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Subject: H-3890-1 - HANDBOOK FOR MINERAL EXAMINERS – (Internal)

1. Explanation of Material Transmitted: This release updates and revises the text of the Handbook for Mineral Examiners, H-3890-1. The revised Appendices were previously issued as release 3-322 of 09/01/2004. The Handbook and its components are being issued in both an 8 ½ x 11 desktop edition and in a pocket edition for effective use in the field.

2. Reports Required: None.

3. Material Superseded: The Material superseded by this release is listed under "REMOVE" below. No other directives are superseded.

4. Filing Instructions: The field pocket edition is filed in the "red binder" Manual sets with Manual Section 3890. Use the existing special binders previously provided to house the pocket edition of the Handbook. The 8 ½ x 11 edition is to be filed behind Manual Section 3890.

REMOVE:	INSERT:
Title Page (rel. 3-322)	Title Page
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	Appendix VI A
(Total: 37 Sheets)	(Total: 64 Sheets)

Assistant Director
Minerals, Realty, and Resource Protection

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Land Management

H – 3890 -1 - HANDBOOK FOR MINERAL EXAMINERS

Policies, Procedures and Standards for Conducting Mineral Examinations of Mining Claims and Sites on Federal Land

and

Appearing as an Expert Witness in an Administrative Hearing before the Department of the Interior

Third Edition (Revised) 2006

by

The Mineral Examiner's Certification Panel [1]

1 Burrett Clay, Chairman; Matthew Shumaker, Executive Secretary; Roger Haskins, Member, BLM; Roy Drew, Member, BLM; Victor Dunn, Member, BLM; Glenwood Kerestes, Member, BLM; John Burghardt, Member, National Park Service.

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Chapter E – Travis, R. B., (1955): Classification of Rocks; Quarterly of the Colorado School of Mines, Vol. 50, No. 1; by permission of the author and the Colorado School of Mines. All rights reserved.

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Appendix IV -- Densities, Volumes, and Weights

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Chapter I -- Introduction

A. The Authority of the Secretary of the Interior under the Mining Laws.

1. The Secretary of the Interior.

The authority of the Secretary of the Interior with respect to public lands is described in Cameron v. United States, 252 U.S. 450 (l920), where the U. S. Supreme Court said:

"By general statutory provisions the execution of the laws regulating the acquisition of rights in the public lands and the general care of these lands is confided to the Land Department, as a special tribunal; and the Secretary of the Interior, as the head of the department, is charged with seeing that this authority is rightly exercised to the end that valid claims may be recognized, invalid ones eliminated, and the rights of the public preserved.

* * * * * * * * * * *

"[T]he power of the department to inquire into the extent and validity of the rights claimed against the government does not cease until the legal title has passed. * * * [The Department's] province is that of determining questions of fact and right under the public land laws, of recognizing or disapproving claims according to their merits and of granting or refusing patents as the law may give sanction for one or the other."

* * * * * * * * * * *

Additional plenary authority is found at 43 U.S.C. § 1457:

"[T]he Secretary of the Interior is charged with the supervision of public business relating to the following subjects and agencies:

* * * * * * * * * *

13. Public lands, including mines."

and at 43 U.S.C. § 2:

"[T]he Secretary of the Interior or such officer as he may designate shall perform all executive duties appertaining to the surveying and sale of the public lands of the United States, or in anywise respecting such public lands, and, also, such as relate to private claims of land, and the issuing of patents for all grants of land under the authority of the government."

2. The Authority of the Director of the Bureau of Land Management.

The authority to administer the mining law program has been delegated to the Director of the Bureau of Land Management (BLM) by the Secretary of the Interior.[1/]

The BLM's authority originates from its succession to the duties and responsibilities of the General Land Office and the Grazing Service.[2/]

3. Mining Claims and Property Rights.

A mining claim constitutes a possessory interest in the land, authorized by the Mining Law of 1872 (30 U.S.C. §§ 21- 54) (hereinafter "Mining Law"). If a mining claim is valid, the mining claimant has a possessory interest in the mineral and the surface for mining or milling purposes. This property right may not be extinguished arbitrarily.[3/]

4. Memoranda of Understanding with Other Agencies.

The U.S. Forest Service and the National Park Service may perform mineral examinations on lands they administer under Memoranda of Understanding (MOU) and Interagency Agreements (IA) they have entered into with the BLM. We retain responsibility for final review and approval of mineral examination work conducted by other agencies. For the purposes of 18 U.S.C. § 1905 and 43 C.F.R. Part 2, subpart C, (proprietary and confidential information handling), the non-BLM agency is a secondary office of control for the Department of the Interior for handling the proprietary and confidential information of a mining claimant whose mining claim is being investigated.

B. Definition of a Mineral Examiner.

A mineral examiner is a federal employee who through education, training and experience has met the requirements as defined within Manual Section 3895 and received certification as a mineral examiner (CME), or review mineral examiner (CRME) by the Director of the Bureau of Land Management. The National Park Service uses our certification process to certify its mineral examiners. The U.S. Forest Service (USFS) also maintains a certification program for its mineral examiners. Employees certified by the USFS as a CME may conduct mineral examinations for BLM under an interagency MOU. Only a BLM CRME may conduct final technical review of a mineral report if BLM is required to act upon the recommendations in the mineral report.

1 135 DM 1.1A(1)(c)(v); 235 DM 1.1A
2 Reorganization Plan No. 3 of 1946 (60 Stat. 1095-1102); Reorganization Plan No. 3 of 1950 (64 Stat. 1262).
3 Best v. Humbolt Placer Mining Co., 371 U.S. 334, 337 (1963).

C. Duties of the Mineral Examiner.

1. Role of a Mineral Examiner.

Your role as a CME is to conduct all validity determinations, common variety determinations, surface rights determinations, and mineral-in-character determinations. In order to make these determinations, you must have a working knowledge of the mineral industry, mineral property evaluation methodologies, geology, and mining engineering. You must also understand and be able to apply the standards established in public land laws, regulations, case law, and Departmental policy.

2. Conducting the Mineral Examination.

You must do a thorough, objective, and professional examination and evaluation of each mining claim, mill site, and tunnel site. Although you are required to work in an objective manner, you work on behalf of the United States, and have no fiduciary obligation to the claimant. Throughout this handbook the terms, "mining claims" or "claims" refer to lode claims, placer claims, mill sites and tunnel sites, unless otherwise noted.

3. Functions of a Mineral Examiner.

You apply the legal and technical standards for mining claim validity established by the Department and give an opinion regarding whether the examined mining claim has met those standards. If you conclude that the standards have been met, then the mining claim will be considered valid. If a mineral patent application is at issue, the mining claim will be recommended for patent. If you conclude that the standards have not been met, then you will recommend a contest. If a contest action is initiated, you will be required to testify as an expert witness for the Government (See Chapter 7).

a. Discovery of a valuable mineral deposit. Your must verify whether the mining claimant has, in fact, found a valuable mineral deposit. You should not explore or sample beyond those areas exposed by the claimant or perform discovery work for the claimant. Your examination is not intended to determine if additional unexposed mineralization might be found somewhere within the limits of the claim that might constitute a valuable mineral deposit.[4/] However, you have the discretion to do additional sampling to obtain a proper sample suite to characterize the deposit.

b. Common (or uncommon) variety determinations. The purpose of your examination is to determine if the claimant has found a mineral that is subject to location under the Mining Law, as amended. If you verify the mineral is subject to the mining laws, it is thereafter subject to the discovery requirements of the mining laws.

4 Hallenbeck v. Kleppe, 590 F.2d 852, 859 (10th Cir. 1979); United States v. Porter, 37 IBLA 313, 315 (1978).

4. Obligations of a Mineral Examiner.

A mineral examiner is obligated to make a careful and competent inspection of a mining claim in order to be able to testify meaningfully on the presence or absence of mineral discovery there.[5/]

5. Expert Opinion of a Mineral Examiner Establishes a Prima Facie Case.

An expert is defined as "A person who, through education or experience, has developed skill or knowledge in a particular subject, so that he or she may form an opinion that will assist the fact finder."[6/]

"[W]here a Government mineral examiner offers his expert opinion that discovery of a valuable mineral deposit has not been made within the boundaries of a contested claim, a prima facie case of invalidity has been made, provided that such opinion is formed on the basis of probative evidence of the character, quality, and extent of the mineralization allegedly discovered by the claimant. Mere unfounded surmise or conjecture will not suffice, regardless of the expert qualifications of the witnesses. * * * The admissibility of expert testimony in a mining claim contest is determined by the hearing examiner, who exercises a wide latitude of discretion in making these determinations."[7/]

6. Market Expertise.

In order to testify as an expert witness, the

"...testifying mineral examiner must be an expert as to the marketability or value of the particular mineral."[8/]

7. Alternate Approaches.

The procedures set forth in this handbook do not address all possible situations. You may encounter situations where handbook and manual guidance do not assist you or where rigid application of that guidance will create an incorrect or indefensible result. In such situations you are expected to draw upon your professional knowledge of accepted industry practices, and case law, as well as the scientific method, to develop a workable solution. If you must deviate from handbook and manual guidance, be certain to document the reasons for doing so, the methodology employed, and the results in the final product. The final product is usually a mineral report that will undergo technical review by a Bureau CRME.

5 United States v. Hess, 46 IBLA 1, 7 (1980).
6 Black's Law Dictionary 600 (7th ed. 1999).
7 United States v. Winters d/b/a/ Piedras Del Sol Mining Co., 78 Interior Dec. 193 (1971) (emphasis added).
8 Rodgers v. Watt, 726 F.2d 1376, 1380 (9th Cir. 1984) (emphasis in original) and cases cited therein.

D. How to Conduct Yourself with the Public.

1. Do Not Give Legal Advice.

Members of the public, including the mining claimant, may ask you to give advice and opinions on many topics. You are not an attorney or a professional consultant working on behalf of the claimant. Do not give legal advice. When asked legal questions, you should suggest that the person contact an attorney. You should avoid giving information, advice, or suggestions that are not within the scope of your authority.

2. Educating the Claimant.

It is important for you to educate the claimant about the mineral examination process. When mining claimants ask you questions about your investigation of his or her mining claims or mill sites, you should limit your answers to an explanation of the procedures you will follow during the course of the examination. This is especially true in talking to mining claimants who have mining claims on land under the jurisdiction of other federal agencies. Your job is to collect the relevant facts, make a professional judgment, and to form an opinion as to the validity of the mining claim. You then document the process and results in a mineral report and make a recommendation regarding the claim validity.

3. Contacts with Claimants.

Please be friendly and courteous at all times. Exercise patience and be a good listener. The mining claimant's primary contact with the Department may be you, the mineral examiner. The mining claimant's impression of the agency will depend on your manner and professionalism during the examination.

a. Invitation to join the mineral examination.

You must invite the mining claimant to accompany you during the validity examination. You must give the mining claimant the opportunity to identify the discovery points and other places from which he or she wishes you to take samples. You must not allow the claimant to collect the samples for you or in anyway handle the samples. It is not your job to perform exploration for the claimant. Your job is only to verify the claimant's data and results. It is important that you explain to the claimant that you will collect only a reasonable number of samples. You may also exercise your professional judgment and take samples from locations not selected by the mining claimant, in order to adequately evaluate the mining claim.

b. Expressing opinions.

Before the report is final, you should not express or imply any opinions or conclusions to the claimant or other outside parties about the value of the minerals present or the validity of the claim. A mineral report is not final until it has undergone all necessary agency

review (See Chapter 6). It is entirely appropriate for you to discuss your opinions and conclusions with other Bureau personnel or the Solicitor's Office.

c. Professional discretion in communications with a claimant.

After the mineral report is final discuss the general outcome with the claimant. In some cases, if the recommendation of the mineral report is to initiate a contest against all or some of the mining claims at issue, you may ask the claimant if he or she is interested in relinquishing those claims.

d. Suspected fraud.

If you suspect that the mining claimant has engaged in fraudulent or other potentially criminal activities, you should contact the Solicitor's Office and BLM Law Enforcement. Likewise, if the claimant has relied on unproven technology, unusual or proprietary assay methods, or you have reason to believe the claimant has salted the samples, you should consult with the Solicitor's Office.

Chapter II – Mineral Investigation Types

A. Valid Locations under the Mining Laws.

1. Locations – Generally.

a. Lode or placer mining claims. A mining claim must be properly located, maintained, and contain a discovery of a valuable mineral deposit subject to location under the Mining Law, as amended.[1/]

b. Mill sites.

(1) A dependent mill site must be properly located, maintained, and not exceed 5 acres in size. It must be located on non-mineral land that is not contiguous to a vein or lode. It must be used or occupied for mining or milling purposes in conjunction with an associated mining claim or claims, or for other uses reasonably incident to a mining or milling operation.[2/] A claimant may locate more than one mill site per mining claim, as long as they are properly used or occupied.[3/]

(2) Independent or custom mill sites may also be located and maintained for the custom tolling and processing of ores and concentrates from several mines.[4/]

c. Tunnel sites. A tunnel site is located and maintained for the development of an existing vein or lode, or for the discovery of blind or undiscovered valuable mineral deposits. A tunnel site may not exceed 3000 feet length, as measured from the beginning of the portal. It must be worked diligently as required by law.[5/] This requires advancing the working face or improving the tunnel every six months.[6/]

A tunnel site is a subsurface right-of-way and intended as an exploration tool for the discovery of blind veins or lodes. A tunnel site cannot be patented. However, lode mining claims may be located over the surface trace of blind veins or lodes discovered within the tunnel. This right of location extends outwards for a radius of 1,500 feet from the centerline of the tunnel.[7/] The date of location of the lode claim is retroactive to the date of the location of the tunnel site.[8/]

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1 30 U.S.C. §§ 22-54 and 43 C.F.R. § 3832.11 (2006).
2 30 U.S.C. § 42; Solicitor's Opinion M-37010 "Mill Site Location and Patenting under the 1872 Mining Law," (Oct. 7, 2003); 43 C.F.R. § 3832.30 (2006).
3 43 C.F.R. Part 3832, Subpart C (2006).
4 Id.
5 30 U.S.C. § 27; 43 C.F.R. § 3832.40 (2006).
6 43 C.F.R. § 3832.44(c) (2006).
7 43 C.F.R. Part 3832, Subpart C (2006).
8 Enterprise Mining Co. v. Rico-Aspen Consol. Mining Co., 167 U.S. 108, 113 (1897); United States v. Parker, 91 Interior Dec. 217, 292 (1984).

2. Determination of a Discovery of a Valuable Mineral Deposit.

a. The Prudent Person rule.

The "Prudent Person rule" defines what constitutes a discovery of a valuable mineral deposit. The "Prudent Person rule" was first mentioned in Castle v. Womble,[9/] and has been repeatedly affirmed by the Federal courts.[10/]

The "Prudent Person rule," as stated in Castle v. Womble, is:

"[W]here 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 statute have been met. To hold otherwise would tend to make of little avail, if not entirely nugatory, that provision of the law whereby 'all valuable mineral deposits in lands belonging to the United States . . . are . . . declared to be free and open to exploration and purchase.' For, if as soon as minerals are shown to exist, and at any time during exploration, before the returns become remunerative, the lands are to be subject to other disposition, few would be found willing to risk time and capital in the attempt to bring to light and make available the mineral wealth, which lies concealed in the bowels of the earth, as Congress obviously must have intended the explorers should have proper opportunity to do."

b. Marketability.

The "Marketability Test" is a refinement of the prudent person rule. It applies to all mining claims and was first enunciated in Layman v. Ellis.[11/] The standard was affirmed and clarified in 1933:

". . . [a] mineral locator or applicant, to justify his possession, must show that by reason of accessibility, bona fides in development, proximity to market, existence of present demand, and other factors, the deposit is of such value that it can be mined, removed, and disposed of at a profit."[12/]

This supplemental requirement has been affirmed by the Federal courts.[13/]

9 19 Pub. Land Dec. 455 (1894).
10 Chrisman v. Miller, 197 U.S. 313 (1905); United States v. Coleman, 390 U.S. 599 (1968).
11 52 Pub. Land Dec. 714 (1929).
12 See Taking of Sand and Gravel from Public Lands for Federal Highways, 54 Interior Dec. 294, 296 (1933).
13 Foster v. Seaton, 271 F.2d 836, 838 (D.C. Cir. 1959); Converse v. Udall, 399 F.2d 616, 619 (9th Cir. 1968); United States v. Coleman, supra.

c. Considering the validity of a claim block.

The validity of mining claims that make up a mine may be considered together as a group, so long as the claimant shows that valuable minerals exist on each claim.[14/]

d. Geochemical or geophysical information.

A mining claimant's geophysical or geochemical data[15/] alone is an insufficient basis for proving a discovery of a valuable mineral deposit. A physical exposure of the valuable mineral is still necessary.

e. Drill core and cuttings.

Evidence of a discovery of a valuable mineral deposit collected from drill holes is adequate. You may verify the exposure by reviewing the drill sites, drill logs, core samples, and/or drill cuttings. Chapter IV-2D explains how you should handle and secure drill core samples and cuttings.

f. Discovery cannot be inferred.

Geological inference, no matter how strong or convincing, cannot be used as the basis for a discovery in lieu of a physical exposure of a valuable mineral deposit in place.[16/]

You must be objective and exercise good professional judgment in evaluating the data that is pertinent to a discovery. Based on the mineral showing and its relationship to the geologic setting of the mineral district, you must decide if there is a discovery under the prudent person rule and marketability requirements.

3. Mineral Patent Applications.

Although the regulations at 43 C.F.R. § 3862-1 (2006) require patent applicants to designate the point of discovery on the mineral survey plat, it is not necessary for the discovery to be found within the "discovery working" that is marked on the plat. When the Mining Law was first enacted, many state laws required that a discovery working had to be identified by the erection of a monument. This monument did not necessarily mark the location of valuable minerals. Most states have discontinued this requirement. Nevertheless, there must still be an exposure of valuable minerals within the boundaries of each claim.[17/]

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14 United States v. Foresyth, 94 Interior Dec. 453, 488 (1987); Schlosser v. Pierce, 93 Interior Dec. 211, 223 (1986).
15 United States v. Feezor, 90 Interior Dec. 262 (1983); United States v. Feezor, 130 IBLA 146,148 (1994).
16 McCall v. Andrus, 628 F.2d 1185, 1188 (9th Cir. 1980), cert. denied, 450 U.S. 996 (1981); United States v. Feezor, 90 Interior Dec. 262 (1983).
17 United States v. Foresyth, 15 IBLA 43, 58 (1974).

B. Mineral-in-Character Determinations.

Make mineral-in-character determinations following the standards described in Southern Pacific Co.:[18]

"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."

Lands examined that do not meet the above criteria are nonmineral-in-character.

1. Placer Mining Claims.

When examining placer mining claims, you must answer two questions:

a. Is there a discovery of a valuable mineral deposit?

b. Is each square ten-acre legal subdivision of a placer claim mineral-in-character?

The second question relates to the "ten-acre rule", which has been followed by the Department since 1899.[19]

These two requirements are discussed further in Chapter III, section G.

2. Mill Sites.

A mill site must be located on non-mineral land. Each square $2^1/_2$ acre subdivision of a mill site must be used or occupied for mining, milling or activities reasonably incident thereto. These requirements are discussed further in Chapter III, section H.

3. Mineral Potential Reports and Conveyances under the Federal Land Policy and Management Act (FLPMA).

The preparation and review of mineral potential reports and those for "known mineral values" under FLPMA are not covered by this Handbook, as they are not actions related to the Mining Law. Please refer to Manual Section 3060 Mineral Reports, Preparation and Review for further information.

18 71 Interior Dec. 224, 233 (1964).
19 United States v. Henrikson, 70 Interior Dec. 212 (1963); United States v. Lara, 67 IBLA 48 (1982); United States v. Lara, on recon., 80 IBLA 215 (1984); Lara v. Secretary of the Interior, 820 F.2d 1535 (9th Cir. 1987); 30 U.S.C. § 36.

C. Common Variety Determinations.

Not all mineral commodities are locatable. Common varieties of sand, stone, gravel, pumice, pumicite, or cinders are not locatable.[20/] Mining claims that are located on or after July 23, 1955, for common variety minerals are not valid. Common variety minerals may be disposed only through sales contracts. When a notice or plan of operations is filed over a suspected common variety mineral deposit, a common variety determination must be made be we can accept or approve the notice or plan. Common variety determinations are discussed further in Chapter V.

D. Evaluation of Mineral Properties for Purchase or Condemnation.

Public lands that contain valid mining claims are occasionally needed for other federal purposes that would conflict with the mining claims. In such situations, mining claims may be appraised for purchase or for condemnation. The Department must determine the validity of the mining claims before the claims may be appraised for condemnation. An invalid mining claim has no property rights to appraise.[21/] Please note that a patent or validity examination report does not appraise the value of the mining claims at issue.

E. Public Law No. 84-167.

The Surface Resources Act of July 23, 1955, Public Law No. 84-167,[22/] allows the United States to manage the surface resources on unpatented mining claims located on or after enactment of the Act. The Act also provides a procedure whereby the United States may assert the right to manage the surface resources on unpatented mining claims located before enactment of the Act. Mining claims located on or after July 23, 1955, are subject to the provisions and limitations of the Surface Resources Act, including the right of the United States to manage the surface and vegetal resources.

Even though the Surface Resources Act authorizes the United States to manage the mineral materials and vegetative surface resources on unpatented mining claims, the mining claimant does not lose any possessory rights to the locatable minerals or to the use of as much of the surface as is reasonably necessary for mining operations. Furthermore, any permittee or licensee of the United States or user of the public land, including the government, may not endanger or materially interfere with authorized prospecting, mining, or processing operations or uses reasonably incident thereto.

20 30 U.S.C. § 611; 43 C.F.R. § 3830.12 (2006).

21 Best v. Humbolt Placer Mining Co., 371 U.S. 334, 337 (1963), Forbes v. Gracey; 94 U.S. 762 (1877); "A Procedural Guide for the Acquisition of Real Property by Governmental Agencies" Department of Justice, Land and Natural Resources Division (2000).

22 30 U.S.C. §§ 611 -615.

F. Multiple Use Conflicts.

Mining claims and mill sites may conflict with other resource uses, such as land disposals, desert land entries, material sale sites, range-improvement projects, timber sales, or rights-of-ways. We may exercise our discretion to conduct validity examinations to clear invalid mining claims that conflict with other resource uses, especially if the lands have been withdrawn from mineral entry.

Validity examinations are not normally required to resolve occupancy trespasses on mining claims located under the guise of the Mining Law. The regulations at 43 C.F.R. Part 3715 are designed to cover most occupancy trespass situations. BLM may institute an administrative action against an unauthorized surface use of a mining claim without first conducting a validity examination.[23/]

G. Surface Management Requirements.

A validity examination is required for notices and plans of operations in withdrawn areas before acceptance or approval may be given to proceed.

H. Mining Claim Administration.

There is no need to conduct any of the determinations described in this chapter if the mining claimant has not properly recorded and maintained the mining claims at issue. Be certain to check the status of each mining claim before beginning any mineral examination work.

1. Recording and Maintenance of Mining Claims or Sites.

Under the FLPMA, all mining claims or sites must be recorded with BLM within 90 days of location or they are forfeited.[24/] Mining claims and sites located before October 21, 1976, must have been recorded with BLM by October 22, 1979, or were abandoned and void.

Mining claimants must pay an annual maintenance fee for each mining claim that is due each September 1st.[25/] Owners of ten or fewer claims or sites may elect to file a waiver from the fee, perform the assessment work that is required by the Mining Law and make the annual filing that is required by FLPMA.[26/]

2. Records Administration. Contact the State Office adjudication staff to ensure that the mining claim or site has been filed properly, is in good standing, and that

23 United States v. Henderson, 243 F.3d 1168 (9th Cir. 2001); United States v. Noguira, 403 F.2d 816 (9th Cir. 1968).
24 43 U.S.C.§ 1744.
25 30 U.S.C. § 28f.-k; 43 CFR Part 3834 (2006).
26 43 C.F.R. Parts 3830, 3834, 3835 (2006).

the mining claimant has paid applicable location and maintenance fees or has complied with the small miner waiver requirements under 43 C.F.R. Part 3834 or 43 C.F.R. Part 3835, respectively.

Chapter III – Mineral Examination Procedures

A. Preparation for a Validity Examination.

1. Case File Review.

Examine the mining claim case file for essential information such as: recordation of the location notice, chain of title, identification of critical dates (such as conveyance of an association placer claim, segregation or withdrawal of the lands or consideration of a patent application), location amendments, and continuous filings of affidavits of labor or notices of intent to hold, and payment of the location fees and annual maintenance fees.

a. Land status. Obtain land status information from the proper BLM State Office. Examine the Historical Index (HI) and Controlled Document Index (CDI) for Public Land Orders, classification actions, and other pertinent data that may show that the mining claim is null and void ab initio, in whole or in part. If available, obtain a copy of the mineral survey plat and notes.

b. Ownership. Identify the current owners and their last known address so that you can notify them of the field examination and any related issues.

2. Notification of the Mining Claimant.

a. Notification policy. You must notify the claimant at least 30 days before a planned mineral examination. If possible, contact the mining claimant directly to try to establish a date that is mutually agreeable. You must invite the mining claimant to accompany you for the field examination and give the claimant the opportunity to point out discovery point(s), claim corners and other essential features of the mining claim or mill site. The mining claimant may designate an agent to act in his/her place. You must confirm the arrangement in writing.

b. Notification requirements. The written notification must state the agreed upon date or must give a proposed examination date. You must send the notification by certified mail, return receipt requested. The field examination may take place even if the certified letter is returned as refused or returned as undeliverable.[1/] Failure to give written notification does not prevent the examination or disqualify the Government's case.[2/]

3. Mineral Property Information.

a. Public information.

(1) You should review all essential literature concerning the geology, mineralization, mining history, and economics of the property and the mineral commodities being investigated. Examine the information collected by the U. S. Geological Survey,

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1 43 C.F.R. § 1810.2 (2006).

2 United States v. Grigg, 8 IBLA 331, 339 (1972).

local State geological surveys, and the former U. S. Bureau of Mines (these records are now with the U. S. Geological Survey). In addition, consult university libraries and any local geological societies. Do not disregard old scientific literature and records, as they will often provide considerable information about mining conditions and production records.

(2) For publicly owned or traded entities, or those properties that are being worked by a publicly owned or traded entity, you should request copies of prospectuses, annual reports, and related documents that they are required to file with the Securities and Exchange Commission (SEC), especially the company's 10K reports. These documents will include documentation of the reserves on the property and must be backed up by evaluation reports by the company. The documents are available from the SEC's EDGAR website **http://www. sec.gov/edgar**.[3/]

b. Claimant information.

(1) Request the mining claimant or his agent to make available any data concerning the geology, mineralization, structure, and any other physical attributes that will allow you to evaluate the mineral deposit. This includes, but is not limited to: geologic, geochemical, geophysical and mineral maps; drill hole information, assays, resource or reserve estimates, engineering studies, and any other information that will assist you in verification of the claimed valuable mineral deposit.

(2) Request copies of any feasibility or pre-feasibility studies, capital and operating cost information. Obtain copies of any economic studies, production records, marketing and sales information.

(3) You must keep a written record of the requests, whether made by telephone, e-mail, or other means.

B. Field Equipment.

Carefully check all field equipment before going into the field to ensure that everything is functioning properly.

1. Calibration of Directional Equipment.

a. Compass Calibration. Set your compass to the proper magnetic declination. Declination is variable through time. Old USGS topographic and other maps often do not reflect the current declination, but do give the annual drift of the magnetic field. It may be necessary to calculate the current declination for the subject area.

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3 For additional information contact the SEC's Office of EDGAR and Information Analysis at 202-942-2930 and SEC's Natural Resources and Food Division at 202-942-1870.

b. Global Positioning Satellite units. When you use Global Positioning Satellite (GPS) mapping systems, you must ensure that the GPS equipment is accurate. Calibrate the instrument prior to use in the field according to the manufacture's instructions. When extreme precision is required, you must consult with the Bureau Cadastral Survey staff. You must be proficient in the use of GPS equipment and understand its limitations.

2. Field and Safety Equipment.

Inspect your field equipment. It must be in good working order. Carefully inspect and test the appropriate safety equipment, which is described below. Clean all equipment you plan to use for sampling prior to use.

3. Cameras and Photography.

You must photograph all significant features of the mining claim or mill site (discovery point, sampling points, improvements, and equipment). Use film with a good color contrast rating. Prints should be produced as opposed to slides.

a. Prints and negatives. Your report may include scanned or photocopied prints, but your original prints and negatives must be retained in case the accuracy of any reproduced photographs is questioned in judicial proceedings.

b. Digital and electronic images. The federal courts do not universally accept digital images as evidence. You must print the images as hard copy, on photographic paper that you intend to use in your report. This hard copy is kept as the official record. After making the hard copy, you may incorporate the digital images into your report.

c. Images as evidence. A factual foundation is required to admit any photograph into evidence. That foundation requires that you state under oath, that your photograph, whether a color print or a digital image, accurately portrays what it is intended to represent.

C. Field Safety.

You must complete all required safety training and all required job hazard analyses. Mine safety training is conducted by the National Training Center (NTC) and by most State Mine Inspection offices.

1. Mine Safety and Health Administration Safety Regulations.

Read and be familiar with the Mine Safety and Health Administration (MSHA) regulations, especially those in 30 CFR Chapter I, subchapters B, H, K, and M. You are required to follow these regulations when on a mining property.

2. Safety Handbooks.

U. S. Bureau of Mines Information Circular 7479 (This is a 1948 publication entitled, Hazards of Entering Old Mine Workings).

3. Underground Safety Policy.

Always file a safety plan before going underground.

YOU MUST ADHERE TO BLM'S UNDERGROUND SAFETY POLICY. See BLM Handbook 1112 - Safety.

4. Entry into Mine Workings.

NEVER ENTER UNDERGROUND MINE WORKINGS ALONE or go onto any areas around surface mine workings in a haphazard manner. BE ALERT AND REMAIN ALERT. Do not enter any areas you suspect are being used for criminal activities. Always carry and wear appropriate equipment.

5. Decision to Not Enter a Mine.

If you believe that it is unsafe to enter underground mine workings or go onto areas around surface mine workings, do not do so. **THE DECISION NOT TO ENTER IS SOLELY AT YOUR DISCRETION AS THE MINERAL EXAMINER.**

DO NOT ENTER UNDERGROUND WORKINGS ALONE.

6. Safety Equipment.

The following is a recommended checklist of items that are normally required for field safety in the examination of a mining claim:

- An MSHA approved hard hat.

- Sturdy over-the-ankle boots. Steel toes are required. Rubber boots with toe and metatarsal reinforcement are preferable where wet conditions may be encountered, and are usually required by the mine operator. BLM must provide safety boots for employees who need them. For hygienic reasons employees must not share boots, dust masks or similar items of a personal nature.

- When entering underground mine workings, at least three different suitable sources of light should be carried (e.g., head lamp, flashlight, penlight, chemical light stick). If there is any possibility that inflammable gas may be encountered, only MSHA-approved non-sparking light sources may be carried. Flame safety lamps are no longer MSHA-approved for underground use.

- When entering an underground mine, carry an oxygen detector, or preferably, a multiple gas detector inclusive of oxygen, combustibles, carbon monoxide, hydrogen sulfide, or other toxic gases known to occur in the particular mining district.

- Safety glasses or goggles for general underground and surface wear, and for use in rock breaking and sampling.

- An MSHA-approved Self-Rescuer (Respirator W 65 for self-rescue from carbon monoxide) for underground work.

- A personal first-aid kit.

D. Field Notes.

Adequate, accurate and legible field notes are critical. Geologic shorthand should use the standard abbreviations given in Compton (1962) or Dietrich (1982). You should use an engineer's field book with water resistant pages for taking field notes. You must keep a reserve copy of the field notes in the event the file copy is lost. If more than one mineral examiner participates in the examination, one mineral examiner should be designated as the official note recorder. However, all examiners should take notes to avoid any confusion that may occur in the office when the mineral report is being written.

Notes taken in the field should be recorded in sequence as the examination proceeds. Use the checklist below to guide the examination, as well as to help standardize note taking. It will also help minimize the possibility of overlooking essential data that should be recorded while in the field. Your mineral report must be written in conformance with Handbook H-3890-3 Validity Mineral Reports. You should review this handbook before entering the field and use the handbook's criteria to further guide you in the collection of data in the field.

Field notes may be subject to discovery requests in a mineral contest proceeding. Write all entries in a professional manner.

1. General.

a. Identify each participant. Identify each person involved in the field examination, and the dates that they are present.

b. Field notes. Date and number each page of the field notes.

c. Checklist for field notes. Appendix VI - A is a checklist for field note contents.

2. Field Maps

Before leaving for the field, gather and take with you all necessary maps, including:

a. Location map. A general location map for determining access and finding the mining claim.

b. Mineral survey plats. A mineral survey plat, where applicable.

c. A U. S. Geological Survey topographic map.

d. Enlargement of topographic maps. You may enlarge topographic maps to highlight mining claim features and assist in the detailed mapping of the mining claims. Keep in mind that enlarging a topographic map will not increase its on-the-ground precision.

e. Base maps.

(1) Prepare a base map of the mining claim(s) by enlarging a topographic map, preferably a 7.5 minute series (scale 1:24,000 or 1 inch to 2,000 feet) to a scale of one inch to 400 feet or better. This will be your base map for your work on the mining claims. Unless you have no other options, you should not map mining claim features directly on the 7.5 minute topographic map as the scale is too large for accurate placement of features being mapped. It may help to use a copy of the Mineral Survey Plat enlarged to an appropriate scale.

(2) Aerial imagery is an important tool for field examinations.[4/] Air photos can be enlarged and used as base maps if topographic maps are not available. Aerial photographs at scales of one inch to 1,320 feet and one inch to 660 feet are preferred, as they may be enlarged 2-3 times without significant distortion of on-the-ground features.

f. Mapping procedures.

(1) All mapping should be done with the use of standard topographical, geologic, and mining symbols. Standard symbols are given in Dietrich et al. (1982), Compton (1962), Lahee (1951), and Appendix I, and should be used in all mineral reports.

(2) You should pencil in claim corners and boundaries in advance of your site visit, as given in the location notice(s). In addition, pencil in the claimant supplied geologic information. You must verify your draft map by comparing it to the actual

4 Coverage is available for most of the continental United States and can be obtained through the BLM's Cadastral Survey office, from the national aerial photograph library at the EROS Data Center in Sioux Falls, South Dakota, or from the U. S. Department of Agriculture Aerial Photography Field Office in Salt Lake City, Utah.

features on the ground while on field location. This will allow you to catch any errors before they can be compounded and allow geologic inferences to be made as the work progresses. Simply collecting notes and map coordinates for later compilation offsite is not considered proper professional practice.

(3) Do not use the Master Title Plat as a base for field mapping because it is not to scale.

3. Sampling Field Notes.

a. Sample numbers. You must number samples with a unique identifier, which can be numeric, alpha-numeric, or alphabetic. Use the same unique identifier in the sample field notes, on the sample bag or other container, and on the maps to correlate the locations, data, and notes.

b. Sample descriptions and photographs. You must describe and photograph each sample site before and after collecting the sample. For some sample locations it may be worthwhile to take photographs while sampling to document the process and people involved. Your field notes should contain enough information to later caption the photographs. Describe your sample collection procedure in detail, including dimensions of sample cut, the relationship of the sample to the mineral deposit, and the location of the sample on the mining claim.

c. Description of sample sites. Describe the geologic setting of the sample site, including structure and lithology. Clearly state the reasons for why you collected the sample at that site. Plot the sample site on the base map using the unique identifier.

d. Chain of custody and sample security.

(1) Briefly outline the sample chain of custody, the security employed, and how samples were transported and stored. This information will be needed in the mineral report. Your samples must be held in secured storage until sent to a laboratory for analysis. The rejects and pulps from the laboratory must be returned to you and retained in secured storage until the case has been fully adjudicated. Secured storage requires limited access locks and a sign in and out sheet record when the cabinets are accessed. Do not allow the claimant to gather or handle the samples. Only you are allowed to collect and handle the samples.

(2) Never allow the claimant, the claimant's family members, employees, representatives, or other related parties near enough to the sampling and processing areas to potentially salt or otherwise tamper with the samples.

e. Special measures when you suspect sample tampering or other fraudulent activity. In some cases, you may suspect fraud or criminal activity. These may include evidence of salting in the sample, such as the presence of bi-modal gold particles, gold

shavings, or gold with highly variable fineness or silver content. These may also include unusually uniform assay results over the breadth of the property, minerals in the samples that normally do not occur together for the deposit type being investigated, and any other unusual item that concerns you. If you suspect fraud or other criminal activity, you should consult Bureau law enforcement staff for advice on handling and storage of evidence that may be used later in a criminal trial.

4. Other Essential Data to be Included in Notes.

a. For all mining claims, take note of the following:

(1) Existence and position of mining claim or mill site monuments.

(2) Orientation of lode claims to the vein or lode, where appropriate.

(3) Posting on the mining claim of mineral survey plat and notice of mineral patent application, as applicable. Take a photograph of the posting. Posting is only required during the 60-day publication period for a patent application.

(4) Conflicts between mining claims.

(5) Compliance with applicable State and local laws.

(6) Notes for each photograph indicating what was photographed, showing date, location, direction the camera was facing, names of persons in the frame, photographer's name, and other specific information to facilitate producing a complete caption.

(7) Names of persons interviewed. Give names, addresses, telephone numbers, and the interview date.

b. For placer mining claims, take note of the following:

(1) Evidence of the use of dummy locators.

(2) Placer mining claims not conforming to legal subdivisions.

(3) Mineral-in-character status of each square ten-acre legal subdivision of placer claims (the "ten- acre rule").

c. For mill sites and tunnel sites, take note of the following:

(1) Mill site use and relationship to associated mining claims. See 43 CFR Part 3832, Subpart C for qualifying uses.

(2) Current viability of associated mining claims or patented mining claims.

(3) For custom or independent mill sites, describe the milling equipment, its operational capability, and identify the source and type of minerals proposed to be processed. Independent mill sites may only process materials from lode claims and not placer claims. See 43 CFR Part 3832, Subpart C for qualifying uses.

(4) Whether the mill site is being used to process minerals from lands that were previously patented under the agricultural land laws. Use of mill sites for such processing is prohibited.

(5) Any tunnel site activity, contrasting current activity from activity that is clearly historic.

E. The Field Examination.

1. Entering a Mining Claim.

Try to gain access to the mining claim or mill site with the claimant's consent. If the mining claimant threatens you or uses force to prevent you from going onto the mining claim or mill site, do not promote an angry confrontation. Leave the claim and contact your supervisor from another location to discuss the situation. On BLM-administered lands, also notify the BLM Law Enforcement Staff. If these officials are unable to get the mining claimant's consent for a mineral examination, request that BLM Law Enforcement Staff to accompany you and protect you while you are on the claim or site to conduct the field examination. Do not re-enter a claim for a field examination under any circumstances without law enforcement if there is concern for your safety.

2. Initial Reconnaissance.

Your field examination should start with a reconnaissance of the mining claim. This acquaints you with the area and facilitates planning and execution of an efficient mineral examination. The reconnaissance includes locating the claim corners and boundaries. Record major features on the base map. Record the geology and cultural features on the map as you walk around the claim. You should compare the mineral survey plat (if one exists) and associated survey notes with the actual location of monuments and workings on the mining claim.

3. Verification of Discovery.

Verify whether the claimant has exposed a mineral deposit on the mining claim. You must record and document all exposures of mineralization and all geologic attributes associated with each exposure. You will use this information when you have returned to the office to determine whether the claimant has discovered a valuable mineral deposit. When examining a mining claim, you are there to verify whether the claimant has discovered a

potentially valuable mineral deposit. You are not to "make a discovery" for the mining claimant. It is the responsibility of the claimant to have physically exposed the mineralization upon which the assertion of a discovery is based.

4. Discovery Points Must Be Open and Safe to Enter.

The discovery points must be open, available, and safe for examination. If the alleged valuable mineral exposure is in a surface or underground working which is inaccessible or unsafe to enter, **do not** try to make it accessible or enter under unsafe conditions.[5/] If the mining claimant refuses to make the discovery points accessible or reveal their location, exercise professional judgment and sample where you can to adequately characterize the mineral deposit on the claim. Note the claimant's failure to identify a discovery point, but collect a sufficient number of samples to confirm the presence or absence of any mineral deposit, as well as to evaluate wall rock and barren zones. If the claimant proposes an excessive number of sample sites, you must use professional judgment to limit the sampling program to a reasonable number of samples to adequately evaluate any mineralization found.

5. Document Geologic Features.

Carefully examine and map all accessible geologic features. Show all important geologic structures, and their attitudes, and plot all sample points. If the discovery point is underground, map all safely accessible subsurface features. Use the symbols for plats, maps and surveys in Appendix I.

F. Lode Mining Claims.

1. Workings and Infrastructure.

It is essential that you prepare a detailed description of all workings and improvements on each mining claim. Draw all workings and infrastructure on the base map. Map all exposed geologic structures and correlate with geologic structures that may be visible in shafts, cuts, pits and other workings. Use the symbols for plats, maps and surveys in Appendix I. Include a description of the valuable minerals, gangue minerals, vein and wall rock alteration, and the country rock. Be certain to note whether the deposit is similar to others in the general area. Published data of the mines in the district can be helpful in evaluating the mineral deposit under investigation.

2. Potential for Extra-lateral Rights.

If the side or end lines of a lode claim extend or project onto land not open to mining claim location, the discovery must be on that portion of the land open to mining claim location in order to obtain extra-lateral rights to the lode deposit, to the extent the extra-lateral rights

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5 United States v. Pool, 78 IBLA 215, 225 (1984), and cases cited therein. ("The mineral examiner has no obligation to either imperil himself or retimber the shaft.")

are to ores within the ground which has not been withdrawn.[6/] A lode claim is limited by statute[7/] to a length of 1500 feet along the vein and a width of 300 feet on each side of the vein. The rights asserted by one claimant against another under the extra-lateral rights provision of the mining law is a question of possessory right, and the issue must be decided between the parties in a court of competent jurisdiction.[8/]

G. Placer Mining Claims.

1. Physical Exposure Required.

You must determine whether the claimant has a physical exposure of a potentially valuable mineral deposit within each placer mining claim. Draw all infrastructure and workings on the base map. Map the geologic formations or units carrying the recoverable values or commodities.

2. Each Ten-Acre Parcel Must Be Mineral In Character.

a. Claims located by legal subdivision. For placer mining claims located by legal subdivision, you must determine whether each square ten-acre aliquot part is mineral in character.[9/] Placer mining claims not located in conformance with the public land survey (such as bench or gulch placers) are permitted under special rules.[10/]

b. Claims located by metes and bounds. For placer claims of irregular shape, the ten-acre tracts, for purposes of determining whether each ten-acre parcel is mineral in character, are created by dividing the claim in half down its long axis and forming ten-acre parcels from the divided portions. This is done by establishing dividing lines at right angles to the base line. (The base line runs down the long axis of the claim). The ten-acre parcels do not have to be square if claim geometry will not permit it, but should approximate ten-acres within each area, to the extent possible.[11/]

c. Ten-acre rule applied to mineral patent applications. If you are determining the validity of placer claims for which a patent application has been filed and conclude that one or more ten-acre parcels are nonmineral in character, ask the applicant to withdraw the nonmineral-in-character parcel(s) from the patent application. If the applicant refuses to withdraw the parcel(s), you must recommend those parcels for contest. You must not recommend for patent any nonmineral ten-acre parcels of a placer claim.

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6 Marilyn Dutton Hansen, 79 IBLA 214, 216 (1984); Santa Fe Mining, Inc., 79 IBLA 48, 50 (1984).
7 30 U.S.C. § 23
8 For further reading on the subject, see The Hidee Gold Mining Co., 30 Pub. Lands Dec. 420 (1901), and II Lindley on Mines § 363a.
9 United States v. Lara (On Recons.), 80 IBLA 215 (1984), aff'd by, Lara v. Secretary of the Interior, 820 F.2d 1535 (9th Cir. 1987).
10 Snow Flake Fraction Placer, 37 Pub. Lands Dec. 250 (1908); United States v. Henrikson, 70 Interior Dec. 212 (1963); 43 C.F.R. § 3832.12(c) (2006)
11 Lara cases, supra.

3. Technical References.

a. Alluvial placers. You should consult McCulloch (2003), Macdonald (1983), Peele (1959, p. 533-640), and Wells (1989), for the appropriate evaluation techniques, equipment, and processing methods for alluvial minerals from placer mining claims. These minerals include, but are not limited to, gold, diamonds, sapphires, cassiterite, garnet, monazite, ilmenite, and other minerals usually recovered using gravity methods.

b. Industrial minerals. Many types of industrial minerals may be located as placer mining claims. There are several good sources of information on industrial minerals that should be consulted.[12]/

H. Mill Sites.

1. Uses of Mill Sites.

All uses of a mill site must be reasonably incident to mine development and operation, except for uses exclusively supporting reclamation or mine closure. [13]/ Each mill site is limited to a maximum of 5 acres in size and must be located on nonmineral land. Mill sites may be located by legal subdivision or by metes and bounds. The claimant's use and occupancy of the land must be reasonably necessary for efficient and reasonably compact mining or milling operations.[14]/

2. Types of Mill Sites.

a. Associated or dependent mill sites. An associated or dependent mill site is one associated with lode or placer mining claims, either patented or unpatented. For a dependent mill site to be valid, the mining claim with which it is associated must be either a mineable patented or a valid unpatented claim. If there are no mining operations occurring on an associated mining claim, the claimant cannot claim that a mill site is necessary for mining or milling operations for that associated mining claim.[15]/ A dependent mill site cannot be patented unless the associated mining claim is being patented concurrently or has been previously patented and remains economically viable.[16]/

b. Independent or custom mill sites. A custom or independent mill site is not associated with a particular mining claim and is a stand alone operation. Custom mill

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12 LeFond (1983); Industrial Minerals and Rocks (2 vols.), AIME; Barksdale (1991); The Aggregate Handbook, National Stone Association, Washington, D.C.; Maley (1996); Mineral Law (6th ed.), Mineral Lands Publications, Boise, ID.

13 43 C.F.R. § 3832.34 (2006).

14 United States v. LeFaivre, 138 IBLA 289, 293 (1997); Solicitor's Opinion M-37010, "Mill Site Location and Patenting under the 1872 Mining Law," (Oct. 7, 2003); 43 C.F.R. § 3832.32 (2006).

15 United States v. Dean, 14 IBLA 107, 109 (1973).

16 United States v. Dean, 14 IBLA 107, 109 (1973); Pine Valley Builders, Inc., 103 IBLA 384, 388-89 (1988).

sites[17] contain a "quartz mill or reduction works." In modern terms this means any milling (grinding or crushing), flotation, or beneficiation facility (smelters, heap leach pads, carbon-in-pulp mills, etc.) for the custom processing of ores.[18] Independent mill sites may be used or occupied for processing metallic minerals from lode claims.[19] Reasonably incidental uses in conjunction with mineral processing may be acceptable, as provided in 43 CFR subparts 3715 and 3809. You must plot all buildings, settling ponds, waste piles, and other structures associated with the operation on the map, and tie them to the mill site or mineral survey corners. The claimant may hold more than one custom mill site in a contiguous block if needed for the proper operation of the custom mill.

I. Tunnel Sites.

1. Tunnel Sites, Generally.

The Mining Law of 1872 authorizes subsurface exploration by tunneling.[20] It grants to the owner of the tunnel site the possession of all blind or previously undiscovered veins or lodes that are intersected by the tunnel.[21] The commencement of a tunnel is a prerequisite to the location of a tunnel site claim.[22] Tunnel sites are subsurface rights-of-way and, therefore, cannot be patented, but may be held indefinitely if the work on the tunnel is being diligently prosecuted.[23] Failure to perform work on the tunnel for over 6 months results in an abandonment of the owner's rights to any undiscovered veins or lodes in the tunnel.[24] Tunnel sites are rarely encountered in modern practice.

2. Rights Associated With a Tunnel Site.

Tunnel sites are located and recorded in the same manner as mining claims.[25] The maximum length of a tunnel site is 3000 feet from its point of origin.[26] A claimant may acquire the right to any blind veins, ledges, or lodes cut, discovered or intersected by the tunnel, if they are located within a 1500-foot radius from the center line of the tunnel.[27] While the tunnel site gives a claimant the right of possession or right to appropriate blind veins, ledges or lodes, the claimant must locate a lode claim on the surface of the trace of the lode or vein discovered in the tunnel to acquire a right to those blind veins, ledges, or

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17 30 U.S.C. § 42(b).
18 43 C.F.R. § 3832.34(b) (2006) for what qualifies as proper use and occupancy of an independent mill site.
19 Id.
20 30 U.S.C. § 27.
21 43 C.F.R. § 3832.41 (2006).
22 United States v. Parker, 82 IBLA 344, 381 (1984).
23 43 C.F.R. §§ 3832.40, 3832.44 (2006).
24 Enter. Mining Co. v. Rico-Aspen Consol. Mining Co., 167 U.S. 108 (1897); 43 C.F.R. § 3832.44(c) (2006).
25 43 C.F.R. § 3832.42 (2006).
26 43 C.F.R. § 3832.42 (2006).
27 43 C.F.R. § 3832.44(a) (2006).

lodes.[28] In United States v. Parker,[29] the Board held that if a tunnel is located before a withdrawal, and a discovery is made in the tunnel after the withdrawal, the discovery relates back to the location date of the tunnel site. Therefore, a lode claim located many years after the effective date of a withdrawal would predate the withdrawal because the claim would be based on a right of appropriation that relates back to the tunnel site location date, assuming that work on the tunnel site was diligently prosecuted.

J. Mineral Patent Applications.

1. Development and Expenditure Requirements.

When you are evaluating a mining claim or mill site for a patent application, in addition to verifying the necessary elements of validity, the mineral examiner must also verify that a reasonable estimate of the value of improvements for each mining claim totals at least $500. If a mining claim is located over an earlier or abandoned mining claim, and a patent application is made for the new location, any improvements or labor made for the prior location **cannot be applied** toward the $500 expenditure for patent. If there is more than one mining claim included in the patent application, the total development expenditure must be equal to at least $500 times the number of claims in the application. The required expenditures may be concentrated on a portion of the claim group in the application. In modern situations, the total expenditures are usually far in excess of $500 per claim. The improvements made must clearly benefit the development of the claim group as a whole. Mill sites are not subject to the $500 expenditure requirement.

2. Survey Requirements.

You must ensure that the Mineral Survey Plat agrees with the actual location of the mining claims, mill sites, and their improvements. If the placer mining claim or mill site is located by legal subdivision, verify the location of the claims. If irregularities exist between the mineral survey or the legal subdivisions claimed and the situation on the ground, you are to notify the appropriate State Office Cadastral Survey and adjudication personnel. The Cadastral Survey staff will take your information and work with the deputy mineral surveyor that performed the original mineral survey to resolve the matter.

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28 Enter. Mining Co. v. Rico-Aspen Consol. Mining Co., 167 U.S. 108 (1897).
29 82 IBLA 344, 379 (1984).

Chapter IV —Sampling and Assay Procedures

A. General Sampling Procedures.

1. A Mineral Examiner Works for the United States.

The purpose of sampling in a validity examination is to allow the United States to verify the presence of a discovery of a valuable mineral deposit on a mining claim. You are required to work in an objective manner. Remember that you work for the United States. You do not have any fiduciary obligation to the claimant.

2. Confirmation and Corroboration of Discovery.

a. Confirmation. Your objective is to verify whether the claimant has made a discovery based on existing mineral exposures. A physical exposure of the locatable mineral(s) is required from within the boundaries of each mining claim. The exposure(s) may take various forms, including a mineral outcrop, trenches, shafts, adits, or drill holes. In older workings, the exposures may be partially hidden by weathering or vegetation. If a property has considerable sample data available, devise a sampling program to verify the claimant's sampling and analytical results.

b. Lack of exposures. There may be little or no evidence of any prior sampling on the claims. You must remember that it is not the government's responsibility to make a discovery for the claimant, only to verify what the claimant has done on the mining claim(s). As a general rule, you should not sample a mining claim where there is neither physical exposure nor evidence of historic mining or exploration activity. You must document the fact that the claim(s) are undisturbed and therefore you have nothing to verify.

c. Claimant obligations. Except for mineral patent applications, the claimant is under no obligation to provide geologic or economic information to the examiner.

3. Limitations on Mapping and Sampling a Deposit.

a. Exploration verses development. You are to verify the existence of a valuable mineral deposit and not to explore the mining claim(s) for the mining claimant. The dividing line between mapping and sampling adequately to understand the mineral deposit that is being prepared and engaging in an inadvertent exploration program for the mining claimant, is not always obvious. This issue was examined by the Interior Board of Land Appeals, where the Board discussed the issue at length:[1/]

> The mining industry, itself, has no difficulty in distinguishing between prospecting, exploration, and development. Thus, Peele defines prospecting as "the search for minerals," exploration as "the work of exploring a mineral deposit when found * * * undertaken to gain knowledge of the size, shape, position, characteristics, and value of the deposit" and "development" as "the driving of openings to and in a proved deposit, for mining and handling the product

1 United States v. Willie White, 118 IBLA 266, 319-320, 98 Interior Dec. 129, 157 (1991).

economically." Peele, *Mining Engineers' Handbook* 10-03 (3d ed. 1941).

Based on the criteria given in White, supra, if the mineral deposit is not "proved," it must still be in the exploration stage and a discovery of a valuable mineral deposit has not been made. For a mineral deposit to be "proved" or "proven," it must meet the criteria given for a positive and/or probable mineral reserve. These terms are defined and explained in depth in chapter V of this handbook. If there are workings, it may be necessary for you to sample beyond the areas of existing workings to establish a defensible conclusion. You must exercise your professional judgment.

4. Chain of Custody.

a. Custody and control.

(1) It is your responsibility to maintain custody and control of the samples, also known as maintaining the "chain of custody." You have the responsibility to protect the samples and must take all appropriate steps to guard against contamination or salting from the time of sampling until the end of all administrative and legal proceedings. This includes the sampling process itself. You must take adequate precautions to detect any contamination or salting of your samples. IT IS EXPRESSLY FORBIDDEN FOR ANYONE OTHER THAN YOU OR A CO-EXAMINER, TO COLLECT OR OTHERWISE HANDLE THE SAMPLES.

(2) UNDER NO CIRCUMSTANCES will you allow the claimant, the claimant's family, employees, representatives, or other associates near enough to the sampling and processing areas to potentially salt or otherwise tamper with the samples.

(3) Plan for the handling, splitting (when technically appropriate), and secure storage of the samples in advance. Properly store splits, pulps, and rejects to assure availability of uncontaminated sample material for re-analysis. This is especially important if the assay results are questioned later, or if the case is involved in litigation.

b. Shipping samples. Maintaining the chain of custody of samples simply means that you are keeping track of who has possession of the samples at each stage of the process, from collection to delivery to the assayer. It is not necessary for you to hand-carry samples to the assayer to maintain the chain of custody. Using the U.S. Postal Service or an express delivery service is acceptable. If you use the U.S. Postal Service, send the samples via certified mail, with return receipt requested. If you use an express service (such as Federal Express), record the tracking number for each package. Be certain to get confirmation from the express service that each package was received at the destination to which you sent it. Place the receipt confirmation in the case file.

5. Joint Sampling With Claimant Prohibited.

When you collect samples during the field examination, you are collecting them on behalf of the United States. You must not allow the claimant to handle or touch the official samples at any time. Joint sampling is not permitted even if the claimant requests it to somehow "reconcile" widely disparate assay results. The claimant is welcome to collect a duplicate sample after you have collected an official sample. If the claimant disputes the results of the official samples, the claimant's remedy is to present his or her own evidence at a contest hearing based on the duplicate samples.

6. Mineral Examiner May Give Sample Split to Claimant.

You have the discretion to give the claimant a split of an official sample, unless it is a detrital (placer) mineral sample. Because you cannot assure the integrity of the split after it has been given to the claimant, the claimant's split cannot be considered an official sample for determining validity. If you provide the claimant with a sample split, it must be fully documented in the mineral report. The documentation must include the reasons for providing the split, a listing of the sample splits provided, and a disclaimer of further official status for the split.

7. Interim Discussion of Results.

In general, you should not share interim analysis or assay results with the claimant, because the mineral report is not a final document until technical review is completed and, in the case of a mineral patent application, until the Solicitor's Office completes its legal review. Discussion of the work in progress with the claimant may be appropriate at times, such as when evaluating a unique mineral deposit, or where a preliminary analysis of data indicates that it may be to the claimant's benefit to withdraw all or part of a patent application or to relinquish a mining claim.

8. When Fraud or Salting are Suspected.

If you suspect that the claimant has salted the claim or any samples, or engaged in any other type of fraudulent behavior, consult with the Solicitor and BLM Law Enforcement personnel before taking any actions regarding the suspected fraud.

B. Sampling of Lodes or Other Rock in Place.

1. Determination of Sampling Method.

You must determine the method by which you will take samples using methods and techniques that are currently recognized as standard practice in the minerals industry and appropriate to the deposit you are examining. For a porphyry copper/molybdenum deposit, empirical data shows that a maximum distance of 400 feet between drill holes is the limit for reliable grade control. In the same manner, a vein gold deposit should be sampled at 50 foot intervals. Other deposits have similar recognized confidence limits on the sample collection intervals.

2. Sampling Heterogeneous Material.

Where the material to be sampled shows a distinct variation in composition such as banding, bedding, or changes in hardness, each major variation should be sampled separately. Doing so reduces the chance of under collection of very hard portions of the structure, and over collection of relatively soft portions. Large, representative samples are to be taken whenever possible. This reduces sampling error if mineralization is not uniformly distributed in the host rock.

3. Sample Site Preparation.

Regardless of the type of sample you take, you must carefully prepare the area to be sampled to minimize the effects of dilution, oxidation, concentration, or any potential salting. You should expose a fresh surface when sampling material that has been weathered. You must clean the sample site to remove all salts, oxides, or any contaminants. Whenever possible, use a plastic tarp under the area to be sampled to ensure that you collect all of the sample material. Use the sampling tarp only once, to prevent cross-contamination of samples.

4. Sample Location and Spacing.

Determine the sample location and spacing by considering the topography and condition of the land and the nature of the material to be sampled. Controlling factors include vein dimensions, number of veins, hanging wall, footwall, variations in composition, outcrop, exposure, workings, claim boundaries, and the number of mineral exposures identified by you and the claimant.

5. Documenting Samples.

a. Information to be recorded. You must thoroughly document all samples using a proper reference number. In every instance, you must complete a sample card. BLM Form 3890-3 is a sample collection form, printed on cardstock. A locally produced form or commercial equivalent is also acceptable. Most sample collection cards, including BLM Form 3890-3, have room for notes and sketches. The sample collection card is not intended to replace the field notes. Sample locations, including any irregularities or contingencies, should be fully explained in the field notes, with the proper reference number for the sample. Describe the geologic feature sampled, the location and dimensions of the area sampled, and record in the notes any other information that will help in the evaluation.

b. Photograph the sample point. Photograph the sample point before and after you take the sample. Photograph a card on the sample point with the following information on the card, in large, thick, dark lettering:

(1) A unique sample number that can be used to identify the specific location.

(2) The date of sampling.

(3) A notation regarding whether you are taking the photograph before or after taking the sample.

c. Sketch the sample site. If the case results in a contest hearing or litigation, a sketch along with a photograph of the sample point, before and after sampling, can be a strong influence when establishing your credibility and expertise. If the assay results are unusual or erratic, the sample site sketch may assist in the interpretation of the results. If re-sampling is necessary, the sketch will assist in the location of a confirmation sample.

6. Deviations from Standard Sample Methods.

Local conditions may require sampling procedures that deviate from the industry norm. If you choose to deviate from the industry norm, you must fully document the methods you chose in the mineral report. You must include in the mineral report an explanation of why the standard methods were not suitable, a detailed description of the methods actually used, and an explanation of why the alternative methods were chosen. Consult McKinstry (1948), Parks (1957), or Peters (1987), for the appropriate sampling methods.

7. Preventing Sample Bias.

a. The nugget effect. The nugget effect can have a severe impact on any kind of sampling. Section 7 of this Chapter deals with the nugget effect as it pertains to placer samples. The nugget effect may also affect sampling of lode claims. Before taking any samples, you should become familiar with the problems caused by the nugget effect and the techniques for minimizing this effect.

b. Collect equal amounts across geologic structures. Channel or chip samples must often cross geologic structures of varying hardness. You must collect equal amounts by weight of each portion to prevent over-representing one part of a vein over another. It is preferable to take several short chip or channel sample segments, end to end, instead of collecting one long one. Shorter sample lengths will often reveal variations in mineral grade within a structure which must be taken into account when calculating resource tonnage and grades.

C. Types of Lode Samples.

1. Channel Samples.

Channel sampling requires the cutting of a uniform channel two or more inches wide and one or more inches deep across the feature to be sampled, amounting to at least two pounds per foot of the feature being sampled. Channel samples are preferred if conditions permit, especially where mineral distribution is erratic. Where possible, catch the sample on a tarp or ground cloth.

2. Chip Samples.

a. Methodology. Grid chip sampling is appropriate for broad geologic features where mineralization is homogenous. As the name indicates, grid chip sampling involves collecting a series of chips at regular intervals in a broad area across a feature. Sampling should be done in a regular pattern and spread over the entire feature.

b. Application of chip sampling. Chip sampling is normally used in particularly hard material, or where the mineralized area is homogenous and uniform over a wide feature. Be certain to obtain a representative sample, especially in hard material and/or where mineralization is not uniform. Properly done, the results of chip sampling should closely approximate the results of a channel sample. Progressive chipping across the feature should amount to at least one pound per foot of the feature being sampled. Care must be taken that no material is lost. A tarp or ground cloth can be used to catch the chips.

3. Grab Samples.

Grab sampling may yield interesting anecdotal information, but grab sampling is not systematic or statistically valid. Grab samples are occasionally useful at a reconnaissance level to aid in developing an appropriate sampling program. Grade and tonnage figures cannot be calculated from grab samples, and they carry little or no probative value.[2/]

4. Drill Core and Cuttings.

Choose sample intervals that represent the character of the deposit. It is advisable to sample both mineralized and non-mineralized intervals to obtain a good evaluation of the claimant's assay information. This will also allow you to determine if the claimant's assay laboratory is providing accurate data on the distribution of the mineral of interest.

a. Government does not normally conduct drilling. The government does not typically conduct its own drilling to confirm validity. You may use data from a claimant's drilling program. This data may be used in validity determinations only after you have verified the data. The verification process is described in detail in Chapter IV, Section 3A.

b. Retention and storage of cuttings and core by claimants. Core and cuttings are usually retained and stored by mining companies. Core is typically stored in boxes with each drill interval identified, whereas cuttings from rotary and reverse circulation drills are normally bagged and stored in 5-foot intervals.

c. Examination of cuttings and core. When planning to examine core or cuttings, you must not give the claimant any advance notice regarding the specific intervals you will evaluate. This is intended to prevent sample tampering, or the appearance of tampering. Make certain that you have the driller's log and geologist's sample log available

2 United States v. Parker, 82 IBLA 344 (1984).

to examine concurrently with the core or cuttings, noting gaps or discrepancies between the logs and the core or cuttings. Examine assay and geophysical logs of the hole and note any correlations or discrepancies. Do not use core or cuttings that do not match the log or that appear to have been rearranged from their proper order. If an unresolved problem exists with respect to the core or cuttings, you may ask the claimant to drill a confirmation hole in your presence.

d. Collecting samples from drill cuttings. Obtaining a sufficient sample from stored cuttings can usually be accomplished by the use of a riffle splitter.

e. Collecting samples from core.

(1) New or stored drill core should be cut in half lengthwise. This may entail cutting a core that has already been split one or more times. Use a core splitter, if one is available. Clean the splitter before each sample is split. If no core splitter is available, obtain a length of channel or angle iron, place the core into it, and split the core with a hammer and a sharp chisel. If the core is sheared or foliated, try to split the core along the major axis of deformation. Assay lengths will be governed by the mineral distribution, geology, and structure in the core.

(2) Drill core may occasionally resemble angular gravel rather than a rock cylinder. This situation is common in oxide or supergene zone metallic mineralization or where the rock in that interval is heavily fractured. It is particularly vexing when the only core available is of small diameter. You should be aware that the nugget effect can easily occur in these situations. When it is impossible to obtain an exact split, you should select a different core interval to verify, if possible, or use other available means to obtain a representative sample. In every case, photograph the core, and thoroughly describe the situation in your notes and in your report.

(3) As a general rule, individual assay lengths should be one to five feet. If the mineralized portion of the drill hole is greater than five feet, assay each five foot unit separately and then mathematically combine the assay units together (See Chapter V, section 4). For porphyry copper and molybdenum deposits, where the mineralized zones may exceed 1,000 feet in width and depth, a 20 to 50 foot assay length is commonly used.

D. Sampling Low Grade Disseminated Deposits.

1. Sampling Methodology Where Abundant Claimant Data Exists.

a. General considerations. If a property has considerable sample data available, devise a sampling program to verify the claimant's sampling and analytical results. You should ask the claimant about their sampling procedures and any variability they have experienced. You must not take samples that cannot be compared with the claimant's data for correlation. If possible, restrict your sampling to existing cores, rotary cuttings, split rejects, pulps, concentrates, slurries, or shot hole cuttings in the ore and other production zones. Review the claimant's drill logs, analytical reports, and sampling intervals before field sampling.

b. Selecting confirmation samples. If the claimant has a large sample retention program, the possibility of being salted is remote, barring a well-organized fraud.[3] You must still use normal precautions. Make arrangements with the claimant to have all stored samples available on the date of the visit to the storage facility. Give the claimant a list of the samples and intervals you plan to examine when you need them at the storage facility, but not before. At the storage site, the claimant may retrieve for you the appropriate closed core boxes or bags of cuttings, but the claimant must not directly handle the material to be sampled. You must take control of the stored samples, and retain custody of them until after you have collected the sample split. Mining claimants, who are familiar with due diligence property evaluations, will be accustomed to this process and will understand why you are doing so.

c. Selecting sample intervals. When you review the claimant's drill and analytical logs, look for sizeable intervals where the lithology and grades appear to be reasonably consistent. For example, a minimum of three intervals together with 10% or less variance would meet this requirement. Sample the middle interval. If you cannot find this situation, then look for two intervals together, avoiding high grade zones if possible. Try to pick intervals with grades similar to the average grade of the deposit, as these will normally give the least variance. It is advisable to sample several sections that the records indicate have low assay values to see if the claimant's assay laboratory is able to consistently report the lower values as well as the higher values from the mineralized intervals.

d. Number of confirmation samples required. The number of samples you should take depends on the number of claims you are examining. At least one sample per claim is required. However, in an evaluation of a small claim group associated with a large deposit, more samples are needed to reduce variability.

Standard statistical textbooks indicate that a minimum of 20 samples from a given sample population (the mineral deposit) are required to show a reliable trend.[4] Typically, 20% of the individual samples will have more than the traditionally acceptable 10-15% variance. Thus in a 20-sample program, there should be 17 closely conforming samples, which would reduce the overall variance to an acceptable limit. The more samples taken, the lower the overall variance will be.[5]

2. Compromised Claimant Data.

If you suspect sample tampering or believe that collecting samples from the claimant's existing cores, cuttings, rejects and pulps may not produce an accurate result, you will have to conduct an appropriate sampling program, which may involve drilling confirmation holes.

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3 Danielson and Whyte (1998).

4 Levinson (1974), Introduction to Exploration Geochemistry; Rose, Hawkes, & Webb (1979), Geochemistry in Mineral Exploration (2nd ed.).

5 Levinson (1974); Davis (1986), Statistics and Data Analysis in Geology; Beus and Grigorian (1975), Geochemical Exploration Methods for Mineral Deposits.

E. Sampling Methodology Where Samples or Records Are Unavailable.

1. Assessing the Need for More Sampling.

In some cases, the claimant may have extensive sampling records but no remaining samples. In such cases, you should review the claimant's sampling data and then try to confirm that data by conducting a sampling program that will allow for a reasonable comparison. Confirmation drilling may be required. In other instances, samples may be available (core splits, drill cuttings, etc.) but documentation of the analysis may be lacking. Sampling remnant material would be appropriate. Where the claimant's data is spotty, more samples will be required than in situations where the examiner is only attempting to confirm specific intervals. In all cases where more sampling is necessary, develop a sampling plan based on your knowledge of the property.

2. Sampling Where Claimant's Data Is Nonexistent.

Keep in mind that a validity examination is intended to verify whether the claimant has discovered a valuable mineral deposit. It is not to explore for a deposit, nor to define and delineate a deposit. The government's verification sampling should be commensurate with the level of diligence shown by the claimant. The suggestions below may be helpful in designing a sampling program to supplement where data or remnant sampling material is unavailable, but it is apparent that the claimant has explored the claim.

a. Collection of representative chip samples. Collect representative chips in a grid pattern from a section of rock approximately 5 feet square (25 square feet) with a resulting sample weight of five to ten pounds.

b. Scope of sampling. Sample a variety of different rock, alteration types, silicified zones, and shear zones. Be aware that most precious metals mineralization, especially gold, is seldom visible and often occurs in nondescript rocks.

c. Pathfinder elements. In addition to analyzing for the metals of interest, test for the common pathfinder elements. As an example, for gold and silver deposits, analyze for As, Sb, and Hg. If the pathfinder elements come up high but no metals of interest are detected, you should consider re-sampling to be certain that precious metals were not missed in the first analysis.

d. No sampling for exploration purposes. You must recognize that more time and effort may be required in a situation where little data exists. The public interest is not served by performing what appears to be an exploration program for the claimant. When a sampling program begins to resemble an exploration program, it is time to complete the analysis and make an evaluation based on the data at hand. Review the difference between exploration and development given above in section A(3)(a) of this chapter.

F. Sampling of Severed Materials.

1. Definitions.

a. Tailings. Tailings are discharged from a mill, and are generally finely ground material, usually in sizes ranging from medium sand to powder. They may contain concentrations of valuable metals due to poor recoveries of earlier processing methods or changes in market conditions.

b. Dumps. Dumps are broken rock excavated from the mine in the course of exploration, development, and production. The material on a dump is heterogeneous and may range in size from fine sand to boulders. A dump is normally considered to be a deposit of rock that had no economic value at the time of its emplacement, even if it contained some mineralization.[6/]

c. Heaps. Heaps are piles or stacks of severed material that have been processed by leaching. Heaps contain materials that range in size from cobbles to coarse sand. Heaps may resemble dumps in size and arrangement.

2. Ownership of Severed Materials.

You must keep in mind that the ownership and the definition of various severed materials can be a complex legal issue. In some cases, claimants may make doubtful assertions about what constitutes tailings or other severed materials, in order to obtain saleable mineral materials without paying for them.

a. Possessory title to tailings. Tailings are derived from the processing of locatable ores and are usually considered the personal property of the claimant, unless they were abandoned by the owner under State law or unless they no longer contain any locatable mineral values.[7/] A tailing must be held and maintained as personal property under the law of the State in which they are located. Abandoned tailings revert to the land and become the property of the land owner.

b. When severed materials are considered mineral materials.

(1) Sand and gravel that are processed to remove detrital minerals are not considered tailings. Detrital minerals include, but are not limited to, gold, diamonds, tin, sapphires, and garnet. Unless the mining claim pre-dates the Surface Resources Act and the sand and gravel are deemed a valuable mineral deposit, the title to the sand and gravel remains in the United States and is subject to sale under the Material Sales Act of 1947.[8/]

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6 Steinfeld v. Omega Copper Co., 141 P.. 847, 848 (Ariz. 1914).

7 United States v. Grosso, 53 Interior Dec. 115, 125 (1930) (quoting Steinfield v. Omega Copper Co., 141 P. 847, 848 (Ariz. 1914) ("The intention with which the owner of the property extracted the ore from the ground and the purpose and intention of the owner with which it was placed on the dump is controlling in arriving at the solution of the question of whether the ore after having been extracted and placed in the dump was personalty or realty.")); 2 Lindley on Mines § 426, at 1009 (1914).

8 Solicitor's Opinion, "Disposal of Sand and Gravel from Unpatented Mining Claims," M-36467 (Aug. 28,

(2) If the material is normally locatable but is of insufficient quality or quantity to constitute a valuable mineral deposit, it becomes a saleable mineral, as this is the only way it may be disposed of in this circumstance.[9/]

(3) The tailings have been permitted to co-mingle with waste rock so that it is no longer feasible to later process the tailings to recover any contained locatable mineral values,[10/] or the tailings are allowed to escape the impoundment and become deposited on the land as a sedimentary deposit.[11/]

(4) Buildings and structures are placed upon the tailings for non-mining purposes.[12/]

(5) The tailings are used or sold for a common variety use.[13/]

3. General Considerations.

Some mineral commodities that are valuable now may not have been at the time of mining, so they may have been discarded in the dump. The situation with tailings is similar. Early precious metals milling operations often had lower recoveries than mills using current technology, so residual valuable minerals may be found in some areas of the tailings repository. Stamp mills were fairly common until about 1915, so mercury containing amalgamated gold may be associated with their tailings. In later years, flotation methods may have been used to recover or suppress certain metals, depending on the market prices at the time. Residual valuable minerals in old heaps will vary according to commodity price and efficiency of the leaching process at the time each particular lift was emplaced.

4. Homogeneity of Material.

It is important to understand that piles of severed materials are rarely homogeneous. The spatial arrangement and stratigraphy of a dump will depend on what portion of the mine and its lithology was being mined at the time the material was dumped.

5. Severed Material Sample Results Do Not Validate Lode Claims.

Dumps, tailings, and heaps cannot be used to validate a lode mining claim. The content of dumps may provide interesting information about what is in the dump, and what materials may have been placed on the dump years before. However, samples collected on dumps, tailings, or heaps will provide no probative information about whether a valuable mineral deposit exists on the lode claim upon which the dumps, tailings, or heaps are found.

1957), as modified by M-36998 "Disposal of Mineral Materials from Unpatented Mining Claims" (June 9, 1999).

9 United States v. Robinson, 21 IBLA 363, 384 (1975).

10 Hayes v. Alaska Juneau Forest Indus., Inc., 748 P.2d 332 (Alaska 1988).

11 Jones v. Jackson; 9 Cal. 237 (Cal. 1858); II Lindley on Mines, § 426 (3rd ed. 1914); United States v. Grosso, 53 Interior Dec. 115, 126 (1930); Conway v. Fabian, 89 P. 1022, 1037 (Mont. 1939).

12 Id.

13 United States v. Robinson, 21 IBLA 3663, 82 Interior Dec. 414 (1975).

6. Placer Location of Severed Material That Is Mineralized.

Once a mining claim has been abandoned under State law, the mineralized dumps, tailings, and heaps that lay upon it may themselves be considered a mineral deposit, and may subsequently be appropriated by the location of a placer mining claim. The question of abandonment of title to the tailings (not of the mining claim), is a question of State law.

7. Sampling Procedures.

Some preliminary work should be performed before sampling deposits of severed materials.

a. Hazardous materials. Before sampling, consult with the appropriate hazardous materials personnel about potential site-specific safety issues.

b. Site maps. Prepare a map of the site so that you can determine the volume of severed materials.

c. Sample grids. Lay out an appropriate sampling grid on the deposit of severed materials. Transfer the grid to your base map at a scale that allows you to contour the mineral values later.

d. Density and tonnage. To determine the tonnage of the severed materials, take multiple measurements of density to compensate for variability within the deposit of severed materials.

e. Severed minerals – variations and complexities. Sampling methodology is dependent upon the variability and complexity of the severed materials deposit. Ensure that sampling is representative of the entire deposit. Taggart (1927) describes several suitable sampling methods.

(1) Tailings can usually be drilled with augers or reverse circulation equipment. Pits or trenches can be excavated in the tailings. Take appropriate safety precautions to prevent cave-ins, which may require shoring with small coffer dams.

(2) Dumps and heaps are difficult to accurately sample since the size of the material varies considerably. Where the dump is stratified, collect an individual sample from each layer at each sample location.

G. Sampling of Alluvial Placer Deposits.

Sampling precious metal placers is one of the most difficult, time consuming, and costly tasks that you will face. Considerations include the type of deposit; depth to bedrock; false bedrock; variation of silt, sand, and cobble size within the deposit; and quantity and physical characteristics of gold and other placer minerals. You must often rely on the mining history of the area and on experience rather than a rigidly defined formula for collection and interpretation of the sample data.

1. Gold Morphology.

a. Size and weight considerations. Gold can occur in particles from smaller than 100 mesh to large nuggets. Nuggets that are larger than 10 mesh often sell for a premium price above the market gold price, as specimens or for jewelry. However, most gold is valued by weight and not by size. It is customary to report gold weights in either milligrams per cubic yard or grams per cubic meter, and not as Troy ounces per cubic yard.

b. Gold content in a sample. The fraction of gold in a nugget or sample is measured by the "fineness." Fineness is the measure of the gold's purity given in parts per thousand. Gold that assays at 900 fine is 90 percent gold and 10% something else, usually silver and copper. The purest refined gold is usually known as 999.9 gold or four nines and exhibits the specific gravity of gold, 19.0 grams per cubic centimeter. For gold that is not sold as jewelry, you must adjust the amount of payable gold in a deposit for the fineness. This is normally done at the recovery stage in your calculations. Specific gravity will also vary by the fineness of the particle.

2. Relationship of Particle Size and Weight.

a. Sieve analysis. Sieving of recovered gold particles is an important method for separating gold sizes. Gold particle size analysis will assist you in designing a gold recovery system. A typical sieve analysis will use a stack of screens in units of ten mesh beginning with 100 mesh and increasing vertically upwards to 10 mesh, plus an 8mm screen on top. Sieve analysis best measures a particle's ability to pass through a specified size of sieve.

b. Size verses weight. There is no exact relationship between gold weight and sieve size, because of the varying shapes of gold particles of a given mesh, as well as each particle's flatness. A spherical gold particle of 1 mm in diameter will weigh much more than a gold particle of 1 mm diameter that has been flattened to the thickness of gold foil. Yet both gold particles will classify in the same sieve size range. Gold recovered in a placer evaluation must be weighed to provide economic information. See Appendix VII for further details.

3. Quantitative Samples Required.

You will need several quantitative samples to adequately verify a discovery and the mineral character of a placer mining claim. Remember that each ten-acre parcel of a placer mining claim must be mineral in character.[14/] If a discovery has been exposed on a placer mining claim, you may use geologic inference to assess the mineral character of the remaining 10-acre parcels. Placer mining claims may range in size from 20 acres for a claim located by an individual to 160 acres for an association placer claim located by eight or more persons.

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14 United States v. Lara (On Recons.), 80 IBLA 215 (1984), aff'd , Lara v. Secretary of the Interior, 820 F.2d 1535 (9th Cir. 1987).

4. Large Samples Required.

Placer samples should be large. Samples should consist of at least 3/4 cubic yard per three vertical feet of bank or outcrop to be considered quantitative.

a. Acceptability of smaller samples. Smaller samples may be acceptable under extenuating circumstances. Collecting small samples may produce less reliable data. You must fully document in the mineral report the reasons for collecting small samples. Those circumstances may include:

(1) The placer accumulation itself is about the size of a quantitative sample.

(2) There is no mechanical equipment available for sampling.

(3) Topographic, safety or legal conditions make it impossible to use mechanized equipment.

(4) Samples must be hand-dug and carried out via backpack or by pack train.

b. Reducing environmental impact. In some cases, you may be required to take samples from placers in withdrawn areas, where the use of mechanized earth moving equipment requires pre-approval from the appropriate surface managing agency. Discuss the available options with appropriate resource personnel and managers.

(1) A short duration sampling project using a few people with small earth moving equipment used to collect samples of adequate size may create minimal disturbance at a relatively low cost. Such a sampling program will usually involve only one or two trips to each sample point. The earth moving equipment can be used for immediate reclamation of the sample points.

(2) Hand sampling may require more time and personnel and may, therefore, be more costly. Pack animals may be required. Multiple trips to each sample point may be required to ensure collection of an adequate sample size. If the samples are too small, the final report may be less defensible and subject to remand at a hearing.

5. Nugget Effect.

The nugget effect can have a serious impact on placer sample value results. The impact on sample values is more pronounced with gold in medium to coarse size fractions due to the larger unit value of each particle. The nugget effect will be more pronounced in deposits with only a few gold particles, and worse still where those particles are large. Collecting relatively small samples creates a risk of missing gold particles altogether or catching more gold particles than are representative for the deposit. Collecting larger samples will reduce the potential error introduced by the nugget effect. McCulloch (2003) graphs the effects of one particle of gold on the valuation of a sample, and those figures should be consulted as you design a sampling program.

6. Determining Sample Sizes.

McCulloch (2003) provides two methods for estimating the sample size necessary for validity examinations.

a. Most accurate method. The first and most accurate method uses a graph to compare the nugget effect of gold particle sizes to sample sizes. This method first requires that you collect a large sample from the horizon suspected of containing placer gold particles. Next, perform a particle size analysis and use Tables 4.4, 4.5, 4.6, and 4.7 in McCulloch (2003) to select minimum sample sizes.

b. Alternate method. The second method is useful when there is insufficient information about particle size at the beginning of an examination. Using the second method, you can use field and literature data gathered during the examination process to select sample sizes from Table 4.3 in McCulloch (2003). This system considers critical data and should result in an appropriate sample size. The method is similar to a taxonomy key. It consists of a series of conditions leading to a minimum sample size and is given in Appendix VII B. The method considers the following:

(1) Gold particle size distribution from historic production.

(2) Historic mining methods.

(3) Gold fineness.

(4) Common accessory minerals.

(5) Predominant gold characteristics.

(6) Lode-source-deposit types.

(7) Placer deposit types.

7. Sample Sites.

No matter which collection method you use, be certain to clean the face of a previously exposed sample trench to a depth of at least four inches before cutting the sample to avoid salting. Photograph each sample site before and after sampling, using the same procedure as for lode samples.

8. Recording Weights and Volumes.

Record the sample volume in loose cubic yards. Measure the volume of the sample channel or pit to obtain the bank cubic yards. There are several available methods. One method is to use five-gallon plastic buckets, which can be calibrated for lesser volumes. Other methods involve using a backhoe bucket of a measured size.

a. Measure loose volume before transporting sample. When collecting samples in calibrated five gallon buckets, it is important to measure the loose volume of the sample before moving the samples away from the sample point. Any motion of the bucket will cause the sample to settle, which will alter the loose volume measurement.

b. Recording sample weights is optional.

(1) The sample weight (sand, gravel, etc.) is rarely needed to make volumetric calculations.

(2) Recording the sample weight may be useful in calculating the concentration ratio of processing equipment.

(3) When using a backhoe for sampling, it is impossible to weigh the sample unless it is transferred into buckets. Five gallon buckets are useful because they make it simple for you to calculate the total weight of each sample. In general, when collecting samples in five gallon buckets, it is usually a good idea to record sample weight, in case it is needed later.

9. Suction Dredge Sampling.

a. Timed analysis. If you use a suction dredge, you should operate it for a timed period of an hour or more to obtain a proper sample and to be able to calculate the economics of the operation on an hourly basis.

b. Collection of sample. If you can do it safely, place a metal tub of known size at the end of the suction dredge's sluice to roughly measure the volume of sample throughput. Measure the entire sample run or the amount that is run during a timed period. The tub will not capture fine materials that are washed away, but will produce a rough approximation.

c. Manufacturer's throughput rating is not reliable. The suction dredge manufacturer's rated throughput, or hourly capacity, is not a reliable indicator of actual production. The rated throughput is based on a controlled test that involves dredging roofing granule sized particles out of a swimming pool.[15/]

10. Concentrate Entire Sample Collected.

Placer deposits and placer samples are not homogeneous. You must recover and concentrate the entire sample, even if it is inconvenient to do so. If part of a sample is discarded, it is impossible to know if the part discarded is barren, rich, or merely representative.

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15 Thornton (1979).

11. Concentrating Samples.

You need to reduce the large volume of a placer sample to a manageable size. You can reduce a typical one-cubic-yard placer sample to a concentrate that weighs less than three pounds by mechanical gravity separation in washers, sluices, or jigs. Hand panning to a concentrate, commonly known as a black sand concentrate, is required as a final step.

a. Retaining precious metal values. Take special care in the concentration procedure to ensure you retain all gold values, recognizing that fine particles such as flour gold can be extremely difficult to capture. Whether or not the fine gold portion is commercially viable to recover, the sampling should seek to capture all of the contained gold. The equipment used in the concentration circuit must be capable of reliably recovering placer gold in fine fractions. Experience has shown that a Denver Goldsaver™ coupled with a tail sluice feeding a Knudsen bowl is especially well suited. However, you may also use other combinations of conventional equipment. Whatever equipment you use, you should be trained in its use.

b. Use of claimant's equipment. At your discretion, you may use a claimant's equipment for sampling and concentration. If you do, you must make sure that there is no opportunity for salting, and that the equipment is safe and appropriate for the situation. You must thoroughly clean the equipment before your sampling to avoid sample contamination. You are under no obligation to use the claimant's equipment.

12. Sampling Information and Notes.

a. Sampling information. Sampling of alluvial placer deposits is discussed in Wells (1989), Macdonald (1983), and McCulloch (2003). Consult these publications before sampling any placer deposit.

b. Field checklists. In addition to the field checklist in Chapter III- D, you should also use a placer checklist, such as is found in Appendix VII-C and in McCulloch (2003). Some items in the checklist are not applicable in every case. However, use of the checklist will ensure that you record the necessary data.

13. Reporting Placer Resources.

Placer mineral resources (volume and grade) are reported in bank cubic yards. However, calculate unit operations for handling placer ores in loose cubic yards. When planning mining and processing operations and sizing mining equipment, you must estimate the volume of loose cubic yards to be moved. Each major horizon must be estimated on an individual basis so that proper mine planning may occur.

a. Determination of swell. Determination of swell is an important part of a placer examination and applies to most mining operations. Swell and swell factor are related, but not the same. Swell is calculated as a percent, which represents the increase of volume from bank to loose measure. The swell factor is the reciprocal of the percent swell. There are swell calculations in Handbook 3890-2.

b. Book swell factors are insufficient. Selecting a swell factor out of a book or table is seldom sufficient. Percentage of swell can be estimated in several ways.

c. Estimation of percent swell. A reliable way to calculate a swell factor is as follows:

- Excavate a hole in the ground of known volume, to determine the bank volume.

- Calculate the volume of the hole (which will normally be a cone) by using the pyramid formula: $v = \frac{\prod r^2 h}{3}$ (h = depth of hole; r = radius at top of hole)

- If the hole is not a cone, consult the Appendices to find a suitable formula to calculate the hole volume.

- Gently place that material into buckets of known volume.

- Measure the volume of the fill in the buckets to determine loose volume.

- Percent swell = $\frac{\text{(loose volume - bank volume)}}{\text{bank volume}} \times 100$

Example: The measured bank volume is 8 yd^3 and the amount of loose yd^3 is 10.

Percent swell = $\frac{10-8}{8} \times 100 = \frac{2}{8} \times 100 = 0.25 \times 100 = 25\%$ swell

d. Alternate method for estimating percent swell. An alternate method involves using a bucket of known volume. This method may be more useful when excavating holes that will not stand well. You should strive to maintain the integrity of the hole because any slough will affect the results. A conical shaped hole will tend to reduce slough.

- Start with a bucket of known volume.

- Pick a relatively flat portion of the surface.

- Dig a hole and fill the bucket. Do not move or handle the bucket any more than necessary to prevent settling.

- Immediately pour material from the bucket back into the hole until the hole is full to the level of the original surface.
- Measure the material remaining in the bucket.

- The ratio of the remaining material to the initial empty volume of the bucket, expressed as a percentage, is the percent swell.

- Bank volume = empty bucket volume - material remaining in the bucket.

- Percent swell = $\frac{\text{(empty bucket volume - bank volume)}}{\text{empty bucket volume}}$ x 100.

Example: Bucket (14 inches deep) volume = 5 gallons (0.6685 ft^3). Bucket is completely filled to top.

Hole is refilled and 4 inches (0.1910 ft^3) remain in bucket.

Bank volume is therefore = 0.6685 ft^3 – 0.1910 ft^3 = 0.4775 ft^3.

Percent swell = $\frac{0.6685 - 0.4775}{0.6685}$ x 100 = 0.28 x 100 = 28%

e. Estimating a swell factor. Swell factor, is the reciprocal of swell and is normally expressed as a decimal fraction. Swell factor can be calculated as follows:

1 / (1 + percent swell as a decimal) = swell factor.

Example: Using the information from "c" above:

1/ (1 + 0.25) = 1/ 1.25 = 0.8 swell factor

f. Estimating loose volume. To estimate loose cubic yards from measured bank cubic yards, you may use the following method:

Loose cubic yards = bank cubic yards/swell factor.

Example: (using "c" above) $\frac{8 \text{ bank yd}^3}{0.8 \text{ swell factor}}$ = 10 loose yd^3

Alternatively, you may use this method:

Loose cubic yards = bank cubic yards + (bank cubic yards x percent swell as a decimal)

Example: (using "c" above) 8 bank yd^3 + (8 bank yd^3 x 0.25) = 8 yd^3 + 2 yd^3

= 10 loose yd^3

g. Prevention of sample settling before estimating swell. Whatever method is used, handle the material as little as possible. The measurements MUST be accomplished before transporting the material any distance. Samples cannot be collected at the site for later swell measurement in the laboratory. Any compaction of loose material will affect the estimation.

h. Use bank cubic yards for resource calculations. When calculating placer resources, you will measure sample sizes at the time of collection, and make all calculations in bank cubic yards.

14. Problems in Sampling.

Great care must be used to take representative samples. Several major problem areas may exist:

a. Boulders. If mining requires avoiding, blasting or moving boulders, the boulder factor will have to be considered. In this usage, the term boulder is not the same as used in sediment size analysis. If the largest rocks at the sample point will pass through the processing equipment, there is no boulder factor to calculate. A boulder factor correction can be found in Appendix VII-C, and in Wells (1989).[16/]

(1) Rocks small enough to be collected and pass through the sampling concentration equipment should be processed as a part of the sample. In such cases, there is no boulder factor to consider.

(2) Rocks too large to pass through the sample concentration equipment should be cleaned of adhering material and the adhering material should be processed through the equipment. It is important to determine if the rocks would pass through the actual production equipment. If they will, there is no boulder factor to consider.

(3) Estimate volume percent of boulders in the cut that cannot pass through the sample concentration equipment and add that volume to the appropriate volume calculation. Calculations using the boulder factor of Wells (1989) may be appropriate. It is extremely important in this case to have photographs before and after sampling.

(4) Boulders will often be a factor in suction dredge examinations. They will affect the volume and grade of placer resources and present operational challenges.

15. Other Valuable Detrital Minerals.

Valuable detrital minerals may occur in placer deposits or may be mixed in a placer gold deposit. These minerals must be identified and evaluated. These may include rutile, monazite, garnet, cassiterite, ilmenite, cinnabar, sapphires, rubies, diamonds, and monazite. Methods and equipment for sampling and concentrating these minerals are similar to those for placer gold. These minerals will generally occur in much larger volumes than gold and

16 The boulder factor in earlier editions of Wells is in error.

are of lower unit value, so the results of the nugget effect will be much less pronounced.

16. Prevention of Salting.

The following precautions should prevent salting, either accidentally or on purpose:

- Examine and clean all equipment used in sampling and sample processing before, during, and after use.

- Make sure that samples are kept secure. Due to the large size of placer samples, it is often impractical to store them in a locked cabinet or building before they can be concentrated. If this occurs, seal the five gallon buckets, if used, in a manner that will show if any tampering has taken place. It may be necessary for you to post a guard.

- Clean sample sites before taking samples, in a manner similar to lode sampling.

H. Analytical Methods and Assaying.

1. Assaying Defined.

Assaying can be generally defined as the quantitative determination of the metals in ores and furnace products. In the United States mineral industry, the word "assay" is most often applied to describe the protocol of a physical and chemical process that, using a precise methodology, determines the concentration of the valuable metals in weight percent. When undertaken properly, a chemical analysis is comparable in precision to an assay. There is no rigid differentiation between an assay and a chemical analysis. Tests for many industrial minerals and other metals are often referred to as analyses, or chemical analyses.

The written result from the laboratory is usually called an assay sheet or report of assay. In informal usage, the written result is often called simply an assay. A complete listing of assay and analysis methods, with a description of how they work, is beyond the scope of this Handbook. A good place to start when researching assay methods is Haffty (1977).

2. Managing Assay Costs.

Assaying can be expensive, especially for examinations involving large claim groups or industrial minerals. You should carefully plan sampling and assaying to minimize costs as much as possible. However, a sufficient amount of assaying or analysis is required, and only you can make that determination. Failure to perform an adequate amount of assay or analysis work may result in a weak case that must be redone. The Government could end up using public funds to settle a lawsuit or purchase mining claims that cause a resource conflict. Doing the examination right the first time usually prevents expensive litigation and settlements.

3. Assay Methods.

Assay and analysis methods in current use include Fire Assay (FA), instrumental methods, and amalgamation of free gold using mercury.

a. Fire assays. Fire assaying is an industry-accepted, time-proven method of determining the concentrations of gold and silver in a sample, and may be applied to the platinum group metals. A fire assay is a miniature smelting process.

(1) There are no Earth materials that cannot be analyzed for gold and silver using a properly conducted fire assay.

(2) Gold and silver from lode or vein deposits (but not placers) should normally be fire assayed. Fire assay may also be used for platinum group elements if the laboratory is properly equipped.

(3) A fire assay is often used as a pre-concentration step. The resultant precious metal bead is subjected to further instrumental analysis, usually by Induction Coupled Plasma Arc (ICP) methods.

b. Instrumental methods. Instrumental methods include Atomic Absorption spectrophotometry (AA), Induction Coupled Plasma Arc Optical Emission Spectroscopy (ICP-OES), and Induction Coupled Plasma Arc Mass Spectrometry (ICP-MS). When instrumental methods are properly applied and conducted, their results are reliable.

(1) In all instrumental methods, certain metals, particularly iron and nickel, will interfere with spectral readings.

(2) If not taken into account, these interferences will cause the assayer to report erroneously high precious metal and platinum group values.

4. Tests for Bulk Tonnage, Low Grade, Metallic Deposits.

If assays confirm the presence of potentially economic metallic deposits that could be processed by leaching, the mineral examiner should arrange for leach tests. This test determines what proportion of the contained metal can be recovered using leaching technology. The leach tests are not additional assays, and are not to be used as such. These are typically column percolation or bottle agitation leach tests, where samples are leached, and passed through appropriate recovery systems. Reagent consumption is also measured in order to calculate leaching costs.

5. Other Tests May Be Needed.

Some metallic mineral deposits may require other tests. These may include such tests as: bulk density measurements, grinding studies, flotation recovery testing, and acid generation potential.

6. Analysis of Nonmetallic Materials.

Analysis of gem and semi-precious stones, specimen-grade minerals, and non-metallic or industrial minerals, requires tests and methods specific to each commodity. Industrial minerals are further discussed in Handbook 3890-4. If you have questions about the proper analytical technique required to produce a reliable analysis, consult with the selected lab, recognized experts, or refer to Rose, Hawkes, and Webb (1979), and Levinson (1974).

7. Assay of Placer Concentrates.

Successful recovery methods for placer minerals depend on removing the minerals from the sediment using gravity separation methods. Gravity recovery methods will not recover minerals that may be chemically contained within a rock.

a. Placer gold is not amenable to leaching. Placer gold cannot be economically leached or precipitated. Placer gold particles are too large, and slow the kinematics of the leach process. This results in poor recoveries and high costs.

b. Mercury amalgamation of placer gold concentrates. To determine the amount of placer gold in a concentrated sample (the black sand concentrates), use the free gold mercury amalgamation method. Any other process will give an inaccurate value which will usually be higher than the actual value of gold recoverable by placer mining methods.

(1) The concentrates must not be split.

(2) You must request that the assay laboratory report results in total milligrams recovered from the entire black sand concentrate. That result, added to any gold manually removed from the sample by the mineral examiner, represents the total milligrams of gold in the sample originally collected.

(3) A result reported in Troy ounces per ton reflects only the value in the concentrates. You must then mathematically convert that value to represent the actual value per bank cubic yard. Whenever possible, the assay laboratory should report the gold content in milligrams.

c. Preparing samples for amalgamation. Examine concentrates visually and sieve them before amalgamation to determine the percentage of the gold in specific particle size fractions. Use sieve sizes that range in units of ten mesh from 10 to 100 mesh. Nugget gold and coarse gold (> 10 mesh) may bring a premium price on the market as jewelry gold.

d. Fire Assay of amalgamation tailings. Once you finish the mercury amalgamation, perform a fire assay on each sample's remaining tailings to measure any gold that could be locked in and not recovered by mercury. Do not combine the tailings of several samples into one for fire assay. Gold that is identified in a fire assay of

amalgamation tailings is usually in concentrations too small to be of any economic value. Wells (1989) discusses the issue in depth.

e. Spectrographic analysis of black sands. Do an emission spectrographic analysis on the black sands recovered to check for rare earths, tin, titanium, columbium, tantalum, and the platinum group minerals. If these are found in significant amounts, have the black sands assayed. Some laboratories offer inexpensive analytical packages that will accomplish this.

8. Selecting an Assayer.

The analysis of samples is important and you must exercise considerable care in this regard. Erroneous or unreliable assays can cause the Government to lose its case in an administrative hearing. Selecting an assay laboratory solely on the basis of bid price is not acceptable. You must use an established analytical laboratory that has a good reputation and is qualified to perform the required assays. When ever possible, you must use a laboratory that conforms to requirements of The International Organization for Standardization (ISO).

a. Laboratory certification. Many reputable laboratories now possess accreditation or certification under one or more of several standards established by The International Organization for Standardization (ISO). A detailed description of the standards is beyond the scope of this Handbook. The ISO provides numerous descriptive publications. Their website, http://www.iso.ch/iso/en/ISOOnline.frontpage, is a good resource. Two ISO standards apply to analytical laboratories that analyze samples collected by mineral examiners.

(1) ISO-9002 deals with the establishment of quality management systems within organizations. ISO-9002 applies to a wide variety of industries in addition to analytical laboratories.

(2) ISO/IEC-17025 is the more applicable standard. Accreditation to ISO/IEC-17025 first requires that the laboratory meet the quality management system of the appropriate ISO-9000 series standard. However to meet the ISO/IEC 17025 standard, the laboratory must also possess adequate equipment to perform its calibration and testing tasks; and the laboratory must employ adequate personnel with the competency to perform the testing.

In addition, most accreditation plans in the United States and Canada require that the laboratory undergo regular proficiency testing, which typically includes "round robin" testing of standard reference materials with other laboratories. In essence, ISO/IEC 17025 accreditation recognizes laboratory competence, while ISO 9000 series certification alone recognizes conformity to a written quality control system.

b. Specific laboratory applications. Many types of laboratories may possess ISO 9002 and/or ISO/IEC 17025 accreditations. Such laboratories may specialize in unrelated work, such as water testing under the Clean Water Act, testing of effluents, or

analysis only of bullion. Experience has shown that sending rock or ore samples to such laboratories will usually produce incorrect results, even if the laboratories have a good reputation in their primary field.

c. ISO/IEC laboratories to be used when available. At a minimum, only assay laboratories that possess an applicable ISO 9002 certification, with labs that also carry applicable ISO/IEC 17025 accreditation preferred, should be used for official precious and base metal assays. The laboratories selected must routinely analyze ores, rocks, and concentrates as a primary business, not as an occasional service. ISO standards can change. At the time that this Handbook was written, there was discussion of modifying the ISO/IEC 17025 standards to conform with the ISO 9000-2000 standards. It is important that you keep track of which standards are current, and use only labs that are accredited. While appropriate ISO accreditation is required when applicable, the assay laboratory selected must also have a positive reputation in the mining industry.

d. Non-availability of ISO/IEC laboratory. In some cases, no ISO certified or accredited laboratory may offer the necessary analytical services. Such services could include strength testing for industrial minerals or mercury amalgamation for precious metal placer concentrates. In all cases, you should carefully consider experience and reputation when selecting a laboratory.

9. Protocols for Quality Control on Your Assays.

When submitting samples to a laboratory for assay work, you must check on the laboratory's accuracy by using a common quality control technique. You must include duplicate samples (labeled with a different sample number) and "blank" samples. Blanks are samples that have been analyzed and are known to not contain any mineral or metal being looked for in the remainder of your sample stream. In many cases (gold, platinum group elements, and certain base metals), standard samples of ores with a precise metal content may be purchased and introduced into the sample stream using sample numbers from your sample stream. Gold standards may be purchased from the Nevada Bureau of Mines and Geology in Reno, Nevada. Platinum group standards may be purchased from the Geological Survey of Canada. In using duplicate samples and standards, the assay values should not vary by more than ten percent. If the variance exceeds ten percent, the samples should be re-analyzed.

10. Unorthodox or Unusual Situations.

In some cases, you may be told by the claimant that only certain unusual, secret or proprietary assay methods will detect the precious metals on the claims. In other cases, the claimant will assert that only certain highly experienced assayers are capable of detecting the precious metals. These are among the warning signs for a mining scam. (Lechler, 1997).

a. Using a claimant's preferred laboratories. At your discretion, it may be prudent to send a few samples to the claimant's preferred assayer, primarily to check the laboratory's reliability. Any samples thus sent must be splits of samples also sent to

accredited laboratories. Contact the BLM National Training Center to find out whether the mining claimant's preferred assayer has already been determined to be unreliable by other BLM or Forest Service mineral examiners.

(1) Before sending samples to a claimant's preferred assayer, the mineral examiner should ensure that assay costs at the claimant's preferred lab are not excessive.

(2) The sample stream must include standard reference materials, plus one or more blanks that visually resemble the material from the claim.

(3) All samples should be numbered and packaged in such a way that the assayer cannot determine the actual origin of any sample.

(4) You must document the analytical methods and their results in the mineral report.

Chapter V – Evaluating a Mineral Deposit

A. General Requirements and Process.

The objective of evaluating a mineral deposit is to determine if the operator has a reasonable prospect of success in developing a valuable mine.[1/]

1. Test for Discovery.

a. Prudent person rule. In patent, validity and related examinations, the standard that you must apply is the prudent person rule, established in Castle v. Womble, supra:

". . .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 statute have been met. To hold otherwise would tend to make of little avail, if not entirely nugatory, that provision of the law whereby 'all valuable mineral deposits in lands belonging to the United States . . . . are . . . . declared to be free and open to exploration and purchase.' For, if as soon as minerals are shown to exist, and at any time during exploration, before the returns become remunerative, the lands are to be subject to other disposition, few would be found willing to risk time and capital in the attempt to bring to light and make available the mineral wealth, which lies concealed in the bowels of the earth, as Congress obviously must have intended the explorers should have proper opportunity to do."

b. A validity examination is not an appraisal. An appraisal and a validity report may rely on similar data. However, the purposes of and analyses in each document differ. An appraisal is intended to determine the fair market value of a property right for sale, trade, or taxation purposes. A validity examination is intended to determine whether a claimant has discovered a valuable mineral deposit under the Mining Law. Appraisals generally reflect risk assessments and the use of higher rates of return than does a validity examination, among other distinctions.

c. Factors to consider. You must consider a number of factors to estimate a deposit's probable economic viability, including:

- The grade, tonnage, and estimated gross value of the mineral deposit.
- All non-sunk capital costs, such as costs of equipment, buildings or other infrastructure at the mine (sunk costs are described below)
- All costs incidental to operating the mine, processing the ore, and reclaiming the site.
- Marketing costs.

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1 Castle v. Womble, 19 Pub. Lands Dec. 455 (1894).

If you don't already possess a complete copy of
H-3890-1, The Mineral Examiner's Handbook,
Contact Central Files or the Library at your Home Office
or the Forms Center at the NOC.
A Certified Review Miner Examiner (CME)
or a Certified Review Examiner (CRME) may be able to lend you one.