

MOON MINING CO.

v.

HECLA MINING CO.

IBLA 2000-94

Decided June 2, 2004

Appeal from a decision of Administrative Law Judge Nicholas T. Kuzmack in a private contest declaring the Hope, Marilyn, Olga Marie Nos. 1 through 6, Mickey Marie Nos. 1 and 2, and Moonbeam unpatented mining claims null and void for failure to discover a valuable mineral deposit and cancelling mineral entries.

Affirmed as modified.

1. Mining Claims: Contests--Mining Claims: Discovery:
Generally--Evidence: Burden of Proof--Evidence:
Preponderance

In a private mining contest, the burden of proof is upon the private contestant to establish the invalidity of a claim for lack of a discovery of a valuable mineral deposit. The decision in a private mining contest, as in any case involving material issues of fact, is properly based on the preponderance of the evidence.

2. Evidence: Preponderance--Evidence: Sufficiency--Mining Claims: Discovery: Generally--Mining Claims:
Marketability

A prerequisite of a valid mining claim subject to patent is a discovery of a valuable deposit of minerals of such quality and in such quantity as to justify a person of ordinary prudence in the further expenditure of his labor and capital with a reasonable prospect of success in developing a valuable mine. A finding of no discovery may be sustained despite a report reflecting relatively

high grade samples when the evidence discloses problems in the sampling technique used which preclude reliance upon the samples to provide a reasonable estimate of the grade of the resource.

3. Mining Claims: Determination of Validity--Mining Claims: Discovery: Geologic Inference

When sample values have been high and relatively consistent, geologic inference may be used to infer a sufficient quantity of similar quality mineralization beyond the exposed areas, such that a prudent man would be justified in expending his labor and capital with a reasonable prospect of success in developing a valuable mine. In the absence of a showing of good reason, geologic inference will not establish a basis to infer a mineable deposit when a significant number of samples do not show those values.

4. Mining Claims: Discovery: Marketability--Mining Claims: Marketability

The prudent man standard of discovery has been supplemented by the marketability test involving the potential that a mineral deposit can be extracted, removed, and marketed at a profit. Evidence of the costs and profits of mining a claim may be properly considered in determining whether a person of ordinary prudence would be justified in the further expenditure of his labor and capital with a reasonable prospect of success in developing a valuable mine.

5. Mining Claims: Discovery: Marketability--Mining Claims: Marketability

In applying the reasonable prudent man standard of discovery, consideration is properly given to costs of compliance with relevant requirements imposed under such regulatory statutes as the Clean Water Act and the Endangered Species Act.

APPEARANCES: Barry Marcus, Esq., Mike Christian, Esq., Boise, Idaho, and Louis F. Racine, Jr., Esq., and John R. Goodell, Esq., Pocatello, Idaho, for Moon Mining Co.; Scott W. Hardt, Esq., and Mark Wielga, Esq., Denver, Colorado, for Hecla Mining Co.

OPINION BY ADMINISTRATIVE JUDGE GRANT

Moon Mining Co., an Idaho Partnership, has appealed a November 15, 1999, decision of Administrative Law Judge Nicholas T. Kuzmack declaring the Hope, Marilyn, Olga Marie Nos. 1 through 6, Mickey Marie Nos. 1 and 2, and Moonbeam unpatented placer mining claims situated in the Jordan Creek Valley of the Challis National Forest, Custer County, Idaho, null and void for failure to discover a valuable mineral deposit. His decision, issued after an 8-day evidentiary hearing held in Salt Lake City, Utah, on April 13 through 17, 1998, and on June 16 through 18, 1998, cancelled the mineral entries for the claims.

This case arises out of a private contest filed on September 5, 1997, by Contestant Hecla Mining Co., challenging the validity of Moon's 11 unpatented placer gold mining claims referenced above on the grounds that the claims lack a discovery of a valuable mineral deposit.^{1/} (Contest Complaint at 4-5.) The contest complaint discloses that portions of the claims were located over an existing Forest Service (FS) road (Jordan Creek Road) which Hecla was "authorized and directed" to upgrade by widening and grading as part of the mining plan of operations for its Grouse Creek project, an open pit gold mine which is located north of Moon's claims in the same watershed. *Id.* at 2-3. Subsequent to the upgrading of the road, Moon filed suit against Hecla, FS, and the Bureau of Land Management (BLM), seeking damages for interference with its right to develop its mining claims. Moon Mining Co. v. Hecla Mining Co. et al., Civ. No. 93-0297-E-HLR (D. Idaho). Proceedings in this litigation have been stayed pending resolution of this contest because of the potential impact of a validity determination on the litigation.

The Decision of the Administrative Law Judge

In his decision, the administrative law judge cited United States v. Whittaker (On Reconsideration), 102 IBLA 162, 166 (1988), in finding that generally, when a patent application has been filed, as in this case, the issue of discovery is properly determined as of the date of issuance of the first half of the final certificate (FHFC)

^{1/} Citations to the eight-volume hearing transcript identify the transcript volume (Roman numeral) and the page number. Exhibit numbers are preceded by an "H" denoting Hecla or an "M" denoting Moon.

when the purchase price is paid.^{2/} (Decision at 31-32.) Accordingly, the administrative law judge found that evidence related to costs and market conditions after that time is relevant to the extent it reflects what could have been reasonably anticipated at that date. See Yankee Gulch Joint Venture v. BLM, 113 IBLA 106, 134 (1990); Yankee Gulch Joint Venture, 4 IBLA 353, 357 (1985). Finding from the evidence that there was no exposure of a placer mineral deposit on the Marilyn claim, the administrative law judge held that no discovery had been established on the claim. Id. at 37. Distinguishing exposure of a mineral deposit from samples taken to verify the value of the deposit, the administrative law judge found the 1992 drill hole sampling data from the remaining claims relevant to the issue of discovery. (Decision at 34.)

In addressing the issue of discovery, the administrative law judge found from the evidence that the Snake River sockeye salmon, the Snake River spring/summer chinook salmon, and the Bull trout were either listed or proposed for listing and being reviewed for listing under the Endangered Species Act (ESA)^{3/} on February 20, 1992. Id. at 38. Further, he found that it was reasonably likely at that date that the listing process for the Chinook salmon would be finalized before a placer mining permit could be issued to Moon in light of environmental reviews required under section 102(2)(C) of the National Environmental Policy Act (NEPA).^{4/} Id. at 39. The administrative law judge concluded from the evidence that a biological assessment would likely find that operations may affect a listed species or its critical habitat and that the resulting consultation with FWS would likely result in a biological opinion finding that operations would jeopardize the continued existence of a listed species or its critical habitat. Id. Based upon evidence that no reasonable and prudent alternatives were likely to be available and that, hence, the necessary permits for the operation would not likely be issued, the administrative law judge held that Moon did not have a reasonable prospect of success in obtaining the necessary permits on February 20, 1992. Id. The administrative law judge also found from the evidence that the presence of Chinook salmon “in the creek from May through October, which includes the period when Contestee plans to mine,” is an obstacle to development of any reasonable and prudent alternatives. Id. at 40.

Even assuming a mining permit were obtained, the administrative law judge found from the evidence that the costs of restoration and mitigation are prohibitive. Id. at 42. He concluded that pre-mining, off-site mitigation would likely be required as a condition of any mining permit. Id. at 43. The administrative law judge found

^{2/} In this case, the FHFC was issued February 20, 1992.

^{3/} 16 U.S.C. §§ 1531–1543 (2000).

^{4/} 42 U.S.C. § 4332(2)(C) (2000).

from the record that the stretch of Jordan Creek passing through the Moon claims has wetlands of both high and low value and that their overall value is at least as great as those of the stretch of Pinion Creek destroyed by the Grouse Creek project for which Hecla was required to provide mitigation at a ratio of approximately 3 acres of mitigation to 1 acre of lost wetlands. Id. at 45-46. Based on the Moon mining plan to disturb suitable habitat for the Chinook salmon which was proposed for listing and whose listing as a protected species was foreseeable on February 20, 1992, the administrative law judge held it was reasonable to expect off-site mitigation would be required in a ratio of at least 3 to 1, in addition to on-site restoration requirements. Id. at 46.

Reviewing the testimony of Moon's experts, the administrative law judge noted that Robert Tiedemann, a professional wetlands scientist, estimated on-site mitigation costs to be \$37,754 per acre of wetlands, but did not consider certain costs including removal, segregation, and protective stockpiling of overburden by soil type and replacing the overburden layers in inverse order including keying in the critical clay barrier layer. Id. at 48. Based on the estimate of Ray Wallace, mining consultant to Moon and retired FS mineral examiner, who calculated the cost of hauling excavated material to be \$3.00 per cubic yard, the administrative law judge found that hauling removed material back to replace it in the valley for backfill would cost \$1,458,261 (486,087 cubic yards x \$3.00 per cubic yard)^{5/} which constitutes \$59,063 per acre for the 24.69 acres which Wallace projected mining. Id. Regarding other costs of backfilling the mined valley, the administrative law judge found the only evidence is the testimony of Tiedemann that it would cost \$4.23 per cubic yard to finish and rough grade the backfill to a depth of one foot and that it was reasonable to assume that cost would apply to the entire depth of the backfill. Id. at 48-49. Using the average depth of the area to be mined of 23.5 feet testified to by Darr Moon, a partner in Moon Mining, the administrative law judge found the volume of backfill per acre would be 37,913 cubic yards (23.5 feet x 43,560 square feet per acre ÷ 27 cubic feet per cubic yard). Id. at 49. Accordingly, the administrative law judge concluded the cost of backfilling would be \$160,372 per acre (\$4.23 per cubic yard x 37,913 cubic yards per acre), bringing the cost of reclamation based on Moon's evidence to \$257,189 per acre of wetlands. Id. Noting that Tiedemann's estimated reclamation costs did not include any costs associated with obtaining necessary permits or approval from the FS, Corps of Engineers, and the State of Idaho; bonding fees; or acquisition of property for mitigation, the administrative law judge held that Moon's evidence indicated reclamation expenses would total at least \$260,000 per acre of wetlands. Id.

^{5/} See Wallace Report (Ex. M-74 at Yellow Tab 2). The yellow pages or tabs which separate the sections of the Wallace Report are unnumbered and, for reference, we have assigned them numbers sequentially.

In considering the revenue to be reasonably expected and the estimated cost of mining, the administrative law judge reviewed the economic analyses prepared by Wallace (Ex. M-74) and by Moon Mining (Ex. M-121). Noting that the Moon economic analysis, unlike that of Wallace, reflects the reality that Moon would process all of the material immediately above bedrock and treat other overlying material as waste and noting that the Moon analysis projects higher expected revenues, the administrative law judge relied upon that analysis to determine revenues which could reasonably be expected. (Decision at 51.)

Most of the sampling of the placer deposit was accomplished by means of churn drilling in which a hollow drilling pipe (casing) with a measured diameter was driven vertically a measured distance into the deposit to obtain a core sample. In his decision the administrative law judge recognized the importance of adjusting for the difference between the volume of the sample actually obtained (which was assayed for its gold content) and the theoretical volume of the sampled core when estimating the gold value of the deposit. The administrative law judge noted that Moon's churn drill sampling calculated a corrected gold value by multiplying the gold value recovered by the ratio of the theoretical volume of the sampled core to the volume of the core recovered for analysis as collected in a calibrated bucket (bucket volume) designed to measure the volume of the recovered core. (Decision at 52.) In using this technique, the administrative law judge found that both Moon and Wallace erred in that they overestimated the value of the gold to be recovered by 20 percent by "multiplying the gold grade figures for the material, which were derived from the theoretical in bank volume, by the swelled volume, rather than the volume in bank, of the material to be mined." *Id.* at 51. Noting that Hecla's consulting geologist, James Hodos, who had greater experience in interpreting churn drill data, testified that core volume should be determined by measuring the core rise in the drill casing rather than relying upon bucket volume, the administrative law judge found that the bucket volume "is not as accurate and reliable" as an adjustment factor as "the core volume measured by the core rise" and this strongly suggests use of the bucket volume to adjust the gold weight figures overinflated gold values. *Id.* at 52-53.

Finding Darr Moon's cost estimates to be insufficiently explained to be helpful, the administrative law judge utilized Wallace's estimated operating costs per cubic yard of \$1 for mining, \$3 for hauling, and \$2 for processing in his decision. *Id.* at 54-55. Allowing \$260,000 per acre for on-site reclamation costs, \$130,000 per acre for off-site mitigation at a ratio of three acres of mitigation for each acre of disturbance, the administrative law judge calculated the operating costs of the mining operation for each of the claims. *Id.* at 54-56. Adjusting gold values derived from the 1992 churn drill sampling program by 20 percent to compensate for the use of loose cubic yards to calculate the value of the deposit, the administrative law judge then calculated the gross value of the gold which would be recovered from each of

the claims which Wallace found to be mineable^{6/} at gold prices of \$401.76/ounce and of \$353.40/ounce,^{7/} respectively. *Id.* at 55-56. Comparing the returns from the material processed at each of these values to the operating costs, the administrative law judge concluded that the “expected operating and reclamation/mitigation costs exceed the maximum gross value to be reasonably expected.” *Id.* at 55. The administrative law judge also noted that the costs considered did not include capital costs likely to reach \$100,000 and the costs of dewatering the area to be mined, as well as costs of acquiring land for mitigation and costs of segregating and stockpiling the different layers of excavated material. *Id.* at 58. Accordingly, the administrative law judge found that the contestant clearly met its burden of proving by a preponderance of the evidence that there is no reasonable prospect of success in developing a paying mine on any of the contested claims. *Id.* at 57, 60.

The administrative law judge also concluded that the evidence failed to show a continuity of high value mineralization sufficient to establish a mineable volume. Noting that to be meaningful, samples of high grade material must be shown to be representative of the deposit, the administrative law judge found that evidence introduced regarding the results of the 1983 drilling program indicated a disparity of grades at depth even in drill holes located in close proximity. *Id.* at 62. The administrative law judge held that the evidence did not support a finding that the 1983 sampling results should be ignored as unreliable. *Id.* at 63. Finding that the claimant divided the Olga Marie Nos. 3 and 6 and the Mickey Marie No. 1 claims into “mineable” and “unmineable” areas on the basis of the assay results of a single drill hole for each area, the administrative law judge held this showed a lack of continuity of a mineable grade at depth. *Id.* at 62. Further, he noted from the testimony of Hecla’s consultants, James Hodos and Ellen Hodos, that the greater values at depth are insignificant because the data does not show a mineable volume, the area of influence of each sample point is very small because of the inherently discontinuous nature of placer deposits, and drill holes for most commercial placer deposits are spaced at a maximum of 100 feet. *Id.* at 64. The administrative law judge found this

^{6/} The administrative law judge did not include the Hope, Marilyn, and Mickey Marie #2 claims which Wallace found were not mineable. (Ex. M-74 at Yellow Tab 8.) His analysis did include the Square Deal, a claim which had been patented earlier, which was included in the analysis of Wallace and Moon as well. As the administrative law judge noted, the Board has held that a group of adjacent mining claims held by a claimant may be considered together for purposes of determining whether a valuable mineral deposit exists on each of the claims. United States v. New York Mines, 105 IBLA 171, 191, 95 I.D. 223, 234 (1988).

^{7/} The administrative law judge found “[e]ither of these prices appears reasonable” at the date of issuance of the FHFC. (Decision at 57.)

testimony was consistent with the description provided in a publication^{8/} cited in the hearing of an adequate sampling program for narrow, stream-type deposits calling for sample wells at intervals of 100 feet or less at right angles to the axis of the deposit with a distance between drill lines in the order of 500 feet or more. Id. at 64. In reaching his conclusion, the administrative law judge noted that most of the claims contain either one or no 1992 drill hole, while the Hope and Olga Marie Nos. 4 and 6 claims contain a line of drill holes at right angles to the trend of the deposit which was ignored by claimant. Id. at 66.

Arguments on Appeal

Appellant asserts in its statement of reasons for appeal (SOR)^{2/} that the administrative law judge erred in relying upon hearsay evidence in concluding that costs of reclamation and mitigation would be prohibitively expensive. Appellant contends that John Han, an employee of contestant who wrote a letter regarding these costs admitted into evidence (Ex. H-35), did not testify and did not provide any details regarding the elements included in these costs. It is asserted by appellant that this hearsay evidence did not meet the minimum indicia of reliability required to admit it as evidence. Further, appellant argues that the administrative law judge misapplied the burden of proof which requires the contestant in this private mining contest to show the invalidity of the claims by a preponderance of the evidence. Appellant contends that Hecla was required to show that the opinion of Moon's experts was demonstrably bad and would not be relied upon by any prudent person. It is asserted by appellant that the prudent man standard of validity is more relaxed in the context of a contest between two claimants than it is in a Government contest.

In addition, appellant asserts that where values have been high and relatively consistent, geologic inference is properly used to infer sufficient quantity of similar quality mineralization beyond exposed areas such that a prudent man would be justified in expending his labor and means with a reasonable prospect of success in developing a paying mine, citing United States v. Feezor, 74 IBLA 56, 90 I.D. 262 (1983). Appellant contends that the opinion of its experts is entitled to greater deference than contestant's experts because they actually participated in sampling of

^{8/} John H. Wells, Placer Examination Principles and Practice, Bureau of Land Management, U.S. Department of the Interior (1989) (hereinafter cited as Wells, Placer Examination). James Hodos, a geologist experienced in churn drill sampling to evaluate placer claims, testified that this authority is well known in the placer mining industry. (Tr. II: 14-15.)

^{2/} Appellant's brief is contained in a filing labeled a supplemental SOR, to distinguish it from the summary objections raised in the notice of appeal.

the claims. Noting that the New Deal and Square Deal claims adjacent to the unpatented claims on the north were the subject of a 1984 mineral report by FS mining engineers and patented to the Moons in 1984, appellant argues this information would cause a reasonably prudent person to believe they had a reasonable chance of developing a paying mine on the adjacent placers. Further, appellant asserts that a discovery is supported by the sale of \$3,000 worth of gold to the Custer Museum in 1989 at five times the quoted gold price.

Appellant also asserts error in the adjustment by the administrative law judge of the value of the gold on the claims calculated from the drill samples to reflect the fact that the value of the deposit was calculated in loose cubic yards. Noting that dirt and gravel removed from the ground will occupy a greater volume after removal than the volume in place or in bank, appellant argues that the gross value must be calculated by multiplying the swelled volume times the resource grade if the grade is based on a removed (and thus swelled) sample. Appellant points out that the volume of the sample was measured after it was removed from the ground and placed in a bucket, *i.e.*, a swelled volume.

Regarding the likelihood of regulatory approval for placer mining operations on the claims and the expense of compliance with regulatory requirements, appellant argues that neither the ESA nor the Clean Water Act (CWA)^{10/} support the imposition of requirements which would effectively preclude appellant from exercising its right to mine its claims under the Mining Law.^{11/} Citing FS surface management and BLM regulatory authority, it is asserted that regulation is limited to prevention of unnecessary or unreasonable injury to the public resources and that regulation which would render mining prohibitive would constitute an unconstitutional taking of private property rights. Appellant also focuses on the situation at the time the FHFC issued, asserting that at the time no species present on Jordan Creek was listed as endangered or threatened and no critical habitat had been designated on Moon's claims. Noting that Jordan Creek was not designated as critical habitat for Chinook salmon until 1994, appellant contends the fact that Hecla was permitted to undertake its Jordan Creek wetlands mitigation project which included excavation and removal of 80,000 cubic yards of gravel in 1992 as well as moving and rebuilding one mile of Jordan Creek supports a reasonable belief Moon's proposal for operations on Jordan Creek would be approved.

Hecla has filed an answer to the Moon SOR. Hecla disputes appellant's assertion that a more relaxed discovery standard should be applied in a private

^{10/} 33 U.S.C. §§ 1251-1387 (2000).

^{11/} 30 U.S.C. § 26 (2000).

mining contest than in a Government contest. Acknowledging that a more relaxed standard of discovery may be appropriate in actions between competing mining claim locators where the issue is one of priority of discovery, Hecla contends this does not apply when the contestant is not a competing mining claimant. Hecla notes that in order to infer the existence of a mineable deposit there must be evidence showing that the samples relied upon are representative of the deposit on the claim and asserts the administrative law judge properly found the evidence did not support a discovery. Asserting that assays of samples from drill holes located in close proximity showed no evidence of continuity of gold grades, Hecla contends that the isolated hot spots reported in the 1992 drilling samples represent a “nugget effect” and do not provide evidence of gold values at other locations on the claims. It is argued by Hecla that Moon’s reliance exclusively on the 1992 drill results is unreasonable in light of the 1983 drilling data and the errors in churn drill sampling technique committed in the 1992 drilling. Hecla contends the values shown in the 1992 drilling may not be projected by inference into areas where prior drilling indicates those values do not exist.

With respect to the credibility of the expert witnesses who testified, Hecla asserts it is clear from the record that James and Ellen Hodos are professional mining engineers with many years of experience in sampling techniques, drilling programs, estimations of mineral deposits, and validity examinations under the Federal Mining Law. Hecla contends James Hodos is the only knowledgeable churn hole driller who testified at the hearing. Noting that Moon’s expert Wallace acknowledged having evaluated churn hole drilling programs only three or four times, Hecla asserts he committed several critical errors in the 1992 churn hole drill sampling program, including using a swell factor of 20 percent to increase the amount of gold “in bank.”

Factual Background

The 11 claims at issue, the Hope, Marilyn, Olga Marie No. 1 (OM #1) through Olga Marie No. 6 (OM #6), Mickey Marie No. 1 (MM #1), Mickey Marie No. 2 (MM #2), and the Moonbeam, are situated in the Challis National Forest, Custer County, Idaho. (Decision at 2; Ex. H-10; Court Ex. 8.) The 11 claims cover a total of 86.831 acres. The claims range in size from the OM #4 claim at 17.609 acres to the Moonbeam claim measuring only 2.411 acres. The claims are continuous, forming a North-South trending column of land (Ex. H-1). The claims run north to south in the order listed above, the Hope being the northernmost of the claims. Moon’s patented New Deal and Square Deal claims are immediately north of the unpatented Hope claim. (Ex. H-2). The administrative law judge aptly summarized the locale of the claims and the geological features of the area disclosed in the record as follows:

Jordan Creek flows generally south through each of the claims for a total distance of approximately two miles (Tr. IV: 191-92). The Jordan Creek Road, a gravel road which parallels the creek, runs through the claims as well.

Within the claims area the width of Jordan Creek varies from 5 to 15 feet and its flood plain varies from 75 to 300 feet (Tr. I: 31). Approximately one mile south of the Moonbeam claim Jordan Creek flows into another stream, Yankee Fork, which continues south until it empties into the Salmon River (Ex. H-7, H-68).

Lode mineralization [in the Yankee Fork district] consists of veins, stockworks, coatings, and replacement zones confined to rhyolite dikes, plugs, domes, and other masses injected into the numerous northeast and northwest trending fractures. Subsequent fracturing of the rhyolitic rocks by continued fault movement had created favorable sites for precious metal deposition. Several authors have classified the lode deposits as epithermal with characteristic hydrothermal wall-rock alteration, extensive fracturing and brecciation, banding and crustification, and associated mineral suites * * *.

(Court Ex. 8; see also Exs. M-110, H-20).

Mineralized fault zones are probably the original sources for the placer gold found in the district (Court Ex. 8; Tr. VI: 36-40). The richest placers appear to be located short distances downstream from these zones ([I]d.; Ex. H-20).

Several faults and rhyolitic dikes cross Jordan Creek in the vicinity of the claims (Court Ex. 8; Tr. VI: 36-40). The likely source for at least some of the gold found on the claims is a mineralized zone running through Estes Mountain and Jordan Creek upstream of the subject claims (see, e.g., Tr. II: 144-47, VI: 36-40, VII: 179; Ex. H-68). Another strongly mineralized zone runs through Jordan Creek downstream of the claims above and below its confluence with the Yankee Fork (Tr. II: 144-50, VII: 179; Ex. H-68; Court Ex. 8).

Approximately one mile to the northwest of the subject claims is a large area of mineralized rock that has been mined at various times and is the site of Contestant's Grouse Creek mine (Court Ex. 8; Tr. II:

116-17, III: 31-32). Contestant recovered a limited amount of ore during 1996-1997 but recovery problems and a decline in the price of gold has forced the mine and mill to shut down. (Court Ex. 8).

“[A] series of northwest trending dikes and faults control the configuration of Jordan Creek canyon. The result is a series of fluvial basins separated by zones of more resistant rock where the canyon narrows considerably and the bedrock is at or very close to the land surface. Within the basins, drilled data shows the depth to bedrock ranges from 16 to 27 feet.

The basins contain three types of fluvial deposits. These are: (1) unconsolidated alluvial sediments associated with the present Jordan Creek, (2) alluvial fans deposited in the Jordan Creek Canyon from side drainages, and (3) discontinuous benches or stream terraces [deposited by an ancient Jordan Creek at elevations of 30 to 50 feet above the current level of the stream]. The * * * bedrock structures closely controlled the configuration and extent of these fluvial deposits.

The gravel deposits of current Jordan Creek occur along the canyon bottom to widths ranging between 50 and 280 feet. * * *

Side drainages tributary to Jordan Creek have developed alluvial fans that can be seen to overlie the Jordan Creek stream gravels on the Mickey Marie 1 and 2, Moonbeam, and Olga Marie 4 and 6 claims. These fans and most of the other numerous smaller fans along the creek canyon are probably interbedded in part with the stream gravels.”

(Court Ex. 8).

Placer gold mineralization in the Yankee Fork district, including the subject claims, is concentrated near or at bedrock (see, e.g. Exs. H-10, p. 3; H-11, p. 2; H-20, p. 102). Coarse gold has been found in the mineralization near and along Jordan Creek, including within the subject claims (see, e.g. Court Ex. 8; Exs. M-109, H-20, p. 105). Placer deposit mineralization in general, and more particularly within the

Yankee Fork district, along Jordan Creek, and on the subject claims is “discontinuous”, “spotty”, or “not evenly distributed across bedrock beneath a valley floor but is concentrated in one or more long meandering buried stream channels” (see, e.g. Exs. H-20, p. 102, M-110, p. 20; Tr. II: 48-51, 73-76, 87-90).

(Decision at 2-4.)

Historically, a considerable amount of placer mining has occurred in the area. A large floating dredge mined the Yankee Fork up to the mouth of Jordan Creek intermittently between 1940 and 1952. (Ex. H-20 at 106-08; Ex. H-24.) The dredge reportedly recovered \$1,023,025 in gold, but estimated costs of mining (\$0.17 per cubic yard) exceeded the average recovery of \$0.16 per cubic yard. (Tr. II: 20; Ex. H-24 at 226.) According to the historical record, Arthur McGowan, “gold man” aboard the barge for several years, reported that drilling in advance of dredging indicated that \$11 million in gold was present. (Ex. H-20 at 106.) Ellen Hodos testified to the importance of considering the ratio of recoverable mineral to the estimated mineral resource based on exploration, known as the R/E ratio, when evaluating mining operations. (Tr. VIII: 84-85.) She further noted that in evaluating reserve estimates, the R/E ratio for an area is commonly considered. *Id.* at 86. Comparing the reported gold recovery from the floating dredge from 1940 to 1952 with the projected gold resource based on drilling, Ellen Hodos calculated the actual amount of gold recovered amounted to approximately 9 percent of the \$11 million in gold estimated to be present from prior drilling. (Tr. VIII: 87-90; Ex. H-20 at 106.) This represents a low R/E ratio.

Although the floating dredge only went a short distance up Jordan Creek, between 1948 and 1950, as evidenced by tailings piles and historic records, the lower 1-1/4 miles of Jordan Creek were dredged using a non-floating drag-line and wash plant up to the vicinity of the Moonbeam claim. (Ex. H-20 at 105; Tr. VII: 183.) “Holes drilled prior to mining indicated that this area ranged in value from \$1.50 to \$3.00 per cubic yard” (Ex. H-20 at 105; Tr. VIII: 91), but the actual average recovery was \$0.54 per cubic yards. (Ex. H-20 at 105.) Using the mid-range drill hole value of \$2.25 per cubic yard to establish a value for E and comparing this to the reported production from the Jordan Creek drag-line dredge for 1948-1949, Ellen Hodos testified she calculated the ratio of R/E to be 24 percent (Tr. VIII: 90-92; Ex. H-20 at 105).

In December 1980, E. D. Moon and his wife filed a patent application for OM #1 - OM #6, Hope, Marilyn, New Deal, and Square Deal mining claims. (Court Ex. 8; Tr. IV: 246.) The filing of the patent application precipitated a 1981 examination by FS mineral examiners Raymond Wallace and Jeff Gabardi. Based on

that examination, Wallace and Gabardi concluded in a mineral report that the New Deal and Square Deal claims contained a valuable deposit of gold and recommended that those claims be clear listed for patent. (Ex. M-2.) A patent thereafter was issued for those claims in 1984. (Ex. M-3.) The patent application for the other eight claims was withdrawn on March 22, 1983, because of the inability to obtain a sample adequate to support a discovery, a situation which would have necessitated a contest.^{12/} (Tr. IV: 246-47; Ex. M-2 at 5.)

Subsequent to the withdrawal of the patent application, Excel Mineral Co., which had an option to lease the claims, conducted an exploratory drilling program in the fall of 1983 involving the use of a churn drill to drill 20 holes to sample the claims. (Tr. VII: 216-17; Ex. H-7 at 144.) E. D. Moon assisted in the sampling. He put the recovered samples in the measuring bucket, washed and bagged the samples, and wrote the drill log. Id. at 221. The lease option was apparently not exercised. Id. at 217. In the summer of 1989, Darr Moon used an excavator, front-end loader and wash plant to take bulk samples from bench areas on the Moonbeam, Mickey Marie #1, and Olga Marie #4 claims. (Tr. VI: 16-18.) To conduct the bulk sampling, Darr Moon, a certified engineer, completed two plans of operations which were approved by FS and two dredge/placer permit applications which were approved by the Idaho Department of Lands. (Ex. M-6; Ex. M-7). To comply with these permits, they were forbidden from sampling the streambed, were required to maintain 75-foot stream buffers, and were not permitted to discharge any substance into the Creek. (Tr. VI: 188-89, 192-93.) To satisfy this latter requirement they used a "closed circuit" operation: Moon built settling ponds to capture the water discharge and then pumped it from the pond to the wash plant for reuse in the sampling operations. (Tr. VI: 18-19, 192-93.)

Moon filed a new patent application for all of the unpatented claims except the Hope and Marilyn on June 21, 1991. (Ex. H-10.) In August 1992, FS conducted a sampling program to evaluate the nine claims for which the patent application was filed. Moon hired the same company that was hired for the 1983 sampling program

^{12/} The sampling of the New Deal and Square Deal claims was conducted in September 1981. (Ex. M-2 at 12.) The mineral deposit on these claims involved bench deposits perched above the present Jordan Creek stream channel. Id. at 10. Although adequate samples were obtained from these two claims, Wallace testified that the water table on the other claims withdrawn from the original patent application was too high to permit representative samples to be obtained using the backhoe which claimant had planned to use for digging a hole and taking channel samples. (Tr. IV: 248-49.) As soon as they started to dig a hole with the backhoe bucket it would fill with water and no representative sample could be obtained in those circumstances. Id.

and used same the drill rig as had been used in 1983. (Tr. V: 14, 15; Tr. VI: 152; Tr. VII: 115, 218.) By the time of the 1992 drill program, Don Peters, mining geologist for the Challis National Forest, had taken over the responsibility for examining the subject claims. (Tr. V: 8-14.) However, he obtained the assistance of Wallace and Gabardi in conducting the examination. Peters, along with his wife, Wallace, Gabardi, and the Moons were all present during the drilling. Don Peters, Ray Wallace, and Jeff Gabardi are all certified mineral examiners. (Tr. V: 14; Tr. VI: 153-54; Tr. VII: 116, 120; Decision at 12.)

With respect to the 1992 drilling program, the administrative law judge recounted the testimony as follows:

The drill and crew cost \$1,200 per day (Tr. VI: 153). Because of this high-cost, they worked 10 to 12 hours each day to minimize the number of days that the drill was needed (Tr. V: 16-17, 102). Over a period of 9 days, 12 holes were drilled on the 9 claims for which the patent application was filed (Exs. M-12, M-13). A new drill shoe was used for each hole (Tr. VI: 141, VII: 129-31).

Mr. Peters observed the drilling and sampling operation, transferred the samples to Messrs. Wallace and Gabardi for processing by a Denver Gold Saver and by panning, and panned some of the samples himself (Tr. V: 15, 102, VI: 154-55). Mr. Peters was not very quick or adept at panning and the three gentlemen could not pan fast enough to keep up with the flow of samples being generated by the drill rig (Tr. V: 99, 102, VI: 154-55).

Because of these facts as well as the fact that they wanted to sample the claims as quickly as possible to reduce the drilling costs, Mr. Peters requested Darr Moon's help in panning the samples (Tr. V: 16-17, 99, 102, VI: 154-55). Eugene Moon also had access to the samples (Tr. VII: 117, 232). However, Messrs. Peters, Wallace, and Gabardi and Mr. Peter's wife kept their eyes on Darr Moon as he panned and no salting of the samples was observed (Tr. V: 17-18, 99-102, VI: 154-56).

After the samples were processed, they were placed in bottles and locked in Mr. Peter's pickup truck (Tr. V: 18, VI: 156). A total of 112 samples were taken and Mr. Peters sent them to Hazen Research, Inc. for assaying (Tr. V: 16, 18; Ex. M-13). In general, the gold grades from the 1992 drilling program were greater than the grades from the 1983 program.

In 1993 Mr. Wallace further assisted Mr. Peters in evaluating the nine claims by spending several days surveying the drill holes and plotting them on maps, mapping the claim boundaries and aerial extent of the gravel deposits, and preliminarily calculating the volume and grade of the mineral deposits (Tr. V: 19-25; Court Ex. 8). Contestee eventually hired Mr. Wallace^{13/} to evaluate the claims and serve as an expert witness in this proceeding.

In March 1994 the patent application filed for the nine claims was transferred from [FS] to BLM in conformance with a March 1993 Secretarial Order transferring responsibility for evaluating mining claims in National Forests from [FS] to BLM (Tr. V: 22-25; Ex. M-10). Consequently, BLM mineral examiners Robert DeTarr and Robert Lewis spent six days on the nine claims in 1995 and 1996 to determine whether each claim contained the discovery of a valuable mineral deposit (Court Ex. 8; Tr. III: 7). Mr. Peters accompanied them for two days, providing information regarding previous mapping and sampling of the claims.

(Decision at 12-13.) Although a draft mineral report had been prepared at the time of the hearing and was admitted into evidence (Court Ex. 8), BLM had yet to issue a final mineral report on Moon's patent application for the nine claims.

Discussion

[1] As a threshold matter, we note that it is well established, as the administrative law judge held, that the burden of proof on the issue of discovery in the context of a private mining contest is upon the private contestant. Schlosser v. Pierce, 92 IBLA 109, 141 (1986); Masserio v. Western Hills Mining Association, 78 IBLA 155, 160 (1983); see In Re Pacific Coast Molybdenum Co., 75 IBLA 16, 22 n.4, 90 I.D. 352, 356 n.4 (1983); State of California v. Doria Mining & Engineering Corp., 17 IBLA 380, 389 (1974); Marvel Mining Co. v. Sinclair Oil & Gas Co., 75 I.D. 407, 423 (1968). While the burden of proof was thus properly placed on contestant, the ultimate decision in cases involving material issues of fact must be rendered on the basis of the preponderance of the evidence. See Bender v. Clark, 744 F.2d 1424, 1429 (10th Cir. 1984) (reversing a Board decision which affirmed the administrative decision on the basis of a failure to establish error by clear and definite evidence).

^{13/} This was subsequent to his retirement from his FS employment.

We must reject appellant's contention that the evidentiary standard regarding the issue of discovery is more relaxed in the context of this private mining contest. In language quoted by appellant the court in Converse v. Udall, 399 F. 2d 616, 619 (9th Cir. 1969), cert. denied, 393 U.S. 1025 (1969), noted "that the standard is more liberally construed in favor of a first locator when the contest is between him and a second locator than in contests between a mineral locator and another party who challenges the mineral nature of the lands." In explaining this distinction, the court itself quoted a discussion in Chrisman v. Miller, 197 U.S. 313, 323 (1905), to the effect that the controversy between competing claimants for mineral lands is simply one of which claimant is entitled to priority whereas in contests brought by non-mineral claimants the evidence of mineral character should be reasonably clear before limiting availability of the land for other uses. The precedents involving disputes between competing mineral claimants are not germane to the present case. Hecla's standing as a contestant stems not from its status as a rival mining claimant seeking to establish a prior claim, but rather as a user of the road across the claims pursuant to its FS plan of operations.

With respect to claims which are the subject of a pending patent application, the administrative law judge noted the Board has held that the date of issuance of the FHFC when payment of the purchase price has been made is the time when equitable title vests in the claimant subject to the right of the Government to file a contest disputing the passage of equitable title and the validity of the claims based on the issue of a discovery and, hence, this is the critical date for determining the existence of a discovery. United States v. Whittaker (On Reconsideration), 102 IBLA at 166-67. We find this is the appropriate date in the context of this private contest.^{14/} For the claims not included in the patent application, the issue of discovery is properly addressed in view of all the evidence available at the time of the hearing.

^{14/} As the administrative law judge observed, the Solicitor has subsequently issued a memorandum to the effect that "the right to a mineral patent does not vest in the applicant until the Secretary of the Interior determines that the applicant has met all the terms and conditions of the patent, including verification that the applicant has discovered a valuable mineral claim." See Entitlement to a Mineral Patent Under the Mining Law of 1872, M-36990, at 6 (Nov. 12, 1997). The Solicitor has further ruled that when the applicant obtaining a FHFC has not supplied sufficient information to allow the Department to verify a discovery, present marketability should be determined as of the date the appellant submitted adequate information to allow the Department to verify the discovery. Patenting of Mining Claims and Mill Sites in Wilderness Areas, M-36994, at 16 (May 22, 1998). At the time of the hearing, the Departmental officials had not yet completed the mineral report evaluating the claims.

Regarding the relevant price of gold to be used in evaluating the contested claims, the administrative law judge found either the price of \$353.40 per ounce prevailing on the date of issuance of the FHFC or the 5-year average price for the period ending on that date (\$401.76 per ounce) was “reasonably anticipatable” as of that date. (Decision at 57.) With respect to the mineral price to be applied in determining the existence of a discovery, the Board has recognized that fluctuations in price over time can make the analysis more difficult. Thus, the Board has held that the issue of whether mineral from the deposit is marketable at a profit means that “as a present fact, considering historic price and cost factors and assuming that they will continue, there is a reasonable likelihood of success that a paying mine can be developed.” In Re Pacific Coast Molybdenum Co., 75 IBLA at 29, 90 I.D. at 360. In considering historic prices to compensate for market fluctuation, we have in some cases accepted the 5-year average price. Vanderbilt Gold Corp., 126 IBLA 72, 89 (1993); U.S. v. Crowley, 124 IBLA 374 (1992). We find that in the present case, use of the 5-year average price for the period ending on February 20, 1992, (\$401.76) is more than fair to claimant since record reveals the price on that date was \$353.40 and the price trend was downward.^{15/} (Ex. M-74 at Yellow Tab 2, “Gold Prices used in Moon Mine analysis.”)

In reviewing the evidence of the mineral deposit on the claims based on churn drill samples, the administrative law judge observed the critical importance of comparing the actual volume of the sample analyzed to the theoretical volume of the sample removed from the casing. As Wells noted in his manual, theoretically when the well casing is driven a foot down through the gravel it will “cut a cylinder of gravel having an area equal to that of the drive shoe [on the bottom of the casing] and a length equal to the drive.” Wells, Placer Examination, at 46. In this manner, Moon’s consultant Wallace, calculated the theoretical volume of a sample from a six inch casing with a seven and ½ inch shoe driven a depth of one foot as 0.31 cubic feet (Volume in cubic feet = $\pi \times (3.75 \text{ inch radius squared}) \times 12 \text{ inches} \div 1728 \text{ cubic inches in a cubic foot}$). (Ex. M-74; see Tr. V: 42; Tr. VIII: 173.) The actual volume sampled often differs from the theoretical:

But in practice a perfect core is rare and we find the measured core rise and the volume of material recovered from each drive to be greater or

^{15/} We must reject claimant’s argument on appeal that a discovery is supported by the sale of \$3,000 worth of gold to the Custer Museum at five times the quoted gold price. Darr Moon testified that gold was sold to tourists in the form of jewelry at a local museum at five times the value of the gold content. (Tr. VI: 69-72.) Enhanced value resulting from the conversion of gold to jewelry is generally not reflective of the value of the gold for purposes of a discovery. United States v. Laczkowski, 111 IBLA 165, 173 n.8 (1989).

less than their theoretical amounts. When drilling gold placers, any deviation from the norm is important because when basing value calculations on small-diameter holes, any deviation between the theoretical sample size and the actual sample size becomes critical. For this reason, any excess or deficiency of core should be taken into consideration during the calculation procedure and suitable corrections applied.

Wells, Placer Examination, at 47. Reasons for variation include a rock partially blocking the drive shoe which may be driven down with the casing forcing material to one side and, in loose wet ground, overpumping involving pulling excess material from under the drive shoe. Id.

In evaluating the placer deposits on the claims, Wallace prepared a report (Ex. M-74) in which he relied primarily on the results of the 1992 churn drill sampling program including the drill logs and Hazen Research, Inc., assay report (Ex. H-13) to estimate the gold resources on the claims.^{16/} (Tr. V: 41.) The 1983 churn drilling results were not considered. Wallace testified he felt there was a problem with the 1983 samples and indicated that sample program was reported to him to be unreliable, but he acknowledged that he never checked the drill logs. (Tr. V: 150-51, 153.) To determine the resource grade for each drill interval, Wallace multiplied the milligrams of gold recovered in the sample (from the Hazen assay report) by the ratio of the bucket volume of the sample pumped from the pipe casing to the theoretical volume of the sample,^{17/} calculated as noted above for a sample cut with a seven and ½ inch drill shoe, to determine the “corrected” weight of gold for the sample interval. (Tr. V: 46; Ex. M-74 at Yellow Tab 3; Ex. M-121.) Dividing the resulting weight in gold by the number of vertical feet in the drill interval times 27 (the number of cubic feet in a cubic yard), Wallace calculated the milligrams of gold per cubic yard for each drill interval. This figure was multiplied by the price of gold per ounce and divided by 31,103 (the number of milligrams in an ounce) to calculate the grade of the resource in terms of the value of gold per cubic yard for each drill interval.

In another spreadsheet (Ex. M-74 at Yellow Tab 4), Wallace calculated the area of influence in square feet for each drill sample interval based on the boundaries

^{16/} Estimates projected from an upstream claim were used for the Square Deal and Hope claims. Bulk samples obtained on the MM #1 were used for that claim.

^{17/} When the sample bucket volume measured less than 50 percent of the theoretical volume, the ratio was capped at the number two. (Ex. M-121 at Tab A; Tr. VI: 139.) Ex. M-121, Moon’s analysis of the claims, was based on Wallace’s work reported in Ex. M-74.

of the placer material which he determined in his on-site examination in October 1993, assuming a zone of influence extending half the distance between adjacent drill holes (Tr. V: 22, 59-60, 89) and that the mineable area at bedrock would be half the width of the flood plain. (Tr. VI: 100.) Multiplying the vertical length of the drill sample in feet by the area of influence in square feet and dividing by 27 (the number of cubic feet in a cubic yard), Wallace calculated a volume in cubic yards for each sample grade which he multiplied by 1.20 to apply a swell factor of 20 percent. (Ex. M-74 at Yellow Tab 4.)

The results of the 1992 churn drill sampling set forth in the Wallace report formed the basis for the Moon report set forth at Ex. M-121. One difference was that the Moon report estimated a greater volume of resource and overburden to be mined based on his understanding that the Jordan Creek valley was generated by glaciers and, hence, had steeper sides with a U-shaped profile as opposed to the more V-shaped profile assumed by Wallace. (Tr. VI: 75.) The greater volume of resource associated with the U-shaped valley profile produced higher gross values. Compare Ex. M-74 at Yellow Tabs 7 and 8 with Ex. M-121 at Tabs G and H. Some of the 1992 samples disclosed relatively high gold values at certain depths. Thus, at the one foot interval between 10 and 11 feet deep on the OM #1 claim, the gold recovered from a single sample measuring 0.2 cubic feet in bucket volume contained 266.247 milligrams of gold which was calculated to represent a resource grade of \$464.28 per cubic yard at a gold price of \$401.76 per ounce. (Ex. M-121 at Tab G.) The sample interval immediately above this level indicated a grade of \$1.89 per cubic yard and the sample interval immediately below a grade of \$2.78 per cubic yard. Id. On the OM #2 claim, a sample taken over a drive interval of two linear feet, containing a bucket volume of 28.52 percent of the theoretical volume of the drill sample, when adjusted for the gold presumed to be in the theoretical volume indicated a grade of \$153.06 per cubic yard. Id. Samples from the intervals immediately above and below, also projected on the basis of a measured bucket volume of 28.52 percent of the theoretical volume, reflected values significantly less at \$45.83 and \$30.29 per cubic yard, respectively. Id. A sample from the bottom of OM #4-1 well with a drive interval of two inches recovered 162.97 percent of the theoretical sample volume and the value of the gold adjusted for the theoretical volume of the sample was found to be \$362.70 per cubic yard. The description indicates this sample was drilled ahead of the casing. Id. The one-foot drill interval immediately above that produced a substantially lower grade of \$68.78 per cubic yard. Id.

Two major issues emerged at the hearing with respect to the meaning and significance of the samples which provided the basis for the Wallace and Moon reports. The first involves the accuracy or representative nature of the samples taken and relates to the manner in which the samples were obtained. A second issue concerns the inferences which may be drawn from those samples with respect to the

placer deposit on the claims. Regarding the churn drilling technique, James Hodos was very critical of the 1992 drilling program. Hodos has extensive experience with churn hole drilling on placer claims over many years, having reviewed thousands of drill logs and having been in charge of obtaining the data on 100 to 200 occasions. (Tr. I: 22-23.) The extensive experience of Hodos with churn drill sampling of placer claims is in contrast to the limited experience of Wallace, who had only investigated three or four placer claims in which churn drilling was involved and acknowledged his lack of expertise in churn drilling. (Tr. V: 106, 120.) Hodos testified to the problems created by “drilling ahead” of the bottom of the casing and shoe in which the drill bit extends into material outside of the cased hole making it difficult to estimate the volume recovered and running a serious risk of inadvertently salting the sample by having gold come into the sample that would not have been in the sample had the pipe been driven all the way and the material taken from inside the casing. (Tr. I: 46, 85-86.)

In reviewing the 1992 drilling program, Hodos found a correlation between drilling ahead and high-grade samples. (Tr. I: 84-85.) In analyzing the samples from the claims, Hodos had problems with the high grade intercept reported in the 1992 drilling program from the well on the OM #1 at the 10 to 11 foot level, noting that the drill log (Ex. H-12) both lacks any core rise data and reflects drilling ahead of the casing. (Tr. I: 68-69.) He felt the sample value could be explained by the “nugget effect” in which a piece of gold weighing perhaps 260 milligrams dramatically altered the sample value. *Id.* at 67. Wallace acknowledged that drilling ahead occurred on six samples on the OM #1, all except one of which he found mineable, and on five intervals on OM #2 including most of the paying levels. (Tr. V: 125; *see* Ex. H-12 (drill logs).) Hodos also indicated that the general procedure with churn drilling is to leave a plug in the bottom of the pipe and not to remove all of the material until you hit bedrock. *Id.* at 86. He stated that drilling ahead is not a good sampling technique. *Id.* at 47. In his treatise, Wells also notes that drilling ahead may “create[] more problems than it solves.” Wells, Placer Examination, at 47.

With respect to the crucial matter of measuring the ratio of the volume of the sample obtained to the theoretical volume of the sample, Hodos testified that when the drill casing is driven into the ground it is important to measure how far the core sample rises in the casing which is recorded on the drilling log form as “measured core” under core data. (Tr. I: 41-42.) Sample volume can then be calculated by multiplying the rise or height of the core times π times the radius squared. (Tr. VIII: 173.) He explained that the printed form used as a log to record churn hole drill sampling has specific blanks for entry of core data including core rise and core pumped which are supposed to be filled out, but which were left blank in the case of the 1992 sampling. (Tr. I: 43-44.) Darr Moon conceded on cross-examination the significance of core rise as an indication of what you might expect to recover.

(Tr. VI: 206-07.) Hodos pointed out that in churn drill sampling water is added to the casing and the core which rose in the casing as a result of driving the casing downward is chopped up into fine particles with a drill bit attached to a wire cable. (Tr. I: 42.) The resulting slurry with the sample material is pumped from the core and dumped into a bucket at the surface. Id. He stated that, in his experience, the measured bucket volume used in the 1992 sampling is not an accurate measure of the volume sampled, noting that the churning and pumping of the material to be sampled in a water solution places a lot of material in suspension which is then lost from the bucket measure when the water is removed. Id. at 44-45; Tr. VIII: 173-75. He testified that use of the bucket volume to establish a correction factor is not industry practice. (Tr. VIII: 210.)

In his Jordan Creek Placer Drilling Report setting out the results of the 1983 churn drill sampling involving 20 holes drilled on the claims, E. D. Moon stated that the volume measured in the casing was 33 percent of the theoretical volume while the volume measured in the bucket was 16 percent of the theoretical volume. (Ex. H-7 at 000145.) Hodos testified that it was good practice to measure the bucket volume to avoid relying on excessive cores which arise when you pull in too much material when pumping out the chopped-up slurry. (Tr. VIII: 173-74.) Wallace acknowledged that a lot of the missing sample volume as measured in the bucket could be due to voids or water in the placer deposit. (Tr. V: 116.) He conceded on cross-examination that application of the correction factor to the sample assay assumes that the missing volume contained an equivalent rate of gold, but that this would not be the case where voids or water are present in the placer deposit. Id. at 116, 119-20.

In reviewing the evidence, we must initially modify the decision of the administrative law judge to the extent that he found that Wallace and Moon erred in multiplying the gold grade figures for the resource by the swell factor of 20 percent. This was done to determine the volume of the resource in loose cubic yards (swelled volume). The samples which they relied upon were chopped up with a drill bit and placed in a water-based slurry before they were pumped from the drill hole and placed in a bucket to measure the volume. Hence, we find the sample volume measured was in loose cubic yards or a swelled volume. Where the sample is measured in loose cubic yards, the relevant expansion factor is properly applied to the volume of the deposit in bank cubic yards to obtain the value of the resource. See United States v. Bush, 157 IBLA 359, 401 n.9 (2002) (Mullen, A.J., concurring).

Notwithstanding the error of the administrative law judge in reducing the grade of the resource by 20 percent because Moon calculated the value of the resource on the basis of the loose cubic yards, we find that the record supports the finding of the administrative law judge that the 1992 churn drill sampling results

relied upon by Wallace and Moon overstated the value of the resource on the claims based upon the evidence of problems with their sampling technique. The evidence in the record of the problems associated with drilling ahead and the correlation found between that procedure and some of the higher grade samples supports a finding that the 1992 samples are not representative of the grade of the deposit. Also compelling is the evidence that the bucket volume provides an inaccurate basis for comparing the volume of the sample to the theoretical volume and, thus, tends to overstate the grade of the deposit. The fact that in the 1983 placer drilling report, in which the core rise was measured, E. D. Moon found that the volume measured in the casing was 33 percent of the theoretical volume while the volume measured in the bucket was 16 percent of the theoretical volume indicates that in the context of this deposit use of the bucket volume to estimate the volume of the sample significantly overstates the grade of the deposit.

[2] In order to be valid and thus subject to patent, a mining claim must contain within its boundaries a “valuable mineral deposit” (30 U.S.C. § 22 (2000)). See 30 U.S.C. § 29 (2000); Best v. Humboldt Placer Mining Co., 371 U.S. 334, 335 (1963); United States v. Clouser, 144 IBLA 110, 113 (1998); United States v. Williamson, 45 IBLA 264, 277-78, 87 I.D. 34, 41-42 (1980). Such a deposit consists of minerals of such quality and in such quantity as to warrant a person of ordinary prudence in the further expenditure of his labor and means with a reasonable prospect of success in developing a valuable mine. See Castle v. Womble, 19 L.D. 455, 457 (1894); followed, Chrisman v. Miller, 197 U.S. 313, 322 (1905). Samples taken from a mining claim must be representative of the mineral deposit to be meaningful. United States v. Ledford, 49 IBLA 353, 355 (1980); United States v. Rosenkranz, 46 IBLA 109, 113 (1980); United States v. Bechtold, 25 IBLA 77, 88 (1976). A report of samples reflecting a relatively high grade may not support a discovery when the evidence discloses problems with the sampling technique used which preclude reliance upon the samples to provide a reasonable estimate of the grade of the resource.^{18/}

^{18/} Claimant’s witness, Ray Crosby, an operator who has worked claims on Jordan Creek, testified regarding a map (Ex. M-122A) showing resource grades from a 1910 drilling program on Jordan Creek which he described as “a curiosity piece” given to him by George Castle. (Tr. VII: 50, 52, and 78-79.) In view of the inability of any of the witnesses to provide any information regarding the specifics of the samples obtained or the details of the sampling technique used (except that the samples were obtained by churn drilling), the administrative law judge found they were entitled to little weight. (Decision at 63-64.) We affirm that a list of sample values without (continued...)

In their mineral reports projecting the grade of the resource to be mined based on the 1992 drill sampling, Wallace and Moon projected the grade of the resource found from the samples over large areas. The inferences which can be drawn from these samples was another major issue emerging from the hearing.

James Hodos used the sampling results from both the 1983 and the 1992 drilling programs in his analysis. Because critical information regarding the core volume sampled was not provided in the 1992 drill logs, Hodos used a different method to estimate the core volume sampled, which method could be applied to both sample data sets in order that the 1983, as well as the 1992, sampling results could be considered in his analysis of the claims. He calculated resource grades for each of the wells drilled in 1983 and in 1992 on the assumption that the sample volume was 12 percent smaller than the theoretical volume which had the effect of increasing the assayed value of the samples by 12 percent when calculating the grade of the resource sampled. (Tr. I: 48-51.) This correction from the sample value is referred to as the Radford factor. *Id.* at 51; Tr. II: 12; Wells, Placer Examination, at 48-49. His calculation of the grades was based on Moon's 1983 mineral report including the 1983 drill logs and assay report (Ex. H-7), the 1992 drill logs (Ex. H-12), and the Hazen Research, Inc., assay report on the 1992 samples (Ex. H-13). (Tr. I: 34.) Assuming a gold price of \$344.97/ounce,^{19/} he calculated a drill hole grade summary for each of the 1983 and the 1992 drill holes on the claims. (Ex. H-15.)

Adjusted for a gold value of \$401.76/ounce, his drill hole grades for the four wells drilled in 1983 on the Hope claim ranged from \$0.00/cubic yard to \$0.36/cubic yard.^{20/} (Ex. H-15 as adjusted for gold value of \$401.76/ounce.) There were no

^{18/} (...continued)

more information as to how the samples were obtained precludes reliance upon the reported values as representative. See United States v. Denham, 29 IBLA 185, 190 (1977).

^{19/} This was slightly less than the lower of the two gold values used by Wallace and Moon (\$353.40/ounce and \$401.76/ounce). For purposes of our analysis, we have adjusted these values as shown in Ex. H-15 to reflect a gold price of \$401.76/ounce.

^{20/} Darr Moon questioned the application of the Radford factor to the 1983 sample data by Hodos, asserting the results were 2/3 of the value that should have been calculated. (Tr. VI: 125-128.) He acknowledged, however, that Jordan Creek placer gold had a fineness factor of 0.666. *Id.* at 194. Wallace testified that the assay process used by Hazen on the 1992 samples removed all impurities from the gold in the sample so that the sample weight could be assumed to be 1000 fine or 100

(continued...)

wells drilled on the Hope claim in 1992. Wallace and Moon in their reports relied on data obtained from the Jordan Creek #2 claim located upstream of the Square Deal to project the grade of the resource on both the Square Deal and the Hope claims. (Ex. M-74 at Yellow Tab 4; Ex. M-121 at Tab D.) No samples were taken in the 1992 drilling program. Noting that grades of \$6/cubic yard and above warrant more attention, Hodos found no evidence of a discovery on the Hope claim. (Tr. I: 60-61.) Acknowledging the absence of any evidence of sampling on the Hope claim, E. D. Moon agreed that the prudent man standard had not been met with respect to the Hope claim. Accordingly, we must affirm the administrative law judge decision finding no discovery has been shown on the Hope claim.

On the OM #1, a claim over 1,100 feet in length (Ex. M-82, survey plat by E. D. Moon), the Wallace and Moon reports relied upon the single well drilled in 1992 to project a resource grade for the entire claim. See Ex. M-74 at Yellow Tab 7. The average well grades reported by Hodos (Ex. H-15), as adjusted, were \$0.04/cubic yard (#83-1), \$0.26/cubic yard (#83-2), and \$22.04/cubic yard (#92-1). This latter well, which reflected a value of interest, was located in very close proximity to well #83-2 which showed an insignificant grade. (Ex. H-59.) ^{21/} Hodos testified that one high value at the 10- to 11-foot strata which he attributed to the nugget effect is crucial to the high well grade. Further, the log for this sample lacks important core data and shows drilling ahead. (Tr. I: 66-69.) He prepared a stratigraphic cross-section of the data from the three wells (Ex. H-16) from which it can be seen that the higher grades at depth shown on the 1992 well (OM #1-1) did not continue at the same depth on the nearby OM #1-2 (1983). ^{22/} Finding that the high grade intercept cannot be projected in any direction, Hodos concluded that there is no evidence of discovery on the claim. (Tr. I: 69.)

With respect to the OM #2 claim, Wallace and Moon also relied upon the results of the single 1992 drill hole to project a resource grade for the entire claim. See Ex. M-74 at Yellow Tab 7. The drill hole grade summary prepared by Hodos (Ex. H-15), as adjusted, shows values of \$12.65/cubic yard (#83-1), \$1.11/cubic

^{20/} (...continued)

percent gold. (Tr. V: 54.) There was no similar testimony regarding the 1983 assay results.

^{21/} Exhibits H-56 through H-66 are large poster boards upon which the boundaries of the claims as depicted by Wallace (Ex. M-74 at Yellow Tab 9) have been projected along with the locations of the wells drilled in 1983 and 1992. (Tr. I: 54.)

^{22/} Darr Moon contended that continuity of a mineable grade was shown in the 1992 drill hole sampling program when resource grades are compared for the layers from bedrock to approximately 11 feet above. (Tr. VI: 102-04, 121; Ex. M-121 at Tab C.)

yard (#83-2), and \$11.67/cubic yard (#92-1). It appears from the plat of the claim (Ex. H-60) that these three wells reflecting such different grades are located very close together. Relatively higher grade samples from the 17 foot level to the 21 foot level were not present in the nearby well drilled in 1983 (#83-2). (Ex. H-107.) Hodos found no discovery on the OM #2 claim because no continuity has been established for the higher grade samples. (Tr. I: 73-74.) On the OM #3 claim, average drill hole grades (Ex. H-15), as adjusted, were \$0.15/cubic yard (#83-1), \$0.14/cubic yard (#83-2), \$0.01/cubic yard (#92-1), \$9.48/cubic yard (#92-2), and \$2.11/cubic yard (#92-3). The relative location of the wells was set forth on Ex. H-61. Wallace divided the placer deposit on this claim into three sections: Area A (#92-1), Area B (#92-3), and Area C (#92-2). (Ex. M-74 at Yellow Tab 9.) The Moon analysis showed areas A and B were uneconomic. (Ex. M-121 at Tab D.) Because the grade of the relatively high value hole drilled in 1992 did not extend either to the nearby well drilled in 1983 or to the three other wells drilled further north on the claim, Hodos concluded no continuity of grade was shown on the claim and, hence, no discovery. (Tr. I: 75-76; see Ex. H-103 (cross-section).)

In his analysis of the OM #4 claim, Wallace divided the claim into Areas A, B, and C. (Ex. M-74 at Yellow Tab 9.) For his computation of the grade of the resource in the areas, he relied upon drill hole OM #4-2 (#92-2) for Area A, OM #4-1 (#92-1) for Area B, and OM #5-1 situated on the OM #5 claim (#92-1) for Area C.^{23/} The OM #4 claim contained four wells drilled in 1983 (#83-1, \$0.02/cubic yard; #83-2, \$0.20/cubic yard; #83-3, \$8.98/cubic yard; and #83-4, \$2.90/cubic yard) as well as the two drilled in 1992 (#92-1, \$17.31/cubic yard and #92-2, \$7.86/cubic yard). (Ex. H-15, as adjusted.) Because the values run all over the map Hodos saw no continuity which would establish a viable deposit. (Tr. I: 77-80; Ex. H-62.) Viewing the well profiles in cross-section (Ex. H-102), he noted that the highest grade well has a very high grade interval in the bottom 0.2 feet which raised questions regarding the reliability of the sample volume and whether material from outside the casing was included in the sample, especially in view of the practice of drilling ahead. (Tr. I: 80-81.) The vertical cross-section also showed that relatively high value intervals did not extend to some other wells in close proximity. (Ex. H-102.) Accordingly, Hodos concluded there was no discovery on OM #4. (Tr. I: 82.)

Wallace depicted the OM #5 claim as including two discrete placer deposits separated by approximately 400 feet where no placer deposit was shown. (Ex. M-74 at Yellow Tab 9 (plat of OM #5).) Area A is at the north end of the claim, adjoining the OM #4 claim, and Area B is at the south end of the claim adjoining the OM #6

^{23/} Area C on OM #4 adjoins Area A on OM #5, the site of drill hole OM #5-1 (#92-1).

claim. Id. In calculating the grade of the resources in the deposit for Area A, Wallace and Moon relied upon the OM #5-1 (#92-1) drill hole. Id. at Yellow Tabs 7, 9; Ex. M-121 at Tab D. Drill hole #92-1 (OM #5-1) had a relatively high average grade of \$15.45/cubic yard. (Ex. H-15, as adjusted.) Hodos noted, however, that the log reflected drilling ahead at the highest interval and one of the other high intervals. (Tr. I: 84; see Ex. H-12 (OM #5-1 drill log).) Drill hole #83-1 located in very close proximity to #92-1 had a much lower average grade of \$4.15/cubic yard. (Ex. H-15, as adjusted; Ex. H-63 (plat).) For Area B, the Wallace and Moon projections were based on drill hole OM #6-1 (#92-1) located on the adjoining OM #6 claim. See Ex. M-74 at Yellow Tabs 7 and 9; Ex. M-121 at Tab D. Drill holes #83-1, #83-2, and #83-3, situated in close proximity to #92-1 (and much closer to that well than to Area B on the OM #5 claim), had much lower drill hole grades of \$0.55/cubic yard, \$0.05/cubic yard, and \$0.05/cubic yard, respectively. (Ex. H-15, as adjusted; Ex. H-58 (plat of OM #6).) On the basis of this variation in grade, Hodos testified that no continuity of a mineable grade has been established and, hence, no discovery has been shown on OM #5. (Tr. I: 83.)

With respect to the OM #6 claim, five holes were drilled in the 1983 program showing average grades reported by Hodos as \$0.64/cubic yard (#83-1), \$0.05/cubic yard (#83-2 and #83-3), \$0.14/cubic yard (#83-4), and \$0.91/cubic yard (#83-5). (Ex. H-15, as adjusted.) The sole well drilled on the claim in 1992 (#92-1) showed a relatively high grade of \$9.57/cubic yard. Id. Despite the one drill hole grade of interest, Hodos found the other drill holes provided no basis to project an extension or infer a continuity of the high grade deposit. (Tr. I: 87.) Accordingly, he concluded no discovery had been shown on the claim. Id. at 90.

In the case of the MM #2 claim, the analysis prepared by Moon showed the claim to be uneconomic. (Ex. M-121 at Tab G.) Wallace also found no discovery on the claim. (Tr. V: 40-41; Ex. M-74 at Yellow Tab 8.) Hodos agreed that the drill hole on the claim did not reflect an economic grade. (Tr. I: 90.) Accordingly, we must affirm the decision of the administrative law judge declaring the MM #2 claim null and void. Wallace also found no discovery on the MM #1 claim. (Tr. V: 40-41; Ex. M-74 at Yellow Tab 8.) Areas A and B were found unprofitable by Moon. (Ex. M-121 at Tab G.) Area C on MM #1, encompassing 0.54 acres, was found by Moon to be profitable on the basis of bulk samples taken. Id. Moon projected resource grades for Area D on the MM #1 claim (0.20 acres) on the basis of a drill hole on the adjacent Moonbeam claim, MB-1 (#92-1) and found Area D to be economic. Id. There were no drill hole samples on MM #1 and Hodos found no evidence of a discovery on the claim, concluding that the area with the bulk samples was too small to be mined. (Tr. I: 91; Tr. II: 63-64.) Hodos found the grade of drill hole MB-1 (#92-1) to be uneconomic and, hence, felt there was no evidence of a discovery on the Moonbeam claim. (Tr. I: 91-92.)

Hodos testified that further drilling would be required to establish continuity of the high grade resource reflected in some of the samples. (Tr. I: 71, 76, 84.) As pointed out by claimant's counsel, the case law does not require that a deposit of sufficient size and value be actually "blocked out." See United States v. Hooker, 48 IBLA 22, 30 (1980); United States v. Pressentin, 71 I.D. 447, 451 (1964), aff'd, Pressentin v. Udall, No. 1194-65 (D.D.C. Mar. 19, 1969). The record reveals that Hodos was aware of this principle and that in his testimony he distinguished the failure of the evidence (e.g., inconsistent drill hole samples) to support a continuity of high grade resource by geologic inference from a requirement that a deposit be blocked out. (Tr. II: 33-35.)

[3] The Board has held that "where values have been high and relatively consistent, geologic inference can be used to infer sufficient quantity of similar quality mineralization beyond the actual exposed areas, such that a prudent man would be justified in expending labor and means with a reasonable prospect of success in developing a paying mine." United States v. Feezor, 74 IBLA 56, 79, 90 I.D. 262, 274-75 (1983), quoted in, United States v. Knoblock, 131 IBLA 48, 92, 101 I.D. 123, 146-47 (1994). Claimant infers the existence of a mineable deposit on the claims solely on the basis of certain holes drilled in 1992 and situated on the OM #1, OM #2, OM #3, OM #4, OM #5, OM #6, and Moonbeam claims.^{24/} (Ex. M-121 at Tab G.) In drawing this geologic inference, however, claimant ignores churn drill samples from other wells, especially those drilled in the 1983 sampling program, which do not support the existence of a mineable deposit of placer gold on the claims, as detailed above. Claimant has provided no basis for using geologic inference to project the continuity of a mineable deposit when other samples do not exhibit those values. United States v. Knoblock, 131 IBLA at 92, 101 I.D. at 147.^{25/} Accordingly, we find the preponderance of the evidence does not show a deposit

^{24/} The only exceptions are the Square Deal and Hope claims where, as noted above, grades are based on projections from an upstream claim which were not presented in evidence and the MM #1, Area C, encompassing 0.54 acres where the grade was based on three bulk samples. See Ex. M-121 at Tab G.

^{25/} Ellen Hodos, partner of James Hodos, a geologist and mining engineer with experience in mining claim validity examinations, testified to the importance of the ratio of the recovery (R) value to exploration (E) value (R/E ratio) in evaluating mineral resources as noted above. She stated that according to relevant literature, grades reported in holes drilled for exploration have historically been higher than the grade of the resource developed in mining. See Tr. II: 228; Ex. H-20, Raul Choate, Geology and Ore Deposits of the Stanley Area 105 (1962). Reviewing the literature, she calculated the historical R/E ratio at approximately 24 percent, as distinguished from the Wallace/Moon projected recovery of 100 percent. (Tr. VIII: 90-93.)

of minerals of such quality and in such quantity as to warrant a person of ordinary prudence in the further expenditure of his labor and means with a reasonable prospect of success in developing a valuable mine. We affirm the decision of the administrative law judge in this respect. Although the finding in this regard is dispositive, the administrative law judge went on to consider the gross value of the deposit using claimant's projected grade based solely on the 1992 drilling program.

[4] The prudent man standard of discovery initially set forth in Castle v. Womble, 19 L.D. at 457, has been supplemented by the marketability test entailing a showing that the mineral deposit can be extracted, removed, and marketed at a profit. United States v. Coleman, 390 U.S. 599 (1968). Although the claimant of a mining claim located for a precious metal (gold) need not prove that the gold can presently be extracted, removed, and marketed at a profit, evidence of the costs and profits of mining the claim may be properly considered in determining whether a person of ordinary prudence would be justified in the further investment of his labor and capital. Lara v. Secretary of the Interior, 820 F.2d 1535, 1541 (9th Cir. 1987).

[5] It has been recognized for at least the last 30 years that the cost of compliance with governmental regulations and other environmental requirements are properly considered in determining whether there has been a discovery. Great Basin Mine Watch, 146 IBLA 248, 256 (1998); United States v. Pittsburgh Pacific Company, 30 IBLA 388, 405, 84 I.D. 282, 290 (1977), aff'd sub nom. South Dakota v. Andrus, 614 F.2d 1190 (8th Cir.), cert. denied 449 U.S. 822 (1980); United States v. Kosanke Sand Corporation (On Reconsideration), 12 IBLA 282, 298-99, 80 I.D. 538, 546-47 (1973). We are aware of no precedent for appellant's assertion that regulation under statutes such as the ESA or the CWA is limited solely to the prevention of unnecessary or undue degradation of natural resources not necessary to develop a mineral deposit.^{26/} In Great Basin Mine Watch we expressly rejected the argument that, since the BLM surface management regulations at 43 CFR Subpart 3809 recognize the right of claimants to locate mining claims pursuant to the Mining Law of 1872 on available public lands and are focused on prevention of unnecessary and undue degradation, it follows that compliance with relevant environmental laws may not be required if this would render mining uneconomic. Great Basin Mine Watch, 146 IBLA at 256.^{27/}

^{26/} The Secretary of the Interior is mandated by section 302(b) of the Federal Land Policy and Management Act of 1976, 43 U.S.C. § 1732(b) (2000), to "take any action necessary to prevent unnecessary or undue degradation of the lands."

^{27/} Under current regulations the argument is largely moot since the definition of unnecessary and undue degradation includes failure to comply with performance standards set forth at 43 CFR 3809.420. 43 CFR 3809.5. These standards require,
(continued...)

Testimony was provided by wildlife biologist Robert Jacobson, retired Assistant Regional Director, FWS, who supervised approximately 200 wildlife biologists responsible for providing input on permits issued by the U.S. Army Corps of Engineers under section 404 of the CWA.^{28/} (Tr. III: 100.) He testified (Tr. III: 106-08) that he was familiar with Moon's plan to mine by dewatering the flood plain including relocating the streambed of Jordan Creek, along with the assessment of potential environmental impacts and appropriate mitigation requirements for development of the claims, prepared by Robert Tiedemann, a consultant to Moon Mining. (Ex. M-72.) According to Moon's consultant, the permits, reviews, and approvals likely required for the project include NEPA review, a FS Plan of Operations, a permit from the Corps of Engineers under section 404 of the CWA, a National Pollution Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (EPA), consultation with the FWS and the National Marine Fisheries Service (NMFS) pursuant to the ESA, a Stream Channel Alteration Permit and a Well Drilling permit issued by the Idaho Department of Water Resources, and a Dredge and Placer Mining Permit issued by the Idaho Department of Lands. (Ex. M-72 at 3.) Jacobson confirmed that a section 404 permit would be required from the Corps of Engineers, FS would have to approve a plan of operations after completion of NEPA analysis, and that consultation would be required with the NMFS regarding three salmon species. (Tr. III: 112-14.) If a section 404 permit were issued by the Corps of Engineers, it would be subject to mitigation measures required by commenting agencies such as FWS, FS, EPA, NMFS, and relevant State agencies (Departments of Water Resources, Lands, and Fish and Game). *Id.* at 116, 121.

Noting the presence of three listed salmon species (Chinook salmon, Sockeye salmon, and steelhead) and critical habitat, Jacobson testified he believed issuance of a required section 404 permit was unlikely. (Tr. III: 123-24, 145.) In the event a permit was issued, he indicated that on-site mitigation in the form of restoration of existing conditions as well as off-site mitigation in the form of replacement of wetlands impacted by mining in a ratio between 5 to 1 (acres of mitigation to acre of disturbed wetlands) and 8 to 1 would be required by FWS. (Tr. III: 124-30.) Moon's consultant Tiedemann, a wetlands specialist and wildlife biologist, explained that mitigation is a term of art with respect to wetlands which encompasses both actions

^{27/} (...continued)

among other things, compliance with all applicable Federal and state water quality standards and all actions necessary to prevent adverse impacts to threatened or endangered species and their habitat. 43 CFR 3809.420(b)(5) and (7).

^{28/} The Corps is responsible for issuance of a permit for the discharge of dredged or fill material into wetlands and waters pursuant to section 404 of the CWA. 33 U.S.C. § 1344 (2000).

to avoid or ameliorate impacts on-site as well as actions off-site to establish a replacement for the resource which has been adversely affected by the project. (Tr. IV: 21-22.) Alison Beck Haas, a supervisory wildlife biologist with FWS whose responsibilities include reviewing actions under the ESA, also stated that the off-site mitigation, as well as on-site mitigation, would be required. (Tr. VIII: 25-26.) She noted the presence of Chinook salmon, a listed species, in Jordan Creek, which was designated as critical habitat. *Id.* at 20-21, 71. The mitigation ratio would be affected by various factors including the function and value of the impacted site, likelihood of success of mitigation, and the duration of the impact over the life of the project. *Id.* at 27-28, 33. With respect to mitigation, she noted that it is the nature of the impacts of the project, rather than the size of the project, which matters. *Id.* at 32.

As early as September 11, 1990, the NMFS published notice of the filing of petitions presenting substantial scientific information indicating that listing may be warranted for the Snake River spring/summer chinook salmon and a proposed rule listing the species as threatened was published June 27, 1991. 56 FR 29542. The NMFS published its determination to list the Snake River sockeye salmon as endangered on November 20, 1991, 56 FR 58619, and the Snake River spring/summer chinook salmon as threatened on April 22, 1992, pursuant to the ESA.

Robert Lewis, BLM geologist and mineral examiner who has investigated and analyzed the claims, consulted with regulatory officials of FWS and the Corps of Engineers regarding costs to mitigate environmental impacts and was referred to the Hecla wetlands mitigation project on Jordan Creek located just downstream of the Moon claims. (Tr. III: 24, 28-30.) He focused on Hecla's mitigation plan (Ex. H-36) to estimate mitigation/reclamation costs associated with developing the Moon claims. (Tr. III: 31.) After referring to a breakdown of Hecla's costs associated with the Jordan Creek mitigation (Ex. H-35, Fig. 1),^{29/} he consulted with Hecla's contractor

^{29/} Appellant asserts that the administrative law judge erred in relying upon Ex. H-35 on the ground that it constitutes hearsay evidence regarding the cost of reclamation and mitigation, noting that the author of the letter which included the statement of costs is an employee of Hecla who did not testify at the hearing. Citing R.C.T. Engineering v. OSM, 121 IBLA 142 (1991), appellant contends that it does not bear the requisite indicia of reliability. The exhibit was introduced through the testimony of BLM mineral examiner Lewis to whom the cover letter was addressed. Lewis testified that he obtained the information as part of his effort to ascertain the actual cost of wetlands mitigation. (Tr. III: 33.) He explained that he was referred by regulators to the Hecla mitigation for an example of likely mitigation costs and that he compared the figures provided to Hecla's mitigation plan (Ex. H-36). (Tr. III: 33.) (continued...)

and reduced the costs by eliminating some which might not be required in Moon's case. (Tr. III: 36.) Based on the information he obtained, he divided the sum of those costs set forth at Ex. H-35, Fig. 1, which he found applicable to Moon's mitigation by the number of acres of mitigation to calculate a reclamation/mitigation cost of approximately \$300,000 per acre. (Tr. III: 33-40.) Jacobson concurred that the type of mitigation provided by Hecla in its earlier Jordan Creek wetlands mitigation project located just downstream of the Moon claims would be appropriate and the costs incurred of approximately \$300,000 per acre represent a good ballpark estimate. (Tr. III: 134-38; Ex. H-35.) This estimate did not include the cost of land acquisition for off-site mitigation. (Tr. III: 137-38.)

Moon's consultant, Tiedemann, did not accept the \$300,000 per acre estimate of mitigation costs. (Tr. IV: 96.) His computation of mitigation costs is found at Ex. M-72 and totals \$37,754 per acre. (Tr. IV: 95.) His estimate includes certain on-site mitigation or reclamation costs, but did not include off-site mitigation. He felt that since Moon would be able to repair and restore the Jordan Creek flood plain, there would not be a requirement for off-site mitigation. (Tr. IV: 105-06.) In distinguishing the Hecla mitigation, Tiedemann noted that the Pinion Creek wetland (for which the Jordan Creek mitigation compensated) was completely lost and was not restored. (Tr. IV: 99.) Jacobson did not agree with his assessment, finding that off-site mitigation would be required because, even to the extent the stream is ultimately restored in the long term, the mine plan called for the excavation of two miles of critical habitat which would have to be replaced in the short term.^{30/} (Tr. III: 161, 220.) Further, Jacobson noted that this is a high-energy stream based on the evidence of scouring of the flood plain (Tr. III: 225) and the difficulties experienced by Hecla with mitigation of the Jordan Creek streambed (many of the improvements were later washed out in a major flood). He asserted this would make the ultimate success of reclamation doubtful and support requirement of off-site mitigation. (Tr. III: 142.)

The administrative law judge found that the Snake River Sockeye salmon was a listed species and the Snake River spring/summer Chinook salmon had been proposed for listing and the subsequent listing was reasonably anticipated at the time

^{29/} (...continued)

Under the circumstances, we find that this statement signed by a company official and prepared in response to an inquiry by a BLM mineral examiner who testified as to his investigation of costs bears sufficient indicia of reliability and, hence, that the administrative law judge properly admitted Ex. H-35.

^{30/} Tiedemann acknowledged that he had never been involved with a project that included excavation of designated critical habitat. (Tr. IV: 132-33.)

the FHFC was issued. Although Jordan Creek was not proposed and designated as critical habitat until December of 1992 and December of 1993, respectively, the administrative law judge held the presence of habitat for the listed Chinook salmon which would be disturbed by appellant's mining operations justified a finding that, at a minimum, appellant would be required to provide on-site restoration plus mitigation at a ratio of 3 to 1. (Decision at 46.) We find this is fully supported by the evidence at the hearing as detailed above.

In addressing costs associated with mining, Wallace estimated operating costs consisting of \$1 per cubic yard of material mined, \$3 per cubic yard of material hauled, and \$2 per cubic yard of material processed. (Ex. M-74 at Yellow Tab 5; Tr. V: 73-74.) He based his estimate on his experience in examining similar mining operations. (Tr. V: 70-71.) Wallace is an experienced mineral examiner, having retired from FS where he served in that capacity (Tr. IV: 224, 239) and we find the record supports reliance upon his cost projections in this regard. Mining costs included mining both the overburden and the mineral material to be processed for gold recovery. (Tr. V: 70.) About half of the overburden material would be stored off-site during mining^{31/} and later returned. *Id.* at 74. Costs of hauling include the half of the overburden stored off-site and all of the mineral material to be processed which would be hauled by truck to another site for processing. *Id.* at 70. Wallace acknowledged on cross-examination that his cost for hauling was for a "onetime haul." (Tr. V: 177.) Wallace did not include either capital costs or environmental (reclamation/mitigation) costs in his estimate. *Id.* at 76-77, 162.

With respect to the costs of reclamation/mitigation associated with appellant's mine plan, both Tiedemann and James Hodos emphasized the importance to reclamation of segregating and stockpiling the layers of overburden by soil type and replacing the excavated material in the pit in the inverse order in which it was removed. Especially crucial is keying the relatively impervious clay layer into the adjacent clay layer in order to protect the stream habitat and prevent the stream from disappearing into the gravel beneath it. (Tr. IV: 62, 200-01; Tr. VII: 184-87.) Tiedemann's cost estimate for mitigation (Ex. M-72) did not include either the costs of segregating and stockpiling the separate layers of excavated material or the cost of returning the material to the pit and replacing the layers in sequence with the exception of a cost of \$4.23/cubic yard for redepositing and grading a one-foot surface layer. (Tr. IV: 200-01.) In projecting operating costs, Wallace estimated the cost of hauling the excavated material including the material to be processed and half the overburden (Tr. V: 70) to be \$3.00 per cubic yard, but this was a one-time cost and he did not include a cost for hauling the excavated material back to the pit. (Tr. V: 177-78; Ex. M-74.) Based on Wallace's calculation of 486,087 cubic yards of

^{31/} The other half of the overburden would be stored on-site.

material to be hauled from all of the claims (except the Marilyn) and 24.69 acres on the claims to be mined (Ex. M-74 at Yellow Tab 8), the administrative law judge found that a reasonable estimate of the cost of hauling the backfill to the excavation would be \$1,458,261 (486,087 cubic yards x \$3.00 per cubic yard) which, when divided by the 24.69 acres in the deposit yielded a cost of \$59,063 per acre. (Decision at 48.) All or part of certain claims were conceded by Moon in his analysis (Ex. M-121 at Tab H) to be uneconomic to mine (Marilyn, OM #3 Areas A and B, OM #6 Area B, and MM #1 Areas A and B). In addition, the U-shape valley profile used in Moon's analysis entails hauling a greater volume of material. Given these facts, we find it more reasonable to calculate the cost of hauling backfill per acre on the basis of the cost of hauling backfill for the areas which would be mined (\$1,427,526) divided by the number of acres in the areas which would be mined (18.01 acres), providing a cost of backfilling of \$79,263 per acre.

Appellant's reclamation cost projection also failed to include the cost of backfilling the excavated layers in sequence, including handling needed to key in the impermeable clay layer. Regarding the cost of backfilling the excavated material to be replaced, Tiedemann testified it was reasonable to assume the same \$4.23/cubic yard cost he used for the one-foot layer would apply to the full depth of backfill. (Tr. IV: 216.) Thus, the evidence supports the finding by the administrative law judge, using the average depth of the deposit to bedrock of 23.5 feet testified to by Darr Moon (Tr. VI: 101), that the volume of backfill per acre is 37,913 cubic yards (23.5 feet x 43,560 square feet per acre/27 cubic feet per cubic yard) costing \$160,372 per acre. (Decision at 49.) Hence, Tiedemann's reclamation cost (\$37,754 per acre), the cost to haul the excavated material back to the pit (\$79,263 per acre), and the cost of backfilling (\$160,372 per acre) total \$277,389 per acre. Certain costs are still omitted as appellant failed to include the cost of acquiring lands for purposes of mitigation, estimate costs associated with obtaining a FS plan of operations, a dredge and placer mining permit from the Idaho Department of Lands, a well drilling permit from the Idaho Department of Water Resources, preparation of NEPA compliance documents, or for consultation with FWS or NMFS regarding compliance with the ESA.^{32/} (Ex. M-72; Tr. IV: 87-88.) Tiedemann's estimate of mitigation costs

^{32/} For preparation of the NEPA analysis and ESA consultation required prior to any authorization to proceed with development, Tiedemann explained that he included no costs because the relevant Government agency will absorb the cost if the applicant is content to wait for them to do it rather than pay to hire its own consultant. (Tr. IV: 86-88.) He acknowledged the delay associated with this process could take at least two years. Id. at 180.

for the mine failed to include a figure for the cost of wells to dewater the area being mined. See Ex. M-72 at Summary of Costs. Darr Moon was not able to say whether dewatering costs were included in Tiedemann's cost summary. (Tr. VIII: 262.) Noting that the uncertainty as to the location and condition of any potential area for off-site mitigation makes it difficult to ascertain a precise cost per acre, the administrative law judge found that using a cost equal to that for on-site reclamation would be reasonable. Such a figure is consistent with the cost of mitigation estimate provided in the testimony of Lewis and Jacobson, as noted above. Adopting a conservative approach to give claimant the benefit of any uncertainty, the administrative law judge proceeded to use a mitigation cost per acre equal to half the reclamation cost. (Decision at 49-50.) Given the evidence on mitigation requirements, we find this projection of half the reclamation cost for mitigation to be more than fair to claimant.

Although the administrative law judge found that a mineral deposit bearing the resource grade projected by Wallace could not be inferred to exist on the claims on the basis of the evidence, a finding which we affirm as noted above, he proceeded to consider whether the claims could be economically mined assuming, arguendo, the resource grade projected by claimant exists. Reviewing the total of operating costs for mining, hauling, processing, reclamation, and mitigation, the administrative law judge found these costs to be in excess of the gross value of the deposit on the claims as reflected in the Moon Report (Ex. M-121 at Tab G) when reduced by 20 percent because of the use of loose cubic yards rather than bank cubic yards. (Decision at 55-56.) While we are unable to affirm the 20 percent reduction in grade of the deposit on this basis as explained above, the preponderance of the evidence indicates that Moon and Wallace have inferred a grade of resource which cannot be sustained on the record in view of sampling technique problems and substantially inconsistent samples which were ignored. Reducing the grade (gross value) of the resource inferred by Wallace and Moon by a mere five percent, an amount fully supported by the evidence in the record, it can be seen that the operating costs and the reclamation/mitigation costs established by the evidence would exceed the value of the resource extracted without consideration of capital and certain other costs.

Claim	Cost of Mining	Cost of Hauling	Cost of Process'g	Total Operating Costs	Reclamation Mitigation Costs	Reclamation Mitigation & Operating Costs	Gross Value At \$401.76 M 121 Tab Less 5%
Square Deal	\$29,369	\$64,401	\$27,132	\$120,902	\$748,950	\$869,852	\$172,562
Hope	\$34,782	\$76,272	\$32,132	\$143,186	\$887,645	\$1,030,831	\$204,369
OM #1	\$65,147	\$130,875	\$44,206	\$240,228	\$1,664,334	\$1,904,562	\$1,894,934
OM #2	\$66,045	\$150,477	\$68,544	\$285,066	\$998,600	\$1,283,666	\$1,187,971
OM #3, Area C	\$34,533	\$77,577	\$34,372	\$146,482	\$658,799	\$805,281	\$471,950
OM #4, Area A	\$49,327	\$92,865	\$25,166	\$167,358	\$963,927	\$1,131,285	\$560,225
OM #4, Area B	\$93,944	\$180,522	\$52,808	\$327,274	\$1,470,162	\$1,797,436	\$1,377,466
OM #4, Area C	\$11,235	\$23,115	\$8,350	\$42,700	\$173,368	\$216,068	\$211,059
OM #5, Area A	\$9,975	\$20,523	\$7,414	\$37,912	\$152,564	\$190,476	\$187,388
OM #5, Area B	\$24,099	\$44,343	\$10,926	\$79,368	\$388,345	\$467,713	\$301,642
OM #6, Area A	\$159,270	\$293,067	\$72,216	\$524,553	\$2,558,914	\$3,083,467	\$1,993,560
MM #1, Area C	\$18,278	\$54,834	\$36,556	\$109,668	\$374,475	\$484,143	\$197,148
MM #1, Area D	\$8,594	\$21,408	\$11,356	\$41,358	\$138,694	\$180,052	\$67,177
Moonbeam	\$83,214	\$197,247	\$96,566	\$377,027	\$1,310,663	\$1,687,690	\$641,179

A finding that a prudent individual would be justified in attempting to develop a paying mine necessarily involves consideration of whether or not a mineral deposit has been exposed within the limits of a claim and, if so, whether the evidence is such that an individual would be justified in concluding that the exposed mineral exists in sufficient quantity and quality so as to make expectations of its profitable extraction reasonable under the facts of record. United States v. Clouser, 144 IBLA at 113; see United States v. Knoblock, 131 IBLA at 92, 101 I.D. at 146-47. The preponderance of the evidence does not support such a finding in this case.

Appellant has presented many arguments in pursuing this appeal, some less relevant than others. To the extent that any of those contentions have not been specifically addressed in this decision, they have been considered and rejected.

Therefore, pursuant to the authority delegated to the Board of Land Appeals by the Secretary of the Interior, 43 CFR 4.1, the decision of the Administrative Law Judge is affirmed as modified, the Hope, Marilyn, Olga Marie Nos. 1 through 6, Mickey Marie Nos. 1 and 2, and Moonbeam unpatented mining claims are declared invalid for lack of a discovery, and the mineral entries are cancelled.

C. Randall Grant, Jr.
Administrative Judge

I concur:

Gail M. Frazier
Administrative Judge