of discovery of a valuable mineral (gold) deposit.

The following report excerpts are from the BLM Report of field examination.

The Ex Cramer gold lode claim is near Pine Grove, Amador County, California in the west central Sierra Nevada at an elevation of about 2,000 feet. A Notice of Intent to Patent the claim (CA-13142) was filed with BLM on September 21, 1982, and an amended Notice November 16, 1982, by Paul L. and Judith A. Ramm.

All of the claim is underlain by soil-mantled phyllite and metasiltstone of the Paleozoic Calaveras Formation. The formation is cut by shear zones containing quartz stringers, pods, and veins as much as 12 feet thick. Locally, the quartz contains oxidized sulfide minerals and free gold. Quartz areas have been explored through pits, trenches, and underground works.

The discovery was within 52 feet west of the No. 9 shaft, in, and adjacent to the 65-foot level. Sulfide minerals and free gold were observed in the quartz vein in the discovery area. Geologic mapping and sampling results by fire assay showed a block of quartz that was 3.10 feet in average thickness for a linear distance of 51.5 feet, and contained a weighted average of 0.53 troy ounces of gold per ton. Our calculations showed that the block weighed 383 tons. The price of gold on June 20, 1983, was $416 (Handy and Harmon), resulting in a gross value of $85,000 for the block (the examination was done prior to the determination of $360 an ounce for gold). Mining, milling, and processing costs are figured at $50 per ton, or $19,000 total for the block. Tax related factors are figured to be about 15% of the gross value of the quartz block or about $13,000.

All necessary mining, milling, and processing equipment is owned out-right by Ramm. Water is available for the mine and mill. Commercial electricity, as well as power from diesel-fired generators is available for the operation.

Our conclusions and recommendations were that the Ramms have filed all necessary documents, certificates, and statements, and have performed more than $500 worth of improvements on the Ex Cramer lode claim. All mineral survey monuments were located and verified as corrrect. Also, the Ramms had posted their Notice of Intent to Patent and their Mineral Survey in a conspicuous place on the hoist house.

An economic analysis of the quantity and quality of in-place gold-bearing quartz in the discovery area, mining, milling, and processing costs, and the price of gold on June 20, 1983, show that the "prudent man" and "marketability" requirements of Federal mining law have been met. Therefore, a valid discovery of a valuable gold deposit on the Ex Cramer lode claim has been made and we recommend clear-listing for patent.

Placer Gold Mine

The following case history concerns the Golden Eagle placer mine located by R.A. LeCleir. A more detailed case history appears in Evans and others, 1985, p. 53-72.

The Golden Eagle (GE) placer mining claims Numbers 1, 2, and 3 (20 acres each), were located by Ruth A. LeCleir on March 5, 1981 along Moccasin Creek, in section 2, T2S, R15E, Tuolumne County, California. Subsequent to her location, Ms. LeCleir filed an application for mineral patent on the aforementioned claims with the California State Office, BLM on January 7, 1985. All pertinent filings, postings, and publishings of this intent

Ex Cramer lode gold mine claim, showing quartz vein in back of the 65-foot level (sample site # 1). The hard, dense vein contains sulfide minerals and free gold.

have been completed. No adverse claims were made on the subject land in the patent application. Final Certificate of Mineral Entry was issued June 27, 1985.

The subject claims are underlain predominately by slates of the Upper Jurassic Mariposa Formation. The slates were overlain by auriferous river terrace and stream bed deposits along Moccasin Creek. Moccasin Creek is a perennial stream that crosses the GE Nos. 1 and 2 placer claims and flows northward, draining areas underlain by the Mother Lode gold belt. River terrace gravels or stream gravels were not found on the N ½ of the GE No. 3 placer claim. No known lodes were found on the subject claims during the examinations.

On the GE No. 1 claim, dredging of Moccasin Creek bed was proposed by the claimant as the best method to support discovery. BLM examiners determined that mining the foresaid material would yield gold at a rate of $10.84 per hour (gold at $360 per troy ounce).

On the GE Nos. 2 and 3 claims, the claimant indicated that she intends to mine the river terrace gravel using a dozer-loader operation. Calculation indicated that recovered gold for the discovery sites yielded values of $5.95 (GE No. 2) and $6.92 (GE No. 3) per cubic yard.

A cash flow analysis was used in the economic evaluation of these claims. This cash flow analysis accounted for the economic requirements to mine the deposit. Sufficient water was available for mining and most of the mining and processing equipment was owned outright (without liens). As a result of this analysis it was determined that the proposed operation would net a positive cash flow.

Our conclusions and recommendations were:

1. Labor and improvements in excess of $500 per claim have been completed on the subject claims.

2. That mineral patent should be issued for the following claims or portions thereof:

Golden Eagle No. 1 (all) described as: E½ SW¼ NE¼ Section 2, aggregating 20 acres;
Golden Eagle No. 2 (all) described as W½ SE¼ NE¼ Section 2, aggregating 20 acres;
Golden Eagle No. 3 described as: S½ E½ SE¼ NE¼ Section 2, aggregating 10 acres; all in T2S, R15E, Mount Diablo Base and Meridian

3. The N½ of the Golden Eagle No. 3 (10 acres) is not mineral in character and, therefore, is not recommended for patent.

CONCLUSION

Development of the mineral resources on the public land pursuant to the General Mining Law, reflects the policy of the

Discovery site on the Golden Eagle No. 2 placer mining claim. The sampling (face) area was "coarse" cleaned to bedrock using a Case 160 loader-backhoe.

United States to allow free and open occupation and purchase of valuable mineral deposits on land open to location of a mining claim. Prior to gaining any rights under authority of that Act, one must "discover" a valuable mineral deposit following the guidance provided by Department of Interior and Court decisions (such as the prudent person and the marketability rule). No two deposits are operationally the same. Therefore, it is important that adequate field and laboratory techniques be utilized in obtaining data needed to economically evaluate the deposit for its quality and quantity of mineralization. Field procedures should be tailored to adequately represent, as near as practical, the grade and volume of the deposit. Testing of the samples should closely fit the method of recovery.

Individual prospectors, miners, government mineral examiners, and others responsible for ensuring compliance with the rules of discovery and mineral in character should possess a knowledge of the many aspects of field, laboratory, mining, processing, refining, environmental, and mineral economics. Conditions are made complex by changing technical and market conditions. Evaluation of small gold deposits for the purpose of verifying discovery require strong professional skills.

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Retirement

THOMAS E. GAY, JR.

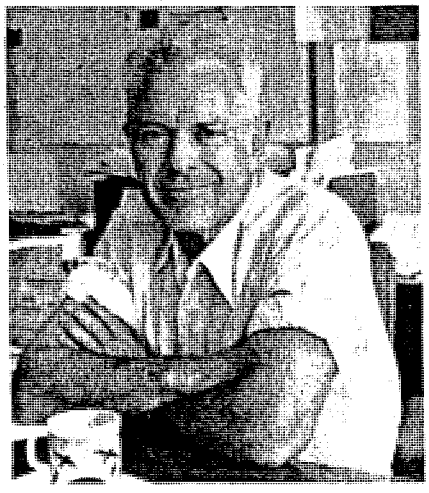

Photo by Jon C. Lloyd

On May 30, 1986, Tom Gay, deputy chief geologist of the Division of Mines and Geology (DMG) retired after 36 years in state service. Most of Tom's professional career was with DMG. He received his bachelors degree in geology from the University of California, Berkeley (UCB) in 1950, continuing with a masters degree in geology awarded in 1952. Tom also holds a masters degree in public administration from Golden Gate University, San Francisco.

While he was a senior student at UCB Tom took the annual civil service examination for mining geologist given by the Division of Mines and was offered a junior mining geologist position by Olaf P. Jenkins, then chief of the Division. Tom accepted the job offer and started work in the San Francisco office on July 1, 1950.

After some years of geologic field mapping while working in the San Francisco, Los Angeles, and Redding offices, Tom became interested in supervision and administration. He has held various management positions and was acting state geologist from September 1975 to March 1978. Tom's career included interim administrative assignments with agencies outside the Division of Mines and Geology, including the Interagency Council for Ocean Research and the Division of Oil and Gas.

His published work includes mapping contributions for many sheets of the Geologic Atlas of California (Alturas, Susanville, and others), and the Saltdale and Elsinore quadrangles, as well as various articles for CALIFORNIA GEOLOGY and it's predecessor *Mineral Information Service*. Tom also wrote the San Bernardino County report, various chapters on economic minerals in Bulletin 176 (Mineral Commodities of California), and Bulletin 198 (Urban Geology Master Plan for California with coauthor John Alfors).

Tom's retirement plans include outdoor activities, such as backpacking trips to the Trinity Alps and more distant localities, tennis, and gardening.

Gold in the Transverse Ra...

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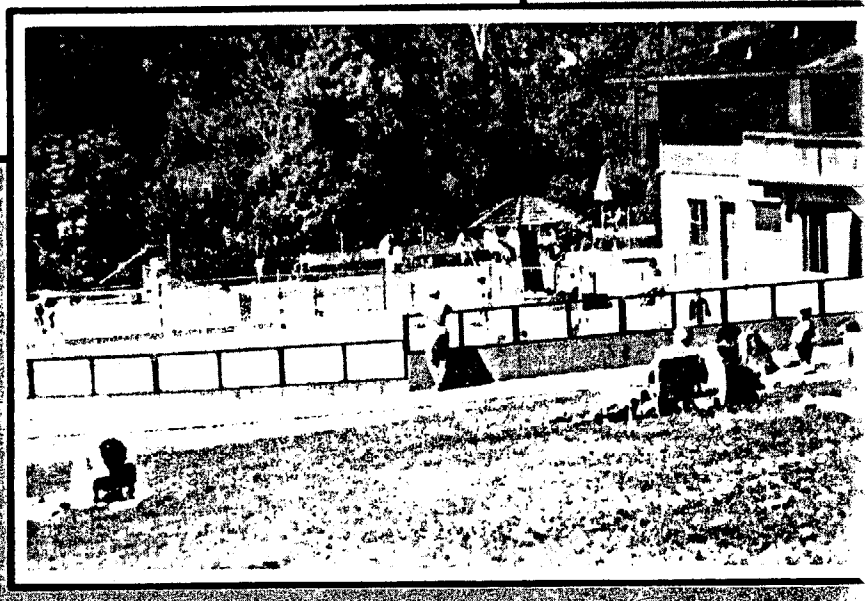

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Gold in the Transverse Ranges

Southern California

By
WILLIAM B. CLARK, Consulting Geologist
Sacramento, California

This article is reprinted from *Geology and Mineral Wealth of the California Transverse Ranges*, Mason Hill Volume, edited by Donald L. Fife and John A. Minch, published in 1982 by South Coast Geological Society, Santa Ana, California. *editor.*

HISTORY

Significant amounts of gold have been produced in the Transverse Ranges from both lode and placer deposits. Some of the earliest known gold-mining operations in California as well as the United States were conducted in the canyons and ravines in the western part of the San Gabriel Mountains and in other regions in the Transverse Ranges (Figures 1-3).

Auriferous gravels were discovered as early as 1834 in Castaic (also known as Castac or Casteca), Palomas, Placerita, Santa Feliciana, and San Francisquito canyons (Figure 2). The gravels were placer mined by persons connected with the San Fernando and San Buenaventura Missions. The work was done under the direction of Father Francisco Lopez and Father Jose Bermudez of the missions. Simple hand methods were used and equipment such as the pan, batea, horn, arrastres, and small sluices were employed.

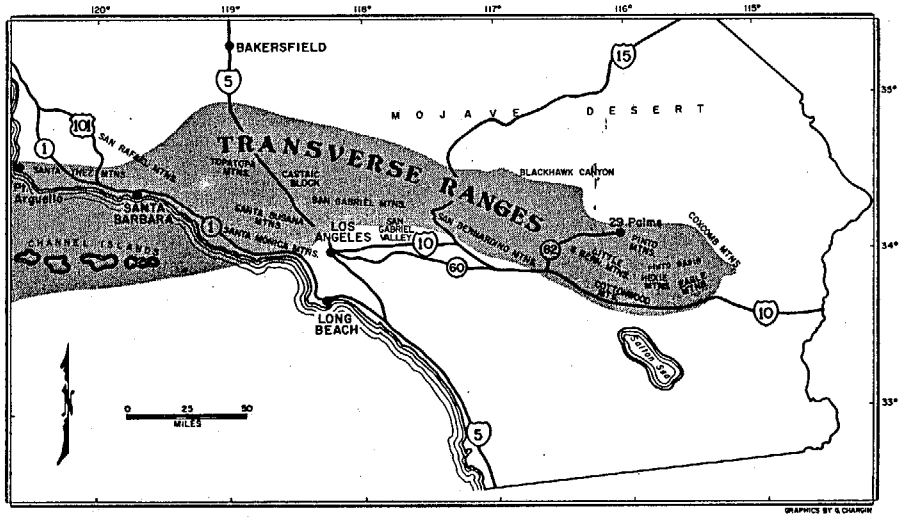
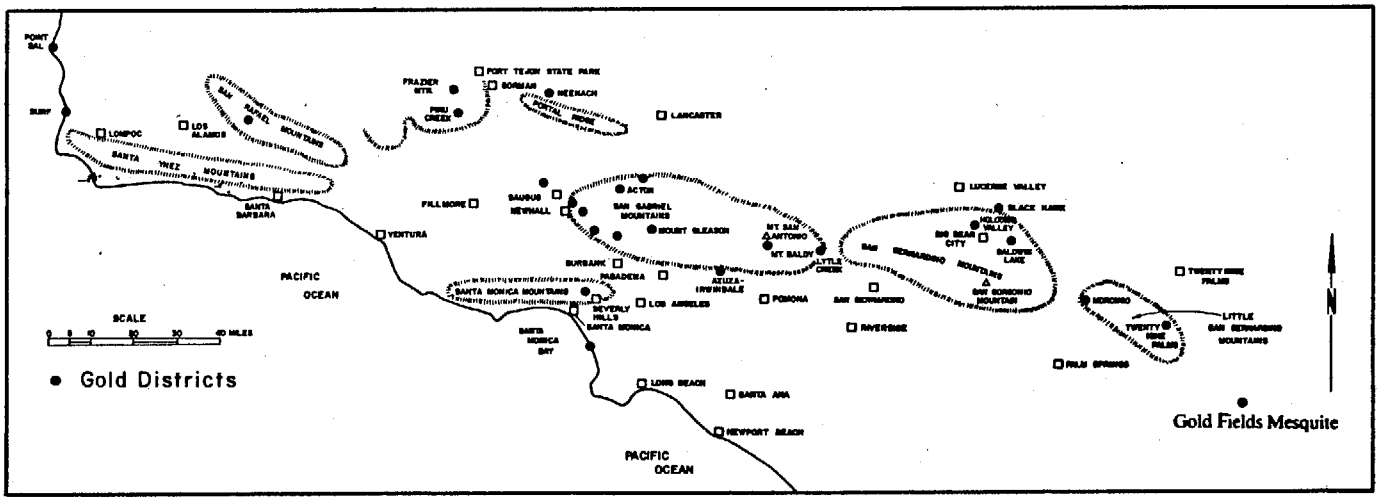


Figure 1. Location of the Transverse Ranges.

Figure 2. The Transverse Ranges showing locations of gold districts.



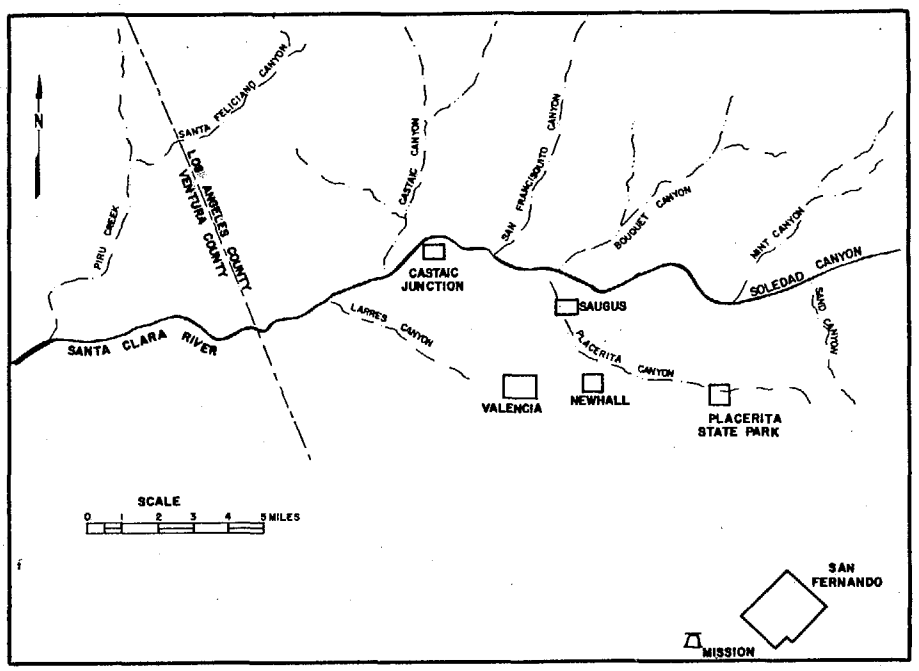


Figure 3. The western San Gabriel Mountains area showing locations of gold-bearing streams.

Meantime in 1848 at Coloma in the Mother Lode area of the Sierra Nevada, James Marshall made his historic gold discovery at Sutter's Mill on the American River. California's gold rush soon was in full sway. Some of the first miners to go north to Coloma were Sonorans from the San Gabriel placer "diggins" in southern California.

Most of the important gold-mining districts in the Transverse Ranges had been discovered by the 1850s and 1860s. After the rushes to the gold deposits in the upper Kern River region and the silver-lead deposits at Cerro Gordo in the late 1850s, many miners came south to the San Gabriel placers and probably also to the then developing lode-gold mines. As many as 6,000 people were reported to have been working the gold deposits in the San Gabriel Mountains in the early 1860s.

In 1838 those operations were visited by Francisco Garcia who had some knowledge of gold mining. Garcia then went to the State of Sonora in Mexico in 1839 and returned in 1840 with 30 miners. These men were skilled at placer mining; during the period of 1840-41 they were reported to have produced more than 20 pounds of gold from Santa Feliciana Gulch. There is a State park now at Placerita Canyon, the site of some of those early-day placer gold mining operations.

Around 1841, placer mining also was done at Piru Creek in Ventura County by Andrew Castillero. There was mining also at that time in the nearby Frazier Mountain district. In 1842 gold from these two districts was shipped to the U.S. Mint in Philadelphia. Placer mining began in the early and middle 1840s in streams along the south flank of the San Gabriel Mountains, particularly along the upper parts of the San Gabriel River south of Mount Baldy. Another area in the Transverse Ranges that is believed to have first been mined in the 1840s was the Baldwin Lake district in the San Bernardino Mountains.

The Lode Gold mine, San Gabriel Mountains, Los Angeles County, circa 1900.

TABLE 1. GOLD-PRODUCING DISTRICTS AND AREAS IN THE TRANSVERSE RANGES OF SOUTHERN CALIFORNIA.

District or Area	*Location*	*Geology and Ore Deposits*	*Mines and Production**	*History*
Acton (includes area known as Cedar district)	Central Los Angeles County in the San Gabriel Mountains 20 miles north of Los Angeles.	Gold-quartz veins with pyrite in quartz diorite and schist; veins are up to 1000 feet deep.	Buena, Esperanza, Governor ($1,-500,000+), Helene, Hi-Grade, Puritan, Red Rover ($550,000).	Placer mining began nearby in the 1830s; lode mining began in the 1860s and 1870s; much activity until 1900; some mining in the 1930s; recent prospecting and development work.
Azuza-Irwindale	At Azuza and Irwindale 20 miles northeast of Los Angeles	Large and deep alluvial fan formed by the San Gabriel River; gold is fine grained.	Major sand and gravel-producing district.	At various times, mainly in the 1930s-1950s, by-product gold produced.
Baldwin Lake	Northern San Bernardino Mountains 5 miles east of Big Bear City.	Quartz-calcite veins with native gold, sulfides, and scheelite in schist, quartzite, limestone, and granite. Some placer deposits.	Christie, Doble ($300,000), Erwin, Gem, Gold Hill, Hollie Ann, Log Cabin, Rose ($500,000+), Stewart.	Placer mining began in the 1830s or 1840s; lode mining began in 1860; considerable activity until 1900 and again in the 1930s; recent prospecting.
Black Hawk (also known as the Silver Reef district)	Northern San Bernardino Mountains 15 miles southeast of Lucerne Valley.	Gold-bearing zones of breccia with sulfides and hematite in schist, gneiss, and granitic rocks.	Lester, Santa Fe group ($300,000+) Silver Reef.	Mining began in 1870 and continued until 1900; mines active again from 1921 to 1940; some recent development.
Frazier Mountain	At Frazier Mountain in northeastern Ventura County 8 miles west of Gorman and Fort Tejon.	Gold-quartz veins with pyrite in schist, gneiss, hornfels, and granitic rocks; placers in streams and older terraces.	Bunker Hill, Esperanza, Fairview, Frazier Mountain ($1,-000,000+), Gold Dust, Harris, Hess, Maule, Sibert, White Mule.	Placer mining began in the 1840s and lode mining in 1865; activity continued until the 1890s; some work since. Fort Tejon, an old U.S. Cavalry post, is a State Park.
Holcomb Valley	Northern San Bernardino Mountains 5 miles north of Big Bear City.	Shallow but extensive beds of Recent and older alluvium; some narrow gold-quartz veins in granitic rock.	Many small operations over the years; power-shovel operation in 1930s treated 200,000 yards that yielded 38 cents/yard.	Mining began in 1860s; extensive work for some years following; active again in the 1930s and 1940s; minor work since.
Lytle Creek	Eastern San Gabriel Mountains 15 miles northwest of San Bernardino.	Gold-bearing stream and old bench gravels; extend along the creek for some miles.		Much activity in 1800s and 1890s when bench gravels were hydraulicked; minor work since; a source of sand and gravel.
Morongo	Little San Bernardino Mountains 15 miles north of Palm Springs.	Narrow gold-quartz veins with often abundant sulfides in schist and granite.		A small lode district that was worked years ago; minor recent prospecting.

District or Area	*Location*	*Geology and Ore Deposits*	*Mines and Production**	*History*
Mount Baldy (also known as Old Baldy)	At Mt. San Antonio (Mt. Baldy) in San Gabriel Mountains 15 miles north of Pomona.	Placer and lode district; stream and older terrace gravels; gold-quartz veins in schist and gneiss; some tungsten.	About $2,000,000 from placers and 50,000 ounces from lode mines. Lode mines are the Allison, Baldora, Big Horn, Eagle, Gold Dollar, Heaton, Holly, Native Son, Stanley, Zanteson.	Placer mining began in 1840s; much work through the 1880s including hydraulic mining; lode mines active 1900s and 1930s; prospected since.
Mount Gleason	San Gabriel Mountains 15 miles north of Pasadena.	Narrow and shallow gold-quartz veins in schist and granite; some high-grade pockets.	Los Padre, Mount Gleason.	Area was mined years ago; minor prospecting since.
Neenach	North of Portal Ridge 10 miles east of Gorman.	Gold-bearing quartz stringers between schist and quartz monzonite.	Rogers-Gentry group ($200,000).	Gold discovered 1899; chief activity was 1935-1938; minor prospecting since.
Piru Creek	Northeastern Ventura County 15 miles southwest of Gorman.	Gold-bearing stream and older terrace gravels; coarse placer gold; quartz veins in gneiss and schist.	Castaic ($160,000).	First mined in 1841; activity continued until the 1890s and again in the 1920s and 1930s; minor prospecting since.
Santa Monica Bay	Beaches along Santa Monica Bay.	Thin gold-bearing beds of black sand; gold is extremely fine.		Worked many years ago on small scale.
Santa Monica Mountains-Hollywood Hills	West Los Angeles and Hollywood.	Narrow gold-quartz veins; small placers in some of the canyons.		Prospected many years ago and again in the 1930s before the area was developed.
San Rafael Mountains	San Rafael Mountains 15 miles east of Los Alamos.	Thin gold-bearing veins.		Prospected in the 1890s and possibly again later on.
Saugus-Newhall	Extensive placer-mining region in the western San Gabriel Mountains.	Many gold-bearing gravel deposits in Soledad, Sand, Mint, Placerita, Castaic, Santa Feliciana, San Francisquito, Paloma, and other canyons; some older bench gravels.		Historic placer mining district that was first worked in the 1830s; it has been mined ever since mainly on a small scale; part of Placerita Canyon is a State Park.
Surf-Point Sal	Western Santa Barbara County—largely in Vandenberg Air Force Base.	Beach sands with thin beds of black sands containing fine grains of gold.		Considerable activity in the 1880s; minor work since.
Twenty-nine Palms	Little San Bernardino Mountains south of Twenty-nine Palms; an extensive area that is partly on Joshua Tree National Monument.	Gold-quartz veins with often abundant sulfides in gneiss and granitic rocks; dikes are common; a number of high-grade pockets.	Anaheim, Atlanta, Bass, Black Warrior, Desert Queen, Gold Coin, Gold Park, Gold Point, Golden Bee, Hexie, Hornet, Lost Horse ($350,000) Silver Bell.	First worked in 1860; much activity 1890s and 1900s; mining was done again in the 1930s, and there has been prospecting since.

*Most of this output was when gold was valued at $20.67 per ounce. The production of many mines is unknown.

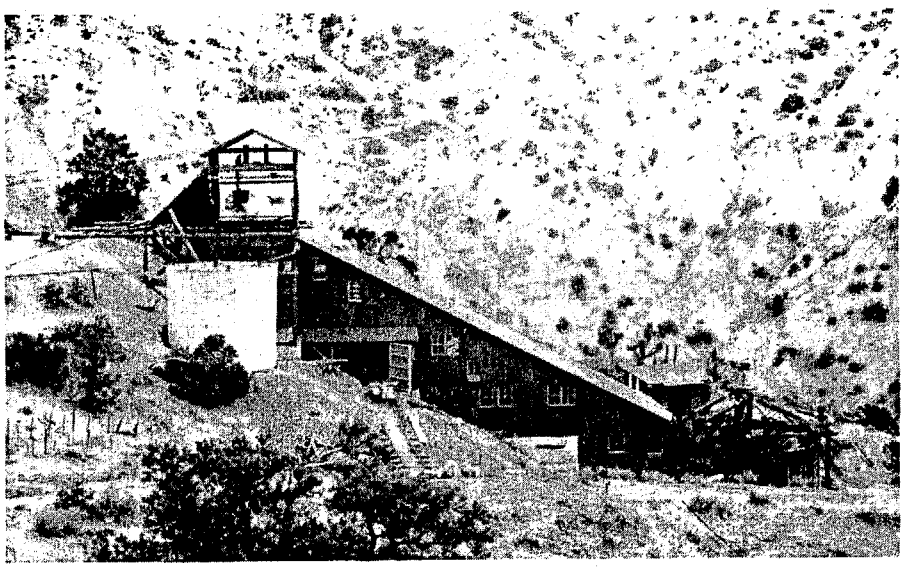
After the rich surface placers were exhausted, quartz mines became the principal sources of gold in the Transverse Ranges as well as all of southern California. The important lode mines such as the Governor and Red Rover Mountain mines in the Acton district, Rose mine in the Baldwin Lake district, and the Santa Fe group in the Black Hawk district (Ely, 1982) were all discovered or developed by the 1860s. They were worked fairly steadily until the 1890s and early 1900s. There was much quartz mining activity again in the region in the 1930s, especially after 1934 when the U.S. Treasury increased the official price of gold from $20.67 to $35.00 per ounce. All of the mines were idle during World War II and for some years afterward.

At one time some hydraulic mining was done in the Transverse Ranges. Probably the most extensive operations were on bench gravel deposits adjacent to upper Lytle Creek and the upper part of the San Gabriel River. Water for the monitors or nozzles was delivered by systems of ditches and pipes. Hydraulic mining in these areas apparently was done as late as 1900. Some of the old cuts and excavations from those operations can still be seen.

Several years ago when the price of gold had a spectacular rise to over $850 per ounce, there was a renewed interest in California's gold deposits, including those in the Transverse Ranges. Prospecting and development work has been done recently in a number of the old gold-mining districts. However, this activity has abated because the price of gold has gone down to around $300 per ounce.

Small-scale prospecting and development work continues in the region. This work now is done mainly by weekend prospectors who work the various streams, especially when water is available. Also they prospect small dry desert placers in the east area of the Transverse Ranges. At various times some placer gold has been produced as a by-product of sand and gravel mining. This has been done chiefly in the large plants in the San Gabriel wash in the Azuza-Irwindale district. Gold may have been recovered at one time in the Sun Valley and Sunland areas in the Tujunga washes in the north part of the city of Los Angeles.

In urbanized southern California extensive housing developments, enormous increases in land values, and strict environmental protection laws have made it difficult, if not impossible, to mine for gold in various areas in the southwestern Transverse Ranges. This is particularly true in various parts of the San Gabriel and Santa Monica mountains. For example, a number of small but rich gold-quartz veins in the Bel Air and Holmby Hills areas of western Los Angeles near Beverly Hills, and gravels in Laurel, Benedict, and other canyons in that area were prospected years ago. Some of the most expensive homes in the nation are in those areas, and now it would not be possible to prospect or mine there.



The Arlington mine mill in Blackhawk Canyon, northern San Bernardino Mountains, San Bernardino County, circa early 1900s. Approximately 10,000 ounces of gold were produced from various operations on Blackhawk Mountain between 1889 and 1940.

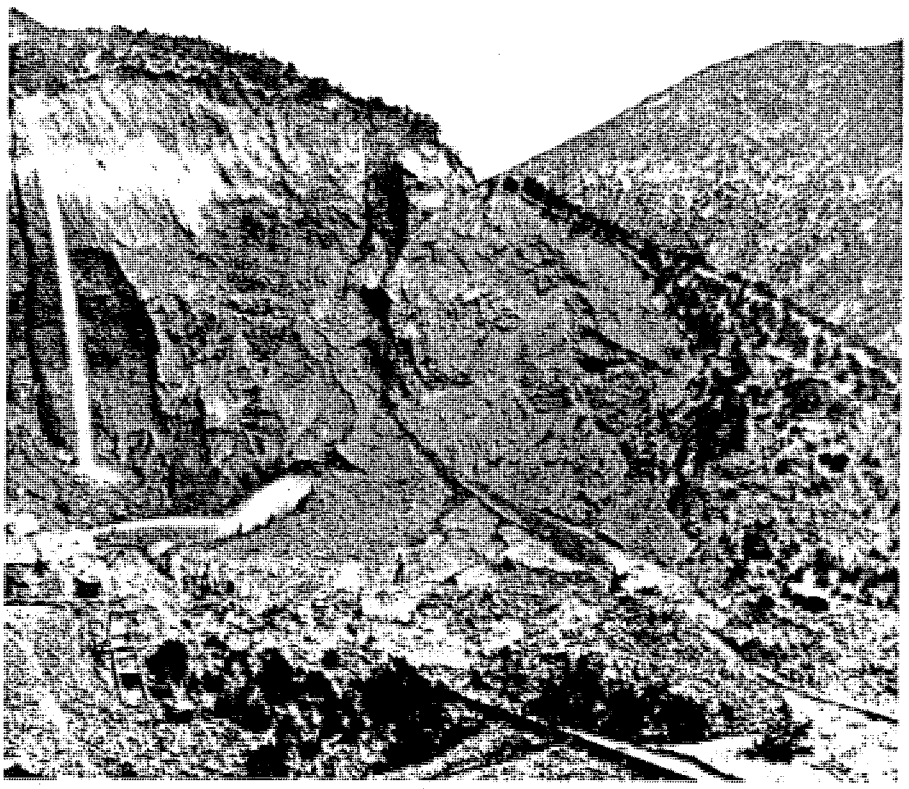
GEOLOGY

There are several types of primary gold deposits in the Transverse Ranges. These deposits are nearly always associated with the intrusion of granitic rocks, and they occur in the granitic rocks (Ely, 1982b) or in adjacent metamorphic rocks (Ruff and others, 1982). The most common and most typical primary deposits are steeply dipping gold-bearing quartz veins. These veins usually range from 1 foot to 10 feet or more in thickness. A number of gold ore bodies consist of several parallel quartz veins or they may consist of a zone of numerous narrow quartz stringers. Sometimes the veins and ore bodies are closely associated with fine-grained dioritic dikes.

In the primary deposits the gold most commonly occurs in the native state and is usually in small grains. In high-grade deposits, the gold may occur as coarse grains or as wires and thin plates and very rarely as crystals. The gold often is associated with sulfides of which pyrite is the most common. Sometimes the sulfides contain gold too. In the early days the oxidized upper portions of some of the veins yielded rich ore.

The most extensive veins and vein systems that have been developed and mined thus far in the Transverse Ranges are those in the Acton district in Los Angeles County and the Frazier Mountain district in Ventura County. In both districts there are a number of veins and vein systems in granitic rocks, gneiss, and schist. The veins at Acton have been developed to an inclined depth of as much as 1,000 feet. Some of the ore bodies had horizontal stoping lengths of 300 feet or more. In places the ore from these districts yielded ½ ounce or more of gold per ton.

In the Baldwin Lake district, located on the north flank of the San Bernardino Mountains, there are several sizeable quartz-calcite vein systems that contain native gold, pyrite, chalcopyrite, and scheelite. These vein systems are 50 feet thick or more and are found in quartzite and schist. At the Black Hawk district, also on the north flank of the San Bernardino



Hydraulic mining in the Lytle Creek mine, eastern San Gabriel Mountains, San Bernardino County, circa 1894. *Photo courtesy of the California State Library.*

Mountains, the ore deposits are in brecciated limestone in schist, gneiss, and granitic rocks (Ely, 1982a). The ore zone here has been deposited in a major fault zone. the ore-bearing zones are as much as 1000 feet long and up to 75 feet thick. In the Neenach district in Los Angeles County there are a number of gold-bearing quartz stringers in a contact zone between schist and quartz monzonite.

There are several so-called "pocket" mining districts in the San Gabriel, San Bernardino, and Little San Bernardino mountains. In these districts the gold occurs in small but rich ore bodies or pockets in narrow and usually shallow veins and stringers. Such deposits have been found in the Mount Baldy, Mount Gleason, Twentynine Palms, and Holcomb Valley districts. In addition, there are several small but rich veins in the Santa Monica Mountains and Hollywood Hills in the western part of the city of Los Angeles. These high-grade pocket deposits commonly contain 1 or more ounces of gold per ton.

Placer deposits are quite widely distributed in the Transverse Ranges region, but the most numerous and most productive have been in the canyons and gulches in the San Gabriel Mountains. The gold-bearing sands and gravels occur not only in the present channels, but in places where there are old bench deposits. the most extensive benches are at upper Lytle Creek and the upper San Gabriel River. The gold fragments, which range in size from microscopic grains to coarse nuggets, are most abundant at or near bedrock. The richest deposits are where cracks, crevices, and other depressions in the bedrock have acted as natural riffles to catch and concentrate the gold.

Other productive placer gold deposits are located in the Piru Creek-Frazier Mountain area in Ventura County. Probably the best-known and most productive placer deposits in the San Bernardino Mountains are in Holcomb Valley north of Big Bear City. The deposits here consist of recent and older alluvium. Although the deposits at Holcomb Valley usually are only a few feet deep, they cover an extensive area.

Small amounts of placer gold have been recovered from beaches along the Pacific Ocean. The best-known beach deposits are at Surf in western Santa Barbara County near the mouth of the Santa Ynez River and at Point Sal to the north. Also minor amounts of gold were recoverd from several beaches in Santa Monica Bay. In beach deposits the gold occurs as extremely fine grains in thin layers of black sand. Such deposits are formed by a combination of wave action and ocean currents.

Although there is very little documentation, there are small dry desert gold placer deposits in the southeastern portion of the Transverse Ranges in the Little San Bernardino Mountains and nearby areas. These deposits are found in ravines and small basins. The gold in these types of deposits usually occurs as small irregular-shaped grains. The gold has been concentrated by a combination of wind and water action, particularly by desert cloud-bursts.

FUTURE POTENTIAL

Even though the Transverse Ranges have been explored by thousands of prospectors, the potential for new discoveries is greatly increased by (1) changes in technology and methodology, such as heap leaching, (2) better understanding of regional and local geology, (3) better geologic and geochemical models of ore accumulation, and (4) more favorable prices for precious metals.

Hydrothermal systems associated with various thrust systems in the Transverse Ranges may offer exploration targets for "Carlin type" large low grade disseminated gold deposits. Such disseminated deposits have been found during the past few years in the old Knoxville mercury district of Napa County, in the Placerville area of northern California, and near the southeast end of the Transverse Ranges in Imperial County. Estimated reserves contain disseminated gold on the order of 0.05 to 0.2 ounce of gold per ton and total more than 7 million ounces of gold. These discoveries should encourage the modern prospector to carefully explore the Transverse Ranges armed with up to date geologic knowledge.

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CRP Call For Papers

The Center for the Study of Early Man is preparing Volume 3 of CURRENT RESEARCH IN THE PLEISTOCENE (CRP) to promote worldwide communication about the archaeology and paleoecology of Pleistocene North and South America as well as northeastern China and Siberia.

The purpose of CRP is to bridge the gap between abstracts, which might be published in academy and society meeting proceedings, and those notes and short articles printed in regular peer-reviewed journals. The success of this annual publication rests on specialists submitting their reports of current research on a regular basis. This will help everyone interested in the study of the peopling of the New World and the paleoenvironmental reconstructions of the Western Hemisphere to keep abreast of this fast-changing, multidisciplinary topic.

Short concise manuscripts submitted by January 31, 1986 will be considered for inclusion in Volume 3, to be published in May, 1986. Categories include (1) Archaeology, (2) Physical Anthropology, (3) Lithic Studies, (4) Taphonomy - Bone Modification, (5) Methods, (6) Paleoenvironments (including subsections on plants, invertebrates, vertebrates, and geosciences); and (7) Dissertations.

For information, contact:

Jim I. Mead

CURRENT RESEARCH
IN THE PLEISTOCENE

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DMG RELEASE

SPECIAL PUBLICATION

SP 79 MINERAL COMMODITY REPORT — Anhydrous Ammonia (Nitrogen). By Gary Taylor. 1985. $1.00

The Mineral Commodity Report (MCR) series makes available to the general public and the mining industry the mineral economics and mineral resources information collected by the U.S. Bureau of Mines and by the Department of Conservation, Division of Mines and Geology.

Each MCR focuses on a particular mineral commodity and provides data on production in the United States and worldwide in Part I. In Part II of each report the mineral occurrence and production in California is discussed. The report includes a generalized location map of the mineral commodity deposits, a list of producers, and a list of references.

SP 79 is available from the Division of Mines and Geology, P.O. Box 2980, Sacramento, CA 95812 and the Division's regional offices.

A POTPOURRI OF WHAT'S HAPPENING IN BLM—CALIFORNIA

The Inside Page

GUIDE THRU HISTORY

Following the route of the historical Mojave Road through the California Desert will now be easier. The new GUIDE TO THE MOJAVE ROAD will enhance the desert explorer's journey along wagon routes and Indian trails, to desert waterholes and cactus gardens, and through some of the most spectacular scenery in the California Desert. Printed and made available to BLM by the "Friends of the Mojave Road," the guidebook can be borrowed for general public use from any of the BLM offices in the California Desert District (see page 7 for locations). It contains directions, interpretive descriptions of natural and historical resources, safety information, driving conditions, etc. The guidebook notes that a 4-wheel drive vehicle is necessary for much of the route.

THE BURNING BRUSH

A 400-acre controlled burn in the Sierra de Salinas range in BLM's Hollister resource area has reduced heavy brush, vastly improving wildlife habitat and watershed conditions. By burning at this time of year, a reduction of heavy fuels buildup can more safely be achieved. "Prescribed-burn" (controlled) reduction lessens the potential for devastating wildfires. Nearly 3,600 acres of brush have been burned under controlled conditions in this area since 1983.

ANOTHER HEAVY WEEKEND

A wilderness and visitor-use monitoring flight conducted by BLM's El Centro office in the California Desert over the weekend marking the first national observance of Dr. Martin Luther King's birthday showed over 3,000 primary campsites being used by an estimated 11,000 visitors. This makes the new holiday the third-heaviest weekend for the El Centro area, behind Thanksgiving (which this past year had 12,000 campsites) and President's Day (with over 5,000 sites observed). On an average weekend in this area, 3,500 visitors at 1,000 campsites enjoy the public lands.

A BLM FIRST

National recognition was recently given to BLM-California petroleum engineering specialist Hal Stoops for his authorship of BLM's first HANDBOOK FOR DRILLING INSPECTIONS. BLM Director Robert Burford acknowledged Stoop's outstanding contribution to BLM in preparing the document. Written with Carl Budd of BLM-Wyoming, the handbook documents the inspection process for oil and gas operations, and will serve as the key training and reference tool for oil and gas inspectors, petroleum engineers, and other specialists as they perform drilling approvals and inspections on public lands.

Bakersfield District Manager Bob Rheiner (right) congratulates Hal Stoops on the award received from BLM national director Robert Burford.

TAKE A HIKE

Desert visitor specialist Fred Coe will conduct hikes throughout the Ridgecrest area during April to the lava formations and falls at Fossil Falls, to the Desert Tortoise Natural Area, and through the Eureka Dunes. Sturdy hiking shoes, a hat and water should be brought on these popular desert hikes. For more inforamtion on these and other events of interest to public land users, call 619/375-7125.

RAILS TO TRAILS READIED

Major progress is reported on the Rails-to-Trails conversion of the Bizz Johnson Trail which meanders though the mountains alongside the Susan River in BLM's Susanville district. Land exchange efforts between BLM and a major timber management company have been completed, placing the entire 25-mile railroad grade trail in public ownership. A spring celebration is being planned to mark the completion of this exchange, which involved 1,500 acres of canyon and woodland areas, and 4 miles of trail that passes through tunnels and across former railroad bridges above the Susan River.

PIPELINES ACROSS THE DESERT

It would surprise some people to learn there are no west-to-east crude oil pipelines in the United States. Crude is presently transported to midwest distribution centers from the west coast via the Panama Canal and the Gulf coast. Two proposals to construct west-to-east pipelines from the California coast to the midwest — crossing public lands in California, Arizona and New Mexico — have been under consideration. One, the All-American pipeline, is presently under construction, has tunneled under the Colorado River, and is on its way to Texas. Also proposed are several pipelines to bring natural gas into central California to facilitate the pumping of crude oil from the ground.

ILLEGAL CUT DONATED

Two-thirds of a cord of fuelwood illegally cut in BLM's San Benito Mountain Natural Area was recently donated to a needy family in Hollister. BLM officials notified the San Benito County welfare department of the availability of the wood, which they picked up and delivered.

The Nature Conservancy Credits State Director (Cont'd from page 1)

threatened Coachella Valley Fringe-Toed Lizard, and affords opportunities for educational uses.

Also acknowledged was the joint creation and management of the Big Morongo nature preserve in the Little San Bernardino Mountains. This area is managed to promote regional biological diversity, conserve plant and animal stock, preserve rare and endangered organisms, provide for scientific research, and offer opportunities for compatible educational and recreational uses. Lush desert oases draw hundreds of species of birds to the Big Morongo area, and birdwatchers from across the country frequent the area.

BLM and The Conservancy have also been coordinating the proposed creation of a new "macropreserve" to be established in the Carrizo Plain area west of Bakersfield — covering roughly 100,000 acres. This area is the last large remnant of what was once typical diverse Central Valley habitat. This habitat now supports threatened, endangered and sensitive species that include the San Joaquin kit fox, the blunt-nosed leopard lizard, the giant kangaroo rat, and the endangered California condor. Working with BLM, The Nature Conservancy has contributed measurably into developing the plan of action to create a preserve area for the protection of those species found there.

Over the years, consistent communication between The Nature Conservancy and BLM has resulted in a strong and results-oriented bond between the two organizations. The award, presented by Steve McCormick, President of The California Nature Conservancy, recognized that the initiative and leadership Hastey has shown has done much to strengthen mutual understanding between the two organizations, and identify natural areas throughout the state for the safekeeping of our endangered species. □

Federal Register Notices

- April 10-11 — Desert District Advisory Council meeting, Riverside
- May 13-14 — Susanville Advisory Council tour and meeting

- April 19-20 — Wild Horse and Burro Adoption PLUS Celebrity/Pro Polo Match — Los Angeles Equestrian Center, Burbank

  Pamela Sue Martin, Alex Cord, Tom Goodspeed playing for Wild Horse Sanctuary

  vs.

  Bill Devane, Doug Sheehan, Joe Henderson playing for Ensemble Studio Theater

  Adoption between 8 a.m. and 5 p.m. both days (call 714/351-6394 for adoption information)

  Polo match at 3:15 p.m. Sunday only (call 818/840-9066 for polo match information)

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	Southern California Metropolitan Project Area 1695 Spruce Street Riverside, CA 92507 714/351-6379		

WHAT'S HAPPENING IN BLM—CALIFORNIA

The Inside Page

DESERT TOURS

• BLM opened its winter touring season in the high desert recently with public tours of historic Soda Springs in the Mojave Desert near Baker. Tours will be conducted by members of the Barstow resource area staff every Saturday and Sunday until mid-June 1987, when hot weather sets in.

Soda Springs

• BLM visitor information specialist Fred Coe will conduct tours to acquaint visitors with the scenic wonders that occur on public lands located in BLM's Ridgecrest resource area; to confirm January's scheduled activities, contact Coe at (619) 375-7125:

—Saturday January 24, 1:00 pm, Fossil Falls Tour;

—Sunday January 25, 1:00 pm, Trona Pinnacles Tour;

—Additionally, BLM's portable ranger station will be set up Jan 16-19 and Jan 30-Febuary 1 to distribute free maps, litter bags, first aid, and other services to public land users and visitors in the Jawbone Canyon area of the desert.

ON THE MOVE

• Ben Koski begins his tenure this month as El Centro's Area Manager when Roger Zortman moves to BLM's Washington Office.

• Ed Katlas will serve as Acting Ukiah District Manager when Van Manning moves later this month to BLM's Salem, Oregon, office.

WILDERNESS STUDIES

BLM is starting wilderness studies on about 11,000 acres of small public land tracts, ranging from 80 acres to 4500 acres, as part of the last of its wilderness review efforts in the state. BLM-California State Director Ed Hastey said his agency has completed, or is in the final stages of completing most of the wilderness studies on over 6 million acres of public land in California. These additional 11,000 acres—in eight wilderness study areas within Alpine, Kern, Mendocino, Modoc, San Luis Obispo, Tehama, Tulare and Trinity Counties—are part of 29 tracts statewide where preliminary studies are still underway.

Once these are complete, expected by the end of 1989, BLM's entire California wilderness recommendation package, covering suitable and unsuitable recommendations for 6.9 million acres of wilderness study areas statewide, will be forwarded to Washington, D.C., for consideration by the Secretary of the Interior, the President, and Congress.

PLANNED BURN

BLM's Arcata Resource Area, with assistance from the Redding area office staff, recently conducted a prescribed burn of over 65 acres in the King Range National Conservation Area. The burn will provide excellent site preparation for tree planting this spring, and will improve upland game access and movement in the area.

MEMORIAL FUND RAISER

In early October 1986, biologist Jim Bicket from BLM's Needles Resource Area was killed in the crash of a helicopter that was taking wildlife experts on a flight to inventory bighorn sheep habitat in the Clark Mountains of southern California. Piloting the copter was Don Landells, a veteran of hundreds of wildlife projects involving California's big game animals. Landells was also killed. The wildlife program in California lost two great friends the day these men died.

Surviving the crash was Gerard Wagner, a volunteer worker, and Dick Weaver, a Department of Fish and Game biologist. While at home still recovering, Weaver has been working with the Desert Bighorn Council on a fund-raising effort to benefit Jim Bicket's family. Bicket leaves a wife and two children.

The Desert Bighorn Council is offering at a drawing to be held at their April meeting a magnificent sculpture by Reva Hansen of a bronze desert bighorn ram. There will be a second prize of four prints of the grand slam wild sheep, and a third prize of a silver ram bolo. Winners need not be present to win.

Ticket sales for the drawing are being handled by Donald Koch of the Department of Fish and Game in Sacramento. All proceeds will go to the Jim Bicket Memorial Fund, established at the Bank of America in Needles. Contact Don Koch at (916) 324-0769 for tickets.

IN THIS ISSUE:

Bureau of Land Management

PUBLIC LANDS ☆USA☆

USE ☆ SHARE ☆ APPRECIATE

ASARCO

Southwestern Exploration Division

JDS

January 23, 1987

To: J. D. Sell

From: F. R. Koutz

Hubbard-Bearpaw Ground
Leviathan-Silver Bow Group
Sec. 4,8,9, T16N, R1E
Calico Mining District
San Bernardino Co., CA

I pass by you and the Mining Dept. (SAA) on their way to our files, a packet of data I obtained in Nov. 1985 from Wm. S. Hubbard through an ad in Skillings on his 53 claims one mile N. of Waterloo. Mr. Hubbard and his father have mined/leased barite from these claims and are now in the land, sand and gravel, quarry, top soil, oil and non-metallic mineral mining business in the southern San Bernardino Mts., 10 mile east of Redlands on their various extensive land holdings (schedule of mineral properties attached). He claims 2 million tons of 65% barite with 2 opt Ag in his Calico Holdings -- grossly exaggerated from the data-reports provided. He does have, however, considerable geologic and assay data from his property and has collected extensive old mine records on the Calico District which might be of use to us in the future.

I had planned on stopping by his Bearpaw Ranch sometime in 1986 to look at his data as he was quite friendly. Note his Bearpaw silica deposit which he says runs 0.03 opt Au. Over the phone, Mr. Hubbard did not sound like the usual desert quack prospector. I believe it is worth briefly looking into Mr. Hubbard's data/property sometime this year when I or someone else is passing through the San Bernardino area.

Bearpaw Ranch
Star Route 150
Forest Falls, CA 92339
ph. (714) 794-1388

Fleetwood R. Koutz

FRK:mek
Att.

cc: S.A. Anzalone

William S. Hubbard
Bearpaw (Ranch)

Star Route 150
Forest Falls, CA 92339
(714) 794-1388

November 19, 1985

Rec'd 22 Nov 85 Joint

Said would try to get by in Early 1986

Mr. Fleetwood Koutz
ASARCO
South West Exploration Division
P.O. Box 5747
Tucson, AZ 85703

Dear Mr. Koutz:

Your call today in response to my ad in Skillings' was a very pleasant surprise. I have been trying since 1965 to get someone from ASARCO to take a look at my Calico holdings. Unfortunately, as you pointed out, I was dealing with the mining people. Smelting (Selby) - long ago

If ASARCO decides to look at the Leviathan-Silver Bow group, I would appreciate being able to give you (or whomever comes out) a short (1-2 hours) orientation on boundaries, workings, and outcroppings, and other salient features. I think it would save a lot of time, and I would not worry that something had been missed. After that you would be on your own.

I put the property together for the barite. I concentrated on that portion of the mineralized zone, starting in 1956 (good heavens! 30 years ago) that had big veins and high barite content.

Some geologists have mentioned that there might be silver potential.

Dr. Jessey, in his report, states that the property should be looked at from a "dual commodities" standpoint; silver and barite. It occurs to me that the property, tied to the Waterloo, could give ASARCO a "dual commodities" capability in a big way.

extensive old mine records on Calico District

Preliminary information is enclosed. If you get interested, you can go through the files and make copies of whatever you would care to.

Should ASARCO like the property, I am agreeable to any reasonable arrangement. Come on out and have a look. I would be available to meet you or your geologist on short notice.

Sincerely,

Bill Hubbard

William S. Hubbard

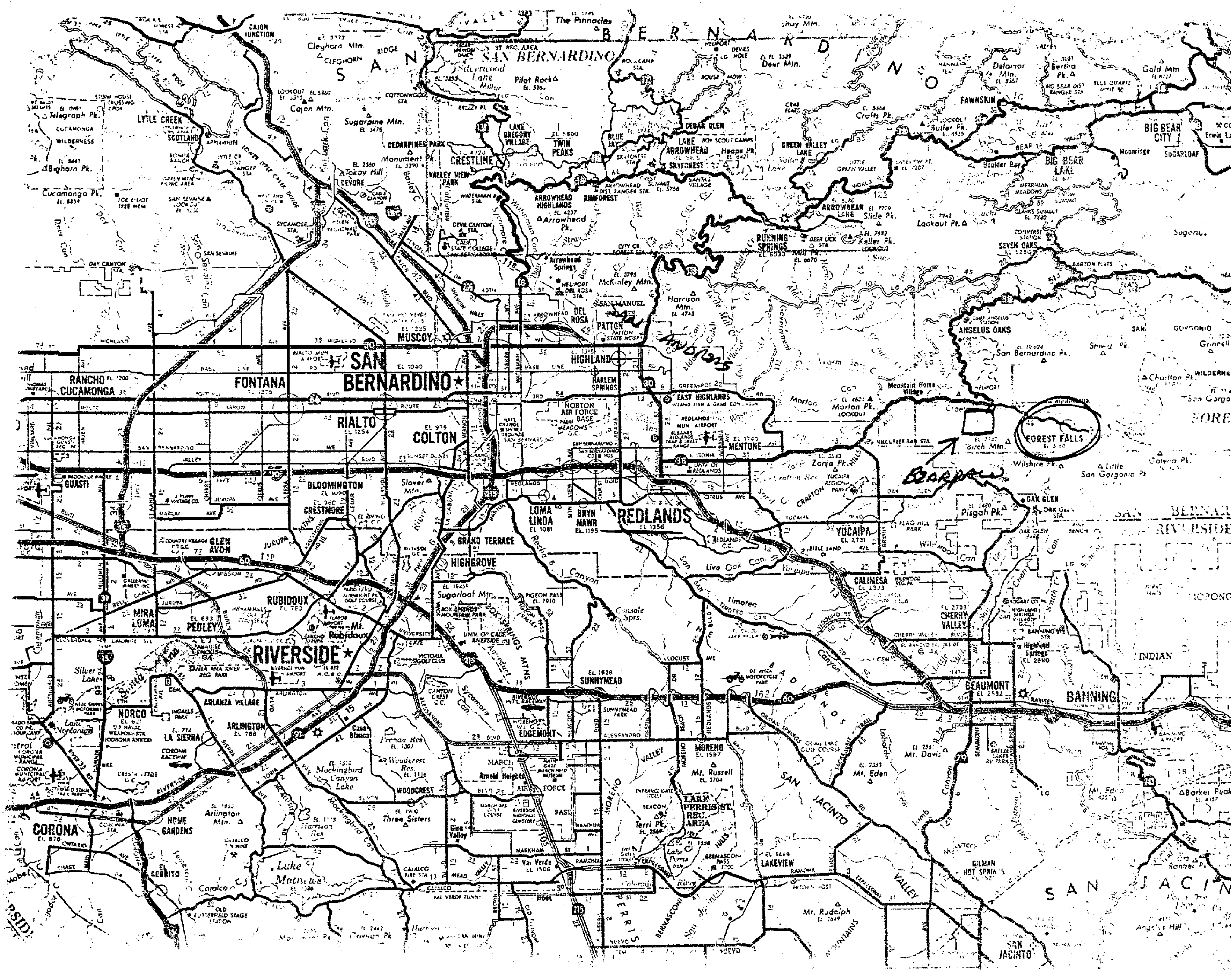
enclosures

WSH/lo

SCHEDULE OF MINERAL PROPERTIES W. S. HUBBARD

Name of Property	Description	Remarks
Cajon Gravel	Operating sand and gravel deposit on 110 acres-Cajon Pass. Site permitted for wide range of industrial uses.	Leased to Cajon Rock. Deposit appurtenant to Cosy Dell Ranch.
Flying "W" Topsoil	Large topsoil deposit-Cajon Pass.	Appurtenant to Flying "W" Ranch
Flying "W" Manganese Flying "W" Sand & gravel	Pigment grade manganese deposit-Cajon Large Sand & gravel deposit	Appurtenant to Flying "W" Ranch. " " " . Lab Report Avail.
Newberry Clay	Large clay deposit-Newberry area.	160 acre placer claim on BLM land.
Salton Gravel	Large gravel deposit formally used to construct State Hwy. 86. Now idle.	Appurtenant to 380 acre Salton Vista property.
Leviathan-Silver Bow Mines Group	Large barite-silver property-Barstow area. Former barite producer. Large reserves.	53 lode mining claims-BLM land. Adjoins American Smeltin & Refining's Calico Silver Mine.
~~Black Jack Manganese~~	~~Pigment grade manganese deposit-Amboy area.~~	~~5 mining claims. BLM land.~~
Bearpaw Silica	World class silica deposit-Yucaipa area.	Geological reports available. Appurtenant to fee Bearpaw Ranch. RUNS .03 OZ gold. Geol. Report Avail.
Bearpaw Topsoil	Large topsoil deposit-Yucaipa area.	Appurtenant to Bearpaw Ranch. Thousand Trails plans to utilize in building their campground.
Bearpaw D.G.	Large decomposed granite deposit-Yucaipa Ridge.	Appurtenant to Bearpaw Ranch. Thousand Trails also plans to utilize in building their campground.
Bearpaw Gold Prospect	Old antigua-Bearpaw.	Purely a prospect. Isolated assays to $250 per ton.
Bearpaw Clay Prospect	Large clay deposit. Possibly industrial grade.	Under investigation.
Silver Sericite	Industrial grade mica deposit. East of Barstow.	3-160 acre placer claims. (two not tot.)
Vinnell Limestone	2200 acre limestone deposit E. of Hesperia.	Fully permitted and operating. Leased to L.S. Hawley
Cajon Oil	Oil lease on Cajon properties to Butte Resources.	Appurtenant to Cosy Dell and Flying "W" Ranches.

WILLIAM S. HUBBARD
BEARPAW
HIGHWAY CONTRACT 01 BX 150
FOREST FALLS, CA 92339


SAN BERNARDINO
RIVERSIDE
REDLANDS
FONTANA
RANCHO CUCAMONGA
RIALTO
COLTON
HIGHLAND
LOMA LINDA
YUCAIPA
CALIMESA
BEAUMONT
BANNING
CORONA
NORCO
SUNNYMEAD
MORENO
EDGEMONT
MUSCOY
DEL ROSA
PATTON
MENTONE
EAST HIGHLANDS
BLOOMINGTON
CRESTMORE
GRAND TERRACE
HIGHGROVE
RUBIDOUX
MIRA LOMA
PEDLEY
GLEN AVON
ARLINGTON
LA SIERRA
ARLANZA VILLAGE
HOME GARDENS
EL CERRITO
WOODCREST
LAKEVIEW
CHERRY VALLEY
CRESTLINE
LAKE ARROWHEAD
RUNNING SPRINGS
BIG BEAR LAKE
BIG BEAR CITY
FAWNSKIN
ANGELUS OAKS
FOREST FALLS
OAK GLEN
SEVEN OAKS
DEVORE
LYTLE CREEK
CEDARPINES PARK
VALLEY VIEW PARK
TWIN PEAKS
CEDAR GLEN
SKYFOREST
RIMFOREST
ARROWHEAD HIGHLANDS
NORTON AIR FORCE BASE
GUASTI
SAN JACINTO
The Pinnacles
San Bernardino Pk.
Arrowhead Pk.
Mt. Rubidoux
Box Springs Mtns
Lake Mathews
Lake Perris
Mt. Russell
Mt. Davis
Mt. Eden
Harrison Mtn.
Morton Pk.
Birch Mtn.
Pisgah Pk.
Wilshire Pk.
Zanja Pk.
Cajon Mtn.
Sugarpine Mtn.
Monument Pk.
Cucamonga Pk.
Telegraph Pk.
Bighorn Pk.
McKinley Mtn.
Slover Mtn.
Sugarloaf Mtn.
Arlington Mtn.
Three Sisters
Mt. Rudolph
Mockingbird Canyon Lake
Keller Pk.
Slide Pk.
Lookout Pt.
San Timoteo Canyon
Live Oak Can.
MARCH AIR FORCE BASE
Bearpaw
Snow Drop

State of California
Department of Conservation
Division of Mines and Geology

December 19, 1985

Wilderness Study Area
CHUCKWALLA MOUNTAINS, CDCA 348

Mineral Survey Report:

Powell, R.E., *et al.*, 1984, Mineral resource potential of the Chuckwalla Mountains Wilderness Study Area, Riverside Counties, California: U.S. Geological Survey Open-File Report 84-674

EXECUTIVE SUMMARY:

The Department of Conservation's Division of Mines and Geology conducted an eight person-day review of the subject report (Powell, R.E., *et al.*, 1984) and field review of the Chuckwalla Mountains Wilderness Study Area. Based on these studies the following comments are presented:

1. Use of analytical values from geochemical sampling of rocks and stream sediments as the principal criteria for interpretation of resource potential is inappropriate; consequently, we recommend that a new assessment of resource potential using different criteria be undertaken.
2. Assign moderate or high potential for copper and lead in selected areas.
3. Assign moderate and unknown potentials to different areas regarding the presence or absence of mafic dikes.
4. Assign unknown potential for geothermal resources in the entire study area.
5. The Red Cloud thrust and remotely-sensed hydrothermally-altered areas should be evaluated for resource potential.

GENERAL COMMENTS:

The U.S. Geological Survey has recently published a guide to the preparation of Mineral Survey Reports on Public Lands (Goudarzi, 1984). In this guide a dual classification scheme is presented using mineral resource potential and certainty ratings. It is recommended that the Goudarzi classification scheme be used in all Mineral Survey Reports of Wilderness Study Areas. To illustrate the differences between the system proposed by Goudarzi (1984) and that used by Powell, *et al.* (1984) in the subject report, we have compared the mineral resource potential definitions in Table 1 of this commentary.

We conclude that the definitions of resource potential used by Powell, *et al.*, (1984) (see Table 1) are improperly conceived and too arbitrary for comparison to the resource potential interpreted by the U.S. Geological Survey/ U.S. Bureau of Mines for the other wilderness study areas in the Mojave Desert. Specifically, we object to basing interpretation of potential principally on arbitrary geochemical levels from assays and particularly stream-sediment analysis. This reliance on geochemistry of collected samples (rocks, sediments) introduces a significant bias early in the process of assessment of potential. For example, limited sampling of outcrops and stream sediments could miss many anomalous concentrations of minerals and thus, by definitions of Powell, *et al.*, (1984), would eliminate assignment of potential because the geochemical anomalies weren't detected.

We believe that geologic environment should have at least equivalent, if not more, importance as a criterion for assessment of potential. Although Powell, *et al.*, (1984, p. 15) use geologic criteria to some extent in their assessment, geochemistry is the dominant criterion. Because they used limited surface observations (sampling of materials), their estimates of potential are inherently conservative in both level and map area. Aside from these points, we commend Michael Lane and his assistants for their diligent study of the area; they produced the most comprehensive study of mines and prospects of any report of the first group released for public comment by the Bureau of Land Management.

Our disagreement with the type of classification used by Powell, *et al.*, (1984) prevents us from reinterpreting the resource potential of the area based on the definitions of Powell, *et al.*, (1984). We recommend that the resource potential of the Chuckwalla Mountains be entirely reclassified using a broader scheme such as that of Goudarzi (1984). Limited time has prevented the Division of Mines and Geology from accomplishing this task, although we make a few reinterpretations using Goudarzi's (1984) scheme, as discussed below.

NEW INTERPRETATIONS OF NEW AND EXISTING DATA

1. All areas with mafic dikes designated by Powell, *et al.*, (1984) as "low to moderate" for gold and silver should be designated "moderate" (Goudarzi, 1984) because:

A. Powell, *et al.*, (1984) noted both the spatial and possible genetic association of the dikes and mineralization in the area. The areas of dikes are thus a favorable environment for mineral deposits. Although exposed dikes may not be associated with quartz veins and mineralization at the ground surface, such mineral zones could be present in the subsurface.

B. The Chuckwalla Mountains are abundantly mineralized in many places where the dikes are exposed. Thus, <u>proximity</u> of the ostensibly unmineralized, exposed dikes to these mineralized areas is significant.

2. On pages 15-16, Powell, *et al.*, (1984) did not assign a resource potential to the areas with neither the ;mafic dikes nor any geologic or geochemical evidence of mineralization. These areas should be assigned an "unknown" potential (Goudarzi, 1984) for precious and base metals, tungsten, and molybdenum because:

   A. The authors recognized (Powell, *et al.*, 1984, p. 17,2nd paragraph; p. 18, 1st and 1nd paragraphs) the uncertainty of possible large mineral deposits in the subsurface of the study area.

3. We see no reason to assign an overall lower potential for lead and copper than to gold, silver, tungsten, and molybdenum because:

   A. Powell, *et al.*, (1984, p. 18) reported that "copper and lead were detected in assays of samples collected at mines and prospects throughout the study area." Several of these had significant concentrations of these metals, such as in the Aztec and Irish Wash areas.

   B. Powell, *et al.*, (1984, p. 18) do not define the term "low" for copper and lead. The difference from moderate and high potential for the other commodities is not clear.

4. Raines (1985) presented data from remote sensing of hydrothermal alteration for two areas in the Chuckwalla Mountains Wilderness Study Area. The data are presented in the table below, but we do not have Raines's map that shows the location of these areas of alteration. Arsenic, antimony, mercury, and gold in the two areas suggest possible epithermal-type mineralization, which may contain disseminated precious metals.

<u>AREA</u>	<u>ALTERATION</u>	<u>ANOMALOUS ELEMENTS</u>
CW2	Argillic	As, Au, B, Bi, Cd, Cu, Hg, Pb, Sb, Zn
CW4	Argillic	As, Au, Cd, Hg, Pb, Sb, Zn

5. The significance, if there is any, of the Red Cloud thrust in relation to mineralization in the study area is not discussed by Powell, *et al.*, (1984). We note that several areas of moderate and high potential for gold and silver, as assigned by the authors, are within or near exposures of the fault. Such faults have been important avenues of ore fluids in other parts of southeastern California, particularly where intruded by younger plutonic rocks. Specific examples are the Last Chance and Lemoigne thrusts in the Death Valley region and the Orocopia thrust in the Chocolate Mountains.
6. The entire study area should be assigned unknown potential (Goudarzi, 1984) for geothermal resources because:
   A. The Chuckwalla Mountains are in a region of California considered favorable for the discovery of geothermal resources as interpreted from various geologic data by Higgins (1980). Such resources comprise temperatures that can be utilized for both non-electrical applications and generation of electricity.
   B. The study area is flanked on the north by a concealed geothermal system at Desert Center (Higgins, 1980), which is evident only by elevated temperatures in water wells. The source and extent of this anomaly is unknown.
   C. The study area is adjacent to the Salton Trough-Imperial Valley, which is a major high-temperature (>200 °C) geothermal anomaly associated with a continental spreading center. This anomaly is largely concealed, thus, as with many other anomalies in the Mojave Desert, the lack of surface evidence (springs, alteration, etc.) is not sufficient to eliminate the potential for geothermal resources. Because of lack of exploratory work, a concealed geothermal system beneath the Chuckwalla Mountains cannot yet be ruled out.

REFERENCES CITED

Goudarzi, Gus H., 1984, Guide to Preparation of Mineral Survey Reports on Public Lands: U.S. Geological Survey Open-File Report 84-787, 38 p.

Higgins, C.T., 1980, Geothermal resources of California: California Division of Mines and Geology, Geologic Data Map Series, Map No. 4, scale 1:750,000

Powell, R.E., Watts, K.C., and Lane, M.E., 1984, Mineral resource potential of the Chuckwalla Mountains Wilderness Study Area (CDCA-348), Riverside County, California: U.S. Geological Survey, Open-File Report 84-674, 25 p.

REFERENCES CITED (continued)

Raines, G.L., 1985, Map of limonitic hydrothermal alteration in Bureau of Land Management Wilderness Study Areas in the Goldfield, Death Valley, Trona, Kingman, Needles, San Bernardino and Salton Sea 1° x 2° quadrangles, California: U.S. Geological Survey, unpublished manuscript, 19 p.

CONTACT PERSON: Chris T. Higgins
Department of Conservation
Division of Mines and Geology
610 Bercut Drive
Sacramento, CA 95814
Telephone (916) 322-9997

Table 1. COMPARISON OF MINERAL RESOURCE POTENTIAL CLASSIFICATIONS

Mineral Resource Potential	Goudarzi, 1984	Powell, *et al.*, 1984 Chuckwalla Mountains WSA
Low	geologic, geochemical, and geophysical characteristics define a geologic environment in which the EXISTENCE OF RESOURCES IS UNLIKELY	Copper/lead-Areas which have potential for gold, silver, tungsten, or molybdenum resources. Tin/Thorium--Areas underlain by Precambrian granite gneiss of the Joshua Tree Terrane or Mesozoic granitic rocks.
Low to moderate	No definition	Gold/Silver--Areas characterized by the presence of mafic dikes, but where gold is rare in assayed vein samples or where field observations did not indicate a need for assay data.
Moderate	FAVORABLE for resource occurrence, REASONABLE LIKELIHOOD of resource accumulation	Gold/Silver--Areas where less than a third of assays on vein samples show gold. Tungsten--Areas where stream-sediment tungsten concentrations fall in the range from 100 ppm to 700 ppm. Molybdenum--Areas where stream-seidment molybdenum concentrations fall in the the range from 10 ppm to 70 ppm.
High	geologic environment FAVORABLE for resource occurrence, HIGH DEGREE OF LIKELIHOOD of resource accumulation, data support mineral deposit models, evidence indicates mineral concentration has taken place	Gold/Silver--Areas where a third or more of assays on systematically collected samples show gold, or where silver is detected in the nonmagnetic heavy-mineral fraction of stream-sediment samples.

Table 1. (continued)

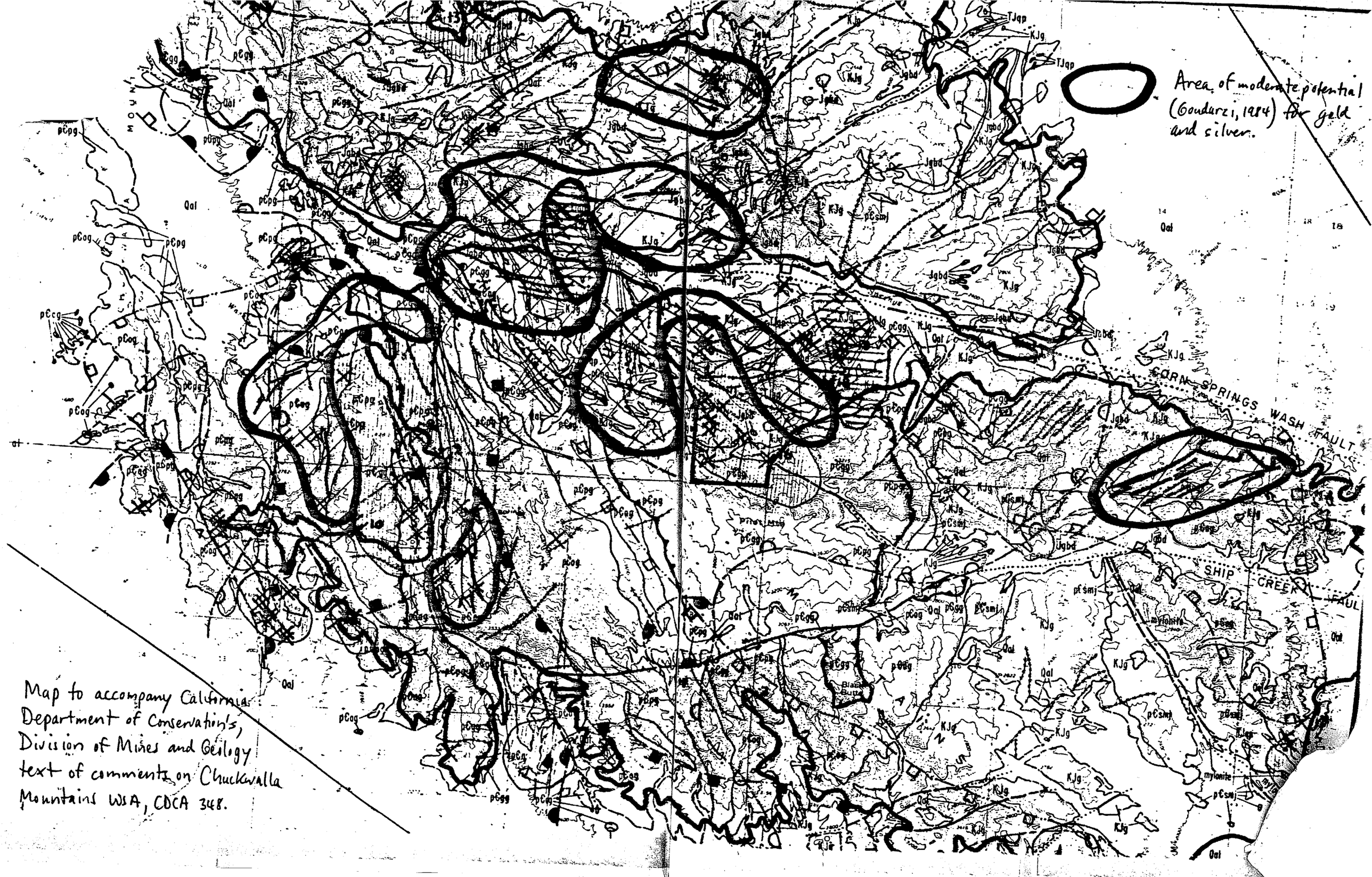
Mineral Resource Potential	Goudarzi, 1984	Powell, *et al.*, 1984 Chuckwalla Mountains WSA
High (continued)		Tungsten--Areas that are characterized by high tungsten concentrations (greater than 700 ppm) in the nonmagnetic heavy-mineral fraction of stream-sediment samples. Molybdenum--Areas that are characterized by high concentrations of molybdenum (greater than 70 ppm) in the nonmagnetic heavy-mineral fractions of stream-sediment samples. Also areas with high potential for the presence of tungsten resources. Oil and Gas--Areas underlain by igneous or metamorphic rocks.
Unknown	INFORMATION IS INADEQUATE to assign low, moderate, or high levels of resource potential	No definition
No	WELL-DEFINED EVIDENCE indicates that there is not the slightest possibility for resources in the area	Tungsten--Areas where stream-sediment tungsten concentrations are 100 ppm or less and are characterized by the absence of mafic or intermediate dikes. Molybdenum--Areas where stream-sediment molybdenum concentrations are 10 ppm or less and are characterized by the absence of mafic or intermediate dikes. Tin/Thorium--Areas with no evidence of a potential for tin or thorium resources.

Table 1. (continued)

CERTAINTY FACTOR	Goudarzi, 1984	Powell, *et al.*, 1984 Chuckwalla Mountains WSA
LEVEL A	AVAILABLE INFORMATION IS NOT ADEQUATE for determination of the level of mineral resource potential	No definition
LEVEL B	AVAILABLE INFORMATION SUGGESTS THE LEVEL of mineral resource potential	No definition
LEVEL C	AVAILABLE INFORMATION GIVES A GOOD INDICATION of the level of mineral resource potential	No definition
LEVEL D	AVAILABLE INFORMATION CLEARLY DEFINES THE LEVEL of mineral resource potential	No definition
LEVEL E	No definition	No definition

Note: Mineral Resource Potential and Certainty

A dual classification scheme using mineral resource potential and certainty has been adopted (Goudarzi,1984, p. 7-8) for use in mineral survey reports on public lands. One rating (the level of mineral resource potential) expresses the favorability of the area for a given resource, and a second rating (the level of certainty) indicates the confidence with which the rating of resource potential was assigned. The certainty rating should reflect (1) the adequacy of the geologic, geochemical, geophysical, and resource data base available at the time of evaluation, and (2) the adequacy of the mineral deposit model used as the basis for each assessment. Generally, the attributes of a mineral deposit type are determined first, the requirements for high, moderate, and low resource potential developed next, and the nature and amount of data required for the various levels of certainty determined last. After setting these criteria, comparison with data from the area being assessed leads to assignment of the level of resource potential and the level of certainty.



Map to accompany California Department of Conservation's, Division of Mines and Geology text of comments on Chuckwalla Mountains WSA, CDCA 348.

GEOLOGY

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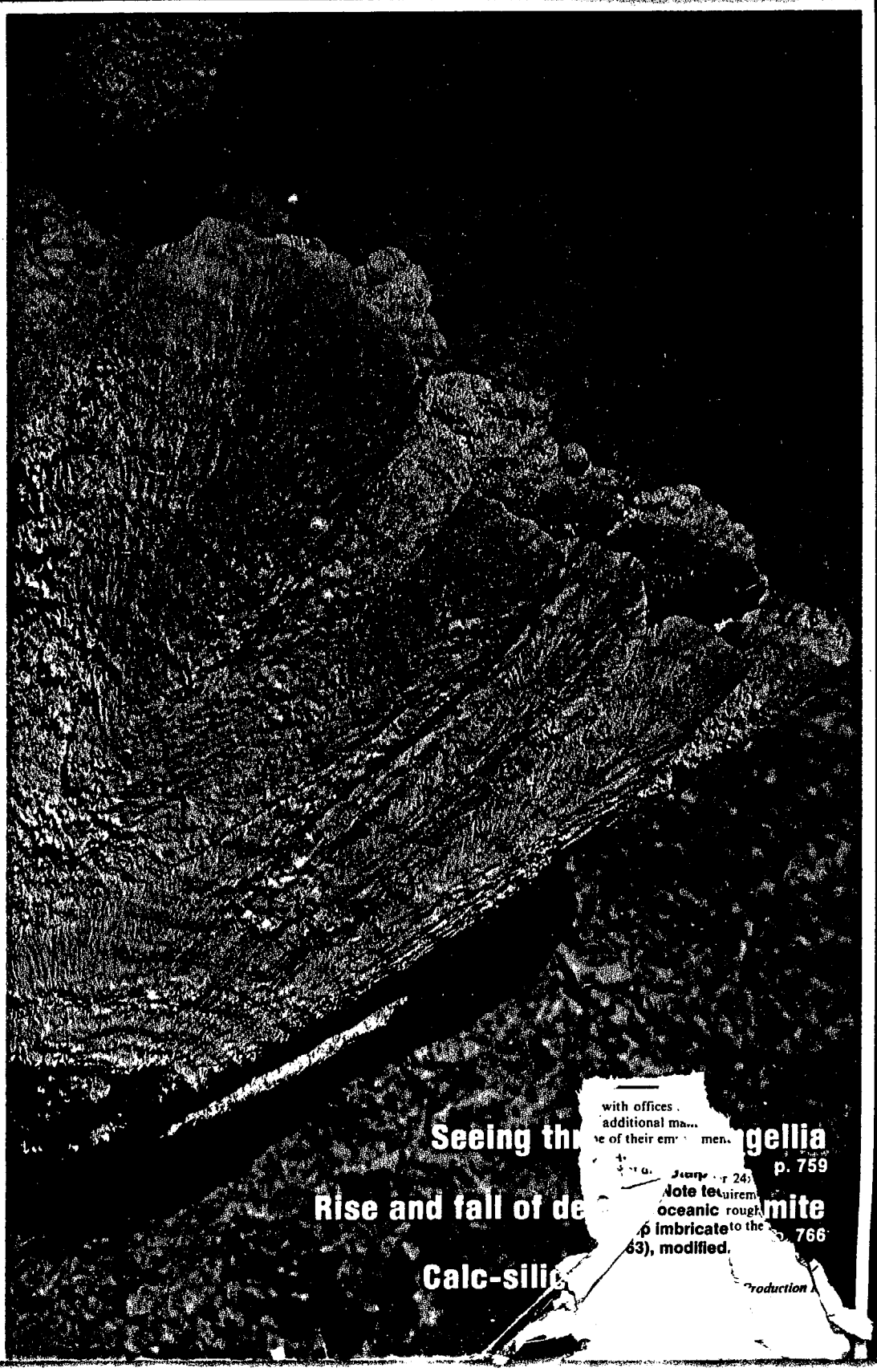

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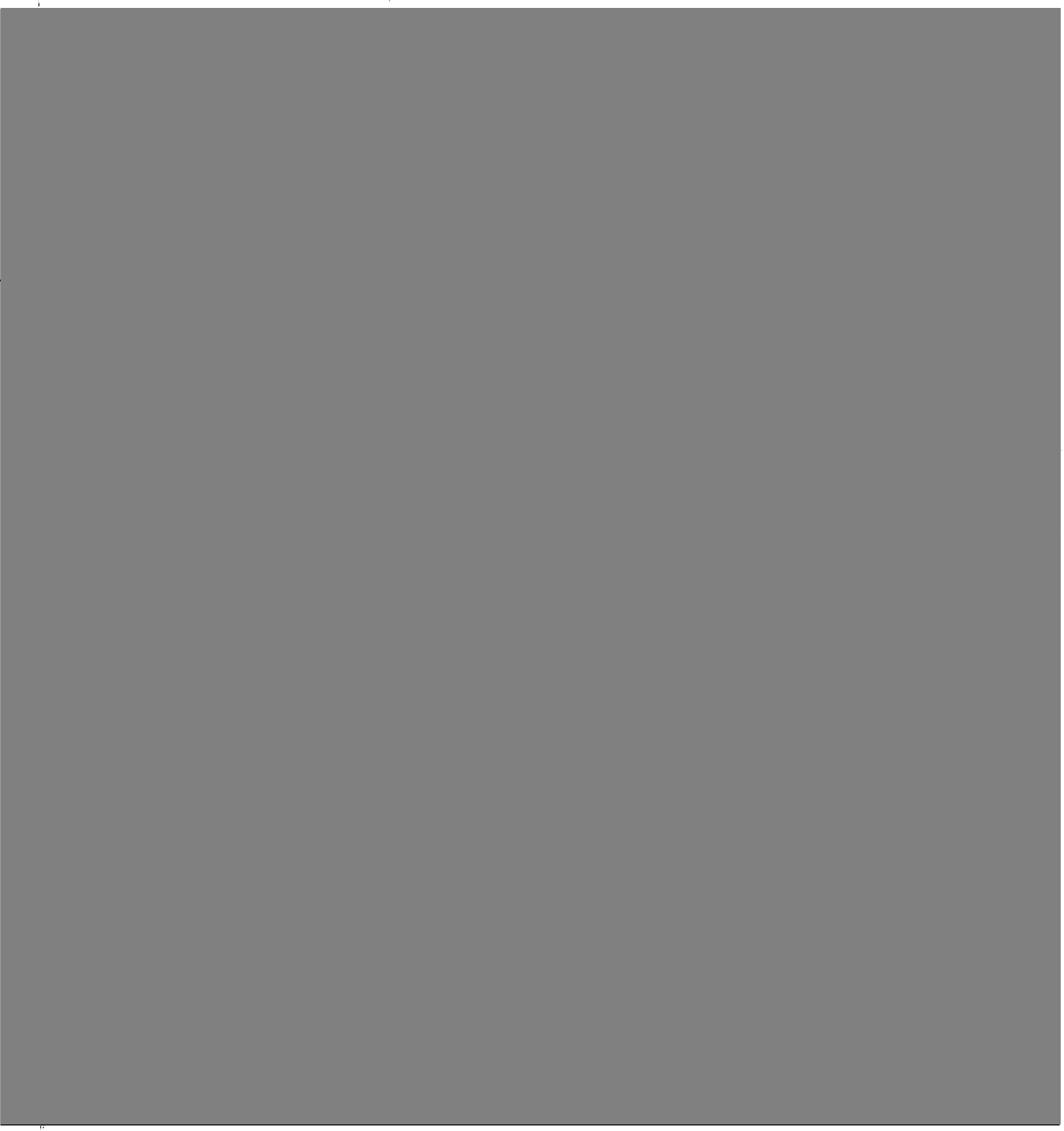
Subsurface structural features of the Saline Range and adjacent regions of eastern California as interpreted from isostatic residual gravity anomalies



Late Precambrian tectonism in the Kingston Range, southern California

Printed in U.S.A.

WLK: In a phone conversation today, Ron Harold (307-766-6506) of the American Heritage Center (307-766-4114) stated that they are trying for a date of September 1987 for having the collection ready for consultation by the public. There will be a user fee, but it has not yet been established. There will be an Advisory Board meeting on June 1 at which time it is expected that the fee will be determined.

JDS → (13)

Lois -- 4/29/87

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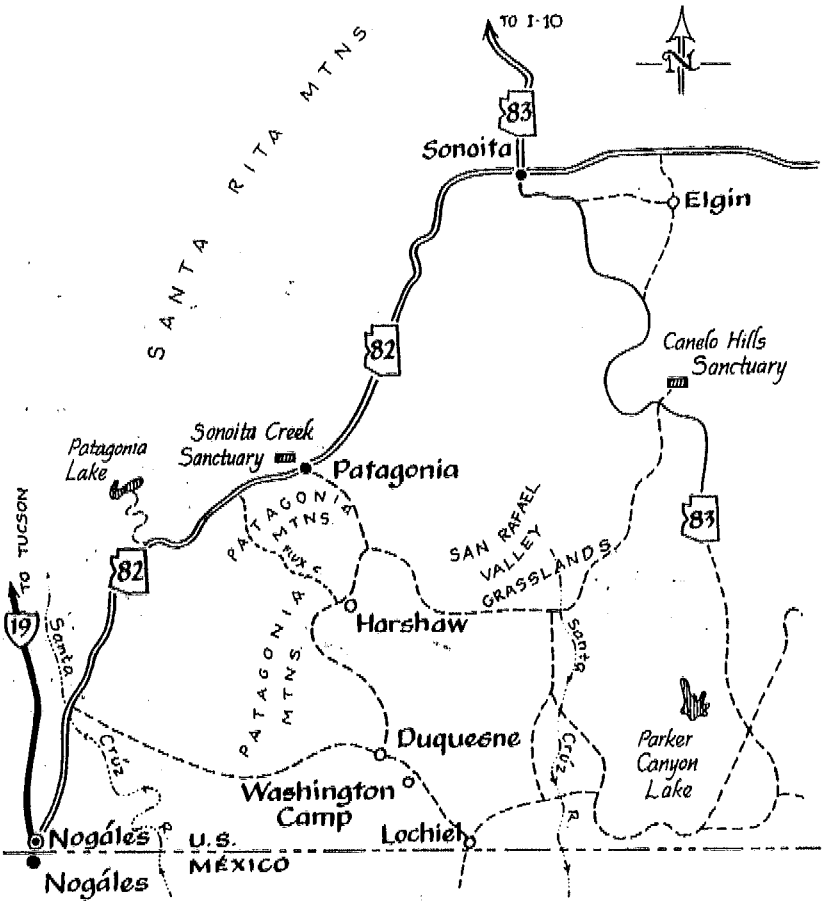

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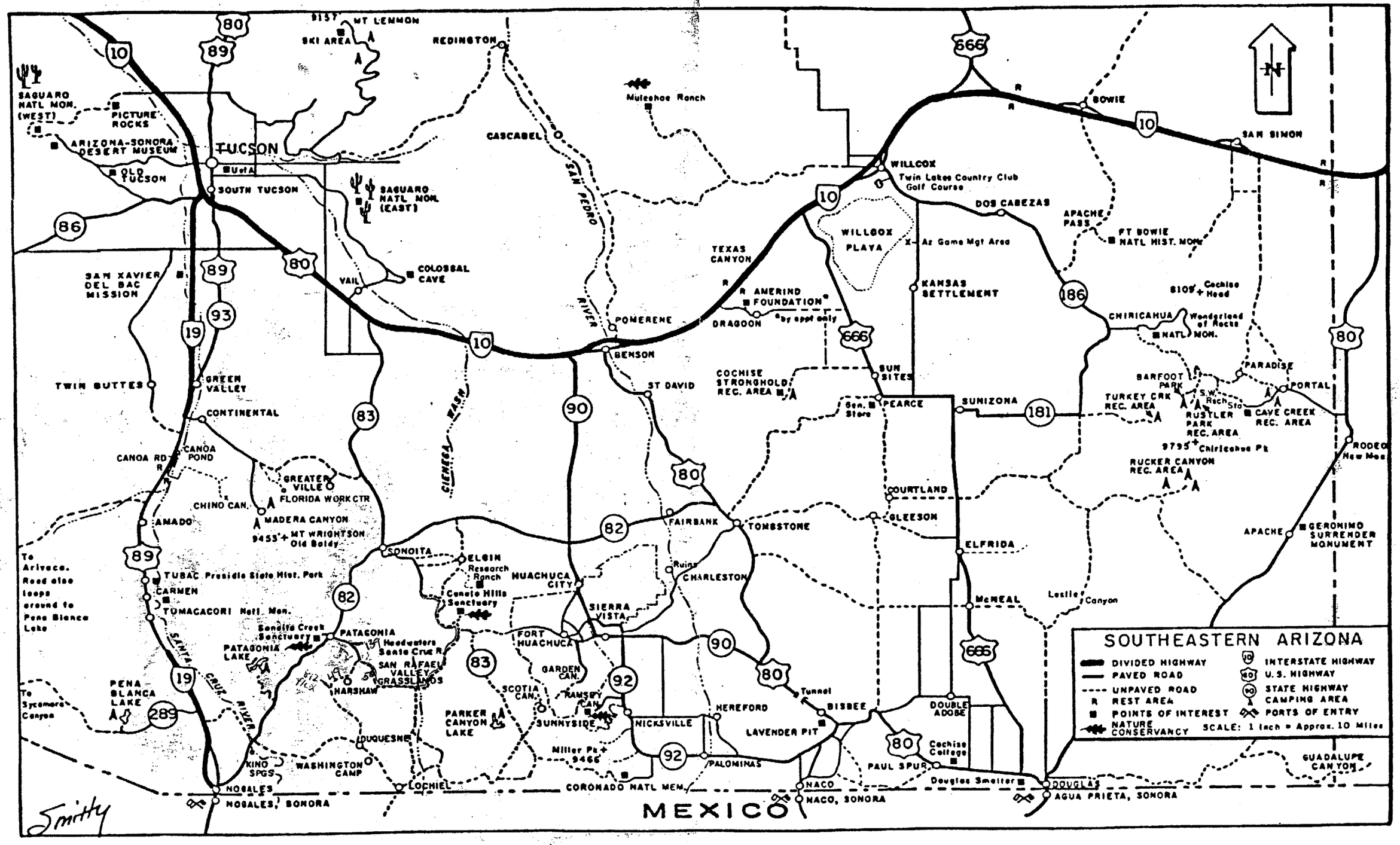
SAGUARO NATL MON. (WEST)
PICTURE ROCKS
ARIZONA-SONORA DESERT MUSEUM
OLD TUCSON
TUCSON
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SOUTH TUCSON
SAGUARO NATL MON. (EAST)
SAN XAVIER DEL BAC MISSION
TWIN BUTTES
GREEN VALLEY
CONTINENTAL
CANOA RD
CANOA POND
GREATER VILLE
FLORIDA WORK CTR
CHINO CAN.
MADERA CANYON
9453'+ MT WRIGHTSON
Old Baldy
AMADO
To Arivaca. Road also loops around to Pena Blanca Lake
TUBAC Presidio State Hist. Park
CARMEN
TUMACACORI Natl. Mon.
Sonoita Creek Sanctuary
PATAGONIA
Headquarters Santa Cruz R.
PATAGONIA LAKE
SAN RAFAEL VALLEY GRASSLANDS
HARSHAW
PENA BLANCA LAKE
To Sycamore Canyon
SANTA CRUZ RIVER
DUQUESNE
KINO SPGS
WASHINGTON CAMP
NOGALES
NOGALES, SONORA
LOCHIEL
CORONADO NATL MEM.
SONOITA
ELGIN
Research Ranch
Canelo Hills Sanctuary
HUACHUCA CITY
SIERRA VISTA
FORT HUACHUCA
GARDEN CAN.
SCOTIA CAN.
RAMSEY CAN.
SUNNYSIDE
PARKER CANYON LAKE
Miller Pk 9466'+
CASCABEL
SAN PEDRO RIVER
CIENEGA WASH
REDINGTON
SKI AREA
MT LEMMON
9157'
Muleshoe Ranch
COLOSSAL CAVE
VAIL
POMERENE
BENSON
ST DAVID
TEXAS CANYON
AMERIND FOUNDATION
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COCHISE STRONGHOLD REC. AREA
WILLCOX
Twin Lakes Country Club Golf Course
WILLCOX PLAYA
Az Game Mgt Area
DOS CABEZAS
APACHE PASS
FT BOWIE NATL HIST. MON.
KANSAS SETTLEMENT
SUN SITES
PEARCE
Gen. Store
SUNIZONA
BOWIE
SAN SIMON
8109'+ Cochise Head
CHIRICAHUA
Wonderland of Rocks NATL MON.
BARFOOT PARK
TURKEY CRK REC. AREA
S.W. Rsch Sta
RUSTLER PARK REC. AREA
CAVE CREEK REC. AREA
PARADISE
PORTAL
9795'+ Chiricahua Pk
RUCKER CANYON REC. AREA
RODEO New Mex
COURTLAND
GLEESON
TOMBSTONE
FAIRBANK
Ruins
CHARLESTON
ELFRIDA
APACHE
GERONIMO SURRENDER MONUMENT
McNEAL
Leslie Canyon
HEREFORD
Tunnel
BISBEE
LAVENDER PIT
PALOMINAS
NICKSVILLE
DOUBLE ADOBE
Cochise College
PAUL SPUR
Douglas Smelter
NACO
NACO, SONORA
DOUGLAS
AGUA PRIETA, SONORA
GUADALUPE CANYON
MEXICO
SOUTHEASTERN ARIZONA
DIVIDED HIGHWAY
PAVED ROAD
UNPAVED ROAD
REST AREA
POINTS OF INTEREST
NATURE CONSERVANCY
INTERSTATE HIGHWAY
U.S. HIGHWAY
STATE HIGHWAY
CAMPING AREA
PORTS OF ENTRY
SCALE: 1 Inch = Approx. 10 Miles
Smitty

OUR 40th YEAR

Tucson Visitor

"this week in tucson"

GOOD EARTH RESTAURANT & BAKERY

(Cover Story, page 20)

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