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Forum

The Concept of Validity on Mining Claims

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The Secretary of the Interior through appropriate staff can inquire into the validity of mining claims through the Act of April 25, 1812 (R.S. 453; 43 USC 2). Validity examinations are also authorized by the Act of July 23, 1955 (USC 601), for management over surface resources of mining claims located prior to the Act [*Adams v. United States*, 318 F2d 861 (9th Cir 1963).] Validity examinations are normally made in response to one of two circumstances: (1) to process a mineral patent application; or (2) to resolve a conflict between the mining claim and some other use of the land. Federal employees charged with the management of Federal lands have the right and authority to challenge the validity of mining claims for any reason [*Estate of Melvin E. Viles*, 126 IBLA 162, 164 (1993).] A validity examination of an unpatented mining claim by a Federal Government minerals examiner is to verify or refute a discovery on that claim. The mineral examiner makes a recommendation as to whether a claim is valid or invalid. If a discovery cannot be verified within the limits of the claim, the examiner will normally recommend that the government contest the claim. Concepts for making validity examinations on mining claims are here given. Many mineral deposits are unique and it is important that the mineral examiner use their initiative and adopt whatever detailed procedures may be required.

INTRODUCTION

Under the General Mining Law of 1872 (May 10, 1872) as amended (30 USC 21-54), citizens of the United States or those intending to become citizens are provided the opportunity to explore for, discover, and purchase (patent) certain valuable mineral deposits on public domain lands in the United States. The law also sets general standards and guidelines for "claiming" the mineral rights to minerals so "discovered." Provisions are included to allow for local rules to be developed, consistent with Federal laws. The discovery of a valuable mineral deposit properly located under appropriate Federal and State laws is essential for a valid mining claim. The location of mining claims technically comes after the discovery of a valuable mineral deposit (43 CFR 3811.1 and 43 CFR 3831.1; Evans and others, 1996).

A *lode mining claim* typically covers a valuable lode, vein, ledge, tabular deposit, or other rock in place between definite walls or boundaries. *Placer mining claims* are used for placer deposits and are defined as ". . . including all forms of deposit, excepting veins of quartz, or other rock in place (except some nonmetallic minerals described later). They shall be subject to entry and patent, under like circumstances and conditions and upon similar proceedings as are provided for veins on lode claims . . ." (30 USC 35).

It is often clear what type of claim is a proper one because of the particular mineral deposit in question. For example, a quartz vein in slate is clearly located as a lode mining claim. Free gold in stream or bank conglomerate is clearly located by a placer mining claim. At other times, it may be unclear what type of mining claim is proper to locate. For example, a carbonate rock bed that is flat lying with little or

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no overburden, containing suitable raw material for cement manufacture, should be located with placer mining claims. A limestone bed with the same raw material, but discontinuous in nature, dipping steeply from the horizontal and enclosed by intrusive igneous rock with definite walls, probably should be located with lode mining claims. In compliance with the Placer Building Stone Act of August 4, 1892 (30 USC 161), any limestone bed that has suitable material for building stone and is chiefly valuable for building stone should be located with placer claims. Perlite can be located with lode mining claims. Specialty clay or gypsum may be located with either lode or placer mining claims, depending on the nature of the deposit (see discussion regarding limestone in paragraph above). Disseminated gold and copper deposits are located with lode claims even though there may be no continuous veins.

Placer mining claims have an equality both in procedure and rights with lode claims, but a lode claim provides no rights to placer deposits and a placer claim provides no rights to lode deposits [see *Clipper Mining Company v. Eli Mining and Land Company*, 194 US 220 (1904)]. The above-cited Supreme Court decision discusses the fact that a person has no right to enter upon a valid placer mining claim to search for, or locate a lode claim without the written permission of the placer mining claim claimant. If a claimant of a valid placer mining claim wishes to search for lodes on their claim, they may do so, but, they will have no title to lode minerals without filing a lode mining claim [see *Campbell v. McIntyre*, 295 F. Cas. 45 (9th Cir. 1924)].

Through Federal laws and regulations, mineral deposits on federally administered land are grouped as locatable, salable, or leasable deposits. The concern here is only with the first group—the locatable deposits or those authorized to be claimed under the General Mining Law of 1872 (as amended).

It is nearly impossible to prepare a complete list of minerals that occur in locatable deposits. This is true because of legal requirements for discovery and because some mineral deposits that are locatable on Federal lands are leasable on the Outer Continental Shelf and on most lands acquired by the United States. In addition, common varieties of sand, gravel, stone, cinders, pumice, pumicite, and clay are not locatable, but are instead salable and require a sales contract from the Bureau of Land Management (BLM) or the United States Forest Service (USFS). Only the uncommon varieties of these commodities are locatable. Sometimes varieties are determined to be uncommon on a case-by-case basis.

As just stated, common varieties of minerals are not locatable under the mining laws. A definition of "common varieties" is found in Title 43 CFR 3711.1 (b) as follows:

> Common varieties includes deposits which, although they may have value for use in trade, manufacture, the sciences, or in the mechanical or ornamental arts, do not possess *distinct*, special economic value for such use over and above the normal uses of the general run of such deposits. Mineral materials which occur commonly shall not be deemed to be common varieties if a particular deposit has distinct and special properties making it commercially valuable, for use in a manufacturing, industrial, or processing operations. In the determination of commercial value, such factors may be considered as quality and quantity of the deposit, geographical location, proximity to market or point of utilization, accessibility to transportation requirements for reasonable reserves consistent with usual industry practices to serve existing or proposed manufacturing, industrial, or processing facilities, and feasible methods for mining and removal of the material. Limestone suitable for use in the production of cement, metallurgical or chemical grade limestone, gypsum, and the like are not "common varieties."

Section 3 of the Multiple Surface Use Act of July 23, 1955 (30 USC 601), authorized removal of the common varieties of sand, gravel, cinders, pumice, pumicite, and clay from the locatable minerals category. These common varieties are sold by the BLM and the USFS under the Materials Act of July 31, 1947. The 1955 act provided an exception at 30 USC 611:

> "Common varieties" as used in sections 601, 603, and 611 to 615 of this title does not include deposits of such materials which are valuable because the deposit has some property giving it distinct and special value and does not include so-called "block pumice" which occurs in nature in pieces having one dimension of two inches or more.

After July 23, 1955, newly found deposits of common variety minerals on Federal lands could be removed only through sale from the Federal government. If a mining claim was located on a common variety mineral prior to July 23, 1955, the mining claimant must show that the material on the claim could have been mined at a profit as of July 23, 1955, or lose his claim. Moreover, the profitability requirement is a continuing one and the claimant could be asked to demonstrate profitability at any time after July 23, 1955, up until the claimant received a mineral patent for the claim.

The definition of common varieties cited above is quite lengthy and actually not adequate in determining what identifies a specific mineral. Federal courts have helped by providing five criteria for distinguishing locatable minerals from common variety minerals. They are set forth in the 1969 9th Circuit Court decision in *McClarty v. Secretary of the Interior*, 408 F.2d 907, 908 (9th Cir. 1969).

1. There must be a comparison of the mineral deposit in question with other such minerals generally.
2. The mineral deposits in question must have a unique property.
3. The unique property must give a deposit a distinct and special value.
4. If the special value is for uses to which ordinary varieties of the mineral are put, the deposit must have some distinct and special value for such use.
5. The distinct and special value must be reflected in the higher price which the material commands in the marketplace.

While it is still difficult to test many materials by these criteria, they are the best available legal guidance, and are used by the BLM in their common variety determination studies. Common variety determinations are directed toward whether or not the mineral in question is locatable or salable. As such, these studies do not involve the overall economic viability of the deposit as they would in a regular validity examination for a locatable mineral.

Examples of specific commodities for which decisions have been made include the following:

Bentonite—held to be locatable in *U.S. v. Kaycee Bentonite Corp.*, 64 IBLA 186 (1982). Some varieties may not be locatable.

Building Stone—depends on uniqueness and distinct and special values. [See *U.S. v. Dunbar Stone Co.*, 56 IBLA 61, 64–67 (1981) for a good discussion of building stone properties.]

Clays—common or salable clays are used for structural brick, tile, pipe, pressed or face brick, and pottery, earthenware, or stoneware that cannot meet standards of high-grade ceramics. Uncommon or locatable if the clay has high refractory properties and quality standards, such as for use in china. [See *U.S. v. Peck*, 29 IBLA 357 and 84 ID 137 (1977).]

Gemstones—value of stone on a mining claim is an important fact (more than ability of stone to take a polish). [See *U.S. v. Bolinder*, 28 IBLA 380 (1974).]

Geodes—held to be locatable in *U.S. v. Bolinder*, 28 IBLA 192 (1976).

Gypsite—locatable as a soil amendment because it causes a chemical rather than a physical change, as in the use of other soil amendments. [See *U.S. v. Bunkowski*, 79 ID 43, 47, 48 (1972).]

Jasper—held to be locatable in *U.S. v. Stevens*, 14 IBLA 380 (1973).

Limestone—locatable for use in manufacture of Portland cement, but common or salable for use as concrete aggregate or soil additives. [See *U.S. v. Alaska Limestone Corp.*, 66 IBLA 316, 324, 318 (1982).]

Obsidian—held to be common or salable in *U.S. v. Mansfield*, 35 IBLA 95 (1978).

Pumicite—often common variety, however, considered to be locatable by the BLM in California for use as a pigment extender in latex flat white paint (Evans, Milne, and Leverette, May 20, 1989). Pumicite is also considered locatable when used for processing stone-washed jeans. [See *United State of America v. Multiple Use Inc.*, 120 IBLA 63–134 (1991).]

Sand and Gravel—almost always common or salable for construction uses, even with superior characteristics. [See *U.S. v. Henderson*, 68 IBLA 26, 29–30 (1961).]

Sunstones (labradorite phenocrysts in basalt)—held to be locatable in *Rogers v. Watt*, 726 F.2d 1376 (9th Cir. 1984).

Terrazzo—common or salable when material chips are used for terrazzo. [See *U.S. v. Henderson*, 68 ID 26 (1961).]

Volcanic Cinders—common or salable when used as aggregate for the manufacture of cement blocks or lightweight aggregates. [See *U.S. v. Harenberg*, 9 IBLA 77 (1973).]

Zeolites—held to be locatable as long as sodium is not present in sufficient quantity so as to be commercially valuable and if sodium is not essential to the existence of the mineral. [See *U.S. v. Union Carbide Corp.*, 31 IBLA 72 and 84 ID 310 (1977).]

DISCOVERY

There are legal and technical aspects to be considered for a discovery of a valuable mineral deposit.

Unfortunately, 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.

The best known test of discovery was in a Land Decision of the Department of the 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 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.

In 1968, the Supreme Court approved, as a complement to the prudent person test of discovery, a preexisting concept, namely, the marketability test. The marketability test concept has been used by the Department of the Interior for widespread nonmetallic minerals since *Layman v. Ellis*, 52 LD 714 (1929). In *Foster v. Seaton*, 271 F.2d 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 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 complimentary 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 and market entry for nonmetallic minerals as well as metallic minerals is a critical factor for discovery. For example, a recent Federal 10th Circuit Court Decision in *Roberts v. Morton*, 549 F.2d 163 (10th Cir. 1977) stated:

> . . . 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 future ability to market and not necessarily to the current marketing of materials from the claim. Speculative future marketability cannot be relied on, rather only economic circumstances that are rationally predictable from present known facts must be used [*United States v. James J. Heldman et al.*, 14 IBLA 1 (November 27, 1973); *United States v. Ethel Schell Larson and Minerals Trust Corporation*, 9 IBLA 247 (February 2, 1973); *United States v. Menzel G. Johnson*, 16 IBLA 234 (July 10, 1974); *Ideal Basic Industries Inc. v. Morton C.A.*, 542 F.2d 1364 (9th Cir. 1976)]. The claimant should show that there is a reasonable prospect of selling material from a claim at a profit. It is not required that material has been sold or is selling at a profit.

In 1983, the Interior Board of Land Appeals (IBLA) presented a new concept regarding marketability. In *Re Pacific Coast Molybdenum*, 75 IBLA 29 (1983) the Board ruled:

> "Present marketability" has never encompassed the examination of either cost or price factors as 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 ID 233, 239 (1969).]

This means that all concerned parties are not locked into the daily price quote of gold, or other commodities, but can take a perspective view of average and expected prices over an appropriate period of time.

However, it must be remembered that to patent any mining claim there must be a discovery at the date of application, irrespective of any other date of discovery—*Pruess v. Udall*, 286 F.Supp. 138(1968), *affirmed*, 410 F.2d 750, *cert denied*, 396 US 967. In addition the Supreme Court wrote in *Best v. Humboldt Placer Mining Co.*, 371 US 334, 336:

> It must be shown before a patent issues that at the time of the application for patent the claim is valuable for minerals, . . .

Another concept that narrows the appropriate time period for marketability determinations on mineral patents only was put forth in *United States v. Norman A. Wittaker (On Reconsideration)*, 102 IBLA 166 (1988):

> Based on our review of the applicable judicial precedents, we have concluded that, as a general matter, where a patent application is involved and final certificate has issued, the question of present marketability must be determined by reference to the date on which the claimant fulfilled all of the prerequisites to the making of the entry, i.e., no later than the date of the issuance of the final certificate.

A reaffirmation of this concept was given in *Elmer H. Swanson v. Bruce Babbitt*, F.3d 1348 (9th Cir. 1993) at 1349:

5. Patent applicant's rights did not vest upon filing of patent application, but instead upon *perfection* of his application,
6. Right to mineral patent accrues when claimant has filed *proper* patent application and has *paid his fee*, regardless of when Department of Interior fulfills its purely administerial function of issuing patent.

It is still proper to use the concepts outlined in *Re Pacific Coast Molybdenum*, 75 IBLA 20-29 (1983) on mineral patent applications. However, the date of issuance of Part I of the Mineral Entry Final Certificate must be kept firmly in mind as a reference date.

The issuance of Part 1 of the Mineral Entry Final Certificate results in a segregation of the land involved in the mineral patent application from all forms of entry and appropriation. [See *Scott Burnham*, 100 IBLA 94; 94 ID 429 (1988), and *Scott Burnham (On Reconsideration)*, 102 IBLA 363 (1988).]

There are three situations where critical time periods, other than the present time period of economic evaluation, must be considered. These are:

1. For location of placer mining claims over 20 acres in size (association placer mining claims), it is required that there be one claimant for each 20 acres involved, up to the maximum of 160 acres involving eight claimants (one claimant per each 20 acres). If a placer mining claim of 160 acres located by eight claimants is later sold to a single corporation or individual, it is essential that a discovery (material was marketable) existed prior to the date of transfer of ownership.

In *U.S. v. Harenburg*, 9 IBLA 86 (1973), it is stated:

> If a discovery had been effected prior to the conveyance, the entire 160-acre claim would have been valid and would have passed to the contestees. However, if no discovery then existed, the two Harenburgs could hold only a minimum of 40 acres in one association placer claim. A transferee of an association placer who makes a discovery after the transfer has a right to patent only 20 acres [United States ex rel., *United States Borax Company v. Jekes*, 98 F.2d 271 (DC Cir. 1938), cert. denied. 305 US 619 (1938)].

2. Mining claims that have had a withdrawal placed over them after their original filing date, such as those in a designated wilderness area, must be continually supported by a discovery.

Even though a mineral examination by the BLM may take place long after a withdrawal date, the examination can be appropriate to establish whether or not a discovery existed at the date of withdrawal. [See *U.S. v. Lara*, 67 IBLA 48 (1982).]

> If, for example, mining claims located in 1960 had a withdrawal placed over them on September 7, 1970, and are now in a designated wilderness area, a discovery of a valuable mineral deposit must be shown in three different time periods—September 7, 1970, October 21, 1976 (passage of FLPMA), and at the current time of evaluation.

3. Claims within the California Desert Conservation Area (CDCA) are usually subject to the requirements of FLPMA, 43 USC 1701. In Section 601(f) of the Act [43 USC 1781(f)], it is stated:

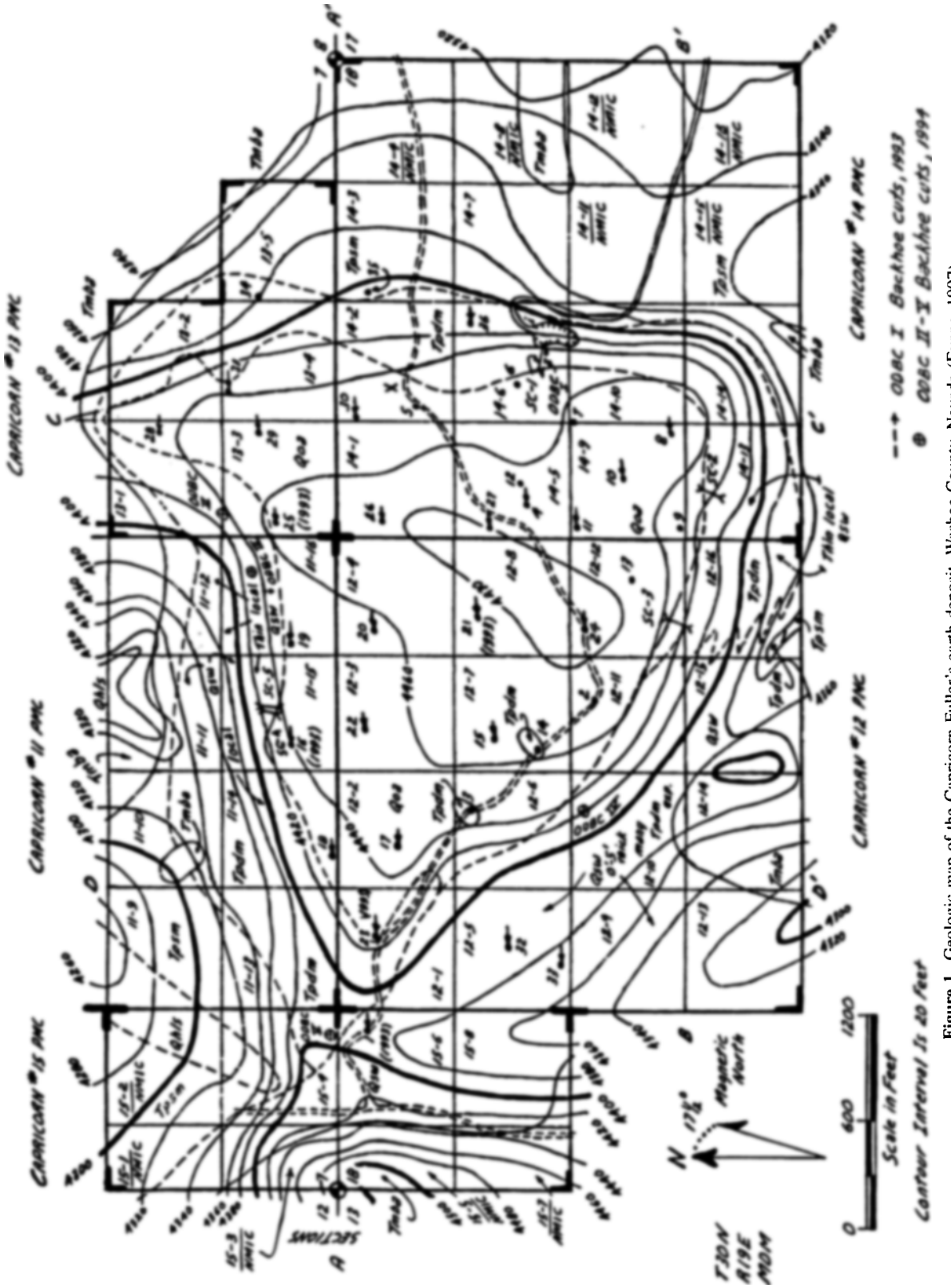

Figure 1. Geologic map of the Capricorn Fuller's earth deposit, Washoe County, Nevada (Evans, 1997).

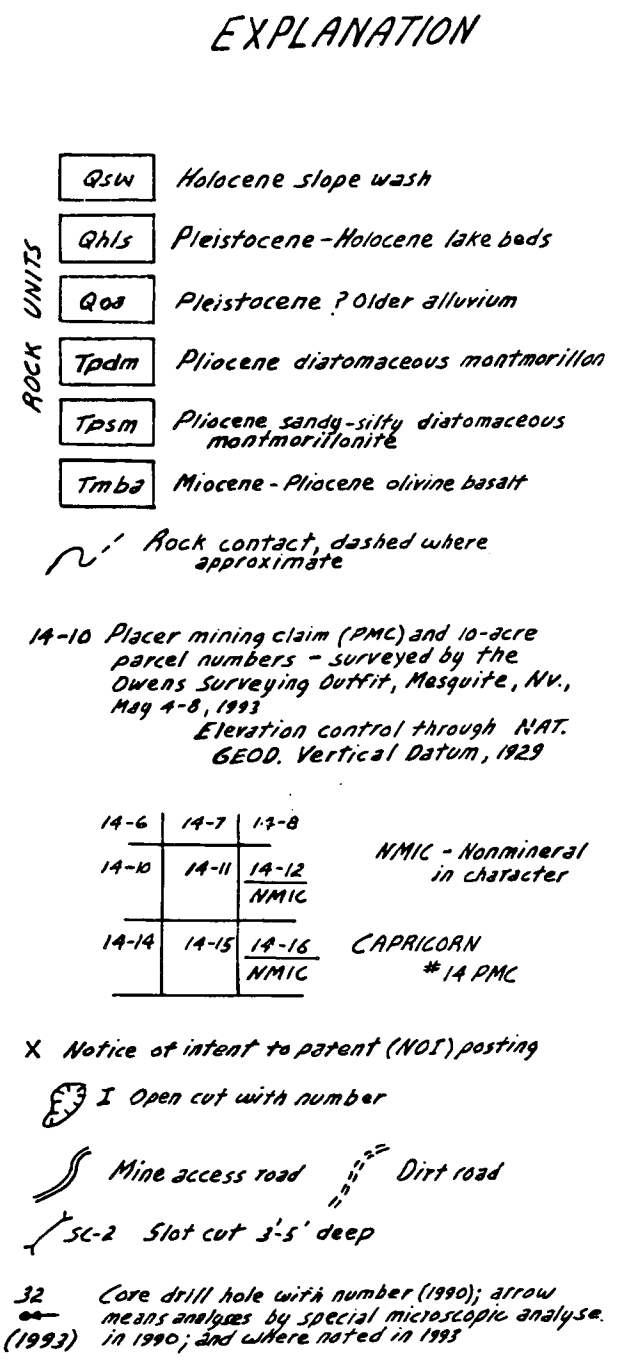

Figure 1. Continued.

> Subject to valid existing rights, nothing in this Act shall affect the applicability of the United States mining laws on the public lands within the California Desert Conservation Area, except that all mining claims located on public lands within the California Desert Conservation Area shall be subject to such reasonable regulations as the Secretary may prescribe within this section. Any patent issued on any subject mining claim shall recite this limitation and continue to be subject to such regulations. Such regulations shall provide for such measures as may be reasonable to protect the scenic, scientific, and environmental values of the public lands of the California Desert Conservation Area against impairment, and to assure against the pollution of the streams and waters within the California Desert Conservation Area.

The term "valid existing rights" means that a claimant has or had a discovery of a valuable mineral deposit at the date in question. The time periods of economic evaluation are critical. Legal data, costs, tax calculations, commodity prices profitability, and so forth, must be determined for each different time period and the deposit shown to be valuable for each time period or the mining claims cannot be deemed valid.

Discovery On Each Claim

Historically the BLM has considered that each claim should 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 or nonmetallic deposits disseminated or spread 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 deposits. A group of claims would be necessary to support an economic operation. A large deposit of reasonable quality with an appropriate quantity of material is clearly necessary to successfully develop such a mine. The BLM has taken a perspective view of the problem and considers this concept in validity examinations (see fig. 1).

The BLM view is supported by a recent decision in *Jim D. Schlosser et al, v. Verle Pierce et al.*, 92 IBLA 109 (June 6, 1986) where the IBLA stated:

> A bentonite mining claimant is not required to show that each claim he has located is capable of independently supporting a paying mine. Rather, marketability of a known bentonite clay deposit, a low-grade, high volume clay material, may be demonstrated by showing the feasibility of mining several claims under a single operation where each claim is shown to contain sufficient mineralization to qualify for inclusion within the mined group.

> . . . the locator of a bentonite placer mining claim must show the mineral character of each 10 acre tract within the claim.

Discovery on Large Disseminated Gold Deposits

Dealing with validity of mining claims on large disseminated gold deposits under a few, to as many as 25 or more mining claims, has been a difficult problem. Concerns about the patenting processing, the existing mining law, in general, land use and environmental issues, and numerous patent applications, have added to the situation. Concepts and procedures used for validity of mining claims should be thorough, consistent, fair, and technically and legally viable.

A recent decision in *James Collard and Marjorie Collard*, 128 IBLA 266 (March 10, 1994) has clarified procedures in dealing with disseminated and/or widespread lode deposits. The Board said at 266:

> Mineral deposits exposed on adjoining lode mining claims may be aggregated in order to determine whether a valuable mineral deposit is present on each claim. To be considered valuable, each deposit must contain ore of sufficient quality and quantity that a profit would be made after the costs of extracting, removing, and marketing are paid, to include a proportionate share of the expense of setting up a mine and mill.

For validity, it is necessary to certify that a valuable gold deposit exists (a discovery is made) and that part of that deposit is within the boundaries of each individual mining claim. Clearly, each claim cannot support a discovery in terms of overall costs necessary to mine the whole deposit. Key factors for concern are the average grade and number of tons of gold-bearing rock in the deposit, how much of that rock can be mined from each individual claim, gold recovery rate, gold price, and the costs incurred therein.

Briefly, the method of approach is to carefully check geologic and grade maps, assay data, mine cost and production records, and make appropriate summaries. If information is lacking, the mineral examiner should ask the company to provide it. It is critical to relate tons, grade, and gold content in the company model developed from exploration drilling to their model developed through blast hole drilling from pit development, to their model developed through belt sampling of agglomerate prior to its placement on leach pads, or through feed into an autoclave or leach tanks, to actual gold recovery (recovery rate, percentage). There can be a high percentage of variance between models, either positive or negative. The BLM's determinations are largely based on exploration data and it must be determined how accurate those data are, based on the blast hole and agglomerate type sampling in relation to actual gold recovery.

The economic model is then filled in with appropriate inputs. They are based on company records and technical and economic factors agreed upon by the company and the BLM mineral examiners. This model is used for determination of economic viability of the overall deposit.

In order to certify a discovery on individual mining claims, the average grade and tons of gold-bearing material to be mined under each claim must be determined. Where material has not yet been mined, exploration data in consideration with the other test data must be used. After this determination of average grade and tons of material by mining claim, maps with appropriate cross sections must be made showing the data by blocks at each actual or projected bench level. If a significant amount of reserves occur under a mining claim at any bench level, then that claim can be certified as valid (see fig. 2).

Physical Exposure Requirement

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 exposed in trenches, cuts, shafts, audits, and drill cores. Geochemical or geophysical anomalies, unsupported and uncorrelated with physical exposures of the mineral, cannot be used for discovery (see figs. 3, 4, and 5).

There are a number of cases that involve the above concept. A recent compelling analysis of the physical exposure requirement came from the Federal court where it was 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 are clear. The following

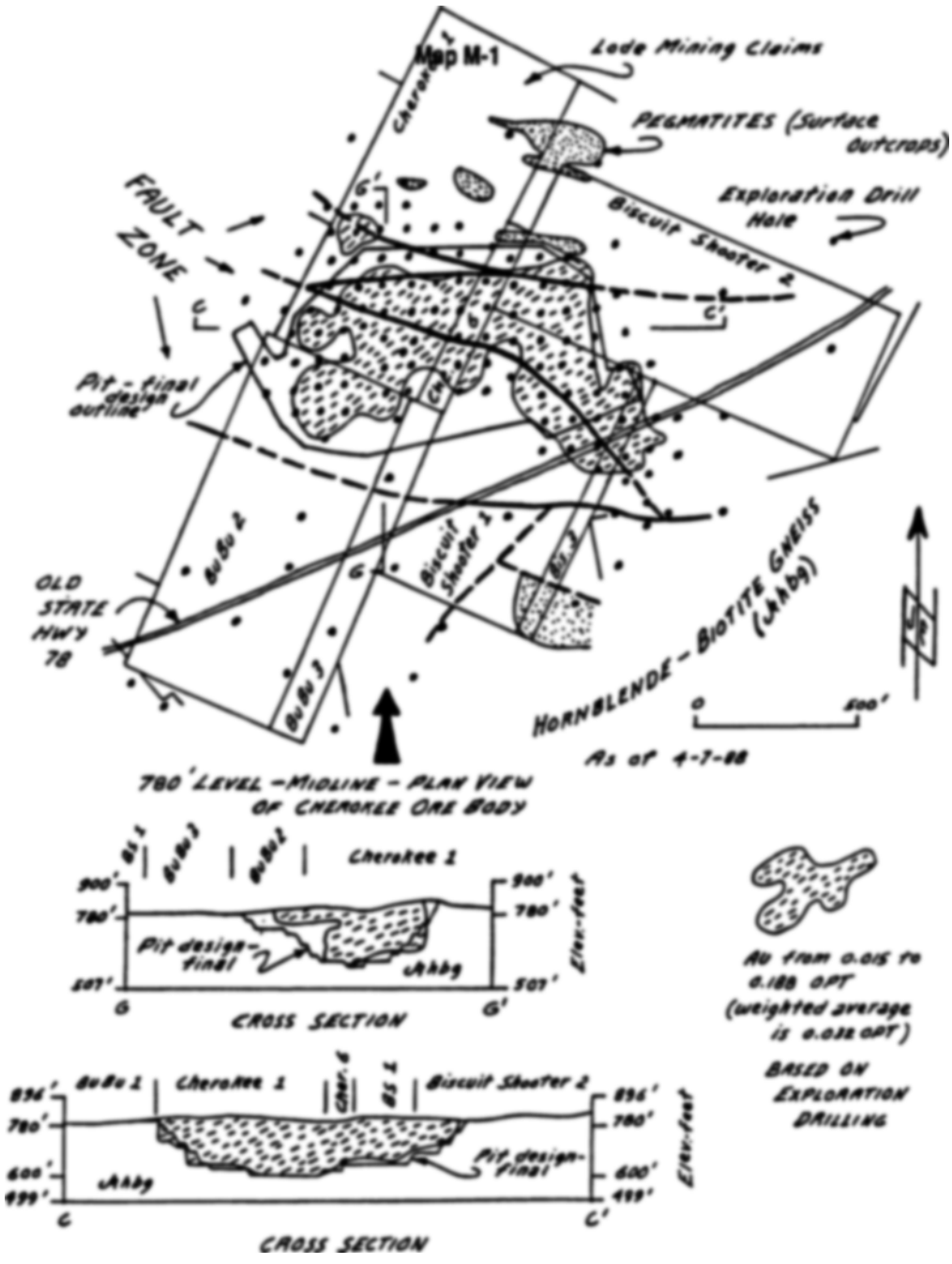

Figure 2. Geologic map, grade map, and cross sections, Cherokee ore body, Mesquite gold mine (Evans, 1988).

conditions may allow drill core and/or cuttings to be acceptable for discovery: adequate and proper logs are taken and maintained; cores or cuttings are left in proper order, clearly marked for proper identification as to drill hole number, depth, and location; cores, cuttings, and logs are made available to the government mineral examiner for their inspection; 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

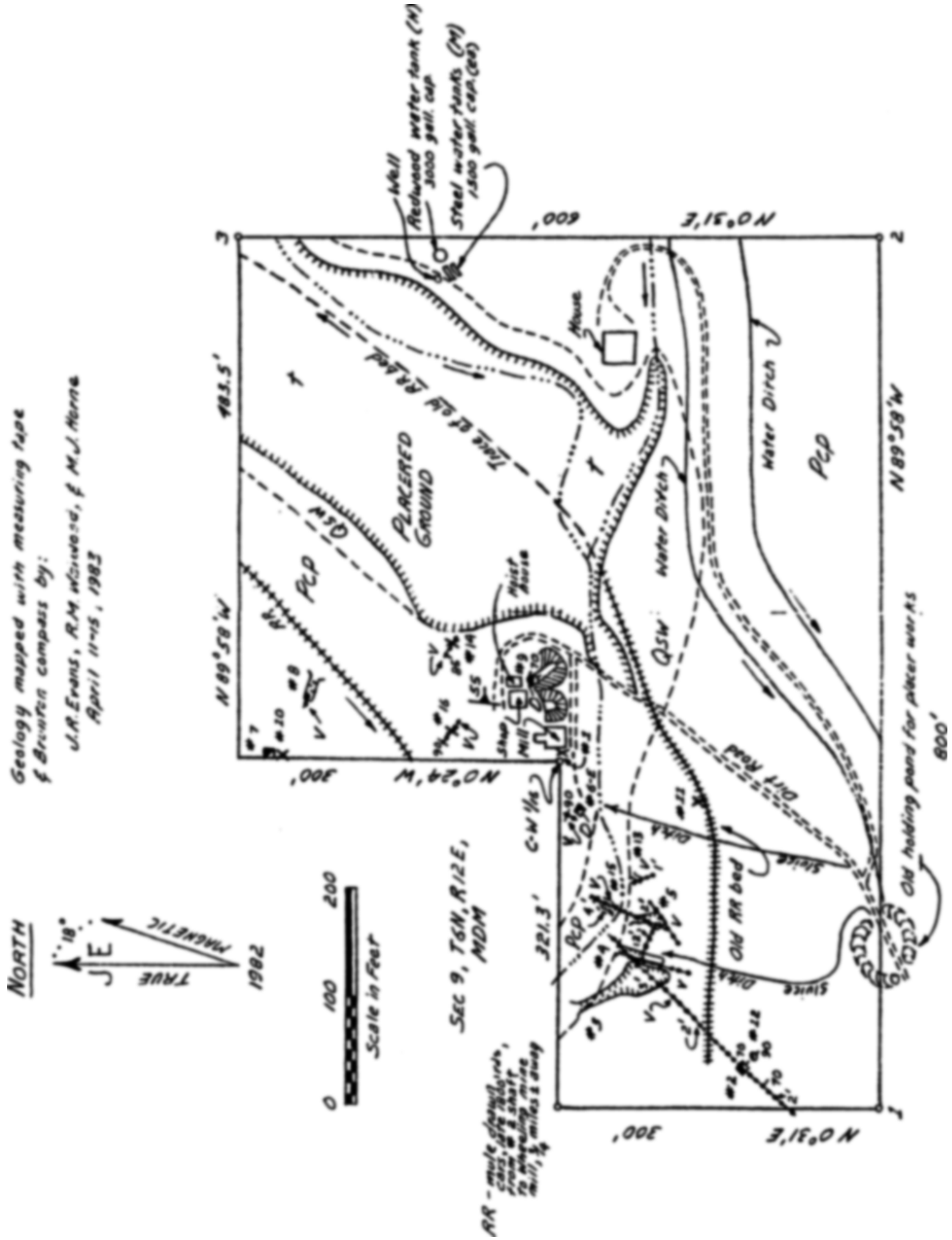

Figure 3. Geologic map of the Ex Cramer gold lode mining claim (CA-13142), Pine Grove area, Amador County, California.

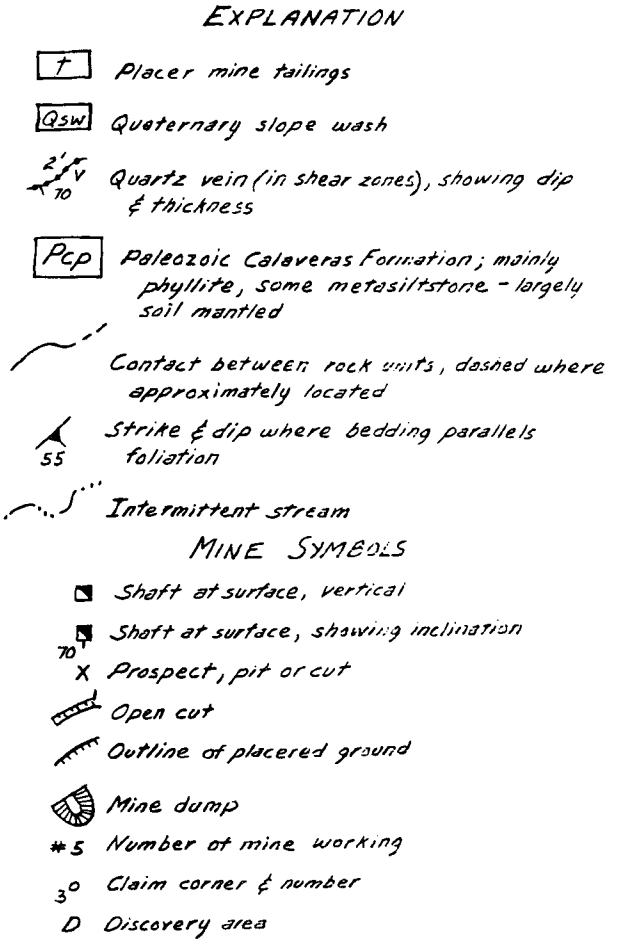

Figure 3. Continued.

examiner; the examiner is allowed to spot-check certain intervals of core or cuttings for accuracy of grade.

Mineral in Character and the 10-Acre Rule for Placer Claims

One discovery of a valuable mineral deposit per placer claim is sufficient, whether the claim is 20 acres for an individual placer claim, or other amounts up to a maximum of 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 shall 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 mineral in character on a placer mining 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 extractions 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)].

Therefore, inference must be drawn from a data base and cannot be merely an unsubstantiated opinion. The geologic inference also must show that minerals occur in amounts that could reasonably be expected to be mined at a profit. Thus, mineral in character is essentially discovery through geologic inference.

By way of example, the following considerations were used in determining mineral in character on a mineral patent examination where the inference was that a Fuller's earth deposit on 10-acre plots could make a contribution to the overall mining operation: bodies were adjacent to existing haul roads; bodies could be mined by open pit methods and concurrently with mining from the main quarry, and sufficient reserves existed on each plot to warrant the taking (see figs. 1 and 6).

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 of whether the claim, as laid out on the ground, conforms to the system of public land surveys. This principle was supported by the Ninth Circuit Court of Appeals in *U.S. v. Lara*, 820 F.2d 1535 (9th Cir.1987). If any 10-acre part of a placer claim under patent application has had a mineral survey, and is found to be nonmineral in character, it will require additional survey work to account for the omission of that part.

An example showing 10-acre subdivisions and some of the analyses for mineral in character on a gold placer deposit are shown in figure 7 and table 1a, b.

A single party can maintain an association placer claim over 20 acres in size, but there must have been sufficient individuals who made the original location on the association placer claim to have met the 20-acre-per-claimant requirement. In addition, a discovery

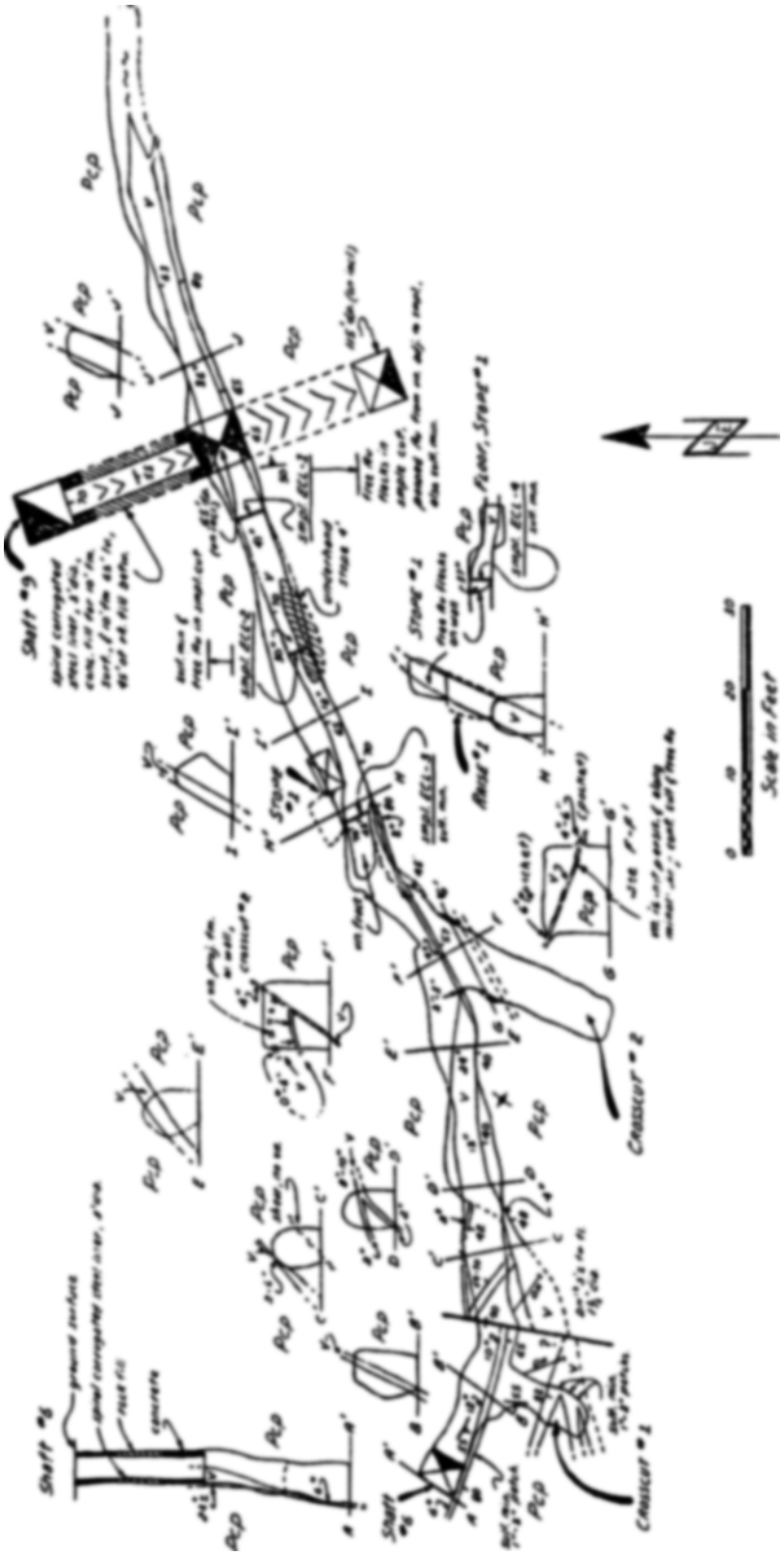

Figure 4. Geology and mine workings of the 65-foot level of the Ex Cramer gold lode mining claim.

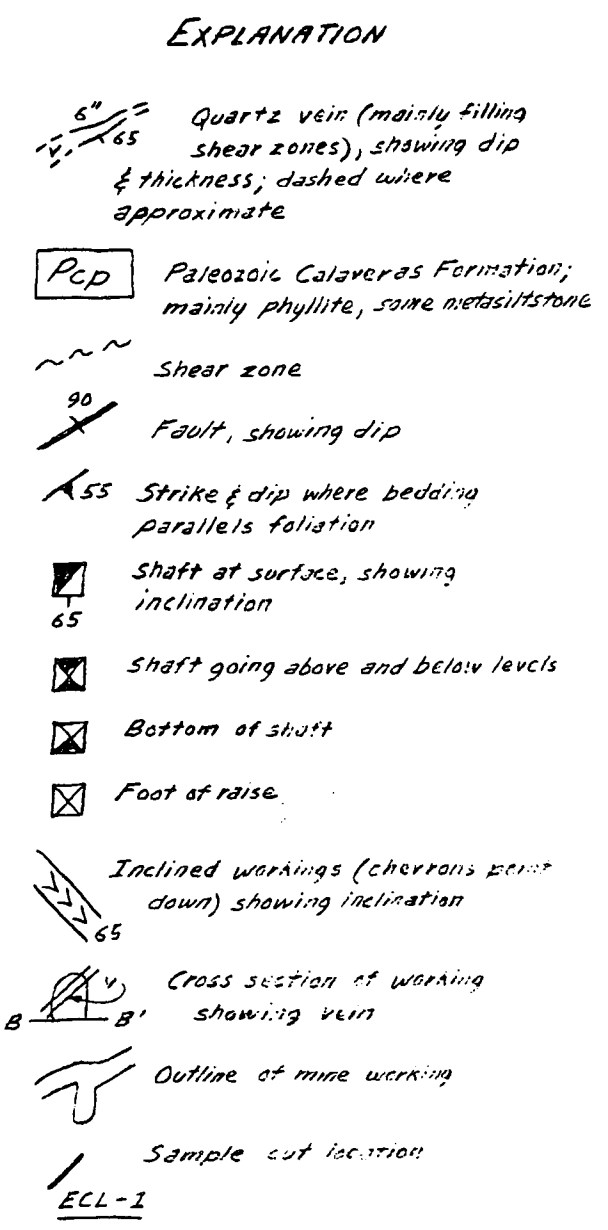

Figure 4. Continued.

must have been made within the limits of the claim prior to the date of transfer to a lessor number of people. In *U.S. v. Harenburg*, 9 IBLA 860 (1973), the IBLA stated:

> . . .If a discovery had been effected prior to the conveyance, the entire 160-acre claim would have been valid and would have passed to the contestees. However, if no discovery then existed, the two Harenburgs could hold only a minimum of 40 acres in one association placer claim. A transferee of an association placer, who makes a discovery after the transfer, has

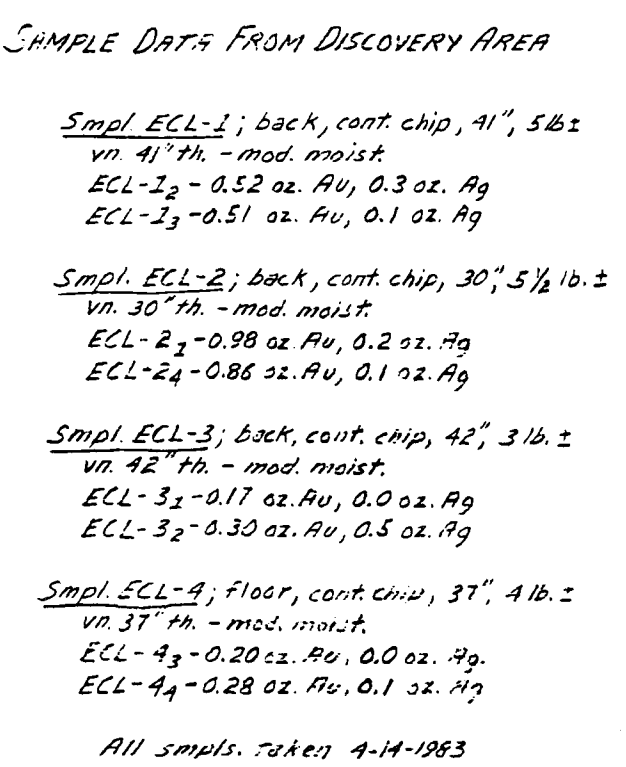

Figure 4. Continued.

> a right to patent only 20 acres [United States ex rel., *United States Borax Company v. Ickes*, 98 F.2d 271 (DC Cir. 1938), *cert. denied.* 305 US 619 (1938)].

INCOME APPROACH FOR ECONOMIC EVALUATION OF MINING CLAIMS

For economic evaluation of mining claims, it is critical to determine whether or not a discovery of a valuable mineral deposit exists. The nature and extent of the mineral deposit and what parts of that deposit are within the boundaries of each lode mining claim and each 10-acre parcel of a placer mining claim must be evaluated. To accomplish this task, it must be shown if an existing mining operation, or a proposed operation, has economic viability under the mining laws and regulations therefore, valid mining claims. This is accomplished using an income approach to value through analyzing inflows and outflows of cash over the projected mine project life using simple or complex discounted cash flow techniques. The time value of money, rate of return on investment, escalation and risk factors, and tax elements are critical and most influential. Before

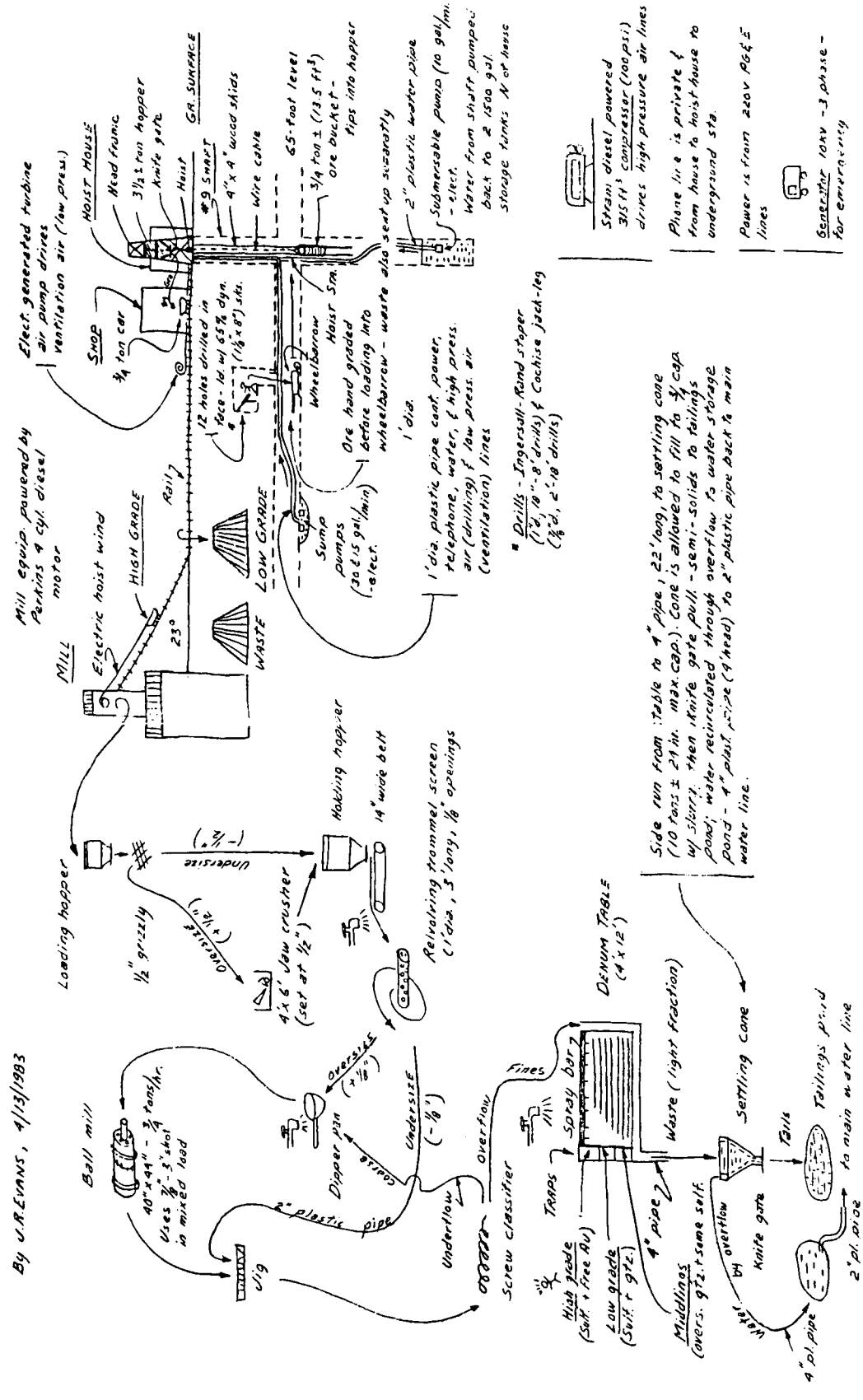

Figure 5. Schematic flow sheet for the Ex Cramer gold lode mining claim.

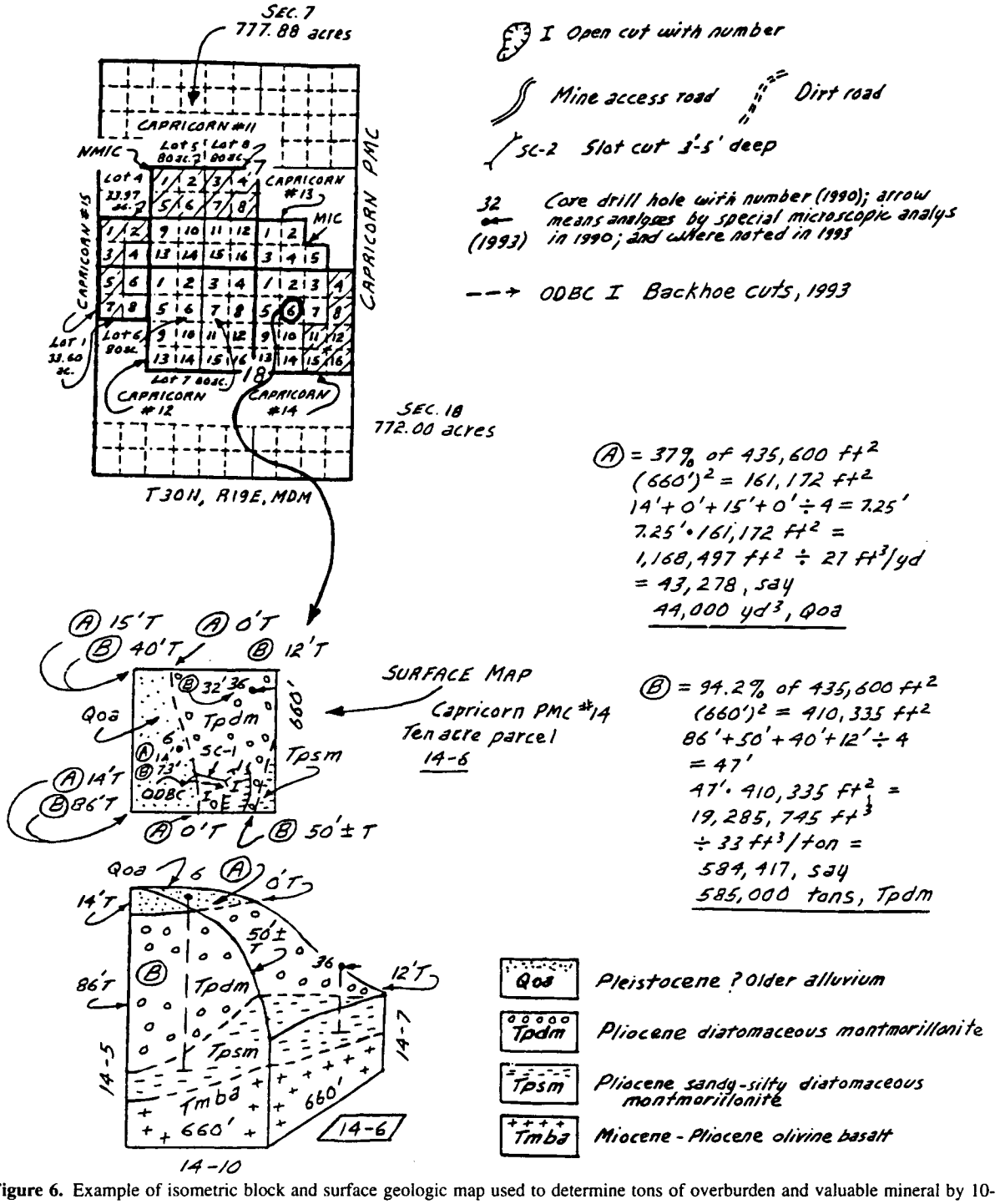

Figure 6. Example of isometric block and surface geologic map used to determine tons of overburden and valuable mineral by 10-acre parcel on the Capricorn Fuller's earth deposit (Evans, 1997).

Figure 7. Geologic map of the Golden Eagle Placer mining claims, Moccasin Creek Area, Tuolumne County, California (Patent Application CA 16916, Ruth A. LeCleir, Claimant).

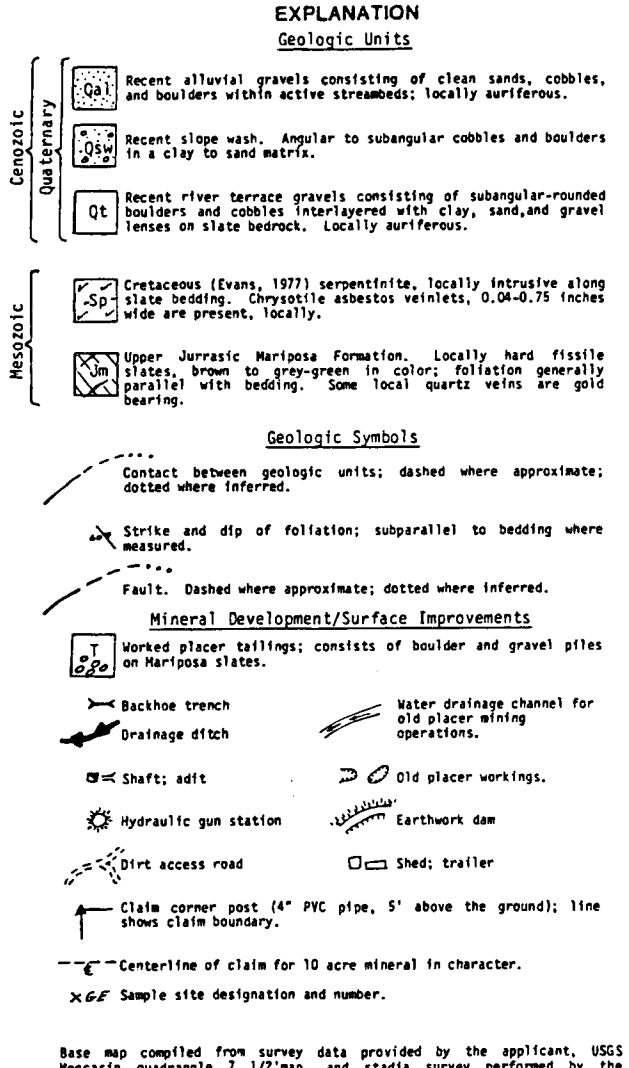

Figure 7. Continued.

economic analysis can begin, important concepts must be considered. They are legal entities, land status and use, geologic and mineralogic relationships, mining, milling and processing techniques, market and market entry studies, reserve analyses, capital and operating costs, royalty rates, royalty buyouts, and exploration and development costs. Whether one claim is owned by a single miner, or hundreds of mining claims are owned by a large corporation, fair, consistent, and appropriate economic concepts must be applied (see Evans and others, 1996).

Mineral deposits have real value only because of the presence of reserves. All costs for improvements, reclamation, equipment, and real and personal property used for the production of reserves must be balanced against income. If a mineral cannot be extracted at a profit, there will be insufficient future income, therefore, no value.

Projected future annual escalated earnings, with an appropriate discount rate over the determined project life years to determine the after-tax net present value is to be used. If the net present value is positive, then the mineral operation will earn a higher percentage rate of return than the discount rate indicates; if negative, the mineral operation will earn less; if zero, the earning equals the rate of return.

Discounted cash flow analyses should not be for more than about 20 years of productive operation life and are adapted, insofar as possible, to the actual system used by mineral operations. If a deposit is not developed, usually 1–3 years of lead time to production is adopted. To carry an economic analysis for more than 20 years of productive life, even though reserves may have a greater life at the projected rate of production, is not generally tenable. The 20-year future value of a dollar today, at 15%, is only about $0.06. In addition, risk factors, adequacy of escalation rates, and the discount rate used are already stretched at 20 years of life. Finally, there is no minimum rate of return or net present value specified by law or regulation (see table 2).

Appropriate tax framework must be used in the discounted cash flow analysis. Many actual, or proposed mineral operations that do, or could, operate on Federal lands are large corporate ventures requiring the use of corporate tax frameworks, rather than individual tax frameworks.

Consideration should be given to expenses (deducted fully in year incurred) and capitalized (not taken in year incurred and over more than 1 year), costs, loan interest, amortization concepts, and any loss carried forward. Some reproduction costs may have to be sunk. Much of the time, the value of depreciable cost items is recovered by using the Modified Accelerated Cost Recovery System, based on a 7-year property.

Depletion allowance benefits are usually recovered by percentage depletion at the appropriate percentage of net revenue from commodity sales. Of course, the deduction for depletion cannot exceed 50% of the taxable

Table 1a. Description of Gold Recovered in Golden Eagle Placer Deposit

Sample number	Comments	Color and staining	Surface texture	Associated minerals observed	Shape	Size[a]	Evidence of salting
1	GE No. 1; dredge	Bright yellow	Smooth, slight pitted	None	Flattish, elongate w/ round edges; some w/ qtz	Most coarse, minor fines	None
13A	GE No. 2; discovery sample	Bright yellow	Smooth	None	Ovoid, flat, round edges	All flat except for amalgam. Au which is v/f	None
13B	GE No. 2; sluice; discovery sample	Bright yellow w/ Fe stn. on all particles	Rough and pitted	None	Coarse-elong., flat round edge; med. and fine elong. to w/ round edges and flat	15 coarse, med. and fine; amalgam. v/f	None
13B	GE No. 2; Knudsen bowl; discovery	Bright yellow	Smooth, some pitted	None	Flat round edges, elongate	All flakes med. to fine; amalgam. v/f	None
14	GE No. 3; Sluice; discovery	Bright yellow, loc. irridescent w/ Fe stn.	Coarse pitted; fine smooth	None	Elong. to ovoid, flat, round edges	8 pieces coarse, remain. med. to fine, except amalgam. which is v/f	None
14	GE No. 3; Knudsen bowl; discovery.	Bright yellow	Smooth	None	Flattish	All v/f as observed in pan	None

[a] Coarse gold = +10 mesh (2.00 or 0.079 mm); medium gold = −10 to +20 mesh (0.84 mm or 0.033 in.); fine gold = −20 to +40 mesh (0.420 mm or 0.017 in.); and very fine (v/f = −40 mesh.

income after all deductions, except depletion and deduction for net operating loss carried forward. Where depletion allowance exceeds the 50% limit, the 50% limit figure is usually used in computation of taxable income.

State and/or county tax frameworks vary and must be accounted for adequately. For example, California property taxes are *ad valorem* (at value), making an actual figure impossible to use as an input to the discounted cash flow, unless actual data from company records can be used. Therefore, it is reasonable to estimate these taxes at 1% of the net revenue on an annual basis. Where an operation is ongoing, the actual tax framework elements should be used to help determine value. Where there is no operation, but one is feasible, the mineral examiner should generally use full rates in consideration of tax framework items. The tax framework is of major importance and must be considered fully, because it can drive an apparent profitable operation into one with a negative cash flow.

Market and Marketability

Marketability is the ability of a mineral product to enter a market place for sale. The examiner should describe the factors that affect the ability of the mineral products that are, or can be, sold in a market place. Each product's use should be described. Minerals can occur either as small percentages of the rock in place, such as metallic minerals, or as minerals that comprise the bulk of the rock in place, such as most industrial minerals. High price commodities, such as precious and other metals, generally do not compete for market shares and, therefore, do not require a marketability analysis. Market entry is assumed. However, a market entry study is usually required for nonmetallic minerals because strong competition is required for a market share.

Because of the significant difference between metal and nonmetal markets, a few broad concepts for consideration are listed below:

For Metals

- Valuable material may be only a percentage or less of total material mined;
- Usually more money for capital is required for the sophisticated mining and processing equipment needed;
- Usually operating costs are higher;

Table 1b. Volume Determinations Statistics in Golden Eagle Placer Deposit

Sample number	Sample description[a]	Volume of sample (yd.)[c]	Weight of conc. (lbs)	Gold recovered by gravity: sluice (mg)[e]	Gold recovered by gravity: Knudsen bowl (mg)	Gold recovered by amalgam-sluice (mg)	Gold recovered by aamlgam-Knudsen bowl (mg)	Total gold recovered (mg)	Gold/ yd[c] (mg)	Value[b] gold/yd.[c] (cents)
1	GE No. 1 discovery; Qa1-river gravels	Time: 2 hr; gold recovered: 2,083 mg; recovery per hour: 1042 mg; value per dredging hour: $10.84; 35 mg. of total gold recovered was by amalgamation								
13A	GE No. 2 discovery; Qsw layer	0.40	0.8	0.0	40	0.0	47	87	218	227
13B	GE No. 2 discovery; Qt layer	1.1	4.9	608	10	5	6	629	572	595
14	GE No. 3(S1/2) Discovery; Qt layer (total sample)	0.46	2.1	208	0	0	93	301	654	680
14C	GE No. 3(S1/2) Discovery[b]		N/A	0.1	N/A	N/A	N/A	5	N/A	N/A
14	Total sample 14 including bedrock	0.46	2.2	206	0	0	93 (+5)	306	665	692

[a] Refer to Table 1a. sample statistics, and mineral report for complete description of samples.
[b] Value per milligram of gold determined to be 1.04¢/mg [$360 × 900 (fineness) × 0.1 devided by 31,104 mg].
[c] Amalgamation by the procedures in Wells (1971) and Evans (1984).
[d] Sample amalgamated directly; gold recovered and weighed and added to the recovery of sample No. 14.
[e] Milligrams.
[f] Sample added to total No. 14 sample as it represented bedrock portion of sample.

- Deposit can be remote from marketplace and still be economically viable;
- Analytical testing mainly for metal content is relatively cheap—many laboratories available to do testing;
- Transportation costs for processed or refined metals are a very small part of the sales price;
- Sales price is quite high compared to nonmetals;
- All metal produced can usually be sold.

For Nonmetals

- Valuable material is the bulk of material mined;
- Usually less capital money required for mining and processing equipment than for metals;
- Operating costs are usually lower than for metals;
- Analytical testing for chemical and physical properties is involved and is relatively expensive—few laboratories available to do testing. Some tests that are usually required are:

Color	Porosity
Brightness	Permeability
pH	Absorption
$CaCO_3$	Adsorption
Free H_2O Content	Bulk densities
Loss on ignition	Free silica content
	Chemical content and stability

- Deposits are mostly close to the marketplace so as to be economically viable;
- Transportation costs are usually a significant part of the sales price of processed materials. Bulk freight on board sales can be made and transportation costs are then negligible;
- Sales prices are usually low compared to metal prices;
- In contrast to metals, a highly competitive marketplace has to be entered, although this is no guarantee that processed material can be sold.

Table 2. Example of Discounted Cash Flow Model

Line	Func.	Project Life Year (PLY) Calendar Year (CY) item	JRE 4-7-93 unit	Symbol	Escal FTR (%)
1		Product mined I (sand and Gravel)	tons	PM(I)	
2	×	Grade I	oz/ton, lb/ton	G(I)	
3	×	Recovery rate I	%	RR(I)	
4	=	Recovered mineral I	tons, oz, lb	RM(I)	
5	×	Selling price I	$/tons, oz, lb	SP(I)	2.00%
6	=	Gross revenue I	$	GR(I)	
7		Product mined II	tons	PM(II)	
8	×	Grade II	oz/ton, lb/ton	G(II)	
9	×	Recovery rate II	%	RR(II)	
10	=	Recovered mineral II	tons, oz, lb	RM(II)	
11	×	Selling price II	$/tons, oz, lb	SP(II)	%
12	=	Gross revenue II	$	GR(II)	
13		Royalty rate I	$ /unit %GR	RoyR(I)	%
14	×	PM(I) or GR(I)	tons, $		
15	=	Royalty payment I	$	RP(I)	
16		Royalty rate II	$ /unit %GR	RoyR(II)	%
17	×	PM(II) or GR(II)	tons, $		
18	=	Royalty payment II	$	RP(II)	
19		Gross revenue (GR(I) + GR(II))	$	GR	
20	−	Royalty payment I	$	RP(I)	
21	−	Royalty payment II	$	RP(II)	
22	=	Net revenue	$	NR	
23		Operating costs per unit	$/ton	OCU	2.50%
24	×	Product mined (total mine production)	tons	PMT	
25	=	Operating costs	$	OC	
26		Net revenue	$	NR	
27	−	Operating costs	$	OC	
28	−	Exploration costs	$	EC	
29	−	Development costs	$	DC	
30	−	Depreciation	$	DPR	
31	−	Amortization	$	AM	
32	−	Interest on loan	$	I	
33	−	California prop tax (1% of NR)	$	CPTX	
34	=	Taxable income before depletion	$	TXIBD	
35	−	50% Limit on depletion	$	50%L	
36		Depletion rate @ 5%	%	%DPL	
37	−	Depletion (5% × NR)	$	DPL	
38	=	Taxable income after depletion	$	TXIAD	
39	−	Net oper. loss carry fwd.	$	NOLCF	
40	=	Taxable income	$	TXI	
41	−	State and fed tax 40.14%	$	TX	
42	=	Net income	$	NI	
43	+	Exploration costs	$	EC	
44	+	Development costs	$	DC	
45	+	Depreciation	$	DP	
46	+	Amortization	$	AM	
47	+	Depletion	$	DP	
48	+	Interest on loan	$	I	

Table 2. Continued

Line	Func.	Project Life Year (PLY) Calendar Year (CY) item	JRE 4-7-93 unit	Symbol	Escal FTR (%)
49	+	Working capital costs returned	$	WCCR	
50	+	Net oper. loss carry fwd.	$	NOLCF	
51	=	Operating cash flow	$	OCF	
52	+	Salvage value	$	SV	
53	−	Working capital costs	$	WCC	
54	−	Nondeprec capital costs	$	NDCC	3.50%
55	−	Depreciable capital costs	$	DCC	2.75%
56	−	Mineral acquisition costs and/or RP buyouts	$	MAC	
57	−	Interest on loan	$	I	
58	=	Cash flow	$	CF	
59	×	Discount rate factor @ 10% (end of year)	Decimal	DRF	
60	=	Discounted cash flow	$	DCF	
61	=	Cumulative DCF	$	CDCF	

A seller may have to literally take away business from a competitor through several means:

1. Produce a superior quality product in terms of physical and chemical characteristics.
2. Produce and process a wider variety of quality, and even new, end products.
3. Provide better overall service, timely delivery of product, better salesmanship, management innovation, and more highly trained staff.
4. Provide lower sales prices of end product through efficiency in reducing capital and operating costs, energy costs, and environmental costs.
5. Provide more sales potential with larger and innovative processing plants.

Market Area and History

The market area is of real concern as it refers to that general area in which the mineral commodity can be sold. For example, gold and petroleum can have worldwide markets. However, sand and gravel operations may have a market area with a radius of 10 to 25 miles. In addition, the time period when the commodity is, has been, or may be sold, as well as the distribution of sales prices through time is of critical importance.

Selling Price

Selling price of an individual commodity, such as gold, or the weighted average selling price of a group of related commodities, such as aggregates produced from the same plant, must be confirmed for an actual operation or determined for a proposed operation. The unit of time is generally one year. Selling prices are determined as freight on board, meaning the first point of sale price without any value-added items such as transportation or packaging. Selling prices should be adjusted on an annual basis.

Where a variety of mineral commodities is to be sold at the same plant at quite different freight on board prices, a weighted average selling price (assuming equal sale amounts) can be approximated by use of the geometric mean (GM) formula,

$$GM = N\sqrt{A + B + C},$$

where A, B, and C equal different products at their FOB list prices ($) and N = number of different prices. With this formula, an equal sales amount for all products is evaluated. Remember, *it is an approximation.*

Product Specifications

Mineral products require unique specifications in order to be sold into a market. Even gold must be 99.9% pure. In terms of physical and chemical specification, nonmetallic minerals can be very difficult to

determine. For example, limestone may be sold as fillers, extenders, whiteners, cement admixture, and into chemical products. For these uses, limestone, must meet rigid requirements and not all limestone can. If it can meet these requirements, then beneficiation costs and market share plus the price of the finished product are critical to a marketability analysis. The mineral examiner must check product specifications thoroughly and carefully, particularly for nonmetallic minerals.

Market Supply and Demand

There must be a reasonable expectation or actual evidence that the mineral commodity in question can be sold in the marketplace. This market may be local, statewide, nationwide, or worldwide. It is the job of the mineral examiner to determine these market conditions and translate them into terms of how much material can be sold in unit within overall time periods. For example, a market that can absorb 1,000,000 tons of specialty limestone over a 10-year period at a rate of 100,000 tons per year may be a good example, presuming there are the necessary tons in the mineral deposit.

Market Entry

An indication of whether or not the commodity is currently being sold is necessary for market entry. If so, support the sales with copies of sales receipts and/or statements from buyers, witnesses, or information describing the findings of the mineral examiner. Where there are no current sales from the deposit, market entry must be discussed by the mineral examiner. Contracts or letters of agreement, assuring future purchases at a specified or market price are important documents to use in establishing future market entry. In the absence of any agreements, a mineral examiner must devise his own study in relation to market entry. Estimates of the type of products, and the ability of the mineral product in question to be competitive, are of real concern. With no contracts or agreements, a mineral examiner must do his own research on market entry possibilities.

Extraction Rates and Remaining Economic Life

Extraction rates and economic life are important because a mineral examiner must know if a proposal of a potential operator is reasonable for the mineral operation in question. If part of a proposal is not reasonable, the examiner must discuss the situation with the owner. If agreement cannot be reached, then the examiner must use his own technical judgment. Where an operation is ongoing, the mineral examiner must understand technical aspects of these factors. All this attention is necessary because capital and operating costs must be obtained for inputs to the economic analyses.

Actual and projected tons and grade of materials are entered each year for production life. The recovered material is key and reflects the sales product after the recovery (waste) factor is applied. Production rate and the length of production time are based on market entry (share), amount of reserves, and waste factor. The mineral examiner must determine, to the best of his ability, how much the recovered material is entering and can in the future enter the marketplace for sale. If the commodity is gold, the assumption is that it can be sold in its entirety. If the commodity is, for instance, carbonate rock, all that can be sold annually by individual use must be determined through a study of past production records and/or a market entry study based on product specifications, demand, and market share. If material is not being sold, then future sales can be documented through contracts or letters of agreement assuring future purchases.

A reasonable extraction rate for the mineral operation must be determined. The extraction rate is mainly a function of market, reserves, waste factors, costs, ability to technically extract, and the amount of time over which extraction will take place. For most operations, 20 years of productive life is the maximum life that should be analyzed, because of the time value of money.

There must be sufficient reserves to last the time frame under consideration with the stipulated extraction rate. For example, if it is determined that there are 20 million tons of reserves that can be extracted at a rate of 1 million tons per year, then there would be sufficient reserves to last 20 years. However, if the extraction rate is increased because of market demand, then the economic life of the mineral operation will be reduced proportionately downward, unless new reserves can be blocked out. New reserves can be blocked out depending on such things as operating and new capital costs, an increase in the selling price of the commodity extracted, and the actual occurrence of the commodity in question with the proper quality (tons and grade).

Income is the key here; the economic or remaining economic life of a mineral operation for income generation is critical and must be examined or determined with great care.

CONCLUSIONS

Mining claims must have a discovery of a valuable mineral deposit to be valid, and to be patented. When required, a Federal government mineral examiner makes a determination of validity and recommendations thereof to authorized government officials. The examiner should demonstrate whether or not an existing mining operation or a proposed operation have economic viability. This is done through an analysis of legal entities, land status and use, geologic and mineralogic relationships, and mining, milling, and processing techniques, considered in an appropriate economic evaluation framework. A framework involves market and market entry studies, reserve analyses, all costs analyses, royalty buyouts, tax structure, discount rate of return, and escalation and risk factors. An income approach to value is used through means of a simple or complex discounted cash flow (DCF) analysis to certify validity by a large corporation. Thorough, fair, consistent, and appropriate concepts should be applied by the mineral examiner, whether one claim is owned by a single miner, or hundreds of claims are owned.

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