MF-203
Revised March 24, 1955

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For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator Shannon Mining Company
Docket No. DMEA-3515
Contract No. Idm-E
Contract Date

CONSENT TO LIEN

To the United States of America:

Referring to that certain land in the County of Cochise, State of Arizona described as follows:1/

Patented Mining Claims: The Empire, Charleston, Copper Belle, Elizabeth, Durand, Dandy, Oak Grove, Joe, and Katherine A, United States Patent recorded in the Office of the County Recorder of Cochise County, Arizona, in Book 26 of Deeds of Mine, at Page 50 et seq.

Unpatented Mining Claim: Pick.

which is the subject of a proposed exploration project contract, hereinafter called the "contract," with the United States of America, hereinafter called the "Government;" in consideration of the contract and as an inducement to the Government to enter into it, the undersigned hereby--

1. Undertakes and agrees that property in which the Government may acquire an interest or equity under the contract may be dismantled, severed from the land, and removed, as may be provided in the contract; and the Government's interest and equity in such property shall be prior and superior to any adverse right or claim of the undersigned;

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom to secure the payment to the Government of a percentage royalty on production as may be provided for by the contract;2/ and represents and undertakes that there are no claims, liens, or encumbrances upon the undersigned's right, title, or interest in the land prior to that hereby granted to the Government other than the following:3/

R.F.C. claim for $2,500, without interest, payable at rate of 5% royalty.

3. Undertakes and agrees neither to commit any act nor assert any claim in conflict with the provisions of this Consent to Lien; and to give advance notice of the Government's rights under this Consent to Lien to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, or interest in the land; and

1/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in book _____ page _____ official records of said county." If (b) is used, the book and page of recordation cannot be dispensed with. If the space provided is insufficient, use an Annex, and refer to the Annex in the space.

2/ Mining or production from the land is not required, and in the absence of production there is no obligation to repay the Government.

3/ Write "none" if that is the case. Do not leave lines blank.

4. Consents to all amendments and assignments of the contract without notice thereof, and agrees that this Consent to Lien shall extend and apply thereto.

5. Added provision: _____

_____

_____

_____

_____

_____

_____

_____

AUG 25 1955

Dated this _____ day of _____, 195__.

_____ [Seal]

_____ [Seal]

_____ [Seal]

I, _____ certify that I am the _____ _____ (Secretary, etc.) of the corporation named herein; that _____ _____ who signed this agreement was then _____ (President or Vice-President, etc.) of said corporation; that said agreement was duly signed for and in behalf of said corporation by authority of its governing body, and was within the scope of its corporate powers.

_____

[Corporate Seal]

Government's copy

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SEP 16 1955

MF-200
(Revised June 1954)

Docket No. DMEA - 3515

Commodity Copper-lead-zinc

Contract No. Idm-E 861

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

EXPLORATION PROJECT CONTRACT[1]

It is agreed this AUG 25 1955 day of ....., 195..., between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and [2] Shannon Mining Company, a Delaware corporation (subsidiary of Peru Mining Company which is wholly owned by Illinois Zinc Company),

whose mailing address is P. O. Box 309
Silver City, New Mexico,
hereinafter called the "Operator," as follows:

ARTICLE 1. *This contract* is entered into under the authority of the Defense Production Act of 1950, as amended. It consists of this form (MF-200), the attached Exhibit "A," Annex I, and 3 maps.

The Operator shall not transfer or assign this contract or any right thereunder without the written consent of the Government.

ARTICLE 2. *Operator's property rights.*—(a) The land which is the subject of this contract (hereinafter called "the land") is in the State of Arizona, County of Cochise, and is described in Annex I.[3]

(b) The Operator represents and undertakes that:

(1) The Operator is the [4] See Annex I of [5] See Annex I in the land, in possession and entitled to possession for all of the purposes of this contract, under and by virtue of a [6] See Annex I, [7] - recorded in Book -, page -, official records of said County; and

(2) The Operator's right, title, or interest (whether as owner, lessee, or otherwise) is subject only to the following claims, liens, or encumbrances: R.F.C. claim for $2,500, without interest, payable at rate of 5% royalty

(c) The Subordination Agreement of the holder of any claim, lien, or encumbrance listed above, and (if the Operator does not hold the legal title) the Consent to Lien of any holder of the legal title

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] Insert name, and if an organization, its nature (corporation and place of incorporation, partnership with names of partners, etc.).
[3] State on a separate sheet marked "Annex I" the legal description or enough to identify the property, particularly excluding any areas from which the production is not to be subject to the Government's percentage royalty.
[4] Insert "owner," "lessee," "contract purchaser," "locator," etc.
[5] Insert "the entire interest," "the mineral rights," "an undivided one-third," etc.
[6] Insert "deed," "lease," "contract," "location notice," "patent," etc.
[7] If not recorded, so indicate by inserting "un."

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of the land (lessor, seller, optionor, etc.), are attached, as follows: Consent to Lien of lessors. Subordination Agreement from R.F.C. is waived.

(d) The Operator shall preserve and maintain his right, title, and interest in the land and his right to the possession thereof for the purposes of this contract, and shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of this contract. Until the lapse of the time within which the Government may make a certification of discovery or development without any such certification having been made, and after any such certification has been made, the Operator shall neither transfer, convey, nor surrender the land nor any right, title, or interest therein, nor permit nor suffer any claim, lien, or encumbrance thereon, without expressly referring to and providing in the instrument of conveyance, lien, or encumbrance for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof. If the Government makes no certification of discovery or development within the time limited in Article 8, it shall thereafter have no claim against the land or any production therefrom except for any production referred to in Article 8(b)(1).

ARTICLE 3. *The exploration project.*—The project is a search for indicated or undeveloped deposits of copper, lead, and zinc. The work to be performed is described in Exhibit "A." The Operator on or before ..... shall commence the work, and on or before September 1, 1956 (unless the Operator's obligation to prosecute the work is terminated—see Article 10) shall either have completed the work or shall have incurred allowable costs (see Article 6) in a sum not less than the estimated total allowable cost set forth in Exhibit "A," except as otherwise provided in Exhibit "A."

ARTICLE 4. *Performance of the work.*—(a) *Operator's responsibility.*—The work shall be performed with reasonable diligence, efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for liability insurance covering employment; and with suitable and adequate equipment, facilities, materials, supplies, and labor, to bring it to completion within the time fixed.

(b) *Independent contracts.*—To the extent that the allowable costs are estimated in Exhibit "A" with express reference to performance by independent contractors on a unit-price basis (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations), the work may be so performed; but if the reference in Exhibit "A" to any such independent contract requires the Government's approval thereof, payments under such contract will not be allowable costs unless the Government gives its written approval of the contract. Any such independent contract shall refer to some specific and identifiable part of the work, and shall be subject to all of the pertinent terms and conditions of this exploration contract; but the Government shall not be considered a party thereto, and its rights under this contract, including the right to terminate its contributions, shall not be affected thereby. Regardless of the provisions of any such independent contract and regardless of the Government's approval thereof, the Government will participate in payments to the independent contractor only on account of work performed in accordance with the provisions of this exploration project contract, and only to the extent that the Government deems the unit prices for the work under the independent contract to be reasonable.

(c) *Government may inspect.*—The Operator shall consult with and inform the Government on all phases of the work as it progresses. The Government may enter at all reasonable times to inspect the work under the contract, and also after a certification of discovery or development to inspect production operations and underground workings. The operator shall provide the Government with all reasonable means of access for such inspections.

ARTICLE 5. *Contribution by the Government.*—The estimated total allowable cost of the project, set forth in Exhibit "A," is the sum of $52,100.00. The Government shall contribute 50 percent of the allowable costs as they are incurred in a total sum not in excess of $26,050.00: *Provided,* That until the Operator has rendered to the Government his final report, and any final auditing required by the Government has been made, and a final settlement of the contract has been made, the Government may withhold from the last

voucher or vouchers such sums as it sees fit not in excess of 10 percent of the estimated total cost of the work or not in excess of the amount of the Government's contribution to the cost of property which is or may become subject to disposal as provided in Article 9(c), whichever is greater. The Government will make its contribution on the basis of the monthly vouchers referred to in Article 7(b), but all payments by the Government are provisional only, subject to audit, until the account between the Operator and the Government is finally audited and settled. "Costs incurred" mean costs that have been paid or have become due and payable, or that in the opinion of the Government have become an obligation. The Government may make payments directly to independent contractors and suppliers for the account of the Operator rather than to the Operator.

ARTICLE 6. *Estimated costs.*—(a) *Categories of costs.*—The allowable costs of the work to which the Government shall contribute are limited to those that are direct, reasonable, necessary, and that are estimated in Exhibit "A" by categories as specified in this article. If any category or subcategory is omitted from the estimate of costs, or if the word "none" is annexed to the listing thereof, costs under such category or subcategory are not allowable. Any excess over any estimate which is indicated as the maximum of any category, subcategory, or item, either as to requirement or related cost, and any excess over the estimated total allowable cost of the work, shall not be allowable. Any excess over the estimate of any category, subcategory, or item, either as to requirement or related cost, not indicated as a maximum shall be allowable within the limit of the estimated total allowable cost of the work. To the extent that excesses over maximums other than the estimated total allowable cost of the work may be necessary for the performance of the work, the Operator shall incur such excesses for his own account without contribution by the Government; but except for any such necessary excesses in categories, subcategories, or items thereunder the Operator is not obligated to incur more than his agreed percentage of the estimated, total allowable cost of the work.

To the extent specified in this article or in Exhibit "A" the following categories, subcategories, and elements thereof are maximums; but if not so specified either here or in Exhibit "A" they are not maximums, and may be exceeded within the limit of the estimated total allowable cost of the work:

CATEGORY (1)—INDEPENDENT CONTRACTS.—Work to be performed under independent contracts (see Article 4(b)). The estimated total amount of this category and the estimated cost of each unit of work for performance under an independent contract are maximums.

CATEGORY (2)—PERSONAL SERVICES.

Subcategory (a)—Supervision.—All elements of this subcategory (number of supervisors, periods of employment, rates of pay, and total) are maximums.

Subcategory (b)—Technical services.—All elements of this subcategory (number of technicians, periods of employment, rates of pay, and total) are maximums.

Subcategory (c)—Labor.

CATEGORY (3)—OPERATING MATERIALS AND SUPPLIES.—Includes such items as drill bits and steel, explosives, fuel, pipe, power, small tools costing less than $50 each, timber, track.

CATEGORY (4)—OPERATING EQUIPMENT.

Subcategory (a)—Rental.—The number of each object to be rented [6 mine cars, 1 truck], the rate of rental [$100 per month, $5 per hour], and the total of this subcategory are maximums.

Subcategory (b)—Purchases.—The estimated total of this subcategory is a maximum.

Subcategory (c)—Depreciation.—All elements of this subcategory (time periods, rate of depreciation, and subcategory total) are maximums.

CATEGORY (5)—INITIAL REHABILITATION AND REPAIRS.—Estimates under this category include all requirements and related costs, such as labor, materials and supplies, and supervision at a rate not higher than provided for in Category (2), and shall not be duplicated under any other category. The estimated total of this category is a maximum.

Subcategory (a)—Initial rehabilitation and repairs of existing buildings, fixtures, and installations (exclusive of mine workings).—The estimated total of this subcategory is a maximum.

Subcategory (b)—Initial rehabilitation and repairs of operating equipment.—The estimated total of this subcategory is a maximum.

CATEGORY (6)—NEW BUILDINGS, FIXTURES, AND INSTALLATIONS (EXCLUSIVE OF MINE WORKINGS).—Estimates under this category include all requirements and related costs, such as labor, materials and supplies, and supervision at a rate not higher than provided for in Category (2), and shall not be duplicated under any other category. The estimated total of this category is a maximum.

CATEGORY (7)—MISCELLANEOUS.—Repairs and maintenance (other than initial) of operating equipment, analytical work, prints and other reproductions, accounting, Operator's share of payroll taxes, liability insurance covering employment, travel, communications, and any other items of requirement or cost that do not fall within any of the first 6 categories.

THE ESTIMATED TOTAL ALLOWABLE COST of the work is a maximum.

(b) *Nonallowable costs.*—The following costs are not allowable for contribution by the Government:

(1) *Costs of the land,* such as rental, depreciation, depletion, or other cost of acquiring, owning, or holding possession;

(2) *Indirect costs,* such as general overhead, corporate management, interest, taxes (other than payroll and sales taxes), insurance (other than liability insurance covering employment), damages to persons, damages to property (other than necessary repairs or replacements of equipment or other property used in the work);

(3) *Previous work* performed or costs incurred before the date of this contract; and

(4) *Deferred payments.*—Any costs incurred by the Operator under any rental-purchase agreement, installment-purchase agreement, or any agreement for the purchase of goods under the provisions of which payment of the full purchase price is deferred more than 90 days from the delivery of the goods; unless the purchase agreement is approved by the Government in writing.

(c) *Reductions in costs.*—The Operator shall account for and give the Government credit for any incidental benefits, credits, or money received in the ordinary course of business in prosecuting the work (as by salvage or sale of materials or equipment, furnishing of room or board, furnishing of power or services to third persons, rebates or discounts on purchases, etc.), in the same ratio in which the Government contributes to costs; and such amounts shall be treated as a reduction in costs incurred so that they are available for use within the limit of the original estimated total cost. This provision does not apply to receipts from production which are subject to the Government's percentage royalty under the provisions of Article 9.

ARTICLE 7. *Reports, accounts, audits.*—(a) *Operator's records.*—The Operator shall keep suitable records and accounts of the work performed and of any production in which the Government may have an interest; and shall preserve those with respect to work performed for at least three years after final payment by the Government, and those with respect to production for at least three years after any obligation to pay royalties to the Government has terminated. The Government may inspect and audit said records and accounts at any time, either by itself or by a certified public accountant. If the Government elects to audit said records and accounts relating to the exploration work by certified public accountant, it may do so as a cost of the work to which the Operator shall contribute. The Comptroller General of the United States or his representative, until the expiration of said three-year periods, shall have access to and the right to examine any pertinent books, documents, papers, and records of the Operator. All of the Operator's vouchers and records and accounts relating thereto and the Government's payments thereof remain subject to adjustment until final audit by the Government. If work under this contract is carried on in conjunction with any other operations, or if labor, supervision, services, materials, supplies, equipment, facilities, or other requirements for carrying on the work are also used in connection with other operations, the costs shall be segregated and accounted for on a basis and by methods and accounts that are satisfactory to and approved by the Government.

(b) *Progress reports and vouchers.*—The Operator shall provide the Government with five copies of monthly progress reports in three sections as follows: (1) Operator's Monthly Report and Voucher showing detailed costs incurred during the reporting period; (2) Operator's Unit Cost and Progress Report showing the various types of work performed during the reporting period and costs incurred for each type of work; and (3) a Narrative Report of the work performed during the reporting period including adequate engineering-geological maps or sketches, drill hole logs and locations, and assay reports on samples taken concurrently with advance in mineralized ground. (Forms for reporting under (1) and (2) above will be provided by the Government.)

(c) *Final report.*—Upon completion of the work or termination of the Government's obligation to contribute to costs, the Operator shall furnish the Government with five copies of a final report (in addition to the final progress report and voucher). This final report shall include a geological and engineering evaluation of the results of the work performed under the contract with an estimate of the ore reserves resulting from such work, complete assay data, adequate geological and engineering maps or sketches, and a summary of the work performed and related costs incurred.

(d) *Report of sales.*—The Operator shall provide the Government with suitable accounting and documentary evidence covering all production to which the Government's percentage royalty relates, such as copies of smelter or concentrator settlement sheets, and certified accounts of production and sale or other disposition of production.

(e) *Compliance with requirements.*—If in the opinion of the Government any of the Operator's reports, records, or accounts are insufficient or incomplete, or if the Operator fails to make them, the Government may procure the making or completion of such with suitable attachments as an expense of the work to which the Operator shall contribute. The Government may withhold approval and payment of any vouchers relating to insufficient or incomplete reports, records, or accounts.

ARTICLE 8. *Repayment by Operator.*—(a) *Certification.*—If the Government considers that a discovery or development from which production may be made has resulted from the work, the Government, at any time not later than six months after a sufficient final report and final account (see Article 7) has been rendered, may so certify in writing to the Operator. Such certification shall describe broadly or indicate the nature of the discovery or development.

(b) *Royalty on production.*—The Operator, as principal if the Operator is the producer, or as surety if the Operator is not the producer, shall pay to the Government a royalty on all minerals mined or produced from the land, as follows: (1) regardless of any certification of discovery or development, from the date of the contract until the lapse of the time within which the Government may make such certification, or until the total net amount contributed by the Government without interest is fully repaid, whichever occurs first; or (2) if the Government makes a certification of discovery or development, within a period of ten years from the date of the contract, or until the total net amount contributed by the Government without interest is fully repaid, whichever occurs first.

(c) *Basis for computation.*—The Government's royalty shall be a percentage of the gross proceeds (including any bonuses, premiums, allowances, or other benefits) from the production sold, in the form sold (ore, concentrates, metal, or equivalent), at the point of delivery (the f. o. b. point); *except,* that charges of *the buyer* arising in the regular course of business, and shown as deductions on the buyer's settlement sheets, on account of the cost of treatment processes performed by *the buyer,* sampling and assaying to determine the value of the production sold, and freight paid by *the buyer* to a carrier (not the Operator), shall be allowed as deductions in arriving at the "gross proceeds" as that term is used herein. Any costs of treatment processes, sampling or assaying, or transportation, performed or paid by the Operator or by anyone other than the buyer, are not deductible in arriving at the "gross proceeds" as that term is here used. The term "treatment processes," as here used, means those processes (such as milling, concentrating, smelting, refining, or equivalent) applied to the crude ore or other production after it is extracted from the ground, to put it into a commercially marketable form; excluding fabricating or manufacturing.

(d) *Unsold production.*—If any production (ore, concentrates, metal, or equivalent), after the lapse of six months from the date the ore was extracted from the ground, remains neither sold nor used by the Operator in integrated manufacturing or fabricating operations (for instance, if it is stockpiled), the Government, at its option, as long as it so remains, may require the computation and payment of its royalty on the value of such production in the form (ore, concentrates, metal, or equivalent) it is in when the Government elects to require computation and payment. If any production is used by the Operator in integrated manufacturing or fabricating operations before the Government makes its election, the Government's royalty on such production shall be computed on the value therof in the form in which and at the time when it is so used. "Value" as here used means what is or would be gross income from mining operations for percentage depletion purposes in Federal income tax determination, or the market value, whichever is greater.

(e) *Percentages of royalty.*—The percentages of the Government's royalty shall be as follows:

One and one-half (1½) percent of amounts ("gross proceeds" or "value") not in excess of eight dollars ($8.00) per ton of production in the form in which sold, held, or used, plus one-half (½)

percent for each additional full fifty cents ($0.50) by which such amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such amounts.

(For instance: the royalty on an amount of five dollars ($5.00) per ton would be one and one-half (1½) percent; on an amount of ten dollars ($10.00) per ton, three and one-half (3½) percent.)

(f) *Time for computation and payment.*—The Government's royalty shall be computed and paid currently upon each lot sold, held, or used in integrated operations, as the case may be, as above provided in this article.

(g) *Lien for payment.*—To secure the payment of its percentage royalty, there is hereby granted to the Government a lien upon the land or the Operator's interest in the land and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(h) *Notice to purchasers.*—The Operator shall give notice of the Government's claim for royalty to any purchaser of the production, and shall authorize and direct such purchaser to pay the royalty directly to the Government and to furnish the Government with copies of the settlement sheets. If the records of any production and sales or other disposition of production, whether the production is by the Operator or by others, are not made available to the Government, the amount of the royalty may be estimated by the Administrator, Defense Minerals Exploration Administration, or his successor, and his estimate thereof shall be final and binding upon the Operator.

(i) *No obligation to produce.*—Nothing in this contract is to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any production operations.

(j) *Government not obligated to buy.*—Nothing in this contract shall be construed as imposing any obligation on the Government to purchase any minerals mined or produced from the land.

ARTICLE 9. *Interests in purchased property.*—(a) *Title and ownership.*—All costs under this contract shall be incurred by the Operator in the Operator's own name and for the Operator's own account; but any property acquired to the cost of which the Government contributes shall belong to the Operator and the Government jointly in proportion to their respective contributions, although title thereto shall be taken in the name of the Operator.

(b) *Preservation of property.*—Until the final disposal of any property in which the Government has an interest the Operator shall preserve and protect same for the best interest of the Government, any reasonable and necessary costs thereof to be treated as an allowable cost of the project. After the completion of the work or termination of the Government's obligation to contribute, or when such property is not in use for or needed for the work, the Operator shall neither use it without the written consent of the Government nor without paying a reasonable rental to be fixed by the Government for its interest.

(c) *Disposal of property.*—Upon the completion of the work or termination of the Government's obligation to contribute to costs, or when the property is no longer needed for the work, the Operator shall promptly dispose of salable or salvageable property in which the Government has an interest for the joint account of the Government and the Operator, either by return to the vendor, by sale to others, or purchase by the Operator or the Government at a price at least as high as could be obtained from others, unless the Government in writing waives its interest in any such property. Without advance approval of the sales price by the Government the Operator shall not sell at any price any item of property the cost of which was more than $500, and shall not sell at less than 25 percent of the purchase price any item of property which cost $500 or less. The Government, in lieu of approving the sales price for any such item, may itself purchase the item at the best price which the Operator is able to obtain or himself cares to give. Property remaining upon any termination of the work shall be considered in groups or categories (such as drill steel, or explosives, or pipe, or rails), and if the original cost of the remaining unexpended portion of any such group or category is less than $50, the Government waives its interest therein. If necessary to accomplish the disposal of any item the Operator shall dismantle and sever it from the land, the cost thereof to be treated as a cost of the project.

(d) *Default of the Operator re disposal.*—If within 90 days after the completion of the work or termination of the Government's obligation to contribute to costs, or after the property is no longer needed for the work, or after such further time as the Government may in writing allow, the Operator has failed to sell or otherwise liquidate or dispose of any property in which the Government has an interest, the Government, at any time prior to final settlement under the contract, may pursue one of the following two courses: (1) the Government, by written notice to the Operator, may place upon such property what in its opinion is a fair valuation thereof, not in excess of the cost less 1.66 percent per month from the

date such property was purchased under this contract to the termination of said 90-day period; and such property shall thereupon be considered and accounted for as having been purchased by the Operator at the valuation so fixed by the Government; or (2) the Government may enter and take possession of such property wherever it may be found, and remove and dispose of it for the joint account of the parties.

ARTICLE 10. *Termination of the Government's obligations.*—(a) If in the opinion of the Government operations at any time have failed to achieve anticipated results that indicate the probability of making a worthwhile discovery, and in the opinion of the Government further operations are not justified, the Government may give the Operator written notice thereof, and thereupon: (1) the Government shall be free of all obligation to contribute to costs not then incurred other than such as may be allowable under the provisions of the contract as necessary and incidental to winding up, reporting, and accounting; and (2) the Operator shall be free of all obligation to prosecute the work other than such as may be necessary and incidental to winding up, reporting, and accounting.

(b) If in the opinion of the Government the Operator is in any manner in default under the terms of the contract, the Government may give the Operator written notice of such default with a specification of reasonable time within which the default must be cured; and if the Operator fails to cure such default as required, thereupon: (1) the Government shall be relieved of all obligation to contribute to costs not incurred when the notice was given, other than such as may be allowable by the provisions of the contract as necessary and incidental to winding up, reporting, and accounting; and (2) the Operator shall be free of all obligation to prosecute the work other than such as may be necessary and incidental to winding up, reporting, and accounting. The remedy provided for the Government in this paragraph "(b)" is in addition to any other remedy provided in this contract, and in addition to any other remedy the law may provide for breach of contract.

(c) The giving of any notice by the Government under the provisions of this Article 10 shall not affect the Government's rights as provided for in the contract with respect to a percentage royalty, and such rights shall be fully preserved.

ARTICLE 11. *Notices to be given by the Government* may be delivered to the Operator, or may be sent by registered mail addressed to the Operator at his mailing address stated in this contract. If mailed, notices are deemed to have been delivered five days after the date of mailing.

ARTICLE 12. *Officials not to benefit.*—No member of or delegate to Congress or resident commissioner shall be admitted to any share or part of this contract or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

ARTICLE 13. *Changes and added provisions.*—

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

By C. Mittendorf
Administrator, Defense Minerals
Exploration Administration

SHANNON MINING COMPANY
(Operator)

By .....

.....

I, ..., certify that I am the ..... secretary of the corporation named as Operator herein; that ..... who signed this contract on behalf of the Operator, was then ..... of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

.....

[CORPORATE SEAL]

U. S. GOVERNMENT PRINTING OFFICE 16—70617-1

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EXPLORATION PROJECT CONTRACT
SHANNON MINING COMPANY
DOCKET NO. DMEA-3515

ANNEX I

The land referred to in Article 2 of the contract form consists of mining claims located in Turquoise Mining District in Cochise County, State of Arizona, as follows:

1. Patented claims

The Empire
Charleston
Copper Belle
Elizabeth
Durand
Dandy
Oak Grove
Joe
Katherine A

United States Patent to these claims is recorded in the Office of the County Recorder of Cochise County, State of Arizona, in Book 26 of Deeds of Mine, at Page 50 et seq.

2. Unpatented claim

Pick

All of the above claims are shown on the attached map, entitled "Figure 2, Claim Map, Shannon Mine, Cochise County, Arizona."

The Operator holds the land as assignee under a lease-option agreement which grants the right to acquire the entire interest in the patented claims and such rights in the unpatented claim as lessors hold.

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EXPLORATION PROJECT CONTRACT
SHANNON MINING COMPANY
DOCKET NO. DMEA-3515

EXHIBIT "A"

Description of the Work

The work consists of diamond drilling from the surface, and is divided into two stages. The diamond drill holes shall have a minimum AX size. The Operator shall perform Stage I and shall perform so much of the work under Stage II as the Government approves in writing in advance.

Stage I

Under this stage 5,500 feet of diamond drilling shall be performed. The approximate locations, directions, inclinations, and lengths of the holes are shown on the attached maps entitled: "Figure 5. Locations of Proposed Surface Drilling, Shannon Mine, Cochise County, Arizona, Mar. 1955," and "Figure 8 Generalized Sections of Proposed Drill Holes, Shannon Mine, Cochise County, Ariz."

The locations, directions, inclinations, and lengths of the holes shall have prior approval of the Government.

Stage II

Under this stage not to exceed 3,200 feet of diamond drilling, of intermediate holes, shall be performed, if the Government is of the opinion that such work is warranted, based upon the results of Stage I.

The locations, directions, inclinations, and lengths of these holes shall have prior approval of the Government.

Estimated Costs of the Project

(In addition to the maximums fixed by the contract form, an asterisk indicates maximum.)

Stage I

Category (1) Independent Contracts

5,500 feet of diamond drilling @ $5.10/ft.	$28,050.00

Category (2) Personal Services

Subcategories (a) & (b) Supervision and Technical Services

Mining engineer and supervisor, 6 months @ $475.00/month	$ 2,850.00	
Consultant, 3 days @$100.00/day	300.00	$ 3,150.00

Subcategory (c) Labor

None

Category (3) Operating Materials and Supplies

(The two items listed below are the only items allowable under this category.)

Electric power	100.00*	
160 core boxes @ $3.00/box*	480.00*	580.00*

Category (4) Operating Equipment

None

Category (5) Initial Rehabilitation and Repairs

None

Category (6) New Buildings, Fixtures, and Installations

None

Category (7) Miscellaneous

(The three items listed below are the only items allowable under this category.)

100 samples assayed for copper, lead and zinc @ $3.50* per sample	350.00

Payroll taxes and insurance	$ 430.00	
Bookkeeping, 6 months @ $50.00/month	300.00	$ 1,080.00
Estimated Total Cost Stage I		$32,860.00

Stage II

Category (1) Independent Contracts

3,200 feet of diamond drilling @ $5.10/ft.		16,320.00

Category (2) Personal Services

Subcategories (a) & (b) Supervision and Technical Services

Mining engineer and supervisor, 4 months @ $475.00/month	1,900.00	
Consultant, 2 days @ $100.00/day	200.00	2,100.00

Subcategory (c) Labor

None

Category (3) Operating Materials and Supplies

(The two items listed below are the only items allowable under this category.)

Electric power	50.00*	
80 core boxes @ $3.00/box*	240.00*	290.00*

Category (4) Operating Equipment

None

Category (5) Initial Rehabilitation and Repairs

None

Category (6) New Buildings, Fixtures, and Installations

None

Category (7) Miscellaneous

(The three items listed below are the only items allowable under this category.)

40 samples assayed for copper, lead and zinc @ $3.50* per sample	$ 140.00	
Payroll taxes and insurance	190.00	
Bookkeeping, 4 months @ $50.00/month	200.00	$ 530.00
Estimated Total Cost Stage II		$19,240.00
Estimated Total Cost of Project		$52,100.00
Government's Participation @ 50%		$26,050.00

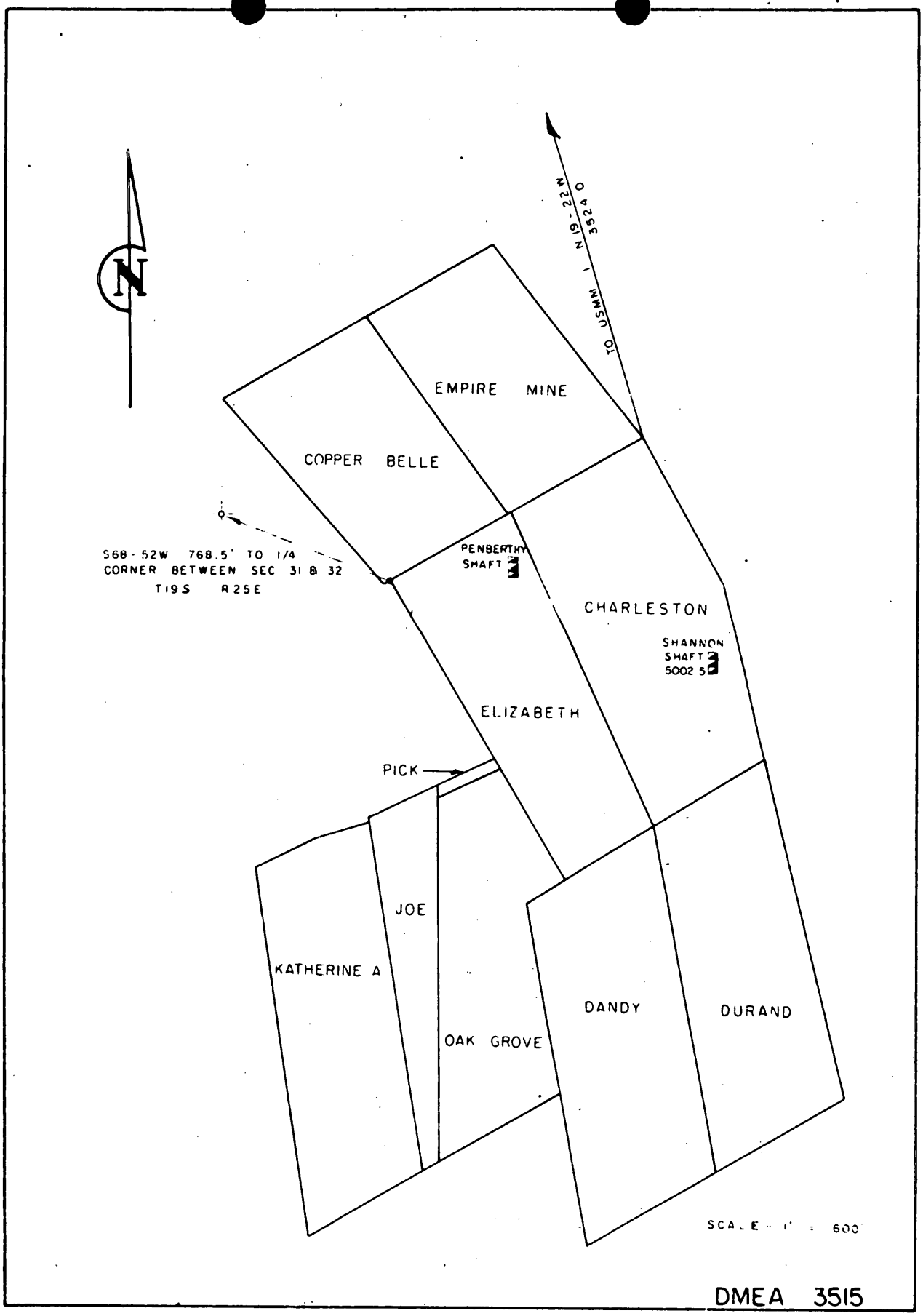

FIGURE 2 CLAIM MAP, SHANNON MINE, COCHISE COUNTY, ARIZ.

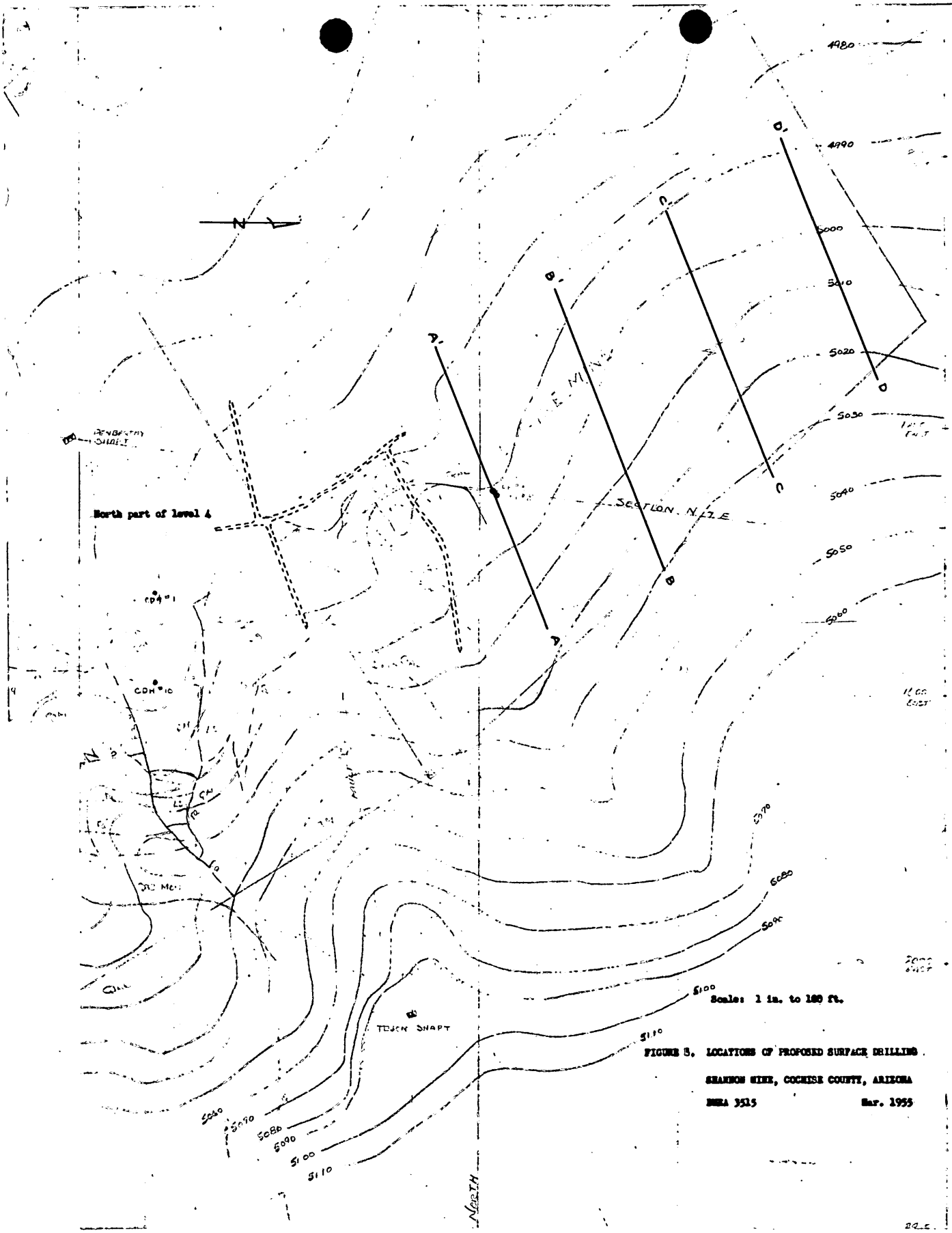

FIGURE 5. LOCATIONS OF PROPOSED SURFACE DRILLING

SHANNON MINE, COCHISE COUNTY, ARIZONA

BMRA 3515 Mar. 1955

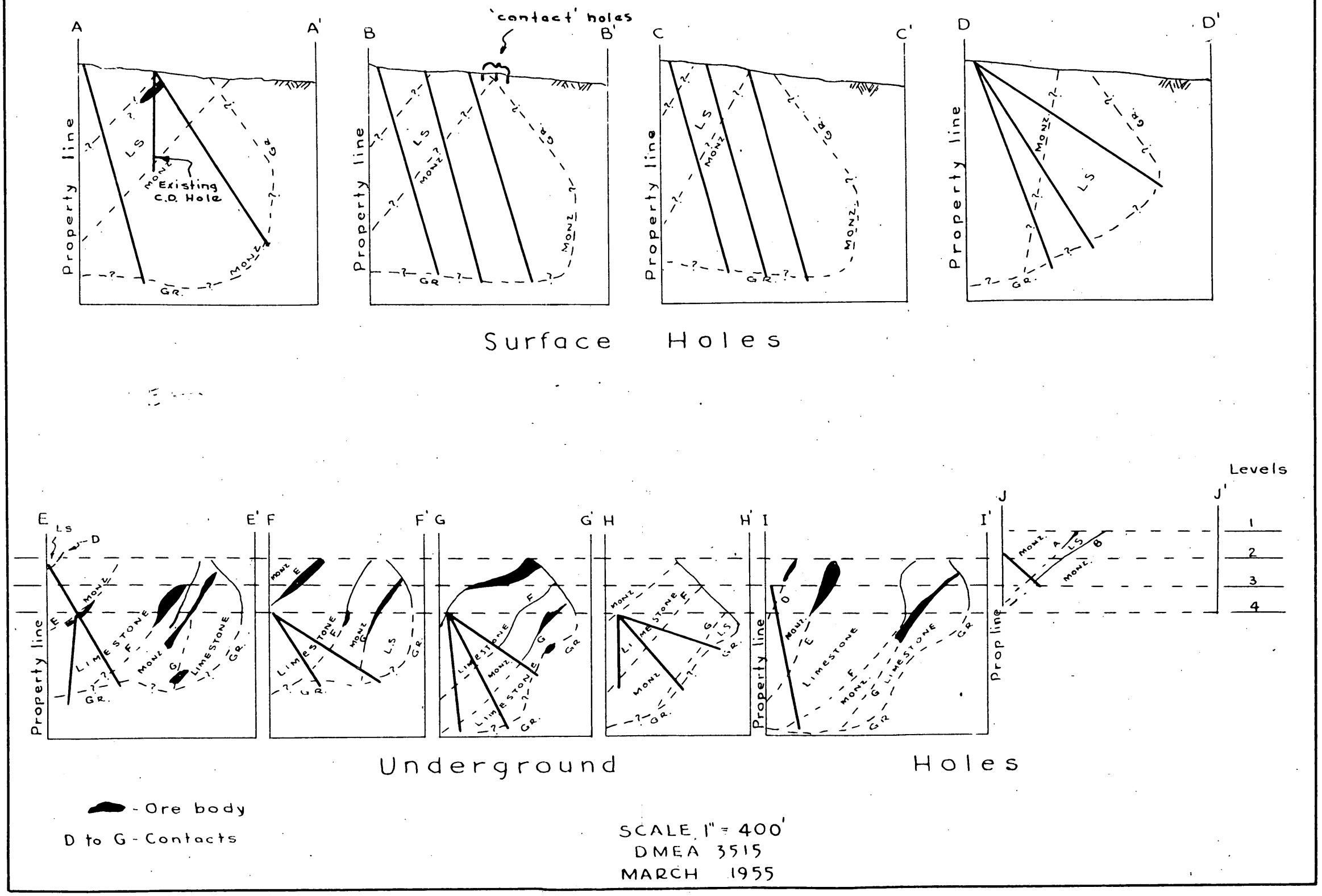

FIGURE 8 GENERALIZED SECTIONS OF PROPOSED DRILL HOLES
SHANNON MINE, COCHISE COUNTY, ARIZ.

File Copy
Surname
J. W.
Yarnell
Selfridge

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

SEP 21 1955

Mr. Joseph H. Taylor
Vice President
Shannon Mining Company
Post Office Box 309
Silver City, New Mexico

Re: Docket No. DMEA-3515 (Copper-Lead-Zinc)
Shannon Mining Company
Shannon Mine
Cochise County, Arizona

Dear Mr. Taylor

This is with reference to your letter dated September 8, to Mr. W. R. Sterms, with which you returned the unsigned copies of a contract covering the cited property. As you did not desire to execute this contract, we are therefore placing it in our inactive files.

If, in the future, you should desire to file another application for Government exploration assistance, we shall be glad to consider it and will give it our immediate attention.

Sincerely yours,

Frank E. Johnson

ACTING Administrator

JWAlt/er 9/21/55
Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Region III (2)
Chron.

R.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

September 21, 1955

Memorandum

To: Chief, Operations Control & Statistics Division

From: Chief, Base Metals Division

Subject: Withdrawal of Shannon Mining Company's Application, Docket No. DMEA-3515, Copper-Lead-Zinc, Shannon Mine, Cochise County, Arizona

Will you please withdraw the cited application from the active files. It is being withdrawn because of the reasons stated in the letter to W. R. Storms from Joseph H. Taylor, Vice President, Shannon Mining Company, dated September 8, and in compliance with the memorandum from the Executive Officer, DMEA Field Team, Region III, dated September 13.

W. R. Griswold

W. R. Griswold

File Copy
Surname

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

September 21, 1955

Memorandum

To: Chief, Operations Control & Statistics Division

From: Chief, Base Metals Division

Subject: Withdrawal of Shannon Mining Company's Application, Docket No. DMEA-3515, Copper-Lead-Zinc, Shannon Mine, Cochise County, Arizona

Will you please withdraw the cited application from the active files. It is being withdrawn because of the reasons stated in the letter to W. R. Storms from Joseph H. Taylor, Vice President, Shannon Mining Company, dated September 8, and in compliance with the memorandum from the Executive Officer, DMEA Field Team, Region III, dated September 13.

W. R. Griswold
W. R. Griswold

JWAlt/er

Copy to: Docket
Base Metals
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
SEP 16 1955

September 13, 1955

224 New Customhouse
Denver 2, Colorado

Memorandum

To: Chairman of the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA 3515 (Copper-Lead-Zinc), Shannon Mining Company, Shannon Mine, Cochise County, Colorado

Enclosed are the Government's, Finance Office, Field Team, Docket, Division, and Operator's copies, unsigned, of the subject proposed contract. Also enclosed are the unsigned copies of Owner's Consent to Lien.

Two copies of the applicant's letter to Mr. Storms are attached. The applicant is no longer interested in the Exploration Project.

W. M. Traver

Enclosures

SHANNON
XXXXXXX

DMEA
Date Rec'd.

September 8, 1955

RECEIVED SEP 12 1955

SEP 1 6 1955 BUREAU OF MINES
Denver, Colorado

Re: DMEA Docket 3515, (Copper-Lead-Zinc), Shannon Mining Company, Shannon Mine, Cochise County, Arizona

Mr. W. R. Storms, Superintendent
Southwest Experiment Station
P. O. Box 4097,
University Station
Tucson 5, Arizona

Dear Mr. Storms:

Mr. Traver's letter of August 30th has been received and carefully examined.

It is now nearly a year since we made application to DMEA for exploration for copper, lead and zinc. During this past year we have spent a very large amount of money at Shannon Mine and done some thousands of feet of diamond drilling, pumped the water out to the 500 level, cleaned up levels and laid track. Due to the diamond drilling which we have done, the proposals in our original application would no longer apply to the best zones for prospecting. For this reason it is difficult to see where we could go ahead with such a contract at present.

I am enclosing the original and six copies of Form MF-203, Owner's Consent to Lien, which were sent to me by Mr. W. M. Traver and which he requested be executed and returned to you.

With kindest personal regards, I am,

Very truly yours,

SHANNON MINING COMPANY

Jos. H. Taylor
Vice President

JHT:F

cc: Mr. W. M. Traver, Executive Officer, DMEA
Mr. Morris Blumberg, President
Mr. L. R. Berkey, Vice President

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
SEP - 2 1955

August 30, 1955

all
Betty

224 New Customhouse
Denver 2, Colorado

Docket

Memorandum

To: W. R. Storms

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA 3515, (Copper-Lead-Zinc), Shannon Mining Company, Shannon Mine, Cochise County, Arizona

Enclosed are the following:

1. Copy of a letter from the Chairman of the Operating Committee dated August 25, 1955
2. Copy of a memorandum from the Acting Assistant Solicitor of Defense Minerals
3. Copy of our letter to the applicant dated August 30, 1955
4. Copies of the contract as follows:
   - Government copy
   - Finance Office copy
   - Field Team copy
   - Docket copy
   - Division copy

Please review the contract and advise this office if it does not meet your approval.

If the contract is satisfactory to you, insert an executed opy of Owner's Consent to Lien in each copy of the contract and return he remaining two copies of Owner's Consent to Lien to this office.

Ascertain from the Operator the date he shall commence work. sert this starting date in the space provided under Article 3 in all e copies of the contract.

When you have completed each copy of the contract as noted w, present all copies for the applicant's signature and return all es to this office.

We will then make the proper distribution and forward the tor his copy which we are holding in this office.

W. M. Traver

W. M. Traver

sures

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
SEP - 2 1955

August 30, 1955

224 New Customhouse
Denver 2, Colorado

Mr. Joseph H. Taylor
Shannon Mining Company
Box 309
Silver City, New Mexico

Re: DMEA Docket 3515, (Copper-Lead-Zinc), Shannon Mining Company, Shannon Mine, Cochise County, Arizona

Dear Mr. Taylor:

Enclosed are the original and six copies of Form--MF-203, Owner's Consent to Lien. Please have the owners sign and return all copies to Mr. W. R. Storms, Superintendent Southwest Experiment Station, P.O. Box 4097, University Station, Tucson 5, Arizona.

When Mr. Storms receives the properly executed copies of the Owner's Consent to Lien, he will continue to process your contract.

Very truly yours,

W. M. Traver

W. M. Traver
Executive Officer, DMEA
Field Team, Region III

Enclosures

File Copy
Surname
J. Alt
Gruwell
Talbot
Selfridge

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

500

Mr. W. M. Traver
Executive Officer
DMEA Field Team, Region III
224 New Customhouse Bldg.
Denver 2, Colorado

AUG 2 5 1955

Re: Docket No. DMEA-3515 (Copper-Lead-Zinc)
Shannon Mining Company
Shannon Mine
Cochise County, Arizona

Dear Mr. Traver:

We are enclosing the original and five copies of a contract to the cited property, signed by the Administrator, together with Annex I, Exhibit "A" (4 pages), and three maps.

Before the contract can be executed it will be necessary for the Operator to obtain Consent to Lien. The necessary copies are enclosed.

It will be necessary to insert in the contract, in the space provided under Article 3, the date when the Operator shall commence work on the project.

For your information we are enclosing copies of a memorandum from the Acting Assistant Solicitor, Defense Minerals, dated August 18. It is our opinion t at the unpatented Pick claim will not have any bearing on the work to be done under the terms of the contract as apparently no work will be done on or near this claim.

If the contract meets with your approval, kindly present it to Applicant for approval and signature and, when completed, distribute the copies in the usual manner. In the event that the contract is not satisfactory, and cannot be amended within your delegated authority, return all copies with your recommendation concerning any modification.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (2/5)

Enclosures

APPROVED:

/s/ Robert W. Geehan (2/5)
Member, Bureau of Mines

Thor H. Kiilsgaard (2/5)
Member, Geological Survey

JWAlt/er 8/22/55
Copy to: Docket Chron
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Ch.

R.C.L.

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SOLICITOR
WASHINGTON 25, D. C.

AUG 18 1955

Memorandum

To: The Administrator, DMEA
Attention: Mr. Griswold

From: Acting Assistant Solicitor, Defense Minerals

Subject: Docket No. DMEA-3515, Shannon Mining Company (Copper, Lead, and Zinc

As requested in Mr. Griswold's memorandum of August 9 we have prepared the attached contract, subject to the attachment of the Consent to Lien of the owners-lessors prior to execution of the contract.

It will be noted that one unpatented claim, it appears to be a small, fractional one, is included in Annex I as part of the land. The extent of the applicant's rights in this one unpatented claim are not clear, due to the language of the agreement covering it. If the claim is of real importance to the project, the applicant's rights therein should be clarified prior to execution of the contract.

Paragraph 4 of the Lease-Option Agreement of April 7, 1954, recites that an RFC loan on the land described therein was obtained in June of 1944 in the amount of $5,000.00. $2,500 of this loan has been repaid, and the balance is repayable, without interest, by royalty on production, in the amount of 5 percent, much like a DMEA royalty is paid. As the RFC's debt is payable from royalty, the risk that the land may be foreclosed by RFC is small, and it is also unlikely that the landowners would permit foreclosure for the relatively small amount of the RFC claim. Thus, it would seem that subordination of RFC's claim to DMEA's is not required, in this case, and Article 2(c) of the contract form recites that subordination is waived.

J. L. Hofflund
Acting Assistant Solicitor
Defense Minerals

Attachment

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SOLICITOR
WASHINGTON 25, D. C.

AUG 18 1955

Memorandum

To: The Administrator, DMEA
Attention: Mr. Griswold

From: Acting Assistant Solicitor, Defense Minerals

Subject: Docket No. DMEA-3515, Shannon Mining Company (Copper, Lead, and Zinc

As requested in Mr. Griswold's memorandum of August 9 we have prepared the attached contract, subject to the attachment of the Consent to Lien of the owners-lessors prior to execution of the contract.

It will be noted that one unpatented claim, it appears to be a small, fractional one, is included in Annex I as part of the land. The extent of the applicant's rights in this one unpatented claim are not clear, due to the language of the agreement covering it. If the claim is of real importance to the project, the applicant's rights therein should be clarified prior to execution of the contract.

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HCRubin/emd
Copy to: DMEA Docket
Solicitor's Docket
W. R. Griswold
J. L. Hofflund
H. C. Rubin
chron.

J. L. Hofflund

J. L. Hofflund
Acting Assistant Solicitor
Defense Minerals

Attachment

Fi
Sur.

500

DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

August 9, 1955

Memorandum

To: Acting Assistant Solicitor, Defense Minerals

From: Chief, Base Metals Division

Subject: Preparation of Contract for Shannon Mining Company, Shannon Mine (Copper-Lead-Zinc), Cochise County, Arizona, Docket No. DMEA-3515.

Will you please prepare a contract for the cited project. A draft of the proposed contract is attached to this memorandum. Also will you prepare the necessary copies of a Consent to Lien.

The necessary copies of the three maps are attached.

W. R. Griswold

W. R. Griswold

WWAlt/er

Copy to: Docket
Base Metals
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

July 18, 1955

Alt

Memorandum

To: Secretary to the Operating Committee, DMEA - Attention: Mr. Alt

From: Executive Officer, DMEA Field Team, Region III

Subject: DMEA-3515 (Copper-Lead-Zinc), Shannon Mining Company, Shannon mine, Cochise County, Arizona

Enclosed are the original and three copies of a memorandum from T. M. Romslo, mining engineer, dated July 15, 1955 with transmittal thereof by W. R. Storms which has to do with my telephone conversation of July 12, 1955 with Mr. Alt regarding costs for core drilling on the proposed contract on this subject loan application.

I believe the two memoranda are self-explanatory and answer Mr. Alt's questions.

W. M. Traver

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

RECEIVED JUL 21 1955

DMEA Date Rec'd. JUL 18 1955

BUREAU OF MINES Denver, Colorado

July 15, 1955

Box 4097
Tucson 5, Ariz.

Air Mail

Memorandum

To : W. M. Traver, Executive Officer, DMEA Field Team, Region III

From : Superintendent, Southwest Experiment Station

Subject : Docket DMEA-3515, Shannon Mining Co.'s Shannon Copper-Lead-Zinc Mine, Turquoise Mining District, Cochise County, Ariz.

In answer to your air mail letter of July 12 (which was received this afternoon), asking Romslo to submit a breakdown of incidental drilling costs for the Shannon project, I am enclosing original and 8 copies of a memorandum by T. M. Romslo, regarding these costs.

If only drilling is to be allowed, we are wondering why Washington is using the long form contract? Why don't they use the short form with so many feet of drilling at so many dollars a foot?

Walter R. Storms

Walter R. Storms

CC W. M. Traver (8)
J. N. Faick
DMEA-3515
DF

WRStorms:frj

DMEA
Date Rec'd.

UNITED STATES
DEPARTMENT OF THE INTERIOR

RECEIVED
JUL 21 1955

JUL 18 1955
BUREAU OF MINES
Denver, Colo.

BUREAU OF MINES

Box 4097
Tucson 5, Ariz.

July 15, 1955

Memorandum

To : W. R. Storms, Superintendent, SW Experiment Station

From : T. M. Romslo, Mining Engineer, Tucson, Ariz.

Subject : DMEA-3515 (Copper, Lead, Zinc), Shannon Mining Company (Shannon Mine), Cochise County, Ariz.

Reference is made to W. M. Traver's memorandum of July 12, 1955 that requested a breakdown of diamond drilling costs and comments on the drilling footages.

Before presenting the requested information, I suggest that the proposed allowance of $5.10 per foot be increased to $7.50. This will provide for a probable higher bid due to changing the project from a 2-rig to a 1-rig job.

In the following breakdown of estimated additional costs I have assumed the following:

1. Drilling 2 shifts daily and 6 days a week;
2. Drilling can be completed in 10 months on bases of 17.5 feet of advance per shift;
3. Core recovery, about 80 percent;
4. Present company's mining and rehabilitation operations will be in progress during life of drilling project.

CC W. M. Traver (Orig. & 8)
J. N. Faick
DMEA-3515
DF

TMRomslo:frj

Supervision		
Mining Engineer, *10 months at $475.00/mo.	$4,750.00	
Consultant, 5 days at $100.00/day	500.00	
		$5,275.00
Labor		
1 Sampler, 250 days @ $13.00/day		3,250.00
Operating Materials and Supplies		
Fuel and greases, 10 months @ $5.00/mo	$50.00	
Electric power for pumping mine water for drilling - 10 percent of originally allowed $1,500.00	150.00	
Core boxes, 232 @ $3.00 each	696.00	
		896.00
Operating Equipment		
Depreciation - ½ of originally proposed $11.16 per month for pickup truck; $5.58 per month for 10 months		55.80
Miscellaneous		
Repairs to equipment (pickup truck) ½ of $10.00/mo. for 10 months		50.00
Analysis of samples		500.00
Payroll taxes, 15% of $8,000.00		1,200.00
Bookkeeping, 10 months @ $50.00/mo		500.00
Estimated total before contract costs		$11,726.80

*Mining engineer probably will spend about ½ time on each the contract drilling, and company mining and rehabilitation operations. I have allowed full time because the services of the supervisor, estimated at 1/4 time at $1,000.00 per month, have not been included.

I have talked with Bryner regarding the suggestion that some of the footage of Stage II be transferred to Stage I. We believe this change is advisable and suggest stage I drilling be increased from 3,900 feet to 5,500 feet. The 5,500 feet of drilling will provide for testing of over one-half of the favorable area by drilling on 3 of the 4 sections. Drilling should start on section A-A' and proceed progressively through sections B-B' and C-C'.

T. M. Romslo
Mining Engineer
Tucson, Ariz.

DMEA
Date Rec'd.
JUL 18 1955
BUREAU OF MINES
Denver, Colorado

July 14, 1955

Box [illegible]
Tucson 5, Ariz.

Air Mail

Memorandum

To : W. H. Tepper, Executive Officer, Bell Field Term, Region XXI

From : Superintendent, Southwest Department: Phoenix

Subject : Project [illegible], Shannon Mining Co.'s Shannon Copper, Longfellow Mine, Turquoise Mining Exploration, Graham County, Ariz.

In answer to your air mail letter of July 12 (which was received this afternoon), asking Bonds to submit a breakdown of Bonds's drilling costs for the Shannon project, I am enclosing original and 8 copies of a memorandum by T. M. Bonds, regarding these costs.

If only drilling is to be allowed, we are wondering why Washington is using the long form contract? Why don't they use the short form which on many feet of drilling at so many dollars a foot?

Walter H. Duane

cc W. H. Tepper (8)
J. H. Fylak
Bonds-[illegible]
WF

[illegible]

[illegible] 6, Ariz. July 18, 1955

[illegible]

To : W. R. Evans, Superintendent, NV Experiment Station

From : T. M. Hamlin, Mining Engineer, Tucson, Ariz.

Subject : [illegible] (Copper, Lead, Zinc), Shannon Mining Company (Shannon Mine), Gaddis County, Ariz.

Reference is made to W. M. Traver's memorandum of July 18, 1955 that requested a breakdown of diamond drilling costs and comments on the drilling program.

Before presenting the requested information, I suggest that the proposed allowance of $6.50 per foot be increased to $7.00. This will provide for a probable higher bid due to changing the project from a 2-rig to a 1-rig job.

In the following breakdown of estimated additional costs I have assumed the following:

1. Drilling 3 shifts daily and 6 days a week;
2. Drilling can be completed in 30 regular on basis of 17.5 feet of advance per shift;
3. Core recovery, about 50 percent;
4. Present company's mining and rehabilitation operations will be in progress during life of drilling project.

cc W. M. Traver (Orig. & 2)
J. R. Fobes
[illegible]
NV

TMHamlin:[illegible]

DMEA
Date Rec'd.
MAR 18 1955
BUREAU OF MINES
Denver, Colorado

Supervision		
Mining Engineer, *10 months at $475.00/mo.	$4,750.00	
Consultant, 5 days at $100.00/day	500.00	
		$5,275.00
Labor		
1 Sampler, 250 days @ $13.00/day		3,250.00
Operating Materials and Supplies		
Fuel and greases, 10 months @ $5.00/mo	$50.00	
Electric power for pumping mine water for drilling - 10 percent of originally allowed $1,500.00	150.00	
Core boxes, 232 @ $3.00 each	696.00	
		896.00
Operating Equipment		
Depreciation - ½ of originally proposed $11.16 per month for pickup truck; $5.58 per month for 10 months		55.80
Miscellaneous		
Repairs to equipment (pickup truck) ½ of $10.00/mo. for 10 months		50.00
Analysis of samples		500.00
Payroll taxes, 15% of $8,000.00		1,200.00
Bookkeeping, 10 months @ $50.00/mo		500.00
Estimated total before contract costs		$11,726.80

*Mining engineer probably will spend about ½ time on each the compact drilling, and company mining and rehabilitation operations. I have allowed full time because the services of the supervisor, estimated at 1/4 time at $1,000.00 per month, have not been included.

I have talked with Bryner regarding the suggestion that some of the footage of Stage II be transferred to Stage I. We believe this change is advisable and suggest stage I drilling be increased from 3,900 feet to 5,500 feet. The 5,500 feet of drilling will provide for testing of over one-half of the favorable area by drilling on 3 of the 4 sections. Drilling should start on section A-A' and proceed progressively through sections B-B' and C-C'.

T M Romslo

T. M. Romslo
Mining Engineer
Tucson, Ariz.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

July 18, 1955

Memorandum

To: Secretary to the Operating Committee, DMEA - Attention: Mr. Alt

From: Executive Officer, DMEA Field Team, Region III

Subject: DMEA-3515 (Copper-Lead-Zinc), Shannon Mining Company, Shannon mine, Cochise County, Arizona

Enclosed are the original and three copies of a memorandum from T. M. Romslo, mining engineer, dated July 15, 1955 with transmittal thereof by W. R. Storms which has to do with my telephone conversation of July 12, 1955 with Mr. Alt regarding costs for core drilling on the proposed contract on this subject loan application.

I believe the two memoranda are self-explanatory and answer Mr. Alt's questions.

W. M. Traver

Enclosures

DMEA
Date Rec'd
JUL 18 1955
BUREAU OF MINES
Denver, Colorado

July 15, 1955

Air Mail

Box 4097
Tucson 5, Ariz.

Memorandum

To : W. M. Traver, Executive Officer, DMEA Field Team, Region III

From : Superintendent, Southwest Experiment Station

Subject : Docket DMEA-3513, Shannon Mining Co.'s Shannon Copper-Lead-Zinc Mine, Turquoise Mining District, Cochise County, Ariz.

In answer to your air mail letter of July 12 (which was received this afternoon), asking Ramalo to submit a breakdown of incidental drilling costs for the Shannon project, I am enclosing original and 8 copies of a memorandum by T. M. Ramalo, regarding these costs.

If only drilling is to be allowed, we are wondering why Washington is using the long form contract? Why don't they use the short form with so many feet of drilling at so many dollars a feet?

Walter R. Storms

CC W. M. Traver (8)
J. N. Fadek
DMEA-3513
RF

WRStorms:frj

Box 4097
Tucson 5, Ariz.

July 15, 1955

Memorandum

To : W. R. Storms, Superintendent, BM Experiment Station

From : T. M. Romale, Mining Engineer, Tucson, Ariz.

Subject : DMEA-3515 (Copper, Lead, Zinc), Shannon Mining Company (Shannon Mine), Cochise County, Ariz.

Reference is made to W. M. Traver's memorandum of July 12, 1955 that requested a breakdown of diamond drilling costs and comments on the drilling footages.

Before presenting the requested information, I suggest that the proposed allowance of $5.10 per foot be increased to $7.50. This will provide for a probable higher bid due to changing the project from a 2-rig to a 1-rig job.

In the following breakdown of estimated additional costs I have assumed the following:

1. Drilling 2 shifts daily and 6 days a week;
2. Drilling can be completed in 10 months on basis of 17.5 feet of advance per shift;
3. Core recovery, about 80 percent;
4. Present company's mining and rehabilitation operations will be in progress during life of drilling project.

CC W. M. Traver (Orig. & 8)
J. N. Faink
DMEA-3515
BF

TMRomale:frj

DMEA
Date Rec'd
JUL 18 1955
BUREAU OF MINES
Denver, Colorado

Supervision		
Mining Engineer, *10 months at $475.00/mo.	$4,750.00	
Consultant, 5 days at $100.00/day	500.00	
		$5,275.00
Labor		
1 Sampler, 250 days @ $13.00/day		3,250.00
Operating Materials and Supplies		
Fuel and greases, 10 months @ $5.00/mo	$50.00	
Electric power for pumping mine water for drilling - 10 percent of originally allowed $1,500.00	150.00	
Core barrels, 232 @ $3.00 each	696.00	
		896.00
Operating Equipment		
Depreciation - ½ of originally proposed $11.16 per month for pickup truck; $5.58 per month for 10 months		55.80
Miscellaneous		
Repairs to equipment (pickup truck) ½ of $10.00/mo. for 10 months		50.00
Analysis of samples		500.00
Payroll taxes, 15% of $8,000.00		1,200.00
Bookkeeping, 10 months @ $50.00/mo		500.00
Estimated total before contract costs		$11,726.80

*Mining engineer probably will spend about ½ time on each the contract drilling, and company mining and rehabilitation operations. I have allowed full time because the services of the supervisor, estimated at 1/4 time at $1,000.00 per month, have not been included.

I have talked with Bryner regarding the suggestion that some of the footage of Stage II be transferred to Stage I. We believe this change is advisable and suggest stage I drilling be increased from 3,000 feet to 5,500 feet. The 5,500 feet of drilling will provide for testing of over one-half of the favorable area by drilling on 3 of the 4 sections. Drilling should start on section A-A' and proceed progressively through sections B-B' and C-C'.

T. M. Ronsale
Mining Engineer
Tucson, Ariz.

DMEA
Date Rec'd
JUL 18 1955
BUREAU OF MINES
Denver, Colorado

July 15, 1955

Air Mail

Box 4097
Tucson 5, Ariz.

Memorandum

To : W. M. Traver, Executive Officer, DMEA Field Team, Region III

From : Superintendent, Southwest Experiment Station

Subject : Docket DMEA-1615, Shannon Mining Co.'s Shannon Copper-Lead-Zinc Mine, Turquoise Mining District, Cochise County, Ariz.

In answer to your air mail letter of July 12 (which was received this afternoon), asking Ronald to submit a breakdown of incidental drilling costs for the Shannon project, I am enclosing original and 6 copies of a memorandum by T. M. Ronald, regarding these costs.

If only drilling is to be allowed, we are wondering why Washington is using the long form contract? Why don't they use the short form with so many feet of drilling at so many dollars a foot?

Walter R. Storms

CC W. M. Traver (8)
J. N. Faick
DMEA-1615
RF

WRStorms:frj

Box 4097
Tucson 5, Ariz.

July 15, 1955

Memorandum

To : W. R. Stearns, Superintendent, SW Experiment Station

From : T. M. Romslo, Mining Engineer, Tucson, Ariz.

Subject : DMEA-3415 (Copper, Lead, Zinc), Shannon Mining Company (Shannon Mine), Cochise County, Ariz.

Reference is made to W. M. Traver's memorandum of July 12, 1955 that requested a breakdown of diamond drilling costs and comments on the drilling footages.

Before presenting the requested information, I suggest that the proposed allowance of $5.10 per foot be increased to $7.50. This will provide for a probable higher bid due to changing the project from a 2-rig to a 1-rig job.

In the following breakdown of estimated additional costs I have assumed the following:

1. Drilling 3 shifts daily and 6 days a week;
2. Drilling can be completed in 10 months on basis of 17.5 feet of advance per shift;
3. Core recovery, about 80 percent;
4. Present company's mining and rehabilitation operations will be in progress during life of drilling project.

CC W. M. Traver (Orig. & 2)
J. N. Faick
DMEA-3415
DF

TMRomslo:frj

Supervision		
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Consultant, 5 days at $100.00/day	500.00	
		$5,275.00
Labor		
1 Sampler, 250 days @ $13.00/day		3,250.00
Operating Materials and Supplies		
Fuel and grease, 10 months @ $5.00/mo	$50.00	
Electric power for pumping mine water for drilling - 10 percent of originally allowed $1,500.00	150.00	
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Operating Equipment		
Depreciation - ½ of originally proposed $11.16 per month for pickup truck; $5.58 per month for 10 months		55.80
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T. M. Romslo

T. M. Romslo
Mining Engineer
Tucson, Ariz.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
JUL 18 1955

224 New Customhouse
Denver, Colorado

July 12, 1955

AIR MAIL

alt
Docket Betty

Memorandum

To: W. R. Storms

From: Executive Officer, DMEA Field Team, Region III

Subject: DMEA 3515 (Copper, Lead, Zinc), Shannon Mining Company (Shannon Mine), Cochise County, Arizona

Washington stated by telephone this morning that they are preparing a long-form contract on the subject docket, allowing the surface drilling part of the program as a preliminary two stages.

Allowing $5.10 a foot for the independent contract (drilling), they request that Romslo submit a breakdown of incidental drilling costs such as technical supervisory services, core boxes, sampling, assaying, miscellaneous, etc., in order for them to arrive at an over-all cost for the drilling operations.

They also expressed the opinion that from drilling depths of eight hundred feet indicated in Stage I it might possibly be in order to increase the footage allowance under Stage I and decrease that under Stage II.

Will you provide this office with the cost breakdown and comments on a revision of the drilling footages as soon as possible in order that it might be forwarded to Washington and expedite preparation of the contract.

W. M. Traver

W. M. Traver

WMT:dja

cc: Docket 3515
Chron
Townsend
Traver
Sec. Op. Comm.(Attn. Mr.Alt)(2)

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

July 12, 1955

Memorandum for the Files

Docket

From: J. W. Alt, Base Metals Division

Subject: Shannon Mining Company, Docket No. DMEA-3515 (Copper-Lead-Zinc), Shannon Mine, Cochise County, Arizona.

On this date, I phone W. M. Traver, Executive Officer, Region III, in regard to the Field Team recommendation for the cited application.

I told him that we would prepare a contract according to his recommendations to allow for surface drilling in two stages, but that in order to do this we would need additional information as the costs that are given in the Field Team report are for the entire work as proposed in the application. I informed him that there is no way to separate these costs for surface drilling only. We would need to know what allowance he would make for an engineer-geologist, core boxes, the number of samples to be assayed for copper-lead-zinc, the cost per assay, and any other costs that are necessary.

The Field Team has recommended that Stage I shall consist of 3900 feet of diamond drilling; Stage II, 4800 feet of diamond drilling. I suggested to W. M. Traver that it would probably be better if the drilling allowance in Stage I be increased to 5000 feet and that the allowance in Stage II be decreased to 3700 feet, the total amount of drilling to remain at 8700 feet as recommended by the Field Team. I explained that from the maps submitted by the Field Team that there did not appear to be allowance for sufficiant drilling in Stage I.

Mr. Traver said that he would contact the engineer and would endeavor to get this information to us soon.

J. W. Alt
J. W. Alt

JWAlt/er 7/13/55

Copy to: Docket
Base Metals
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

July 5, 1955

Re: DMEA-3515
Shannon Mining Co.
Shannon Mine
Cochise County, Ariz.

Memorandum

To: W. R. Griswold, DMEA

From: O. M. Bishop, Branch of Base Metals

Subject: Field Team reviews by Romslo, USBM and Bryner, USGS, April 1955 transmitted by Traver and Harshman, June 14, 1955

I have reviewed the material submitted by the Shannon Mining Company in support of their application for assistance in a $125,000 program consisting of rehabilitation of portions of the 300- and 400-foot levels, 7,000 feet of underground drilling from these two levels, and 8,700 feet of surface drilling.

Mr. Romslo and Mr. Bryner of the examination team each wrote a report concluding that exploration is warranted and offers a reasonable chance of indicating a significant reserve of copper, lead and zinc ore. In reviewing the two reports the DMEA Field Team recommended that a contract be prepared to cover only the surface diamond drilling since the potential for surface exploration between the Shannon mine and the Mona mine to the north is believed greater than that of the proposed underground exploration.

Mr. Bryner in his report points out that churn drill hole No. 3 collared about 100 feet to the north of the Shannon mine cut 39 feet of "heavy pyrite with ore in places," and that geologic relationships in the nearby Mona group somewhat farther north are essentially similar to those at the Shannon mine with concentrations of sulfide mineralization at the contact of the quartz monzonite with the limestone.

It was also pointed out that since the underground drilling program was planned without benefit of critical examination of the underground workings, it would be better if the decision on DMEA participation in such work were postponed until the operator completes the rehabilitation work and a critical examination can be made.

I concur in these views.

O. M. Bishop

O. M. Bishop

Copy to: Div. of Minerals
Mr. Kiilsgaard
O. M. Bishop
Files
H. M. Meyer

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

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DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

RECEIVED
JUL - 6 1955

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Shannon Mine
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Copy to: Div. of Minerals
H. M. Meyer
Mr. Kiilsgaard
Files
O. M. Bishop

O. M. Bishop

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 1 1955

Re: DMEA 3515
Shannon Mining Co.
Shannon Mine
Cochise Co., Arizona
$125,791.67 - Copper-Lead-Zinc

June 30, 1955

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: N. E. Nelson, U. S. Geological Survey

Subject: Review of Field Team report.

Perhaps the work recommended is justified but it may be worth noting that the 300 level showed more ore than the 400 and probably more than the 200, for which see map in DMA 1273. The productive area appears to have centered in the large orebody shown in section W-W' of the Geologic Sections. The orebodies in the surrounding area are smaller. A special condition is suggested and the geologic plans of the 300 and 400 levels show a marked, perhaps untoward, change going northwestward, in the number and size (area) of the monzonite tongues on the Shannon property which cut the limestone and make the "contacts" in which the orebodies occur.

If the trend continues northwestward the surface drill holes in sections A-A', B-B' and C-C' may find little if any monzonite, the contacts and the ore. Section D-D' drilling should cut the Mona porphyry and should it, like the Shannon monzonite plunge to the south or southeastward favorable conditions may be found at the bottom of the "cup" presaged for sections A-A' to I-I' (the need for drilling on section I-I', as shown, is not apparent if section G-G' is drilled out). All told, as seen from here, the ore picture at the Shannon mine is not as rosy as the program envisages -- 300,000 to 400,000 tons of ore containing about 2% copper. DMA 1273, 1951, says "An accurate production record of the mine covering the years 1912 to 1918, inclusive, shows 298,732 tons, averaging 1.34 percent copper, were shipped to the Shannon Copper Co., smelter at Clifton, Ariz. . . . . In 1918 the Shannon mine at Gleeson was closed. The ore was too low grade to be mined at a profit. Outside of a few tons shipped from a high grading operation, the mine has remained closed."

A feel-your-way stage drilling program involving about half the drilling should be considered. If some of the high hopes should be realized an amended contract would be in order.

N. E. Nelson

N. E. Nelson

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 1 1955

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Shannon Mining Co.
Shannon Mine
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NENelson:iml
6-6/30/55

Copy to: Director's reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
O. M. Bishop, 3617

N. E. Nelson

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 1 1955

Re: DMEA 3515
Shannon Mining Co.
Shannon Mine
Cochise Co., Arizona
$125,791.67 - Copper-Lead-Zinc

June 30, 1955

Memorandum

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NENelson:iml
6-6/30/55

Copy to: Director's reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
O. M. Bishop, 3617

N. E. Nelson

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

RECEIVED
JUL - 1 1955

June 30, 1955

Field Report

Re: DMEA 3515
Shannon Mining Co.
Shannon Mine
Cochise Co., Arizona
$125,791.67 - Copper-Lead-Zinc

Memorandum

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EEnelson:fml
6-6/30/55

Copy to: Director's reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
R. M. Bishop, 3617

E. E. Nelson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

RECEIVED
JUN 17 1956

224 New Customhouse
Denver 2, Colorado

June 14, 1955

Memorandum

To: Chairman, Operating Committee, DMEA

From: DMEA Field Team, Region III

Subject: Report of Examination, DMEA Docket 3515 (Copper-Lead-Zinc), Shannon Mining Company (Shannon mine), Cochise County, Arizona

Enclosed are the original and three copies of the report pertaining to the above application.

We recommend that a contract be prepared to provide for surface drilling only.

After the underground rehabilitation has been completed, at the applicant's expense, and the surface drilling has been completed under the contract, we recommend another field examination before proceeding further with DMEA funds.

DMEA Field Team, Region III

W. M. Traver

W. M. Traver

E. N. Harshman

E. N. Harshman

Enclosures

Noted by
Mess Operations Committee
6-22-55
(date)

TRANSMITTED JUN 4 1955

RECEIVED JUN 17 1955

DMEA Date Rec'd JUN 3 1955

BUREAU OF MINES Denver, Colorado

May 31, 1955

Memorandum

To: W.M. Traver, Executive Officer, DMEA Field Team, Region XII

From: Superintendent, Southwest Experiment Station

Subject: Report of Field Examination, Docket DMEA-3515, Shannon Mining Co.'s Shannon Copper-Lead-Zinc Mine, Turquoise Mining District, Cochise County, Ariz.

Enclosed are original and 8 copies of the revised field report on the above property as requested in your memorandum of May 4. The report has been clarified somewhat, but much of the 400-level still has not been cleaned out to the proposed drill stations, so the cost estimates for rehabilitation still are rather hazy. However, this is about as good as the examiners can do with the present information on hand.

Walter R. Storms

Walter R. Storms

cc: Traver (8)

6-22-55

RECEIVED
JUN 17 1955
TRANSMITTED
JUN 14 1955

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

DMEA-3515, Shannon Mine (Copper-Lead-Zinc)

Shannon Mining Company

Cochise County, Arizona

T. M. Romslo, Mining Engineer
U. S. Bureau of Mines

Leonid Bryner, Geologist
U. S. Geological Survey

April 1955

Reviewed by
DMEA OPERATING COMMITTEE
6-22-55
(date)

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By T. M. Romslo[1/] and Leonid Bryner[2/]

The Shannon mine, Cochise County, Ariz. was examined by the Defense Minerals Exploration Administration in connection with the Shannon Mining Company's request for Governmental assistance on a proposed exploratory project for copper, lead and zinc ores. The application, docketed as DMEA-3515, briefly outlined work costing an estimated $100,000.00. Cost of the work was raised to $119,000.00 in a revised program received prior to field investigations. These cost estimates had been prepared while the mine was largely inaccessible and consequently before either the type and amount of desirable exploration could be determined. Examination of the property by engineers and geologists for the DMEA was made after the applicant had made much of the mine accessible.

A prior application for aid at the property, docket DMA-1273, had been denied because ore reserves were believed to be insufficient to justify reopening of the mine and construction of a mill and sulfuric acid plant at an estimated cost of $500,000.

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The Shannon mine, discovered and first worked as the Copper Belle or Leonard deposit, has been intermittently operated from about 1896 to late in 1926. Reported production for a 5-year period starting late in the 1890's was $280,000.00 (gross) of ore containing 4 to 7 percent copper. The next production was in 1907 when ore shipments contained 64,982 pounds of copper, 20,843 ounces of silver, and 307 ounces of gold. The last production from 1911 to 1922 was about 305,000 tons of ore. Of this production 298,732 tons of ore containing 1.73 percent copper, 1.60 ounces of silver and 0.035 ounce of gold a ton, was shipped from 1912 to 1918. In 1923, an attempt was made to roast and leach the ore in place. The mine was set on fire by igniting large quantities of fuel oil and timbers. The fire died out after burning satisfactorily for a few years. In 1926, precipitation of copper from the mine water proved unsuccessful. Since then operations at the mine have been confined to the applicant's current construction and rehabilitation program that started in June 1954.

At the start of current operations, surface structures were confined to a steel headframe. Mine workings were inaccessible with water at 120 feet from the surface. At present, the surface plant consists of small buildings that house a hoist and compressor, a carpenter shop, core storage, and tool shop. Other surface installations include a transformer station for electricity furnished by a utility company, and a large water tank. The 3-compartment main

shaft has been reconditioned to just below level 4, and this level and levels 2 and 3 have been partially rehabilitated. Levels 5 and 6 are under water. A natural flow of air via 2 shafts adequately ventilates the presently accessible workings. Workings were said to total about 38,000 feet.

The Shannon mine is situated on the lower west slope of Gleeson Ridge near its south end. Ore occurs as lenses of sulfide minerals at the irregular easterly dipping contacts between Pennsulvanian Naco limestone and sill-like bodies of quartz-monzonite. To the west and also at depth, the limestone and quartz monzonite end against granite. Fault systems, both normal and reverse, traverse the mine area. Faults, that account for the western termination of sediments and their enclosed sills, are probably of the reverse type. Thrust faulting following normal faulting is shown by the outlier of Bolsa quartzite and Tertiary rhyolite southwest of the mine. All of the faulting except possibly the thrust faulting probably pre-dates ore deposition.

The mined ore bodies occur along seven limestone-quartz monzonite contacts within an approximately 600-foot wide zone that has a strike length of about 1,200 feet. The largest ore body is roughly lenticular, about 400 feet in its dip and strike lengths, and has a maximum thickness of approximately 100 feet. The average ore body is in the order of about one-third this size. The mineral content of the

deposits apparently varies considerably. Most of the ore bodies are predominantly pyrite, though they show a tendency toward copper mineralization in places. Some bodies are relatively rich throughout in copper minerals. Besides bodies of iron and copper sulfides, the mine also contains at least two bodies of galena and sphalerite. Higher concentrations of copper minerals appear to occur below the pyrite bodies, while zones above these bodies appear to contain the higher concentrations of lead and zinc. Oxidation of the ore zone has been of minor importance below about 100 feet from the stopes.

The potential reserves of the project area are in the order of 300,000 to 400,000 tons of ore containing about 2 percent copper and probably significant amounts of lead, zinc, and silver. Of these reserves, 200,000 to 300,000 tons may be present in the geologically favorable zone of proposed surface drilling. The remainder is indicated and inferred reserves present as probable lateral and depth extensions of known ore bodies.

A proposed 2-stage exploratory program involves rehabilitation of underground workings, and a total of 15,700 feet of diamond drilling from both the surface and underground. It is designed so an evaluation of results of about one half of the work will indicate the advisability of continuing explorations. The total cost of the program has been estimated at $125,791,67. Of this amount,

$64,298.03 and $61,493.64 are allocated to stages 1 and 2, respectively.

Governmental participation in the proposed project is recommended because (1) the project has a fair chance of indicating the presence of significant reserves of copper, lead and zinc ore, and (2) competent supervision and prosecution of the work is expectable.

DMEA-3515, SHANNON MINE (COPPER-LEAD-ZINC)
SHANNON MINING COMPANY
COCHISE COUNTY, ARIZONA

Engineering Report

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April 1955

Reviewed by
DMEA CLEARING COMMITTEE
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(date)

DMEA-3515, SHANNON MINE (COPPER-LEAD-ZINC)
SHANNON MINING COMPANY
COCHISE COUNTY, ARIZONA

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INTRODUCTION

The Shannon mine in Cochise County, Ariz. was visited by examiners for Defense Minerals Exploration Administration in connection with an application by the Shannon Mining Co. for Governmental participation in a proposed exploratory project for copper, lead and zinc ores. Cost of the project had been estimated at $100,000.00. The application, docketed as DMEA-3515, was reviewed by the Operating Committee and sent to the Field Team, Region III. The Field Team, after receipt of requested supplemental data from the applicant, requested an examination of the property and a suitable report. Included with the supplemental data was a revised program, the cost of which had been estimated at $119,000.00. Proposed work included a geophysical and a geological survey, rehabilitation of underground workings, drifting, and diamond drilling from both the surface and underground.

A prior application for aid at this property, made by A. J. Hutchinson and K. C. Moon of Douglas, Ariz. in July 1951, was docketed as DMA-1273. It involved a proposed project of reopening the mine, and building a mill and sulfuric acid plant at an estimated total cost of $500,000.00. The requested aid was denied on the basis of the examining engineer's conclusion that the mine did not contain adequate ore reserves. As the mine was inaccessible, the conclusions were based on mine records and the knowledge gained by one of the engineers who was employed at the mine in 1912.

The current field investigations were initiated from January 17 to 19, 1955 by J. N. Faick and Leonid Bryner, both of the U.S. Geological Survey. Supplemental field investigations were made March 9 to 11, and May 17, 1955, by Bryner, and T.M. Romslo of the U.S. Bureau of Mines. The applicant's representatives, J.W. Faust, assistant manager, and Jack Conley, mine engineer, assisted the examining engineers on both occasions. Conditions for these investigations were relatively favorable as the applicant had made the mine accessible to the 4th level and rehabilitation of the mine workings was well under way. Consequently, the DMEA examiners and the applicant's representatives were able to set up a desirable exploratory program in which much of the proposed work was dependent upon the results of the initial findings.

LOCATION AND ACCESSIBILITY

The Shannon mine is situated in sec. 32, T. 19 S., R. 25 E., Turquoise Mining District, Cochise County, Ariz. (figure 1). Gleeson, an old mining town that has been almost completely abandoned, is less than 1 air-mile southwest of the mine.

The nearest railroad shipping point is at Tombstone, Ariz., a village on U. S. Highway 80 at about 15 air-miles west of the mine. To reach the mine from Tombstone follow the graded Gleeson-Elfrida road easterly 15.6 miles to a northerly trending access road at 0.1 mile east of Gleeson. Proceed 0.5 miles on the access road that ends at the Shannon mine.

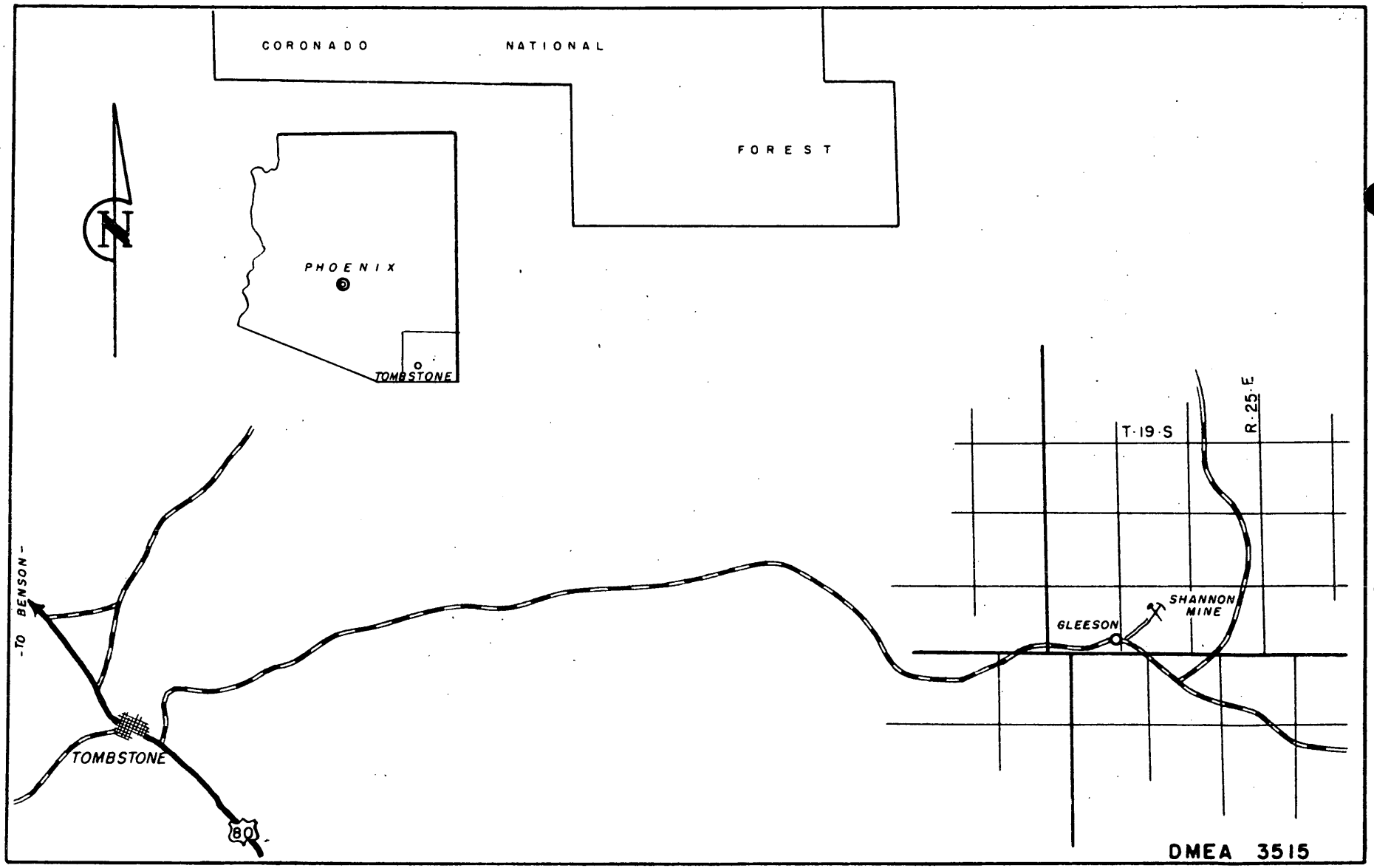

FIGURE 1 LOCATION MAP, SHANNON MINE, COCHISE CO. ARIZ.

Douglas, Ariz., the site of a Phelps-Doge Corp. smelter, may be reached from Gleeson by traveling 8 miles easterly to Elfrida, thence 26 miles southward on U. S. Highway 666.

PHYSICAL FEATURES AND CLIMATE

The Shannon mine is at an average altitude of about 4,970 feet. It is in an area of gently rolling hills that forms the southwest base of Gleeson Ridge. Gleeson Ridge is about 2 miles long, north to south, and about one half mile wide. It attains a maximum altitude of 5,500 feet.

Climatic conditions are favorable for year round mining operations. Summer temperatures seldom rise above 100° F. and winters are mild with minimum temperatures of 16° F. Annual precipitation averages about 14 inches. Heavy rainfalls occur principally during July and August, and a few light snowfalls can be expected during the winter.

Drainage in the mine area is southward to the southern end of Gleeson Ridge, thence eastward to Sulphur Springs valley.

HISTORY AND PRODUCTION

The Shannon copper mine originally was known as the Copper Belle, or Leonard mine. Its history and production to May 1927 have been reported by Wilson:[1/]

1/ Wilson, Eldred D., Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona, Ariz. Bur. of Mines Bull. 123, 1927.

"The Copper Belle, or Leonard, deposit was discovered in 1896 by Mr. John Gleeson, who obtained the claim and in a few years developed it into an important copper producer. In five years he is said to have shipped about $280,000 worth (gross) of ore containing from 4 to 7 percent copper, mainly to the Clifton smelter, where also the iron and sulphur content were paid for. Due to the fact that these shipments involved a 30-mile wagon-haul to the railroad at Cochise, an attempt was made to smelt the ore at the mine by roasting the sulphides in pits with juniper; but this effort was not very successful. Two copper furnaces, one of 350 tons and one of 70 tons daily capacity, were tried out on the property, but it was found that it was more profitable to ship the ore.

"Later, the Shannon Copper Company obtained a 5-year lease and bond upon the property, and eventually purchased it, according to Mr. Gleeson, for about $100,000. This company during 1907 shipped from the property ore that contained 64,982 pounds of copper, 20,843 ounces of silver, and 307 ounces of gold, aggregating in value $32,962; and between 1911 and late 1922 mined about 305,000 tons of ore, most of which was sent to Clifton, where its high sulphur content and lack of gangue were at a premium for fluxing other ores. In 1923 there was begun an attempt to extract copper from the mine ores by a unique method of roasting and leaching in place. This plan entailed, first, setting fire to the mine workings, in the belief that the sulphide ore bodies, once they were kindled, would burn in the persistent fashion of other known sulphide mine fires; next, after the fire had burned itself out, flooding the workings with water to dissolve the copper sulphates; and, finally, pumping out the water and passing it over iron scrap to precipitate the copper from solution. Accordingly, the timbering of the mine was ignited, quantities of fuel-oil, fire-wood, and old railroad ties were dumped down the shaft, and the fire burned satisfactorily for a few months; but after about a year, unfortunately, it gradually died down without accomplishing its purpose. For a time, the water was allowed to rise in the workings; but in May, 1926, it was being pumped out, and partial retimbering was in progress."

The operations of 1926 proved unsuccessful. Since then little or no work was done on the property until June 1954, when the present Shannon Mining Company started construction of a surface plant and rehabilitation of underground workings.

EXTENT AND OWNERSHIP

The property, comprising a group of 10 lode mining claims of which 9 are patented, is owned by Ira Van Tuyl and J. D. Haynes of Odessa, Texas and K. C. Moon and A. J. Hutchinson of Douglas, Ariz. (figure 2). It is held under a lease and option agreement by the Shannon Mining Co., a subsidiary of the Peru Mining Co., which in turn is owned by the Illinois Zinc Co. The agreement, dated April 7, 1954, calls for an initial payment of $11,000.00 and semi-annual payments of $2,500.00 toward the total purchase of $39,000.00.

At present, the Shannon Mining Co. is attempting to obtain control of several mining claims that adjoin its current holdings to the east and north.

DESCRIPTION OF DEPOSITS

Wilson[2/] says the following about the ore bodies of the Shannon mine:

"An irregular outcrop of Carboniferous limestone, about one-half mile long and up to about 800 feet wide, is separated from the main limestone mass of Gleeson Ridge by a sill of quartz monzonite 350 to 700 feet wide, and on the southwest, beneath a mantle of surface wash, is in thrust-fault contact with rhyolite. This body of limestone is probably hull-shaped in vertical section, and its bedding dips about 45° E. Three sills of altered quartz monzonite cut approximately parallel to the bedding, with the result that the limestone and quartz monzonite make alternate irregular layers of about 250 feet maximum thickness. The limestone, which is more shaly and sandy than that of Gleeson Ridge, shows a little bleaching and recrystallization along cracks near the contacts; and the quartz monzonite is altered into a fine-grained mixture of sericite and quartz, traversed by minute calcite veinlets and speckled sparingly by tiny pyrite grains.

2/ Previously cited in footnote 1.

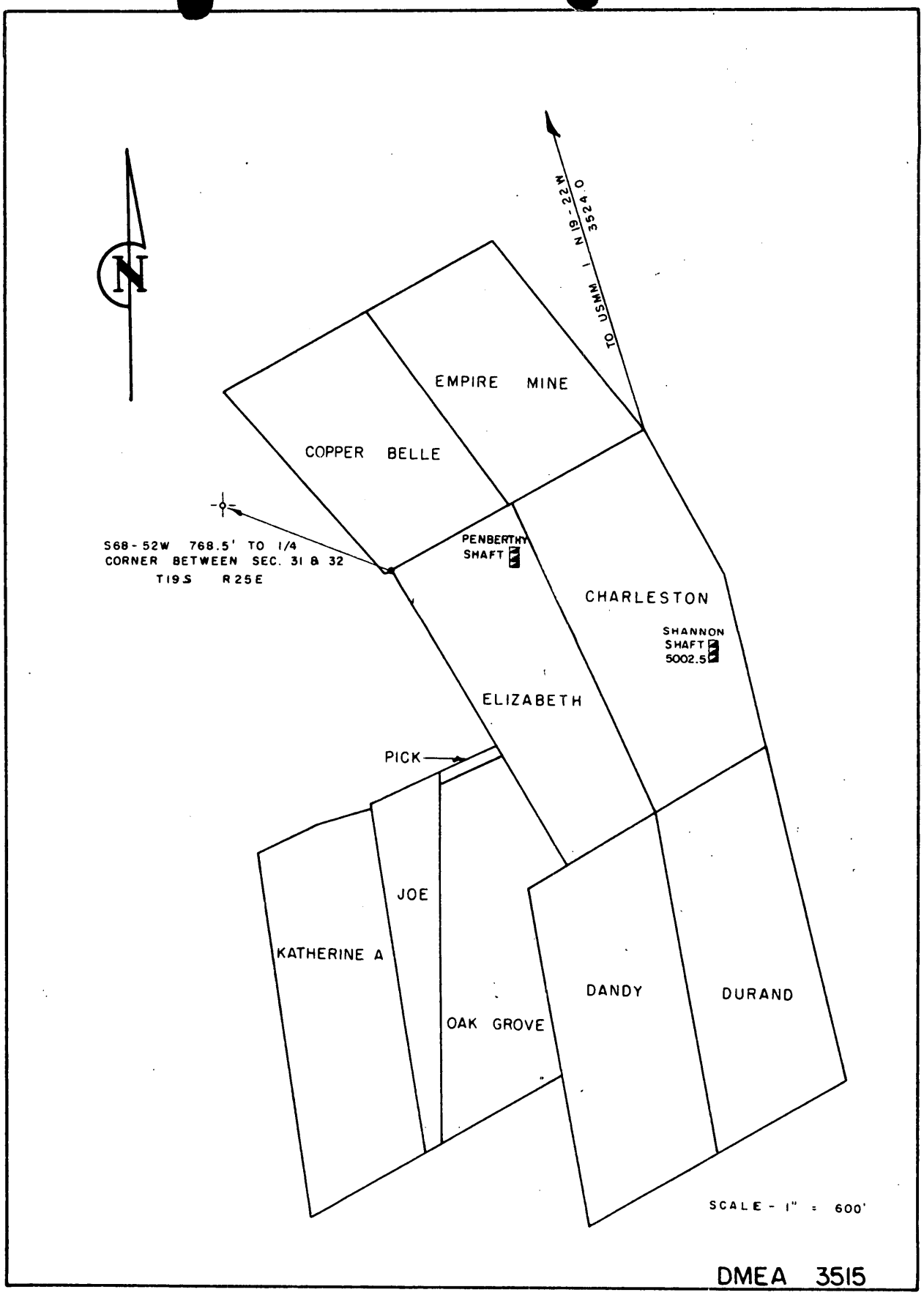

FIGURE 2 CLAIM MAP, SHANNON MINE, COCHISE COUNTY, ARIZ.

"Faulting, both pre-ore and post-ore, has affected the rock formations in the vicinity. One fault of the earlier class strikes nearly north-south, and dips 65° SE. Several east-west faults of steep north or south dips are probably in part of pre-ore age. Numerous movements that occurred along, or roughly parallel to, the limestone-quartz monzonite contacts are also probably in part pre-ore. Many minor, post-ore faults are evident. An overthrust fault, the plane of which dips about 40° W., lies between the limestone and rhyolite.

"Most of the ore bodies are confined to the limestone and show close limitation to contacts with quartz monzonite, although the latter itself often contains abundant stringers and disseminations of pyrite. The ore bodies are irregular lenses along these contacts, but nevertheless maintain a tabular, roughly vein-like character, and are widest where there is a flattening of the dip. Sometimes the ore bulges into the limestone as far as 100 feet, but usually one side remains against the quartz monzonite, and fails to wander off along fractures or breccia zones. Generally, the richness of the deposits increases with intensity of rock alteration, although in some cases this alteration shows but little dependence upon proximity to ore.

"Ore minerals: The ore consists of massive pyrite with minor chalcopyrite and bornite, and occasionally contains very small quantities of accessory galena and sphalerite. Some oxidized ore was present in the upper 100 feet of the workings, where the minerals cuprite, malachite, azurite, and probable tenorite are said to have been well developed. There was probably some rich chalcocite between this oxidized zone and the primary sulphides."

The present investigations indicate that the quantities of copper, lead, and zinc minerals associated with pyrite deposits generally is small, but that some deposits and portions of others contained relatively large amounts of the ore minerals. One partly developed sulfide deposit recently encountered on the 200 level contains an estimated 10,000 to 50,000 tons of 10 to 20 percent combined lead and zinc, and records show that portions of mined deposits contained as much as 5 percent copper.

Geological conditions in the area of proposed surface diamond drilling, north of the mine workings, are obscured by a mantle of conglomerate (figure 3). That conditions favorable for ore bodies may exist in this area is indicated by the findings of churn drill hole 3, a small outcrop of limestone in the area, and mineralized outcrops immediately north of the area.

ORE RESERVES

The deposit contains little or no measurable ore reserves.

Combined indicated and inferred reserves are in the order of 300,000 to 400,000 tons of ore containing about 2 percent copper and probably significant amounts of lead, zinc, and silver. Of these reserves, about 100,000 tons is present as probable and possible extensions of known deposits. The remainder could be present in the zone of proposed surface diamond drilling to the north of mine workings.

PRESENT STATUS

Surface Plant

At the beginning of current operations, surface structures at the Shannon mine were confined to a 57-foot steel headframe. At present the surface plant comprises the reconditioned headframe, a hoist-compressor house, a tool house, a carpenter shop, a core house, an electric transformer station, and an 8,500-gallon water

storage tank. All buildings are of wood-frame construction and are roofed and sided with galvanized iron. A primary crusher, belt conveyor and 250-ton steel ore bing are under construction.

Electric power is furnished by a private utility company.

Water for all uses except human consumption is pumped from the mine. The amount of water entering the mine is believed to be small, probably around 10 gallons per minute. Drinking water is hauled to the mine from a nearby well.

The principal surface equipment consists of a double drum hoist, a 700 cfm. compressor, a 2-ton truck, and a 1/2-ton pickup.

Underground Plant

Rehabilitation of the underground workings is well under way (figures 4, 6, and 7). The 3-compartment Penberthy shaft has been almost completely retimbered to the 3rd level and reconditioned from the 3rd to the present water level at approximately 25 feet below the 5th level. Water, first encountered at a depth of 120 feet from the surface, is being raised to the surface through a newly installed 3-inch pipe line by an electric centrifugal pump. The present water level is being maintained in order to assure an adequate supply for proposed exploratory operations. Cages and 3/4-inch hoisting cables have been installed in each hoisting compartment, and air and water lines have been placed in the manway compartment. Shaft sets, composed of 10-by 10-inch timbers, are completely lagged. Rehabilitation of a portion of the approximately 38,000 lineal feet of mine

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workings is presently confined to levels 2, 3 and 4. Diamond drilling was recently started. Several short holes have been drilled on levels 3 and 4.

Ventilation of the accessible parts of levels 3 and 4 appears to be adequate. It is accomplished by a natural circulation of air via the Pemberthy and Shannon shafts, the lateral workings and a few raises and stopes.

The principal mining equipment consists of 20 mine cars, 3 mucking machines, a Mancha motor trammer, 3 stopers, 2 jackhammers, and an underground diamond drill machine.

MINING OPERATIONS

Mining of the high-grade lead-zinc-copper deposit on the 200 level is expected to begin within a fewweeks, probably early in June. Production of 75 to 100 tons daily is expected. Ore will be trucked to the nearby village of Cochise for shipment via the Southern Pacific Railroad to the Peru Mining Co.'s concentrator at Deming, N. Mex.

About 25 of the present crew of 35 will be maintained for mining and rehabilitation operations. These operations probably will be continued on the present schedule of 2 shifts daily for 6 days a week.

PROPOSED EXPLORATORY WORK

As revised, the proposed exploratory project involves underground rehabilitation work, and diamond drilling from both the surface and underground. The geophysical survey of the original proposal has not been included because the results of such work in the project area

could only be expected to indicate that the planned surface diamond drilling should be done. Also excluded is a separate item for geological surveying. Essentially all of the planned survey work was outside the area of the proposed exploratory project.

Diamond Drilling

Surface and underground drilling will be conducted simultaneously. Underground drilling should start at the north end of the mine and progress to the south while surface drilling proceeds from south to north. Under this plan, probably the most favorable zones would be progressively explored in 2 stages. Results obtained during the first stage would be used to determine the advisability of continuing the project.

As the expectable average strike and dip of the deposits is in the order of 200 feet, initial explorations should consist of drilling 1 to 3 holes in vertical planes approximately normal to the average trend of the deposits and at intervals of about 200 feet.

On the basis of present drilling results, good core recovery can be expected, especially in sulfide zones. Surface and underground holes probably will be started at BX and AX sizes, respectively and should be bottomed at AX size if possible.

Surface Drilling

A generalized plan of proposed drilling in the vertical planes of figure 5 is shown on figure 8.

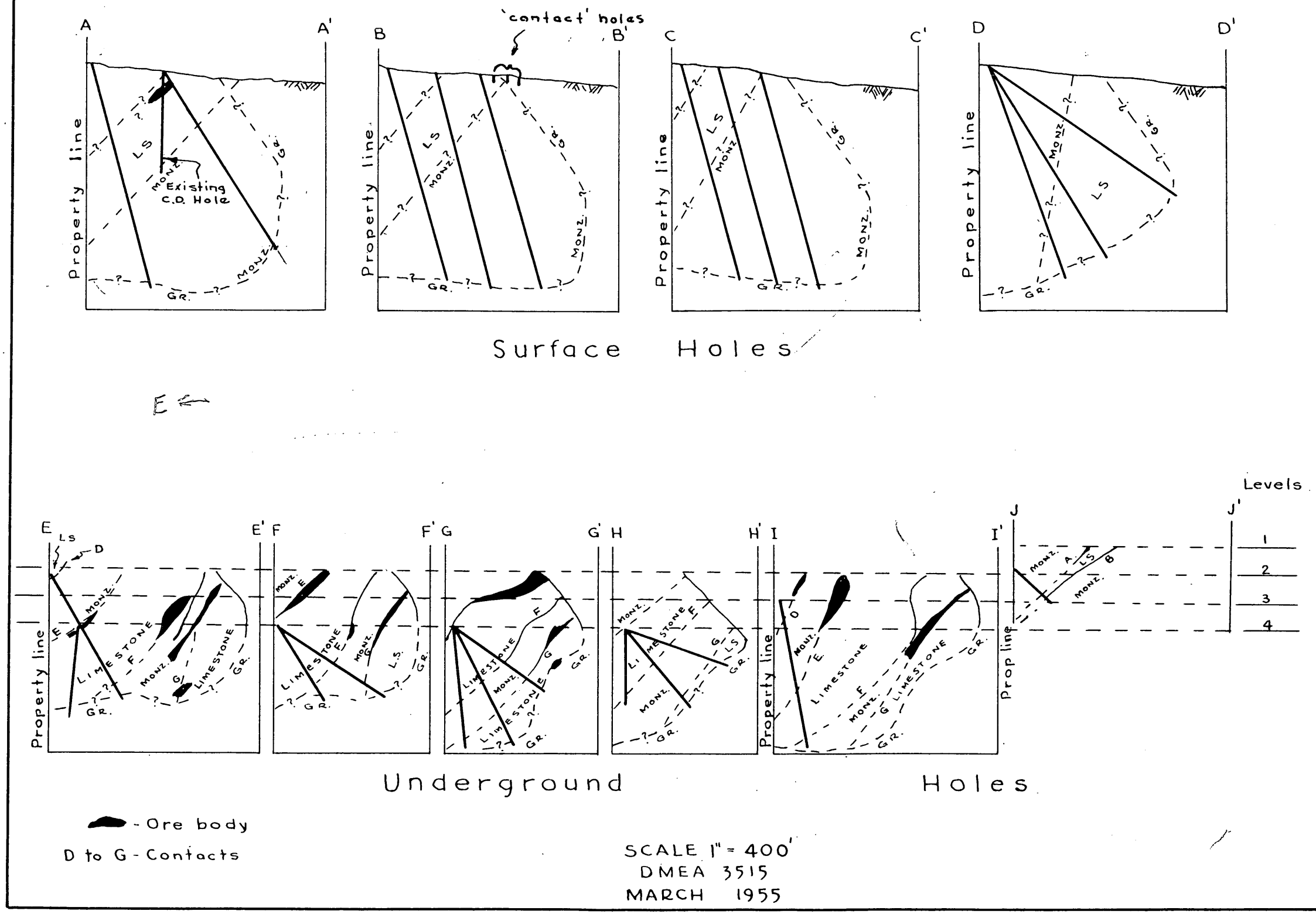

FIGURE 8 GENERALIZED SECTIONS OF PROPOSED DRILL HOLES
SHANNON MINE, COCHISE COUNTY, ARIZ.

Provision has been made for the diamond drilling of 2 or 3 shallow "contact holes" at the most advantageous locations near vertical section B-B'. These holes are designed to establish the approximate location of the granite-ore zone contact. They are of questionable value and are subject to elimination on the basis of information in the Geological Report.

Exploratory drilling should be initiated by drilling the most westerly hole of section A-A'. The other hole of this section then should be drilled from near the property line to intersect potential ore zones at favorable angles. Drilling then should proceed progressively through sections B-B', C-C' and D-D'. The first drilling in each section should be the most western hole. Data obtained will indicate whether the drilling of other holes in the section is advisable and also provide information for a proper design of desirable holes. Drilling of holes to maximum depths of 800 feet may be desirable. However, they should be stopped at lesser depths if granite is encountered or after penetrating the deepest potential ore horizon as indicated by initial drilling.

The proposed drilling totals 8,700 feet of which 3,900 feet is allocated to the first stage, and the remaining 4,800 feet is for drilling under the second stage. These footages should allow for the drilling of intermediate holes, if found warranted, because some of the proposed holes may not be found necessary and other holes may be stopped at less than the indicated depths.

Underground Drilling

The pattern of underground drilling is similar to the surface drilling (figures 6, 7, and 8). Drilling along sections should be completed in the indicated order, starting with E-E' and finishing with J-J'. Where "down" holes are indicated, the order of drilling should be from the flatter to steeper holes. For each section, data obtained from the first hole may indicate that the inclination and depth of subsequent holes should vary somewhat from that shown.

Proposed underground drilling totals 7,000 feet of which 4,000 feet is allocated to the first stage of the project. The 4,000 feet is sufficient for the drilling of all holes of sections E-E', F-F', and G-G', and for the drilling of intermediate holes to test for stike extensions of any ore zones encountered by the initial drilling. The remaining 3,000 feet are for drilling along the other sections and for intermediate holes of the above mentioned type.

The underground drilling should be completed in 10 months on the basis of an estimated advance of about 30 feet per working day.

Drill Stations

Drill stations will have to be prepared only for the underground explorations. The applicant proposed to prepare necessary stations by driving short vertical or inclined raises. Each raise will average an estimated 10 feet in length. They will be driven from existing drifts or crosscuts and provide adequate room for drill rod changes of 10 feet. Muck from the raises and any necessary "slab rounds" will be back-filled in the nearest feasible sites.

REHABILITATION

Proposed rehabilitations are confined to the levels of proposed underground drilling, the 300 and 400 (figures 6 and 7).

300 Level - Both proposed drilling sites are presently accessible through drifts and crosscuts that lead to the Shannon and Penberthy shafts. Pipe-line installations will be made from the 200 level to the drill sites via the Shannon shaft. No track will be installed as drilling equipment will be skidded to the stations. Timbering will not be necessary and rehabilitation of the drifts and crosscuts will be confined to the leveling-off of a few small piles of debris.

400 Level - At present (May 1955) approximately 1,100 feet of drifts and crosscuts must be rehabilitated in order to reach the 4 proposed drill sites. Of the 1,100 feet, 850 feet would be under the first stage of the project and the remaining 250 feet would be carried out under the second stage. At the point marked "filled with debris", (fig. 7) 2 men on each shift are reopening the drift at an average rate of about 4 feet per day. On this basis, the same crew would have to work about 275 days to reopen the 1,100 feet of workings. However, it probably is reasonable to expect a major portion of the working will require little work and that the present crew can be expected to advance at an average rate of 25 feet per day. Track and pipe lines will have to be installed for the entire distance if removal of debris from the mine if found necessary. Some timbering can be anticipated.

ESTIMATED COST OF PROJECT

Independent Contracts

Diamond Drilling

Three contractors, E.J. Longyear Co., Sprague & Henwood, Inc., and Joy Manufacturing Co., submitted bids to the applicant. Two of the bids were for a minimum of 3,000 feet each of surface and underground drilling to BX and AX sizes. These bids were for drilling to depths of less than the anticipated maximum of 800 feet. The other bid on a total of 6,000 feet of the same size holes did not specify any maximum depth of hole. On the basis of the 3 bids, the estimated cost of drilling will be about $5.10 a foot, or a total of $80,070.00 for the proposed 15,700 feet. AX size coring is preferred and should not be decreased to EX unless found advisable.

The recommended allocation of the estimated $80,070.00 is as follows:

	Surface Drilling		Underground Drilling		Totals	
Stage	Feet	Cost	Feet	Cost	Feet	Cost
1	3,900	$ 19,890.00	4,000	$ 20,400.00	7,900	$40,290.00
2	4,800	24,480.00	3,000	15,300.00	7,800	39,780.00
Totals	8,700	$ 44,370.00	7,000	$ 35,700.00	15,700	$ 80,070.00

Drill Stations

The applicant has offered to prepare underground drilling stations by driving 10-foot vertical or inclined raises for $20.00 a foot. Raises will be 4 by 6 feet in section. If additional room is necessary, slabbing will be done at no additional charge. Cost of the 7 stations will be $1,400.00. Cost of the 30 feet of raise for the 3 stations of stage 1 would be $600.00. The remaining $800.00 would be for the 40 feet of raising in the 4 stations of stage 2.

Supervision

Mining Engineer,	10 months at present salary of $475.00 per month	$ 4,750.00
Supervisor -	Jerry Faust, who probably will spend 1/2 of his time at mine, reported his salary is in excess of $1,000.00 per month. Suggest allowance of $500.00 per month of which $50.00 per month is allotted to bookkeeping, 10 months at $450.00	4,500.00
Consultant -	Services of Harrison Schmidt, mining geologist of Silver City, N. Mex., or other competent consultant. Justification for services is given in Geologic Report. 10 days at $100.00	1,000.00
	Total	$10,250.00

Labor

The present wage schedule at the Shannon mine follows:

Classification	Rate/hour
Hoistman	$ 1.50
Miner	1.50
Mucking machine operator	1.50
Mucker-trammer	1.25
Shaftman	1.75
Shaftman helper	1.50
Underground timberman	1.50
Undergronnd timberman helper	1.25
Repairman	1.50
Diamond driller	1.75
Carpenter	1.75
Sampler	1.50

Labor costs of $12,038.00 have been estimated on the following basis:

1. Average daily wage of $13.00 per employee includes overtime for a 6 day-a-week operation but does not include payroll taxes and insurance.

2. Hoistman, one on each of 2 shifts, will also service compressor.

3. One sampler will assist engineer in handling cores and sludges.

4. Four employees of other classifications will be required for a period of 44 days on pipe and track installations and clean-up work.

Operating Materials and Supplies

Timber, 10,000 board feet at $91.00/M		$ 910.00
Pipe, 1,500 feet of 2-in. at $36.37/100 ft.	$ 545.55	
1,500 feet of 1-in. at 19.75/100 ft.	296.25	841.80
Rails, 1,100 feet of 20 lb. at $207/ton		621.00
Pipe and track accessories		170.00
Electric power, 10 months at $150.00 per month		1,500.00
Fuel and greases		500.00
Total		$ 4,542.80*

*Cost of delivery to mine has been included in unit prices.

Operating Equipment

All necessary equipment, except that to be furnished by drilling contractor, is located at the mine. Following is a list of equipment with the company's estimated values:

		New	Used	Value
1	57' Steel Headframe		x	$ 5,000.00
1	Double Drum Ottumwa Hoist 48" drums and 1600' 3/4 Hoisting cable 125 HP, 440 Volt motor and control		x	4,000.00
1	Worthington Laidlaw Compressor #1 24941 15 x 9-1/2 x 12, 150 HP, 440 Volt motor and compensating starter		x	3,000.00
1	2 Ton Chevrolet Flatbed stake body, 2 Speed rear end, 1952 model - Bluebook			1,190.00
1	1/2 Ton Chevrolet pickup, 1951 model - Bluebook			670.00
20	20 Cu. Ft. end dump mine cars Sanford-Day trucks, $230.00 each new		x	2,000.00
3	Gardner Denver mucking machines at $3,265.00 each new		x	4,800.00
1	Mancha Motor, new $5,500.00		x	2,500.00
3	Batteries for above, $600.00 each new		x	900.00
1	Black & Decker 10" Bench grinder, 440 volt motor		x	30.00
1	Delta Table saw and planer, new $225.00		x	100.00
1	Black & Decker portable electric saw, 10"	x		195.00
1	Black & Decker portable elec. chain saw	x		130.00
1	Arc welder		x	50.00
1	Oxygen & Acety. welding set		x	50.00
3	IR38 Stope hammers		x	750.00
2	Gardner Denver jackhammers		x	300.00
1	No. 2 MRD-50 IR Motor Pump (turbine)		x	450.00

The writer inspected all equipment and found the applicants' estimated values to be reasonable. Following is a list of equipment that will be chargeable to the project, with allowances for depreciation based on a 5-year life:

Item	Depreciation allowance Per month	Depreciation allowance 10 months
1 - Hoist	$ 66.67	$ 666.70
1 - Compressor	50.00	500.00
1 - Pickup truck	11.16	111.60
1 - Mucking machine	26.67	267.67
1 - Motor trammer with battery	46.67	466.70
1 - Pump	7.50	75.00
6 - Mine cars	10.00	60.00
		$ 2,147.67

Miscellaneous

Repairs to equipment, 10 months at $50.00 month	$ 500.00
Analysis of samples	1,000.00
Payroll taxes & insurance, 15 percent $22,288.00	3,343.20
Bookkeeping, 10 months at $50.00	500.00
	$ 5,343.20

Contingencies

To provide for additional diamond drilling, and drifting to drill sites, or to further explore ore bodies, if justified by findings	$10,000.00

Distribution and Summary of Estimated Costs:

Item	Stage I Diamond Drilling	Stage I Rehabilitation	Stage I Totals	Stage II Diamond Drilling	Stage II Rehabilitation	Stage II Totals	Totals Stages I & II
Independent Contracts							
Diamond drilling	$ 40,290.00			$ 39,780,00			
Drill stations	600.00			800.00			
	$ 40,890.00		$40,890.00	$ 40,580.00		$ 40,580.00	$ 81,470.00
Supervision							
Engineer	2,137.50	$ 237.50		2,137.50	$ 237.50		
Supervisor	2,025.00	225.00		2,025.00	225.00		
Consultant	500.00			500.00			
	4,662.50	462.50	5,125.00	4,662.50	462.50	5,125.00	10,250.00
Labor							
Hoistmen	2,925.00	325.00		2,925.00	325.00		
Sampler	1,625.00			1,625.00			
Others		1,716.00			572.00		
	4,550.00	2,041.00	6,591.00	4,550.00	897.00	5,447.00	12,038.00
Operating Materials & Supplies							
Timber		728.00			182.00		
Pipe		450.00		280.60	111.20		
Rails		508.00			113.00		
Pipe & track accessories		120.00		25.00	25.00		
Electric power	675.00	75.00		675.00	75.00		
Fuel & greases	225.00	25.00		225.00	25.00		
	900.00	1,906.00	2,806.00	1,205.60	581.20	1,786.80	4,542.80

Distribution and Summary of Estimated Costs - (Cont'd.)

Item	Stage I Diamond Drilling	Stage I Rehabilitation	Stage I Totals	Stage II Diamond Drilling	Stage II Rehabilitation	Stage II Totals	Totals Stages I & II
Equipment							
Hoist	$ 300.00	$ 33.35		$ 300.00	$ 33.35		
Compressor	225.00	25.00		225.00	25.00		
Pickup truck	50.00	5.80		50.00	5.80		
Mucking machine		133.83			133.84		
Trammer with battery		233.35			233.35		
Pump	37.50			37.50			
Mine cars		50.00			10.00		
	612.50	481.33	$ 1,093.83	612.50	441.34	$ 1,053.84	$ 2,147.67
Miscellaneous							
Repairs to equipment	225.00	25.00		225.00	25.00		
Analysis of samples	500.00			500.00			
Payroll Taxes & Ins.	1,371.00	421.20		1,371.00	180.00		
Bookkeeping	225.00	25.00		225.00	25.00		
	2,321.00	471.20	2,792.00	2,321.00	230.00	2,551.00	5,343.20
Contingencies	5,000.00		5,000.00	5,000.00		5,000.00	10,000.00
Totals	$58,936.00	$5,362.03	$64,298.03	$58,931.60	$2,562.04	$61,493.64	$125,791.67

Distribution of costs, where applicable, have been made on the basis of engineering judgment that indicates usage of items, except certain materials and supplies will be about 90 percent for diamond drilling and 10 percent for rehabilitation. Of the materials and supplies, costs of timber, pipe, rails, and track and pipe accessories have been distributed on the basis of the anticipated footages of workings to be rehabilitated. It will be noted that a portion of the cost of pipe and pipe accessories has been applied to diamond drilling. This distribution appears to be in order because these items are intended for use on the 300 level where water and air lines will be installed in workings that require very little rehabilitory work.

In event project and independent company operations are conducted simultaneously, the allowable costs of certain items will have to be determined on a percentage usage basis.

CONCLUSIONS AND RECOMMENDATIONS

The proposed exploratory program is feasible and has a fair chance of indicating the presence of significant reserves of copper, lead and zinc ore. It is designed so that an evaluation of results of possibly one-half of the work will indicate the advisability of continuing explorations.

Competent supervision and prosecution of the proposed work can be expected although it appears that some of the recently completed work was not based on good engineering judgment. Expenditures for

installations worthy of an operating mine probably could have been more wisely used on exploratory work.

Approval is recommended for Government participation in a proposed 2-stage exploratory project at the Shannon mine that will cost an estimated total of $125,791.67.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Defense Minerals Exploration Administration
Denver Federal Center
Denver, Colorado

DMEA
Date Rec'd
JUN 10 1955
BUREAU OF MINES
Denver, Colorado

June 10, 1955

TRANSMITTED
JUN 14 1955

Memorandum

To: Field Team, Region III

From: E. N. Harshman

Subject: DMEA Docket 3515 (Copper-lead-zinc), Shannon mine, Cochise County, Arizona

Enclosed are the original and 8 copies of a geologic report by Leonid Bryner, U. S. Geological Survey, covering an examination of the subject property.

Ore deposits occur near the contacts of limestone and quartz monzonite sills. The ore consists of pyrite containing minor amounts of a chalcopyrite, bornite, galena, and sphalerite in a gangue of calcite, quartz and garnet. One high grade lead-zinc ore body is reported to have been mined.

Byrner concludes that exploration on the property is warranted and he proposes a program of drilling to explore for the northward and downdip extensions of the ore-bearing zone.

The program of drilling from the surface to explore the ground between the Shannon mine and the Mona mine to the north appears justified as proposed in the geologic report. However, the propriety of approving the suggested program of underground exploration at this time is questioned for reasons as follows:

1) According to Bryner, the ore potential of the ground to be explored by underground exploration is considerably less than that to be explored by surface drilling.

2) Rehabilitation of 1,100 feet of old workings will be necessary before the drill sites on the 400-foot level will be accessible. Perhaps this work should be done by the applicant at his expense. At the present rate of progress the engineer estimates it will require 275 days to complete this work. If surface and underground drilling are to proceed concurrently, as recommended by both the engineer and geologist, a long delay in starting the work can be anticipated.

Returned by
DMEA OPERATIONS COMMITTEE
6-22-55
(date)

3) The underground exploration has been laid out without benefit of examination of much of the 400-foot level, perhaps a critical level with respect to a knowledge of the potential downward continuation of geologic conditions favorable to ore deposits.

I suggest that approval of a program of surface exploration, similar to that proposed by the examining team, be approved at this time but that a decision on the proposed program of underground exploration be deferred until the operator completes the rehabilitation work on the 400-foot level of the Shannon mine and a re-examination of the property is made.

E. N. Harshman

E. N. Harshman
Member, Field Team

Enclosures (9)

ENHarshman:arh

TRANSMITTED

JUN 14 1955

Box 4126 University Station
Tucson, Arizona

May 26, 1955

MEMORANDUM

To: E. H. Harshman

From: J. E. Faick

Subject: Report of the field examination
NMA Docket 3545 (Copper-Lead-Zinc)
Shannon Mine, Cochise County, Arizona

NMA ... LETTER
6-22-55
(Date)

Returned herewith are the original and eight copies of the subject geologic report by Leonid Breyer. The report has been revised and somewhat expanded as a result of questions raised in your letter of May 4, and as a result of a one-day re-examination of the property and conference with the applicant.

The accurate establishment of the granite-quartz monzonite contact probably would be more trouble than it is worth, and it is probably unnecessary to the exploration project, but the question has been reviewed in the revised report and the pros and cons given. The sentence "Remapping the geology of the mine and surface would be a worthwhile project" has been deleted. But a treatment of this subject of slightly greater length has been added on page 2 in the Introduction.

As these reports will reach you without the engineering report, we are enclosing a single composite level map to show the proposed underground drilling on sections E-E', F-F', G-G', H-H', I-I', and J-J', the location of stopes and ore bodies in plan view, and the seven limestone-quartz monzonite contacts ("A", "B", "C", "D", "E", "F", "G") which form the drilling targets. Also included is a copy of figure 8 of the engineering report showing the relationship of the proposed drilling to the generalized geologic sections. The location of the surface drilling, the outline of the north part of the 400 level, and the inferred surface trace of the granite-quartz monzonite contact have been added to figure 3 of the geologic report.

In this connection we would ask whether you ordinarily would want us to submit copies of the engineering maps with our geological report. In other words, do you get just the geologic report or does Mr. Traver send you a copy of the engineering report for your use while you review the geologic report?

J. E. F.
John E. Faick

JEF:ms
cc: 8 - Harshman
Storms

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
FIELD TEAM, REGION III

DMEA 3515

SHANNON MINE
GLEESON MINING DISTRICT

(Copper-Lead-Zinc)

COCHISE COUNTY, ARIZONA

GEOLOGY

By
Leonid Bryner
Geologist
U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE
6-22-55
(GEOG)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
FIELD TEAM, REGION III

GEOLOGY
DMEA 3515
SHANNON MINE
GLEESON MINING DISTRICT
(Copper-Lead-Zinc)
COCHISE COUNTY, ARIZONA

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ILLUSTRATIONS

Fig. 1	LOCATION MAP	See Engineering Report
Fig. 2	CLAIM MAP	" " "
Fig. 3	GEOLOGIC MAP AND SECTIONS	Following page 5
Fig. 4	COMPOSITE MAP OF MINE WORKINGS	See Engineering Report
Fig. 5	LOCATIONS OF PROPOSED SURFACE DRILLING	" " "
Fig. 6	PLAN OF 300-LEVEL	" " "
Fig. 7	PLAN OF 400-LEVEL	" " "
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TABLES

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INTRODUCTION

In an application to the Defense Minerals Exploration Administration, dated September 15, 1954, Joseph H. Taylor, vice-president of the Shannon Mining Company, requested government participation in an exploration program estimated to cost $125,791.67, to explore for copper, lead, and zinc at the Shannon Mine, Cochise County, Arizona. This is the second application for DMEA aid submitted for this property. The first application (DMA 1273) was in July 1951, when the Coordinating Committee, Copper Branch, requested an examination. The applicants at that time were A. J. Hutchinson and K. C. Moon, both of Douglas, Arizona, and they were asking for a loan of $500,000 to re-open the mine, build a mill and construct a sulphuric acid plant. The examination was made by C. A. Kumke and B. C. Brown of the U. S. Bureau of Mines, but due to the inaccessibility of the workings the report was based on mine records and on Kumke's first-hand acquaintance with the mine in 1912 as an employee of the Shannon Copper Co. The examining engineers concluded that the reserves of copper ore were probably too small and too low grade to warrant the great expense of rehabilitating the mine. The loan was denied.

The examination for the current loan applicant was made under more favorable conditions. The mine was accessible to the 4th level and rehabilitation of the workings is well under way. The present report summarizes the results of an examination on January 17, 18 and 19 by J. N. Faick and Leonid Bryner, both of the U. S. Geological Survey. The engineering report is by T. M. Romslo of the U. S. Bureau of Mines, who examined the property with Bryner during March 8, 9, and 10. Bryner and Romslo made another examination on May 17 in order to bring their

report up to date and to further discuss an exploration program with the applicant. The examiners were assisted by J. W. Faust, Assistant Manager, and Jack Conley, Engineer at the mine. The geologic examination consisted mainly of additional mapping of the surface and of spot-checking the geology shown on the level maps belonging to the company. These maps were found to be substantially correct though they lack some fundamental data, such as directions of fault displacements. Remapping the geology of the deposit would be desirable but not essential in further evaluating the mine. Additional geologic mapping, if it were well done, would improve our understanding of the deposit. But this added knowledge probably would be of more value in development and mining than in exploration, because the broader geologic features as they are now known offer an adequate basis for laying out an exploration program. The examination showed that certain parts of the deposit contain high grade lead and zinc ore as well as copper ore that is considerably above the average grade of the deposit. Also, it appears from the geology that the ground north of the mine is the best place to look for substantial reserves in the project area. A program of diamond drill exploration is recommended.

The Shannon Mine, also known as the Copper Belle or Leonard Mine is described by E. D. Wilson in "Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona", Arizona Bur. of Mines Bull. 123, pp. 69-71, 1927.

LOCATION AND ACCESSIBILITY

The Shannon Mine is located on the Southwest slope of Gleeson ridge in Sec. 32 T. 19 S., R. 25 E., Cochise County, Arizona. It is

less than half a mile east of the old mining town of Gleeson in the Turquoise Mining District. The mine is accessible by 18 miles of good dirt road east from Tombstone, or by 21 miles of dirt road north from the Bisbee-Douglas highway (U. S. 80). The elevation at the mine is about 5000 feet.

PROPERTY AND TITLE

The property consists of 9 patented claims and an unpatented fraction called the "Pick". The mine itself consists of about 38,000 feet of horizontal workings on six levels spaced 100 feet apart. The 500 and 600 levels, the two lowest in the mine, account for less than 6 percent of the workings. These two levels were flooded at the time of the examination, though rehabilitation is now close to the 500 level. The property is being operated from the Penberthy Shaft which is about 580 feet deep. However, the total shaft footage on the property amounts to about 1400 feet. The underground workings are shown in fig. 4 of the Engineering report.

Title to the mine is by lease from Ira Van Tuyl, J. D. Haynes, K. C. Moon, and A. J. Hutchinson. The lessee is the Shannon Mining Company, a subsidiary of Peru Mining Company which in turn is owned by Illinois Zinc Company.

GENERAL GEOLOGY

The sedimentary rocks of Gleeson Ridge, a north-trending ridge that is the dominant topographic feature in the mine area, consist of the Cambrian Bolsa Quartzite and the Pennsylvanian Naco Limestone. The thickness of the Naco is indeterminate because of faulting, but at Bisbee Ransome determined its thickness as at least 3,000 feet. Although the Naco is mostly quite pure it contains sandy, shaly and cherty beds. The base of Gleeson Ridge is locally covered with Quaternary or Recent alluvium and talus.

The igneous rocks around Gleeson Ridge are classified by Wilson in the order of their age as (1) Pre Lower Cretaceous Quartz Monzonite, (2) Pre Lower Cretaceous Quartz Monzonite-Porphyry, (3) Post Lower Cretaceous Felsite, (4) Post Lower Cretaceous Granite, and (5) Tertiary Rhyolite. All of these are intrusives, but the Rhyolite occurs mostly in flows. Although (2) does not outcrop around Gleeson Ridge, it may occur underground in the mine area since Wilson considers it the source of the primary mineralization of the district. It has not so far been recognized in the mine.

Gleeson Ridge is an erosional remnant of Naco limestone having a strike that follows the northerly trending axis of the ridge and an easterly dip of 30° to 47°. The limestone of the ridge rests on a sill of quartz monzonite that is several hundred feet thick and also has an easterly dip. The base of this sill rests on Naco limestone and, at the Shannon Mine, sends offshoots into the underlying limestone in the form of two or three small sills.

Faults along the west side of Gleeson Ridge, in the mine area, parallel the ridge and are both normal and reverse. These faults dip both east and west and are of two and possibly three ages. Low-angle thrust faulting was later than at least one of the periods of normal faulting.

GEOLOGY OF THE MINE

The Shannon Mine is situated on the lower west slope of Gleeson Ridge, near its south end. The ore occurs as lenses of sulphide minerals at the contacts between the limestone and

sill-like bodies of quartz monzonite. The irregular easterly dip of these contacts and the distribution of some of the ore bodies along them is shown in the sections in figure 3. To the west, and also at depth the limestone and quartz monzonite end against granite. One or possibly both of the faults labeled "H" and "I" in figure 3 probably account for the westerly termination of the sediments and their enclosed sills. These, most likely, are reverse faults, and possibly reflect the stresses accompanying the intrusion of the granite below and west of the mine area. Low-angle thrust faulting in the mine area appears to be confined to the fault outlier of Bolsa Quartzite and Tertiary rhyolite shown southwest of the mine on the geologic map, figure 3. The "K", "J", and several other westerly-trending normal (?) faults cross the mine area. Although a quartzose rock is found north of the "K" fault on the 300 level, this rock most likely is a product of hydrothermal alteration of the Naco Limestone rather than a segment of Bolsa quartzite.

In addition to the fault systems represented by the "H", "I", "J" and "K" faults there has been some normal faulting in which the faults trend about north and dip steeply to the east. Two faults of this class are shown in section X-X', figure 3. All of the faulting, with the possible exception of the low-angle thrusting, appears to pre-date the ore deposition.

The intrusive rocks as well as the limestone in the mine area are highly altered, and for this reason are hard to identify. Silification and possibly sericitization appear to have been the predominant

processes of alteration. Silicification is especially widespread and complete in the limestone so that large amounts of this altered limestone resemble quartzite. Widespread disseminated pyrite also is characteristic of the silicified limestone. Probably much of the igneous rock also is silicified but the most obvious effect of alteration in the igneous rocks seems to be in the fuzzy outlines of crystals and the green cast of the rocks. Possibly much of this green is sericite.

The ore mined in the past consisted mainly of massive sulfides, predominantly pyrite, but also included chalcopyrite, bornite, galena and sphalerite. Though oxidized minerals occur above the 100 level, the normal water table, hardly any copper oxides were seen. The non-metallic gangue minerals are predominantly calcite, quartz and garnet. The ore occurs mainly as replacements in the limestone.

The form, dimensions, and distribution of the ore bodies can be seen in figures 3, 6 and 7. These bodies have been found along seven quartz monzonite limestone contacts labeled from east to west, "A", "B", "C", "D", "E", "F", and "G". They are distributed across the beds through an interval of about 600 feet, and along strike for a distance of about 1200 feet. Viewed in cross section the ore bodies seem to have a crude zonal arrangement, being concentrated in a zone that dips across the beds and almost perpendicular to them. The largest body (contact "E", section W-W') is roughly lenticular and about 400 feet in its strike length, about 400 feet in its dip length, and has a maximum thickness of about 100 feet. The average body, however, is more on the order of about one-third this size. Generally the thickest part of each body occurs where the dip of the quartz monzonite-limestone contact is flattest.

The limestone apparently was the host rock for metal deposition as most of the bodies protrude from the contact into the limestone. In some cases, however, the bodies protrude into the quartz monzonite. Such instances show evidence of fault control of the mineralizing solutions. Also, in the newly opened, northerly part of the mine on the 400 level, it appears as though most of the sulphides are concentrated close to bedding plane faults. These faults perhaps served as subsidiary ore-solution channelways, parallel to the limestone-quartz monzonite contacts, and like these contacts, extending in depth to the probable source of the ore solutions. It is perhaps indicative of their serving as channelways that these bedding plane faults are rather open and in the mine workings are subject to caving.

The mineral content of the bodies apparently varies considerably within single bodies as well as from one body to another. This is based more on grade data than on first hand observation since the stopes are mostly inaccessible. On the basis of production data and sample records, it appears that the large body described above must be almost entirely pyrite. Its lower edge, however, may contain chalcopyrite and other copper minerals. Most of the bodies in fact are predominantly pyrite, though they show a tendency toward copper mineralization in places. Bodies like the one at the "G" contact, section X-X', seem to be relatively rich throughout in copper minerals. There seems to be no general pattern of copper concentration at a certain depth as might be expected if this copper were the result of supergene enrichment. Also, the presence of unoxidized pyrite, sphalerite and galena in the upper levels, above the copper ore, suggests that the zone of oxidation has always been above a datum corresponding to the present surface. Therefore if any zone of supergene enrichment existed, it was considerably above the 300, 400, and 500 levels where the best copper values in the mine were found. Besides bodies of copper

sulphides, the mine also contains at least two and possibly three galena and sphalerite bodies. One of these is known to contain a significant tonnage of ore. It is between the "A" and "B" contacts in the 202 stope (Sec. W-W', fig. 3). There is a suggestion of hypogene zoning in the higher concentration of copper minerals stratigraphically below the large pyrite body and the higher concentration of lead and zinc minerals stratigraphically above it.

Besides the lithologic and structural controls mentioned above, the faults that trend across the deposit probably have influenced the emplacement of ore. This is shown by the presence of gossan in the fault outcrops, and by the fact that the deposit thins out against the "H" and "K" faults.

Probably some of the lower bodies persist as much as 100 feet down dip from their lowest known point. This estimate is based on the shape and dimensions of the known bodies. However, churn drill holes indicate that the ore of the Shannon Mine is limited in depth by the granite that underlies the deposit. These holes show that the top of the granite is 100 to 150 feet below the fifth level but possibly at a greater depth farther to the east.

North of the most northerly workings of the mine and within one hundred feet of them, churn drill hole No. 3 cut 39 feet of "heavy pyrite with ore in places." The outcrops north of this hole are obscured for an interval of about 600 feet by a mantle of Quaternary or Recent alluvium or talus (fig. 3). However, where the bedrock is exposed north of this mantle the sill relationship of quartz monzonite to limestone found in the mine area continues, and concentrations of sulphide minerals close to the contacts are found. These northern deposits, known as the Mona group, are essentially similar to that of the Shannon Mine and the gossan is equally strong. It is

possible, therefore, that a zone of sulphide lenses similar to the one found in the Shannon Mine continues north to the vicinity of the Mona group.

South of the Shannon Mine, limestone with quartz monzonite sills continue for 600 or more feet. But here three churn drill holes (Nos. 5, 6, and 7) failed to find any high concentrations of sulphides and showed that the quartz monzonite sills are relatively weak and sulphide minerals occur only in trace amounts.

To the east of the applicant's property line the ground is likely to be favorable as the ore-bearing contacts dip to the east beyond the property line. However, it is also possible that granite cuts off these contacts, at depth and to the east. This possibility can be better evaluated after the proposed drilling program has been completed, when a clearer picture of the position of the granite will be possible.

PRODUCTION AND GRADE

In five years during its early history the mine shipped about $280,000 worth of ore containing from 4 to 7 percent copper. Company records, according to Kumke's report (DMA 1273), show that from 1912 to 1918 the mine produced 298,732 tons, averaging 1.73% copper, 0.035 oz. gold, and 1.60 oz. silver. The yearly production for this period is shown in Table I.

TABLE I
ORE SHIPPED FROM SHANNON MINE TO SHANNON COPPER CO.
SMELTER AT CLIFTON, ARIZONA

Year	Tons	Gold (oz./ton)	Silver (oz./ton)	Copper (Percent)
1912	53,072	0.0417	3.0	2.7
1913	75,223	0.0417	1.4	1.09
1914	35,998	0.0117	1.39	0.88
1915	20,752	0.0220	0.87	1.44
1916	35,657	0.0287	1.10	1.78
1917	26,924	0.0363	1.42	1.90
1918	51,106	0.0446	1.36	2.27

The applicant has supplied us with stope production records for the years 1917 to 1919, the year when production ceased, and these are summarized in Table II, below.

TABLE II
SUMMARY OF STOPE PRODUCTION FROM 1917-1919

Stope	Tons	Percent Copper (Weighted Av.)		Tons	Percent Copper (Weighted Av.)
201	454	0.11			
202	149	0.37			
203	100	0.19			
307	7,993	6.98	Single Orebody	13,011	5.3
408	2,354	2.19			
408	214	1.97			
408	312	5.40			
408-3A	232	5.22			
408-3B	126	2.28			
408-4	246	2.80			
408-7	1,534	2.39			
308	13,829	2.63	Single Orebody	36,996	3.0
308-2	59	3.23			
407	14,811	3.09			
407-5	1,604	3.83			
407-6	1,326	2.18			
407-10	2,877	3.24			
502	1,807	4.66			
502-2	683	3.65			
309	65	0.61			
321	570	3.04			
322	14	9.16	Single Orebody	6,338	1.1
405	13	0.28			
405-3	194	0.92			
405-4	2,426	1.53			
405-6	3,691	0.80			
323	859	0.16			
325	3	2.81			
403	1,554	1.67			
412	655	1.69			
503	37	1.02			
512	65	6.36			
Total	60,856	3.2			

It is obvious by comparing tables I and II that the above stope records are incomplete. In the year 1918 (the only year completely represented in these stope figures), for example, the total production is calculated at 33,056 tons of ore averaging 3.43 percent copper. Using these stope production figures and the figures for 1918 in Table I, namely 51,106 tons averaging 2.27 percent copper, it is calculated that 18,050 tons of rock averaging about 0.19 percent copper would have to be added to the stope tonnage figure to obtain a total of 51,106 tons averaging 2.27 percent copper. So it appears that the higher grade ore was deliberately diluted in order to raise the tonnage, and the mine did not shut down because the ore at depth declined in grade. The reason for the shutdown, as related orally by Kumke, was that the smelter at Clifton which used the Shannon ore changed hands and the new owner had a much more conveniently situated source of fluxing ore. Consequently the Shannon ore was no longer needed.

The gold and silver values of the ore are not known, but judging by the overall production from 1912 to 1918, the ore remaining in the mine probably averages about $2.00 per ton in gold and silver. The complete lack of data on the grade of lead-zinc ore makes an estimate very difficult. J. W. Faust informed the examiners that the lead-zinc ore between the "A" and "B" contacts in the 202 stope (Section W-W', fig. 3) averages 30 percent combined lead and zinc. This ore had the appearance of being high grade and possibly is as high as Faust estimates it to be. To be on the conservative side, the grade is estimated here as 20 percent. Present operations are devoted

to development work rather than production so there is no recent production data on which to base grade estimates.

EXPLORATION

From 1912 to 1914, 10 churn drill holes were put down by the Shannon Copper Co. on this property. The location of these holes is shown in figure 3. A summary of the logs of these holes follows. The holes that cut no appreciable sulphide bodies are omitted from the table.

TABLE III
SUMMARY OF CHURN DRILL LOGS

Hole No.	Collar Elev.	Total depth (feet)	Interval (feet)	Copper (Percent)	Remarks
1.	4928'	640	280-282	---	"Heavy pyrite"
			383-390	1.81	
			390-395	1.12	
			395-400	1.67	
			443-475	---	"Heavy pyrite"
			585-628	---	"Heavy pyrite"
2.	----	135	---	---	Lost @ 135; confirms No.3 to that depth
3.	4995'	360	45-84		"Heavy pyrite - ore in places"
8.	4956'	310	310	1.8	"Chalcopyrite, sphalerite, bornite" Hole lost at this depth
9.	4974'	641	200-213	Tr.	"Heavy sulphides"
			393-435	Tr. to 0.50	"Heavy pyrite"
			472-495	Tr.	"Heavy pyrite"
			597-600	1.1	"Heavy pyrite"
10.	4969'	635	380-385	0.48	
			385-390	0.98	
			390-443	0.12-0.97	Highest grade is from Pannings. "Heavy sulphides"

Though all of the holes drilled within the radius of the mine workings cut sizeable bodies of pyrite relatively little copper was found. This drilling confirms the idea that to extract a commercial grade of copper ore from this mine selective mining would be necessary. Only one hole (#8) is noted as cutting zinc sulphides, and there is no record of lead mineralization.

An element of doubt as to the reliability of this churn drill sampling is introduced by the wide discrepancy between some of the churn drill samples and the stope production records. Hole No. 1 is recorded as showing only "heavy pyrite" at 443 to 475 feet, yet this interval corresponds to part of the ore body in stopes 308, 407, and 502 which are recorded as producing 36,996 tons of 3.0 percent copper ore. Likewise, Hole No. 10 shows a maximum of 0.97 percent copper and this was from "pannings". Yet this hole cuts the body in the 408 stope which, according to production records for 5,018 tons, ranged in grade from 1.97 to 5.40 percent copper.

Since the property was visited in March, the applicant has drilled about 23 diamond drill holes, mostly less than 100 feet in length, from the north end of the mine. Although this drilling discovered a little ore along the "D" contact the picture of the deposit as so far outlined remains essentially unchanged. Two of these recently drilled holes are shown on the maps of the 300 and 400 levels (figs. 6 and 7).

The applicants' exploration program consisted of (a) rehabilitation of the old workings, (b) Geophysical prospecting, (c) drifting a total of 1,600 feet to reach suitable diamond drill stations, (d) 8,000 feet of diamond-drilling from 16 underground stations, (e) 5,000 feet of surface diamond drilling and geological surveying.

Most of the underground drilling proposed above is at the north end of the mine, in and near the "K" fault. This fault, though apparently pre-mineral, is not known to be mineralized underground.

Likewise at the south end of the mine much of the proposed drilling is in and near the "H" and "I" faults, and these faults show no evidence underground of appreciable mineralization. Furthermore, much of this proposed drilling parallels rather than cuts the quartz monzonite-limestone contacts along which the ore is most likely to be found. Consequently another program was worked out between the DMEA examiners and the applicant.

In order to test the ground that is likely to contain the largest reserves the program of diamond drilling outlined below is proposed:

Four lines of holes drilled from the surface normal to the elongation of the deposit to test the area between the northernmost workings of the Shannon Mine and the Mona Group, just north of the Shannon property line. The lines would be spaced 200 feet apart and would contain from 1 to 3 holes. A series of holes drilled from the east side of the mine from the 300 and 400 levels to intersect the limestone-quartz monzonite contacts in at least 20 places to test for downward and lateral extensions of the deposits in the immediate vicinity of the mine. This underground drilling would require up to 7,000 feet and the surface drilling would require up to 8,700 feet. The surface drilling would proceed progressively north and the underground drilling would proceed progressively south from near the north end of the mine. With this sequence of drilling from the more favorable to the less favorable ground, the project could be periodically evaluated so that in the event of unfavorable results the work could be stopped. The proposed project is in two stages. The first stage would require $64,298.03 for 3,900 feet of surface drilling and 4,000 feet of underground drilling, or the amount needed to complete the first two lines of holes on the surface and the first three lines of

holes underground. Only if the results of this drilling were decidedly favorable would the second stage be undertaken. The second stage would require $61,493.64 for 4,800 feet of surface and 3,000 feet of underground drilling. The approximate location of the drilling is shown in figures 5, 6, 7, and 8 in the Engineering report. Figure 3 in the Geologic report shows the location of surface drilling.

The west limit of potentially mineralized ground probably corresponds to the granite-quartz monzonite contact and the position of this contact is inferred rather than known in the area north of the mine. Two viewpoints can be taken of this fact:

1) The contact might be sought prior to other drilling in order to control locations of the holes, which should be drilled no closer than 100 to 200 feet from the granite, or

2) The granite contact should be ignored to the extent that if granite is not cut by the most westerly hole in each line before a limestone-quartz monzonite contact is cut, that hole should be drilled as planned; but if that hole cuts granite before encountering a limestone-quartz monzonite contact, drilling should be stopped and the hole moved east one or two hundred feet.

In either case the belt of favorable ground between the Shannon and Mona workings is the controlling factor in locating most of the surface drilling. Though the examiners at first were inclined to take the first viewpoint they now think that this may well be an unnecessary refinement in the exploration program. However, in case the field team favors preliminary exploration for the granite contact, three shallow holes in drill section B-B', near the inferred granite contact are included in the exploration program.

Although the mine engineer, Jack Conley, has been doing a conscientious job of logging diamond drill core and of geologic mapping in the newly opened workings, the guidance of an experienced mining geologist would be desirable in this work. Consequently the services of a consulting geologist are provided for in the exploration proposal. With this provision the applicant should be ready at any time during the program to furnish up-to-date and accurate geologic sections or any other geologic data useful in evaluating the exploration.

The examiners doubt whether geophysical exploration would contribute much in exploring this property, because the geology and property limitations together narrow the area of search sufficiently for diamond drill exploration. No allowance is made for geophysical exploration.

RESERVES

The combined indicated and inferred reserves in the immediate vicinity of the Shannon workings are estimated as 70,000 tons of 2 percent copper with 0.035 oz. gold and 1.6 oz. silver per ton. This estimate is based on probable lateral and vertical extensions of 50 to 100 feet of known sulphide lenses and the grade estimate is based on the grade of stope production. The grade of 2 percent is probably conservative, and without much sacrifice in tonnage the ore might average $2\frac{1}{2}$ percent. There is a fair chance of doubling this reserve figure by drilling beneath the 300 and 400 levels as outlined in the proposed drilling program.

The proposed surface drilling would test the ground between the Shannon deposit and Mona deposits to the north, as this unexplored interval is potentially ore-bearing. As the volume of ground to be

tested in this interval is approximately equal to the volume of ore-bearing ground in the Shannon Mine, a tonnage of ore comparable to that produced from Shannon Mine might be discovered. It is possible, therefore, that the surface drilling would discover two or three hundred thousand tons of reserves. Such reserves are designated potential reserves as they are postulated on less evidence than ordinarily would be required for inferred reserves.

Lacking the necessary basic data, a reserve estimate of lead-zinc ore is not attempted here. It can only be said that one high grade body of lead-zinc ore, perhaps containing 10,000 tons, has been found, and there is a fair chance that one more comparable body might be discovered by the drilling near the present workings. In this connection it should be reported that Faust estimates that this body contains 25,000 tons and Faust reports that Harrison Schmitt, as consultant to the company, estimated it at 50,000 tons.

CONCLUSIONS AND RECOMMENDATIONS

The property shows potentialities for the development of a moderate-sized reserve of medium grade copper ore, and a small reserve of high grade lead-zinc ore. Also, the discovery of additional ore bodies on this property might stimulate search in the immediate area; especially farther to the north and to the east where the possibilities for discoveries are best. Therefore, it is recommended that diamond drilling up to about 15,700 feet be done in order to find more reserves. The diamond drill core should be logged, and mineralized intervals should be sampled and assayed for copper, lead, and zinc.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

June 14, 1955

Memorandum

To: Chairman, Operating Committee, DMEA

From: DMEA Field Team, Region III

Subject: Report of Examination, DMEA Docket 3515 (Copper-Lead-Zinc), Shannon Mining Company (Shannon mine), Cochise County, Arizona

Enclosed are the original and three copies of the report pertaining to the above application.

We recommend that a contract be prepared to provide for surface drilling only.

After the underground rehabilitation has been completed, at the applicant's expense, and the surface drilling has been completed under the contract, we recommend another field examination before proceeding further with DMEA funds.

DMEA Field Team, Region III

W. M. Traver

W. M. Traver

E. N. Harshman

E. N. Harshman

Enclosures

TRANSMITTED

JUN 14 1955

DMEA
Date Rec'd

JUN 3 1955 RECEIVED

BUREAU OF MINES
JUN 17 1955
Denver, Colorado

May 31, 1955

Memorandum

To: W.M. Traver, Executive Officer, DMEA Field Team, Region III

From: Superintendent, Southwest Experiment Station

Subject: Report of Field Examination, Docket DMEA-3515, Shannon Mining Co.'s Shannon Copper-Lead-Zinc Mine, Turquoise Mining District, Cochise County, Ariz.

Enclosed are original and 8 copies of the revised field report on the above property as requested in your memorandum of May 4. The report has been clarified somewhat, but much of the 400-level still has not been cleaned out to the proposed drill stations, so the cost estimates for rehabilitation still are rather hazy. However, this is about as good as the examiners can do with the present information on hand.

Walter R. Storms

Walter R. Storms

cc: Traver (8)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

RECEIVED
JUN 1 2 1955

TRANSMITTED
JUN 1 4 1955

DMEA-3E16, Hanscom Mine (Copper-Lead-Zinc)

Hanscom Mining Company

Cochise County, Arizona

T. M. Romslo, Mining Engineer
U. S. Bureau of Mines

Leonid Bryner, Geologist
U. S. Geological Survey

April 1955

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By T. M. Romslo[1] and Leonid Bryner[2]

The Shannon mine, Cochise County, Ariz. was examined by the Defense Minerals Exploration Administration in connection with the Shannon Mining Company's request for Governmental assistance on a proposed exploratory project for copper, lead and zinc ores. The application, docketed as DMEA-3513, briefly outlined work costing an estimated $160,000.00. Cost of the work was raised to $119,000.00 in a revised program received prior to field investigations. These cost estimates had been prepared while the mine was largely inaccessible and consequently before either the type and amount of desirable exploration could be determined. Examination of the property by engineers and geologists for the DMEA was made after the applicant had made much of the mine accessible.

A prior application for aid at the property, docket DMA-1373, had been denied because ore reserves were believed to be insufficient to justify reopening of the mine and construction of a mill and sulfuric acid plant at an estimated cost of $250,000.

1/ Mining Engineer, U.S. Bureau of Mines
2/ Geologist, U.S. Geological Survey

The Shannon mine, discovered and first worked as the Copper Belle or Leonard deposit, has been intermittently operated from about 1888 to late in 1926. Reported production for a 5-year period starting late in the 1880's was $250,000.00 (gross) of ore containing 4 to 7 percent copper. The most production was in 1907 when ore shipments contained 64,988 pounds of copper, 28,043 ounces of silver, and 397 ounces of gold. The last production from 1911 to 1926 was about 206,000 tons of ore. Of this production 200,733 tons of ore containing 1.73 percent copper, 1.10 ounces of silver and 0.035 ounce of gold a ton, was shipped from 1911 to 1916. In 1926, an attempt was made to roast and leach the ore in place. The mine was set on fire by igniting large quantities of fuel oil and timbers. The fire died out after burning satisfactorily for a few years. In 1936, precipitation of copper from the mine water proved unsuccessful. Since then operations at the mine have been confined to the applicant's current construction and rehabilitation program that started in June 1954.

At the start of current operations, surface structures were confined to a steel headframe. Mine workings were inaccessible with water at 120 feet from the surface. At present, the surface plant consists of small buildings that house a hoist and compressor, a carpenter shop, core storage, and tool shop. Other surface installations include a transformer station for electricity furnished by a utility company, and a large water tank. The 3-compartment main

shaft has been reconditioned to just below level 4, and this level and levels 2 and 3 have been partially rehabilitated. Levels 5 and 6 are under water. A natural flow of air via 2 shafts adequately ventilates the presently accessible workings. Workings were said to total about 20,000 feet.

The Shannon mine is situated on the lower west slope of Shannon Ridge near its south end. Ore occurs as lenses of sulfide minerals at the irregular easterly dipping contacts between Pennsylvanian Bass limestone and sill-like bodies of quartz-monzonite. To the west and also at depth, the limestone and quartz monzonite and against granite. Fault systems, both normal and reverse, traverse the mine area. Faults, that account for the western termination of sediments and their enclosed sills, are probably of the reverse type. Thrust faulting following normal faulting is shown by the outlier of Bolan quartzite and Tertiary rhyolite southwest of the mine. All of the faulting except possibly the thrust faulting probably pre-dates ore deposition.

The mined ore bodies occur along seven limestone-quartz monzonite contacts within an approximately 600-foot wide zone that has a strike length of about 1,200 feet. The largest ore body is roughly lenticular, about 400 feet in the dip and strike lengths, and has a maximum thickness of approximately 100 feet. The average ore body is in the order of about one-third this size. The mineral content of the

deposits apparently varies considerably. Most of the ore bodies are predominantly pyrite, though they show a tendency toward copper mineralization in places. Some bodies are relatively rich throughout in copper minerals. Besides bodies of iron and copper sulfides, the mine also contains at least two bodies of galena and sphalerite. Higher concentrations of copper minerals appear to occur below the pyrite bodies, while zones above these bodies appear to contain the higher concentrations of lead and zinc. Exploration of the ore zone has been of minor importance below about 100 feet from the stopes.

The potential reserves of the project area are in the order of 300,000 to 400,000 tons of ore containing about 2 percent copper and probably significant amounts of lead, zinc, and silver. Of these reserves, 200,000 to 300,000 tons may be present in the geologically favorable zone of proposed surface drilling. The remainder is indicated and inferred reserves present as probable lateral and depth extensions of known ore bodies.

A proposed 2-stage exploratory program involves rehabilitation of underground workings, and a total of 16,700 feet of diamond drilling from both the surface and underground. It is designed to an evaluation of results of about one half of the work will indicate the advisability of continuing explorations. The total cost of the program has been estimated at $135,722.57. Of this amount,

$64,[illegible].03 and $61,493.64 are allocated to stages 1 and 2, respectively.

Governmental participation in the proposed project is recommended because (1) the project has a fair chance of indicating the presence of significant reserves of copper, lead and zinc ore, and (2) competent supervision and prosecution of the work is expectable.

[illegible], SHANNON MINE (COPPER-LEAD-ZINC)
SHANNON MINING COMPANY
COCHISE COUNTY, ARIZONA

Engineering Report

By T. H. Rumble
Mining Engineer
U. S. Bureau of Mines

April 1956

BARA-3313, SHANNON MINE (COPPER-LEAD-ZINC)
SHANNON MINING COMPANY
COCHISE COUNTY, ARIZONA

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INTRODUCTION

The Shannon mine in Cochise County, Ariz. was visited by consultants for Defense Minerals Exploration Administration in connection with an application by the Shannon Mining Co. for Government participation in a proposed exploratory project for copper, lead and zinc ores. Cost of the project had been estimated at $100,000.00. The application, designated as DMEA-2013, was reviewed by the Operating Committee and sent to the Field Team, Region III. The Field Team, after receipt of requested supplemental data from the applicant, requested an examination of the property and a suitable report. Included with the supplemental data was a revised program, the cost of which had been estimated at $110,000.00. Proposed work included a geophysical and a geological survey, rehabilitation of underground workings, drifting, and diamond drilling from both the surface and underground.

A prior application for aid on this property, made by A. J. Hutchinson and E. G. Moore of Douglas, Ariz. in July 1951, was designated as DMA-1373. It involved a proposed project of reopening the mine, and building a mill and sulfuric acid plant at an estimated total cost of $500,000.00. The requested aid was denied on the basis of the examining engineer's conclusion that the mine did not contain adequate ore reserves. As the mine was inaccessible, the conclusions were based on mine records and the knowledge gained by one of the engineers who was employed at the mine in 1913.

The current field investigations were initiated from January 17 to 19, 1955 by J. H. Faich and Leonid Reyner, both of the U.S. Geological Survey. Supplemental field investigations were made March 9 to 11, and May 17, 1956, by Reyner, and T.M. Rennie of the U.S. Bureau of Mines. The applicant's representatives, J.W. Faust, assistant manager, and Jack Conley, mine engineer, assisted the examining engineers on both occasions. Conditions for these investigations were relatively favorable as the applicant had made the mine accessible to the 4th level and rehabilitation of the mine workings was well under way. Consequently, the RMEA examiners and the applicant's representatives were able to get up a desirable exploratory program in which much of the proposed work was dependent upon the results of the initial findings.

LOCATION AND ACCESSIBILITY

The Shannon mine is situated in Sec. 32, T. 19 S., R. 25 E., Turquoise Mining District, Cochise County, Ariz. (figure 1). Gleason, an old mining town that has been almost completely abandoned, is less than 1 air-mile southeast of the mine.

The nearest railroad shipping point is at Tombstone, Ariz., a village on U. S. Highway 80 at about 15 air-miles west of the mine. To reach the mine from Tombstone follow the graded Gleason-Elfrida road westerly 13.4 miles to a northwesterly trending access road at 0.1 mile east of Gleason. Proceed 0.5 miles on the access road that ends at the Shannon mine.

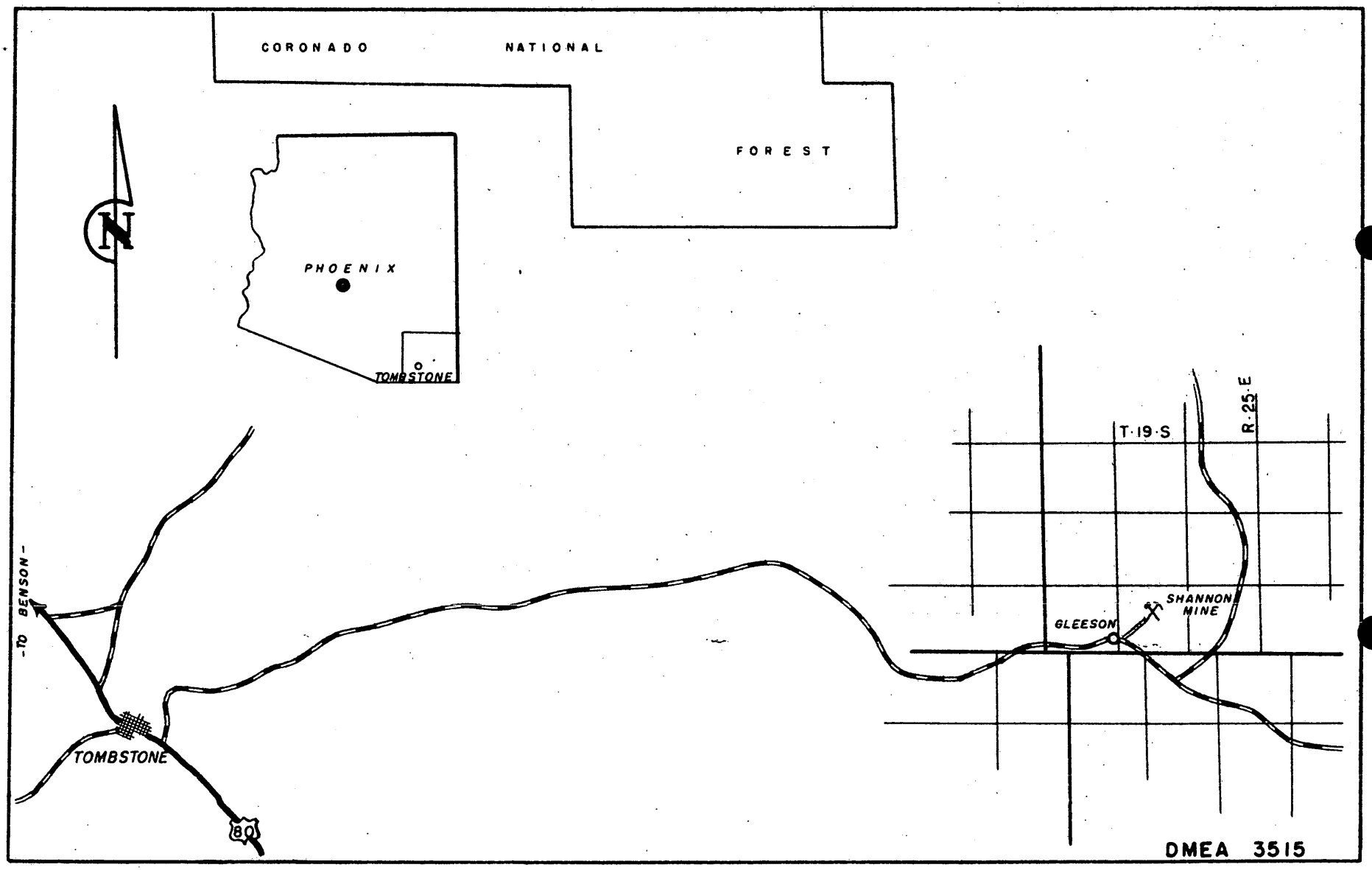

FIGURE 1 LOCATION MAP, SHANNON MINE, COCHISE CO. ARIZ.

Douglas, Ariz., the site of a Phelps-Dodge Corp. smelter, may be reached from Glenora by traveling 9 miles easterly to Elfrida, thence 26 miles southeast on U. S. Highway 666.

PHYSICAL FEATURES AND CLIMATE

The Glenora mine is at an average altitude of about 4,970 feet. It is in an area of gently rolling hills that forms the southeast base of Glenora Ridge. Glenora Ridge is about 2 miles long, north to south, and about one half mile wide. It attains a maximum altitude of 5,250 feet.

Climatic conditions are favorable for year round mining operations. Summer temperatures seldom rise above 100° F. and winters are mild with minimum temperatures of 10° F. Annual precipitation averages about 14 inches. Heavy rainfalls occur principally during July and August, and a few light snowfalls can be expected during the winter.

Drainage in the mine area is westward to the southern end of Glenora Ridge, thence westward to Sulphur Springs Valley.

HISTORY AND PRODUCTION

The Glenora copper mine originally was known as the Copper Belle, or Leonard mine. Its history and production to May 1937 have been reported by Wilson:[1]

1/ Wilson, Eldred D., Geology and Ore Deposits of the Courtland-Gleason Region, Arizona, Ariz. Bur. of Mines Bull. 123, 1937.

"[illegible]"

"[illegible]"

The operations of [illegible] proved unsuccessful. [illegible] or no work was done on the property until June [illegible], when the present Shannon Mining Company started construction of a surface plant and rehabilitation of underground workings.

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[illegible] AND OWNERSHIP

The property, comprising a group of 20 lode mining claims of which 9 are patented, is owned by Jon Van Tuyl and J. R. Bayuse of Ottawa, Texas and E. G. Moss and A. J. Hutchinson of Douglas, Ariz. (figure 2). It is held under a lease and option agreement by the Shannon Mining Co., a subsidiary of the Pure Mining Co., which in turn is owned by the Hillsdale Mint Co. The agreement, dated April 7, 1954, calls for an initial payment of $11,000.00 and semi-annual payments of $6,000.00 totaling the total purchase of $30,000.00.

At present, the Shannon Mining Co. is attempting to obtain control of several mining claims that adjoin the current holdings to the east and north.

[illegible] OF REPORTS

Wilson[1] says the following about the ore bodies of the Shannon mine:

"An irregular outcrop of fossiliferous limestone, about one-half mile long and up to about 600 feet wide, is separated from the main limestone mass of Quinnat Ridge by a sill of quartz monzonite 300 to 700 feet wide, and on the southeast, through a number of surface vents, is in hydraulic contact with rhyolite. This body of limestone is primarily well-stratified in southeast portion, and the bedding dips about 40°. Three sills of altered quartz monzonite are approximately parallel to the bedding, with the result that the limestone and quartz monzonite make alternate irregular layers of about 100 feet maximum thickness. The limestone, which is pure white and only that part of Shannon Ridge about 1,000 feet southeast and northwestward along strike has been mineralized and the quartz monzonite is altered into a fine-grained mixture of sericite and quartz, traversed by minute calcite veinlets and speckled sparingly by tiny pyrite grains.

1/ Previously cited in footnote 1.

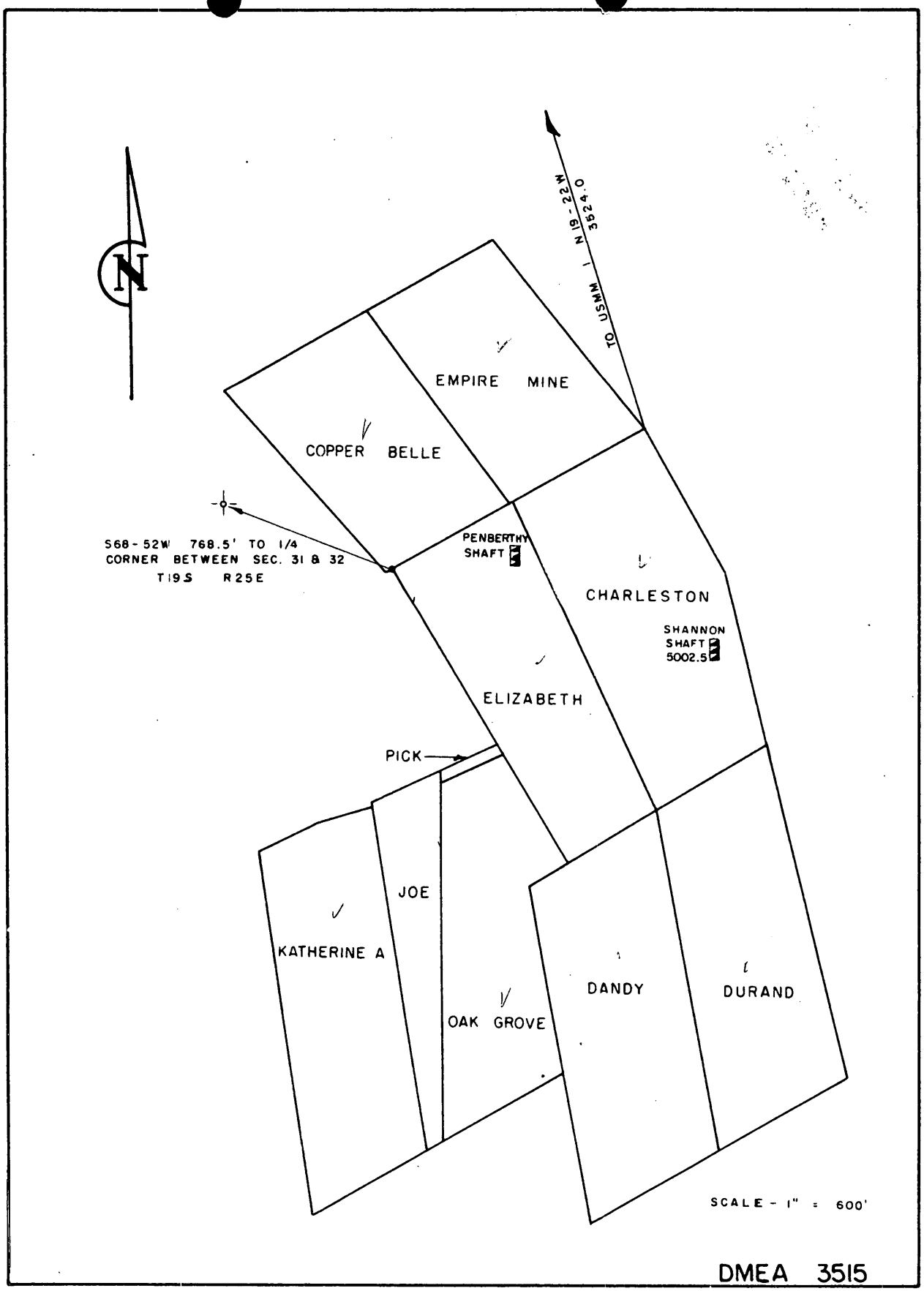

FIGURE 2 CLAIM MAP, SHANNON MINE, COCHISE COUNTY, ARIZ.

"Faulting, both pre-ore and post-ore, has affected the rock formations in the vicinity. One fault of the earlier class strikes nearly north-south, and dips 60° E. Several subsequent faults of this north or south dips and probably is part of pre-ore age. Numerous movements that occurred along, or roughly parallel to, the limestone-quartz monzonite contact are also probably in pre-ore. Many minor, post-ore faults are evident. An overthrust fault, the plane of which dips about 40° W., lies between the limestone and rhyolite.

"Most of the ore bodies are confined to the limestone and show close limitation to contact with quartz monzonite, although the latter itself often contains abundant outcrops and disseminations of pyrite. The ore bodies are irregular lenses along these contacts, but nevertheless maintain a tabular, roughly vein-like character, and are widest where there is a flattening of the dip. Sometimes the ore bulges into the limestone as far as 100 feet, but usually one side remains against the quartz monzonite, and faults cut off along fractures or breaks such. Generally, the richness of the deposits increases with intensity of rock alteration, although in some cases this alteration shows but little deposition upon proximity to ore.

"Ore minerals: The ore consists of massive pyrite with minor chalcopyrite and bornite, and occasionally contains very small quantities of secondary silver and gold. Base metals are the greatest in the upper 100 feet of the workings, where the minerals cerussite, anglesite, azurite, and probable smithsonite are said to have been well developed. There was probably some rich enrichment between this outlined zone and the primary sulphides."

The present investigations indicate that the quantities of copper, lead, and zinc minerals associated with pyrite deposits generally is small, but that some deposits and portions of others contained relatively large amounts of the ore minerals. One partly developed sulfide deposit recently encountered on the 200 level contains an estimated 10,000 to 20,000 tons of 10 to 20 percent combined lead and zinc, and records show that portions of mixed deposits contained as much as 5 percent copper.

Geological conditions in the area of proposed surface diamond drilling, north of the mine workings, are obscured by a mantle of conglomerate (figure 3). That conditions favorable for ore bodies may exist in this area is indicated by the findings of ensuro drill hole 3, a small outcrop of limestone in the area, and mineralized outcrops immediately north of the area.

ORE RESERVES

The deposit contains little or no measurable ore reserves.

Combined indicated and inferred reserves are in the order of 300,000 to 400,000 tons of ore containing about 2 percent copper and probably significant amounts of lead, zinc, and silver. Of these reserves, about 100,000 tons is present as probable and possible extensions of known deposits. The remainder could be present in the zone of proposed surface diamond drilling to the north of mine workings.

PRESENT STATUS

Surface Plant:

At the beginning of current operations, surface structures at the Sherman mine were confined to a 57-foot steel headframe. At present the surface plant comprises the reconditioned headframe, a hoist-compressor house, a tool house, a carpenter shop, a core house, an electric transformer station, and an 8,500-gallon water

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storage tank. All buildings are of wood-frame construction and are roofed and sided with galvanized iron. A primary crusher, belt conveyor and 250-ton steel ore bins are under construction.

Electric power is furnished by a private utility company.

Water for all uses except human consumption is pumped from the mine. The amount of water entering the mine is believed to be small, probably around 10 gallons per minute. Drinking water is hauled to the mine from a nearby well.

The principal surface equipment consists of a double drum hoist, a 700 cfm. compressor, a 2-ton truck, and a 1/2-ton pickup.

Underground Plant

Rehabilitation of the underground workings is well under way (figures 4, 6, and 7). The 3-compartment Pomeroy shaft has been almost completely retimbered to the 3rd level and reconditioned from the 3rd to the present water level at approximately 25 feet below the 5th level. Water, first encountered at a depth of 130 feet from the surface, is being raised to the surface through a newly installed 3-inch pipe line by an electric centrifugal pump. The present water level is being maintained in order to assure an adequate supply for proposed exploratory operations. Cages and 3/4-inch hoisting cables have been installed in each hoisting compartment, and air and water lines have been placed in the manway compartment. Shaft sets, composed of 12-by 16-inch timbers, are completely lagged. Rehabilitation of a portion of the approximately 30,000 lineal feet of mine

workings is presently confined to levels 2, 3 and 4. Diamond drilling was recently started. Several short holes have been drilled on levels 3 and 4.

Ventilation of the accessible parts of levels 3 and 4 appears to be adequate. It is accomplished by a natural circulation of air via the Foulkerthy and Shannon shafts, the lateral workings and a few raises and stopes.

The principal mining equipment consists of 20 mine cars, 3 mucking machines, a Nemetha motor trammer, 3 stopers, 2 jackhammers, and an underground diamond drill machine.

MINING OPERATIONS

Mining of the high-grade lead-zinc-copper deposit on the 500 level is expected to begin within a fortnight, probably early in June. Production of 75 to 100 tons daily is expected. Ore will be trucked to the nearby village of Cochise for shipment via the Southern Pacific Railroad to the Pure Mining Co.'s concentrator at Deming, N. Mex.

About 25 of the present crew of 36 will be maintained for mining and rehabilitation operations. These operations probably will be continued on the present schedule of 2 shifts daily for 6 days a week.

PROPOSED EXPLORATORY WORK

As revised, the proposed exploratory project involves underground rehabilitation work, and diamond drilling from both the surface and underground. The geophysical survey of the original proposal has not been included because the results of such work in the project area

could only be expected to indicate that the planned surface diamond drilling should be done. Also included is a separate item for geological surveying. Essentially all of the planned survey work was outside the area of the proposed exploratory project.

Planned Drilling

Surface and underground drilling will be conducted simultaneously. Underground drilling should start at the north end of the mine and progress to the south while surface drilling proceeds from south to north. Under this plan, probably the most favorable areas would be progressively explored in 2 stages. Results obtained during the first stage would be used to determine the advisability of continuing the project.

As the expectable average strike and dip of the deposits is in the order of 300 feet, initial explorations should consist of drilling 1 to 3 holes in vertical planes approximately normal to the average trend of the deposits and at intervals of about 300 feet.

On the basis of present drilling results, good core recovery can be expected, especially in sulfide zones. Surface and underground holes probably will be started at BX and AX sizes, respectively and should be bottomed at AX size if possible.

Surface Drilling

A generalized plan of proposed drilling in the vertical planes of figure 5 is shown on figure 8.

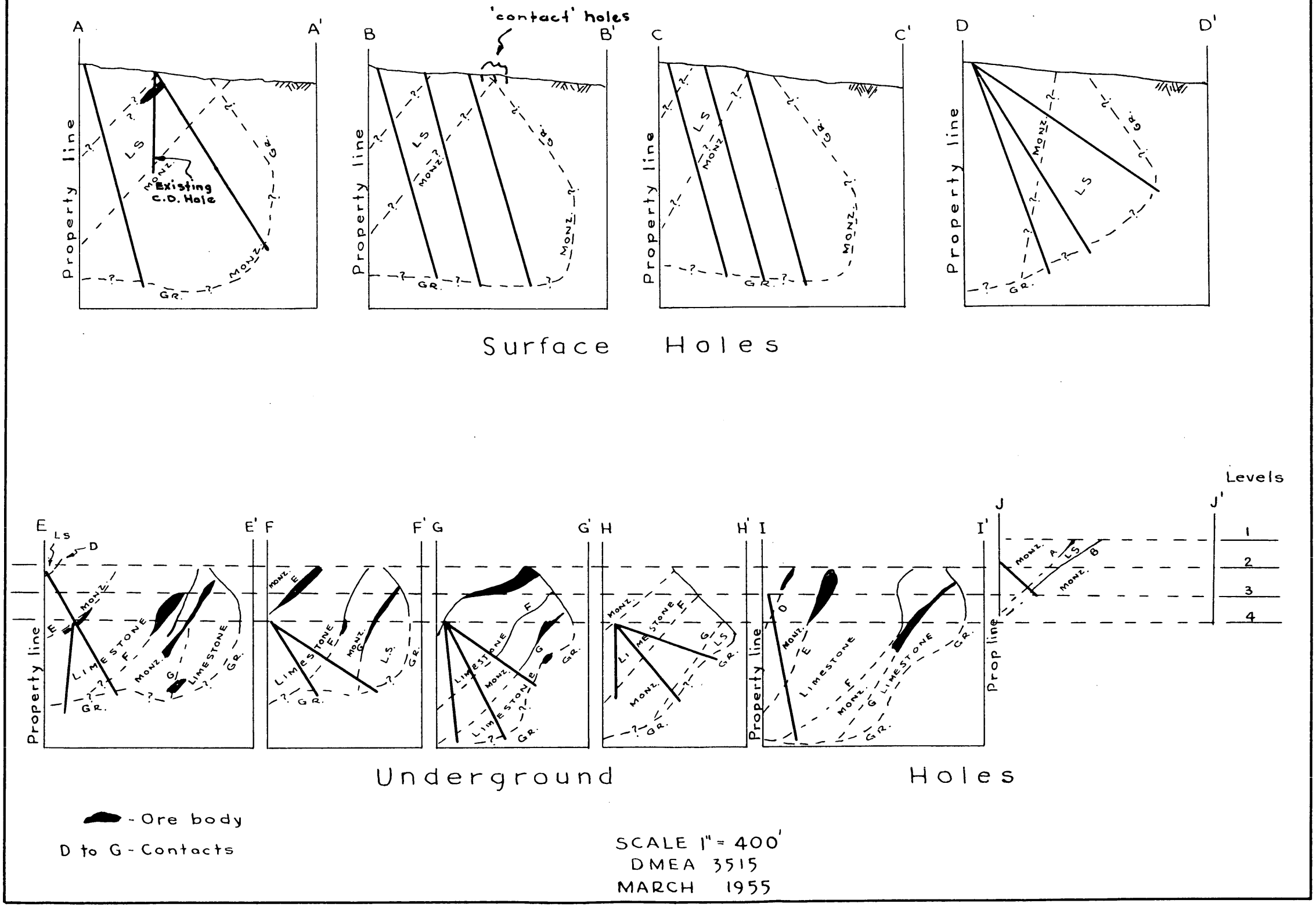

FIGURE 8 GENERALIZED SECTIONS OF PROPOSED DRILL HOLES
SHANNON MINE, COCHISE COUNTY, ARIZ.

Provision has been made for the diamond drilling of 2 or 3 shallow "contact holes" at the most advantageous locations near vertical section B-B'. These holes are designed to establish the approximate location of the granite-ore zone contact. They are of questionable value and are subject to elimination on the basis of information in the Geological Report.

Exploratory drilling should be initiated by drilling the most westerly hole of section A-A'. The other hole of this section then should be drilled from near the property line to intersect potential ore zones at favorable angles. Drilling then should proceed progressively through sections B-B', C-C' and D-D'. The first drilling in each section should be the most western hole. Data obtained will indicate whether the drilling of other holes in the section is advisable and also provide information for a proper design of desirable holes. Drilling of holes to maximum depths of 800 feet may be desirable. However, they should be stopped at lesser depths if granite is encountered or after penetrating the deepest potential ore horizon as indicated by initial drilling.

The proposed drilling totals 8,700 feet of which 3,900 feet is allocated to the first stage, and the remaining 4,800 feet is for drilling under the second stage. These footages should allow for the drilling of intermediate holes, if found warranted, because some of the proposed holes may not be found necessary and other holes may be stopped at less than the indicated depths.

Underground Drilling

The pattern of underground drilling is similar to the surface drilling (figures 6, 7, and 8). Drilling along sections should be completed in the indicated order, starting with E-E' and finishing with J-J'. Where "down" holes are indicated, the order of drilling should be from the flatter to steeper holes. For each section, data obtained from the first hole may indicate that the inclination and depth of subsequent holes should vary somewhat from that shown.

Proposed underground drilling totals 7,000 feet of which 4,000 feet is allocated to the first stage of the project. The 4,000 feet is sufficient for the drilling of all holes of sections E-E', F-F', and G-G', and for the drilling of intermediate holes to test for strike extensions of any ore zones encountered by the initial drilling. The remaining 3,000 feet are for drilling along the other sections and for intermediate holes of the above mentioned type.

The underground drilling should be completed in 10 months on the basis of an estimated advance of about 20 feet per working day.

Drill Stations

Drill stations will have to be prepared only for the underground explorations. The applicant proposed to prepare necessary stations by driving short vertical or inclined raises. Each raise will average an estimated 10 feet in length. They will be driven from existing drifts or crosscuts and provide adequate room for drill rod changes of 10 feet. Muck from the raises and any necessary "slab rounds" will be hand-filled in the nearest feasible stope.

REHABILITATION

Proposed rehabilitations are confined to the levels of proposed underground drilling, the 300 and 400 (figures 6 and 7).

300 Level - Both proposed drilling sites are presently accessible through drifts and crosscuts that lead to the Shannon and Pumberthy shafts. Pipe-line installations will be made from the 200 level to the drill sites via the Shannon shaft. No track will be installed as drilling equipment will be skidded to the stations. Timbering will not be necessary and rehabilitation of the drifts and crosscuts will be confined to the leveling-off of a few small piles of debris.

400 Level - At present (May 1951) approximately 1,100 feet of drifts and crosscuts must be rehabilitated in order to reach the 4 proposed drill sites. Of the 1,100 feet, 800 feet would be under the first stage of the project and the remaining 300 feet would be carried out under the second stage. At the point marked "filled with debris", 2 men on each shift are reopening the drift at an average rate of about 4 feet per day. On this basis, the same crew would have to work about 275 days to reopen the 1,100 feet of workings. However, it probably is reasonable to expect a major portion of the working will require little work and that the present crew can be expected to advance at an average rate of 12 feet per day. Track and pipe lines will have to be installed for the entire distance if removal of debris from the mine if found necessary. Some timbering can be anticipated.

ESTIMATED COST OF PROJECT

Independent Contractor

Diamond Drilling

Three contractors, R.J. Longyear Co., Sprague & Henwood, Inc., and Joy Manufacturing Co., submitted bids to the applicant. Two of the bids were for a minimum of 3,000 feet each of surface and underground drilling to EX and AX sizes. These bids were for drilling to depths of less than the anticipated maximum of 800 feet. The other bid on a total of 6,000 feet of the same size holes did not specify any maximum depth of hole. On the basis of the 3 bids, the estimated cost of drilling will be about $6.10 a foot, or a total of $80,070.00 for the proposed 13,700 feet. AX size coring is preferred and should not be decreased to EX unless found advisable.

The recommended allocation of the estimated $80,070.00 is as follows:

	Surface Drilling		Underground Drilling		Totals	
Stage	Feet	Cost	Feet	Cost	Feet	Cost
1	3,000	$ 18,[illegible].00	4,000	$ 24,[illegible].00	7,000	$42,[illegible].00
2	4,000	24,[illegible].00	2,000	12,[illegible].00	6,000	36,[illegible].00
Totals	7,000	$ 42,[illegible].00	6,000	$ 36,[illegible].00	13,700	$ 80,070.00

Drill Stations

The applicant has offered to prepare underground drilling stations by driving 16-foot vertical or inclined raises for $20.00 a foot. Raises will be 4 by 6 feet in section. If additional room is necessary, slabbing will be done at no additional charge. Cost of the 7 stations will be $1,400.00. Cost of the 30 feet of raise for the 3 stations of stage 1 would be $600.00. The remaining $800.00 would be for the 40 feet of raising in the 4 stations of stage 2.

Supervision

Mining Engineer,	10 months at present salary of $475.00 per month	$ 4,750.00
Superintendent -	Jerry Faust, who probably will spend 1/3 of his time on mine, reported his salary is in excess of $1,000.00 per month. Suggest allowance of $500.00 per month of which $200.00 per month is allocated to bookkeeping, 10 months at $300.00	4,500.00
Consultant -	Services of Harrison Schmitt, mining geologist of Silver City, N. Mex., or other competent consultant. Justification for services is given in Geologic Report. 10 days at $100.00	1,000.00
	Total	$10,250.00

Labor

The present wage schedule at the Shannon mine follows:

Classification	Rate/hour
Foreman	$ 1.80
Miner	1.80
Machine machine operator	1.50
Muscher-trammer	1.25
Shaftman	1.75
Shaftman helper	1.50
Underground timberman	1.80
Underground timberman helper	1.25
Repairman	1.80
Diamond driller	1.75
Carpenter	1.75
Sampler	1.25

Labor costs of $12,000.00 have been estimated on the following basis:

1. Average daily wage of $12.00 per employee includes overtime for a 6 day-a-week operation but does not include payroll taxes and insurance.

2. Roistman, one on each of 2 shifts, will also service compressor.

3. One sampler will assist engineer in handling cores and sludges.

4. Four employees of other classifications will be required for a period of 44 days on pipe and track installations and clean-up work.

Operating Materials and Supplies

Timber, 10,000 board feet at $81.00/M		$ 810.00
Pipe, 1,800 feet of 2-in. at $26.37/100 ft.	$ 445.56	
1,800 feet of 1-in. at 19.75/100 ft.	355.50	841.00
Rails, 1,160 feet of 30 lb. at $537/ton		621.00
Pipe and track accessories		179.00
Electric power, 16 months at $150.00 per month		1,200.00
Fuel and greases		390.00
Total		$ 4,542.00*

*Cost of delivery to mine has been included in unit prices.

Operating Equipment

All necessary equipment, except that to be furnished by drilling contractor, is located at the mine. Following is a list of equipment with the company's estimated values:

		New	Used	Value
1	57' Steel headframe		x	$ 5,000.00
1	Double Drum Ottumwa Hoist 48" drums and 1600' 3/4 hoisting cable 125 HP, 440 Volt motor and control		x	4,000.00
1	Worthington Laidlaw Compressor #1 340-A 15 x 9-1/2 x 12, 150 HP, 440 Volt motor and compensating starter		x	3,000.00
1	2 Ton Chevrolet Flatbed stake body, 2 Speed rear end, 1952 model - Klondeek			1,190.00
1	1/2 Ton Chevrolet pickup, 1951 model - Klondeek			670.00
30	30 Cu. ft. end dump mine cars Sanford-Day trucks, $230.00 each new		x	2,000.00
3	Gardner Denver mucking machines at $2,265.00 each new		x	4,000.00
1	Manaka Motor, new $5,500.00		x	2,500.00
3	Batteries for above, $500.00 each new		x	900.00
1	Black & Decker 10" Bench grinder, 440 volt motor		x	30.00
1	Delta Table saw and planer, new $225.00		x	100.00
1	Black & Decker portable electric saw, 18"	x		195.00
1	Black & Decker portable elec. chain saw	x		130.00
1	Arc welder		x	80.00
1	Oxygen & Acety. welding set		x	50.00
2	IR36 Stope hammers		x	750.00
2	Gardner Denver jackhammers		x	300.00
1	No. 2 MSD-60 IR Motor Pump (turbine)		x	450.00

The writer inspected all equipment and found the applicants' estimated values to be reasonable. Following is a list of equipment that will be chargeable to the project, with allowances for depreciation based on a 5-year life:

Item	Depreciation allowance For month	Depreciation allowance 10 months
1 - Hoist	$ 66.67	$ 666.70
1 - Compressor	50.00	500.00
1 - Pickup truck	11.16	111.60
1 - Mucking machine	25.67	257.67
1 - Motor tramper with battery	45.67	456.70
1 - Pump	7.50	75.00
6 - Mine cars	10.00	60.00
		$ 2,147.67

Miscellaneous

Repairs to equipment, 10 months at $50.00 month	$ 500.00
Analysis of samples	1,000.00
Payroll taxes & insurance, 15 percent $22,288.00	3,343.20
Bookkeeping, 10 months at $50.00	500.00
	$ 5,343.20

Contingencies

To provide for additional diamond drilling and drifting to drill mines, or to further explore ore bodies, if justified by findings	$10,000.00

Distribution and Summary of Estimated Costs:

Item	Stage I Diamond Drilling	Stage I Rehabilitation	Stage I Totals	Stage II Diamond Drilling	Stage II Rehabilitation	Stage II Totals	Totals Stages I & II
Independent Contracts							
Diamond drilling	$ 40,200.00			$ 39,790.00			
Drill stations	600.00			680.00			
	$ 40,800.00		$40,800.00	$ 40,390.00		$ 40,390.00	$ 81,470.00
Supervision							
Engineer	2,137.50	$ 237.50		2,137.50	$ 237.50		
Supervisor	2,025.00	225.00		2,025.00	225.00		
Consultant	500.00			500.00			
	4,662.50	462.50	5,125.00	4,662.50	462.50	5,125.00	10,250.00
Labor							
Maintenance	2,925.00	325.00		2,925.00	325.00		
Sampler	1,625.00			1,625.00			
Others		1,716.00			857.00		
	4,550.00	2,041.00	6,591.00	4,550.00	857.00	5,447.00	12,038.00
Operating Materials & Supplies							
Timber		725.00			182.00		
Pipe		450.00		200.00	111.50		
Rails		500.00			113.00		
Pipe & trench accessories		125.00		25.00	35.00		
Electric power	675.00	75.00		675.00	75.00		
Fuel & greases	225.00	25.00		225.00	25.00		
	900.00	1,900.00	2,800.00	1,125.00	561.50	1,686.50	4,542.00

Distribution and Summary of Estimated Costs - (Cont'd.)

Item	Stage I Diamond Drilling	Stage I Rehabilitation	Stage I Totals	Stage II Diamond Drilling	Stage II Rehabilitation	Stage II Totals	Totals Stages I & II
Equipment							
Hoist	$ 300.00	$ 33.35		$ 300.00	$ 33.35		
Compressor	225.00	25.00		225.00	25.00		
Pickup truck	50.00	5.00		50.00	5.00		
Mucking machine		133.83			133.84		
Trammer with battery		233.35			233.35		
Pump	37.50			37.50			
Mine cars		50.00			10.00		
	612.50	481.33	$ 1,093.83	612.50	441.34	$ 1,053.84	$ 2,147.67
Miscellaneous							
Repairs to equipment	225.00	25.00		225.00	25.00		
Analysis of samples	500.00			500.00			
Payroll Taxes & Ins.	1,371.00	421.20		1,371.00	180.00		
Bookkeeping	225.00	25.00		225.00	25.00		
	2,321.00	471.20	2,792.00	2,321.00	230.00	2,551.00	5,343.20
Contingencies	5,000.00		5,000.00	5,000.00		5,000.00	10,000.00
Totals	$58,936.00	$5,362.83	$64,298.83	$58,931.60	$2,562.04	$61,493.64	$125,791.6[illegible]

Distribution of costs, where applicable, have been made on the basis of engineering judgment that indicates usage of items, except certain materials and supplies will be about 90 percent for diamond drilling and 10 percent for rehabilitation. Of the materials and supplies, costs of timber, pipe, rails, and truck and pipe accessories have been distributed on the basis of the anticipated footages of workings to be rehabilitated. It will be noted that a portion of the cost of pipe and pipe accessories has been applied to diamond drilling. This distribution appears to be in order because these items are intended for use on the 300 level where water and air lines will be installed in workings that require very little rehabilitery work.

In event project and independent company operations are conducted simultaneously, the allowable costs of certain items will have to be determined on a percentage usage basis.

CONCLUSIONS AND RECOMMENDATIONS

The proposed exploratory program is feasible and has a fair chance of indicating the presence of significant reserves of copper, lead and zinc ore. It is designed so that an evaluation of results of possibly one-half of the work will indicate the advisability of continuing explorations.

Competent supervision and prosecution of the proposed work can be expected although it appears that some of the recently completed work was not based on good engineering judgment. Expenditures for

installations worthy of an operating mine probably could have been more wisely used on exploratory work.

Approval is recommended for Government participation in a proposed 2-stage exploratory project at the Shannon mine that will cost an estimated total of $125,791.67.

DMEA
Date Rec'd. JUN 10 1955

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Defense Minerals Exploration Administration
Denver Federal Center
Denver, Colorado

BUREAU OF MINES
Denver, Colorado
RECEIVED
JUN 17 1955

June 10, 1955

TRANSMITTED
JUN 14 1955

Memorandum

To: Field Team, Region III

From: E. N. Harmsen

Subject: DMEA Docket 3515 (Copper-lead-zinc), Shannon mine, Cochise County, Arizona

Enclosed are the original and 8 copies of a geologic report by Leonid Bryner, U. S. Geological Survey, covering an examination of the subject property.

Ore deposits occur near the contacts of limestone and quartz monzonite sills. The ore consists of pyrite containing minor amounts of a chalcopyrite, bornite, galena, and sphalerite in a gangue of calcite, quartz and garnet. One high grade lead-zinc ore body is reported to have been mined.

Bryner concludes that exploration on the property is warranted and he proposes a program of drilling to explore for the northward and downdip extensions of the ore-bearing zone.

The program of drilling from the surface to explore the ground between the Shannon mine and the Moon mine to the north appears justified as proposed in the geologic report. However, the propriety of approving the suggested program of underground exploration at this time is questioned for reasons as follows:

1) According to Bryner, the ore potential of the ground to be explored by underground exploration is considerably less than that to be explored by surface drilling.

2) Rehabilitation of 1,100 feet of old workings will be necessary before the drill sites on the 400-foot level will be accessible. Perhaps this work should be done by the applicant at his expense. At the present rate of progress the engineer estimates it will require 275 days to complete this work. If surface and underground drilling are to proceed concurrently, as recommended by both the engineer and geologist, a long delay in starting the work can be anticipated.

3) The underground exploration has been laid out without benefit of examination of much of the 400-foot level, perhaps a critical level with respect to a knowledge of the potential downward continuation of geologic conditions favorable to ore deposits.

I suggest that approval of a program of surface exploration, similar to that proposed by the examining team, be approved at this time but that a decision on the proposed program of underground exploration be deferred until the operator completes the rehabilitation work on the 400-foot level of the Shannon mine and a re-examination of the property is made.

E. N. Harshman

E. N. Harshman
Member, Field Team

Enclosures (9)
EHHarshman:arh

TRANSMITTED

JUN 1 4 1955

Box 4186 University Station
Tucson, Arizona

May 26, 1955

RECEIVED

JUN 1 7 1955

MEMORANDUM

To: R. H. Burchman

From: J. M. Feick

Subject: Report of the field examination
ERDA Docket 3515 (Copper-Lead-Zinc)
Shannon Mine, Cochise County, Arizona

Returned herewith are the original and eight copies of the subject geologic report by Harold Bryner. The report has been revised and somewhat expanded as a result of questions raised in your letter of May 4, and as a result of a one-day re-examination of the property and conference with the applicant.

The accurate establishment of the granite-quartz monzonite contact probably would be more trouble than it is worth, and it is probably unnecessary to the exploration project, but the question has been reviewed in the revised report and the pros and cons given. The sentence "Managing the geology of the mine and surface would be a worthwhile project" has been deleted. But a treatment of this subject at slightly greater length has been added on page 2 in the Introduction.

As these reports will reach you without the engineering report, we are enclosing a single composite level map to show the proposed underground drilling on sections E-E', F-F', G-G', H-H', I-I', and J-J', the location of shafts and ore bodies in plan view, and the seven limestone-quartz monzonite contacts ("A", "B", "C", "D", "E", "F", "G") which form the drilling targets. Also included is a copy of Figure 8 of the engineering report showing the relationship of the proposed drilling to the generalized geologic sections. The location of the surface drilling, the outline of the north part of the 400 level, and the inferred surface trace of the granite-quartz monzonite contact have been added to Figure 3 of the geologic report.

In this connection we would ask whether you ordinarily would want us to submit copies of the engineering maps with our geological report. In other words, do you get just the geologic report or does Mr. Weaver send you a copy of the engineering report for your use while you review the geologic report?

J. M. F.
John M. Feick

JMF:ms
cc: 2 - Burchman
Steven

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
FIELD TEAM, REGION XIX

RECEIVED
JUN 17 1955

DMEA 3515

SHANNON MINE
SHANNON MINING MARKETS

(Copper-Lead-Zinc)

COCHISE COUNTY, ARIZONA

GEOLOGY

by
Leonid Bryner
Geologist
U. S. Geological Survey

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
FIELD TEAM, REGION XII

RECEIVED
JUN 17 1955

GEOLOGY
DMEA 3315
SEASIDE MINE
SEASIDE MINING DEPARTMENT
(Copper-Lead-Zinc)
COCHISE COUNTY, ARIZONA

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ILLUSTRATIONS

Fig. 1	LOCATION MAP	See Engineering Report
Fig. 2	GRADE MAP	" " "
Fig. 3	GEOLOGIC MAP AND SECTIONS	Following page 3
Fig. 4	COMPOSITE MAP OF MINE WORKINGS	See Engineering Report
Fig. 5	LONGITUDINAL OF PROPOSED REPAIRS MINING	" " "
Fig. 6	PLAN OF 300-LEVEL	" " "
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TABLES

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INTRODUCTION

In an application to the Defense Minerals Exploration Administration, dated September 15, 1954, Joseph H. Taylor, vice-president of the Shannon Mining Company, requested government participation in an exploration program estimated to cost $125,791.67, to explore for copper, lead, and zinc on the Shannon Mine, Cochise County, Arizona. This is the second application for DMEA aid submitted for this property. The first application (DMA 1273) was in July 1951, when the Coordinating Committee, Copper Branch, requested an examination. The applicants at that time were A. J. Hutchinson and H. C. Hoon, both of Douglas, Arizona, and they were asking for a loan of $250,000 to re-open the mine, build a mill and construct a sulphuric acid plant. The examination was made by C. A. Hunter and D. C. Brown of the U. S. Bureau of Mines, but due to the inaccessibility of the workings the report was based on mine records and on Hunter's first-hand acquaintance with the mine in 1942 as an employee of the Shannon Copper Co. The examining engineers concluded that the reserves of copper ore were probably too small and too low grade to warrant the great expense of rehabilitating the mine. The loan was denied.

The examination for the current loan applicant was made under more favorable conditions. The mine was accessible to the 4th level and rehabilitation of the workings is well under way. The present report summarizes the results of an examination on January 17, 18 and 19 by J. M. Fuich and Leonid Reyner, both of the U. S. Geological Survey. The engineering report is by E. K. Romslo of the U. S. Bureau of Mines, who examined the property with Reyner during March 8, 9, and 10. Reyner and Romslo made another examination on May 17 in order to bring their

report up to date and to further discuss an exploration program with the applicant. The examiners were assisted by J. E. Faust, Assistant Manager, and Jack Conley, Engineer at the mine. The geologic examination consisted mainly of additional mapping of the surface and of spot-checking the geology shown on the level maps belonging to the company. These maps were found to be substantially correct though they lack some fundamental data, such as directions of fault displacements. Re-mapping the geology of the deposit would be desirable but not essential in further evaluating the mine. Additional geologic mapping, if it were well done, would improve our understanding of the deposit. But this added knowledge probably would be of more value in development and mining than in exploration, because the broader geologic features as they are now known offer an adequate basis for laying out an exploration program. The examination showed that certain parts of the deposit contain high grade lead and zinc ore as well as copper ore that is considerably above the average grade of the deposit. Also, it appears from the geology that the ground north of the mine is the best place to look for substantial reserves in the project area. A program of diamond drill exploration is recommended.

The Shannon Mine, also known as the Copper Belle or Leonard Mine is described by R. D. Wilson in "Geology and Ore Deposits of the Courtland-Gleason Region, Arizona", Arizona Bur. of Mines Bull. 143, pp. 69-71, 1947.

LOCATION AND ACCESSIBILITY

The Shannon Mine is located on the Southwest slope of Shannon ridge in Sec. 32 T. 19 S., R. 23 E., Cochise County, Arizona. It is

less than half a mile east of the old mining town of Gleason in the Turquoise Mining District. The mine is accessible by 18 miles of good dirt road east from Tombstone, or by 21 miles of dirt road north from the Bisbee-Douglas highway (U. S. 80). The elevation at the mine is about 5000 feet.

PROPERTY AND WORK

The property consists of 9 patented claims and an unpatented fraction called the "Fish". The mine itself consists of about 38,000 feet of horizontal workings on six levels spaced 100 feet apart. The 300 and 600 levels, the two lowest in the mine, account for less than 6 percent of the workings. These two levels were flooded at the time of the examination, though rehabilitation is now close to the 300 level. The property is being operated from the Pumbertly Shaft which is about 580 feet deep. However, the total shaft footage on the property amounts to about 1400 feet. The underground workings are shown in fig. 4 of the Engineering report.

Title to the mine is by lease from Ira Van Engl, J. D. Haynes, E. G. Hunn, and A. J. Heidelmann. The lessee is the Shannon Mining Company, a subsidiary of Pure Mining Company which in turn is owned by Illinois Zinc Company.

GENERAL GEOLOGY

The sedimentary rocks of Gleason Ridge, a north-trending ridge that is the dominant topographic feature in the mine area, consist of the Cambrian Bolsa Quartzite and the Pennsylvanian Naco Limestone. The thickness of the Naco is indeterminate because of faulting, but at Bisbee Bonanza determined its thickness as at least 3,000 feet. Although the Naco is mostly quite pure it contains sandy, shaly and cherty beds. The base of Gleason Ridge is locally covered with Quaternary or Recent alluvium and talus.

The igneous rocks around Gleason Ridge are classified by Wilson in the order of their age as (1) Pre Lower Cretaceous Quartz Monzonite, (2) Pre Lower Cretaceous Quartz Monzonite-Porphyry, (3) Post Lower Cretaceous Felsite, (4) Post Lower Cretaceous Granite, and (5) Tertiary Rhyolite. All of these are intrusives, but the Rhyolite occurs mostly in flows. Although (2) does not outcrop around Gleason Ridge, it may occur underground in the mine area since Wilson considers it the source of the primary mineralization of the district. It has not so far been recognized in the mine.

Gleason Ridge is an erosional remnant of Nace limestone having a strike that follows the northerly trending axis of the ridge and an easterly dip of 30° to 47°. The limestone of the ridge rests on a sill of quartz monzonite that is several hundred feet thick and also has an easterly dip. The base of this sill rests on Nace limestone and, at the Shannon Mine, sends offshoots into the underlying limestone in the form of two or three small sills.

Faults along the west side of Gleason Ridge, in the mine area, parallel the ridge and are both normal and reverse. These faults dip both east and west and are of two and possibly three ages. Low-angle thrust faulting was later than at least one of the periods of normal faulting.

GEOLOGY OF THE MINE

The Shannon Mine is situated on the lower west slope of Gleason Ridge, near its south end. The ore occurs as lenses of sulphide minerals at the contacts between the limestone and

sill-like bodies of quartz monzonite. The irregular southerly dip of these contacts and the distribution of some of the ore bodies along them is shown in the sections in figure 3. To the west, and also at depth the limestone and quartz monzonite and against granite. One or possibly both of the faults labeled "E" and "I" in figure 3 probably account for the westerly termination of the sediments and their enclosed sills. These, most likely, are reverse faults, and possibly reflect the stresses accompanying the intrusion of the granite below and west of the mine area. Low-angle thrust faulting in the mine area appears to be confined to the fault outlier of Bolen Quartzite and Tertiary rhyolite shown southwest of the mine on the geologic map, figure 3. The "H", "J", and several other westerly-trending normal (?) faults cross the mine area. Although a quartzose rock is found north of the "H" fault on the 350 level, this rock most likely is a product of hydrothermal alteration of the Ross limestone rather than a segment of Bolen quartzite.

In addition to the fault systems represented by the "H", "I", "J" and "K" faults there has been some normal faulting in which the faults trend about north and dip steeply to the east. Two faults of this class are shown in section X-X', figure 3. All of the faulting, with the possible exception of the low-angle thrusting, appears to pre-date the ore deposition.

The intrusive rocks as well as the limestone in the mine area are highly altered, and for this reason are hard to identify. Silicification and possibly serpentinization appear to have been the predominant

processes of alteration. Silicification is especially widespread and complete in the limestone so that large amounts of this altered limestone resemble quartzite. Widespread disseminated pyrite also is characteristic of the silicified limestone. Probably much of the igneous rock also is silicified but the most obvious effect of alteration in the igneous rocks seems to be in the fuzzy outlines of crystals and the green cast of the rocks. Possibly much of this green is serizite.

The ore mined in the past consisted mainly of massive sulfides, predominantly pyrite, but also included chalcopyrite, bornite, galena and sphalerite. Though oxidized minerals occur above the 100 level, the normal water table, hardly any copper oxides were seen. The non-metallic gangue minerals are predominantly calcite, quartz and garnet. The ore occurs mainly as replacements in the limestone.

The form, dimensions, and distribution of the ore bodies can be seen in figures 3, 6 and 7. These bodies have been found along seven quartz monzonite limestone contacts labeled from east to west, "A", "B", "C", "D", "E", "F", and "G". They are distributed across the beds through an interval of about 600 feet, and along strike for a distance of about 1200 feet. Viewed in cross section the ore bodies seem to have a crude zonal arrangement, being concentrated in a zone that dips across the beds and almost perpendicular to them. The largest body (contact "F", section W-W') is roughly lenticular and about 400 feet in its strike length, about 400 feet in its dip length, and has a maximum thickness of about 100 feet. The average body, however, is more on the order of about one-third this size. Generally the thickest part of each body occurs where the dip of the quartz monzonite-limestone contact is flattest.

The limestone apparently was the best rock for metal deposition as most of the bodies protrude from the contact into the limestone. In some cases, however, the bodies protrude into the quartz monzonite. Such instances show evidence of fault control of the mineralizing solutions. Also, in the newly opened, northerly part of the mine on the 400 level, it appears as though most of the mineralization are concentrated along to bedding plane faults. These faults perhaps served as subsidiary ore-solution channelways, parallel to the limestone-quartz monzonite contacts, and like these contacts, extending in depth to the probable source of the ore solutions. It is perhaps indicative of their serving as channelways that these bedding plane faults are rather open and in the mine workings are subject to caving.

The mineral content of the bodies apparently varies considerably within single bodies as well as from one body to another. This is based more on grade data than on first hand observation since the stopes are mostly inaccessible. On the basis of production data and sample reserve, it appears that the large body described above must be almost entirely pyrite. Its lower edge, however, may contain chalcopyrite and other copper minerals. Most of the bodies in fact are predominantly pyrite, though they show a tendency toward copper mineralization in places. Bodies like the one at the "G" contact, section X-X', seem to be relatively rich throughout in copper minerals. There seems to be no general pattern of copper concentration at a certain depth as might be expected if this copper were the result of supergene enrichment. Also, the presence of unoxidized pyrite, sphalerite and galena in the upper levels, above the copper ore, suggests that the zone of oxidation has always been above a datum corresponding to the present surface. Therefore if any zone of supergene enrichment existed, it was considerably above the 300, 400, and 500 levels where the best copper values in the mine were found. Besides bodies of copper

sulphides, the mine also contains at least two and possibly three galena and sphalerite bodies. One of these is known to contain a significant tonnage of ore. It is between the "A" and "B" contacts in the 5th stope (See, V-V', Fig. 3). There is a suggestion of hypogene zoning in the higher concentration of copper minerals stratigraphically below the large pyrite body and the higher concentration of lead and zinc minerals stratigraphically above it.

Besides the lithologic and structural controls mentioned above, the faults that trend across the deposit probably have influenced the emplacement of ore. This is shown by the presence of gossan in the fault outcrops, and by the fact that the deposit thins out against the "E" and "F" faults.

Probably some of the lower bodies persist as much as 100 feet down dip from their lowest known point. This estimate is based on the shape and dimensions of the known bodies. However, shaft drill holes indicate that the ore of the Shannon Mine is limited in depth by the granite that underlies the deposit. These holes show that the top of the granite is 100 to 150 feet below the fifth level but possibly at a greater depth further to the east.

North of the most northerly workings of the mine and within one hundred feet of them, shaft drill hole No. 3 cut 30 feet of "heavy pyrite with ore in places." The outcrops north of this hole are obscured for an interval of about 600 feet by a mantle of Quaternary or Recent alluvium or talus (Fig. 3). However, where the bedrock is exposed north of this mantle the sill relationship of quartz monzonite to limestone found in the mine area continues, and concentrations of sulphide minerals close to the contacts are found. These northern deposits, known as the Mona group, are essentially similar to that of the Shannon Mine and the gossan is equally strong. It is

possible, therefore, that a zone of sulphide lenses similar to the one found in the Shannon Mine continues north to the vicinity of the Nina group.

South of the Shannon Mine, limestone with quartz monzonite sills continues for 600 or more feet. But here three shown drill holes (Nos. 5, 6, and 7) failed to find any high concentrations of sulphides and showed that the quartz monzonite sills are relatively weak and sulphide minerals occur only in trace amounts.

To the east of the applicant's property line the ground is likely to be favorable as the ore-bearing contacts dip to the east beyond the property line. However, it is also possible that granite rises off these contacts, at depth and to the east. This possibility can be better evaluated after the proposed drilling program has been completed, when a clearer picture of the position of the granite will be possible.

PRODUCTION AND GRADE

In five years during its early history the mine shipped about $250,000 worth of ore containing from 4 to 7 percent copper. Company records, according to Emmons's report (USGS 1273), show that from 1912 to 1918 the mine produced 198,732 tons, averaging 1.73% copper, 0.035 oz. gold, and 1.60 oz. silver. The yearly production for this period is shown in Table I.

TABLE I

ORE SHIPPED FROM SHANNON MINE TO SHANNON COPPER CO.

SMELTER AT CLIFTON, ARIZONA

Year	Tons	Gold (oz./ton)	Silver (oz./ton)	Copper (Percent)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1914	35,[illegible]	0.0137	1.[illegible]	0.[illegible]
1915	50,[illegible]	0.0[illegible]	0.87	1.14
1916	35,[illegible]	0.0[illegible]	1.10	1.78
1917	36,[illegible]	0.0363	1.[illegible]	1.90
1918	51,[illegible]	0.0[illegible]	1.36	2.27

The applicant has supplied us with stope production records for the years 1917 to 1919, the year then production ceased, and these are summarized in Table II, below.

TABLE IX

SUMMARY OF MINE PRODUCTION FROM 1917-1919

Stope	Tons	Percent Copper (Weighted Av.)		Tons	Percent Copper (Weighted Av.)
301	454	0.11			
302	149	0.37			
303	100	0.19			
307	7,993	6.98			
408	2,354	2.19			
408	814	1.97			
408	312	5.40	Single Orebody	13,011	5.3
408-3A	232	5.22			
408-3B	126	2.28			
408-4	846	2.80			
408-7	1,534	2.39			
306	13,889	2.63			
306-2	99	3.23			
407	14,811	3.69			
407-5	1,684	3.83	Single Orebody	36,996	3.0
407-6	1,386	2.18			
407-10	2,877	3.24			
502	1,807	3.66			
502-2	683	1.65			
309	65	0.61			
321	570	3.04			
322	14	9.16			
405	13	0.28			
405-3	194	0.32	Single Orebody	6,330	1.1
405-4	2,486	1.33			
405-6	3,691	0.80			
323	859	0.16			
325	3	2.81			
403	1,954	1.67			
412	635	1.69			
501	37	1.02			
512	65	6.36			
Total	60,856	3.2			

It is obvious by comparing tables X and XI that the above stope records are incomplete. In the year 1918 (the only year completely represented in these stope figures), for example, the total production is calculated at 33,036 tons of ore averaging 3.43 percent copper. Using these stope production figures and the figures for 1918 in Table X, namely 51,166 tons averaging 2.27 percent copper, it is calculated that 18,030 tons of rock averaging about 0.10 percent copper would have to be added to the stope tonnage figure to obtain a total of 51,166 tons averaging 2.27 percent copper. So it appears that the higher grade ore was deliberately diluted in order to raise the tonnage, and the mine did not shut down because the ore at depth declined in grade. The reason for the shutdown, as related orally by Hughes, was that the smelter at Clifton which used the Shannon ore changed hands and the new owner had a much more conveniently situated source of fluxing ore. Consequently the Shannon ore was no longer needed.

The gold and silver values of the ore are not known, but judging by the overall production from 1912 to 1918, the ore remaining in the mine probably averages about $2.00 per ton in gold and silver. The complete lack of data on the grade of lead-zinc ore makes an estimate very difficult. J. W. Faust informed the examiners that the lead-zinc ore between the "A" and "B" contacts in the 800 stope (Section W-S', fig. 3) averaged 30 percent combined lead and zinc. This ore had the appearance of being high grade and possibly is as high as Faust estimates it to be. To be on the conservative side, the grade is estimated here as 20 percent. Present operations are devoted

to development work rather than production so there is no recent production data on which to base grade estimates.

EXPLORATION

From 1912 to 1914, 10 churn drill holes were put down by the Shannon Copper Co. on this property. The location of these holes is shown in figure 3. A summary of the logs of these holes follows. The holes that cut no appreciable sulphide bodies are omitted from the table.

TABLE XXI
SUMMARY OF CHURN DRILL LOGS

Hole No.	Collar Elev.	Total depth (feet)	Interval (feet)	Copper (Percent)	Remarks
1.	4988'	640	280-282	---	"Heavy pyrite"
			383-390	1.81	
			390-395	1.18	
			395-400	1.67	
			443-475	---	"Heavy pyrite"
			585-628	---	"Heavy pyrite"
2.	----	135	---	---	Lost @ 135; confirms No.1 to that depth
3.	4995'	360	45-84		"Heavy pyrite - ore in places"
8.	4956'	310	310	1.8	"Chalcopyrite, sphalerite, bornite" Hole lost at this depth
9.	4974'	641	200-213	Tr.	"Heavy sulphides"
			393-435	Tr. to 0.90	"Heavy pyrite"
			478-495	Tr.	"Heavy pyrite"
			597-600	1.1	"Heavy pyrite"
10.	4969'	635	380-385	0.48	
			385-390	0.98	
			390-445	0.12-0.97	Highest grade is from Fissures. "Heavy sulphides"

Though all of the holes drilled within the radius of the mine workings cut sizeable bodies of pyrite relatively little copper was found. This drilling confirms the idea that to extract a commercial grade of copper ore from this mine selective mining would be necessary. Only one hole (#8) is noted as cutting mine sulphides, and there is no record of least mineralization.

An element of doubt as to the reliability of this churn drill sampling is introduced by the wide discrepancy between some of the churn drill samples and the stope production records. Hole No. 1 is recorded as showing only "heavy pyrite" at 443 to 475 feet, yet this interval corresponds to part of the ore body in stopes 308, 407, and 508 which are recorded as producing 36,996 tons of 3.0 percent copper ore. Likewise, Hole No. 10 shows a maximum of 0.97 percent copper and this was from "peanings". Yet this hole cuts the body in the 408 stope which, according to production records for 5,618 tons, ranged in grade from 1.97 to 5.40 percent copper.

Since the property was visited in March, the applicant has drilled about 25 diamond drill holes, mostly less than 100 feet in length, from the north end of the mine. Although this drilling discovered a little ore along the "F" contact the picture of the deposit as so far outlined remains essentially unchanged. Two of these recently drilled holes are shown on the maps of the 300 and 400 levels (Figs. 6 and 7).

The applicants' exploration program consisted of (a) rehabilitation of the old workings, (b) Geophysical prospecting, (c) drifting a total of 1,600 feet to reach suitable diamond drill stations, (d) 8,000 feet of diamond-drilling from 16 underground stations, (e) 5,000 feet of surface diamond drilling and geological surveying.

Most of the underground drilling proposed above is at the north end of the mine, in and near the "F" fault. This fault, though apparently pre-mineral, is not known to be mineralized underground.

Liberian at the south end of the mine much of the proposed drilling is in and near the "W" and "X" faults, and these faults show no evidence underground of appreciable mineralization. Furthermore, much of this proposed drilling parallels rather than cuts the quartz monzonite-limestone contacts along which the ore is most likely to be found. Consequently another program was worked out between the MMM engineers and the applicants.

In order to test the ground that is likely to contain the largest reserves the program of diamond drilling outlined below is proposed:

Four lines of holes drilled from the surface normal to the elongation of the deposit to test the area between the northernmost workings of the Shannon Mine and the Mona Group, just north of the Shannon property line. The lines would be spaced 200 feet apart and would contain from 1 to 3 holes. A series of holes drilled from the east side of the mine from the 300 and 400 levels to intersect the limestone-quartz monzonite contacts in at least 20 places to test for downward and lateral extensions of the deposits in the immediate vicinity of the mine. This underground drilling would require up to 7,000 feet and the surface drilling would require up to 8,700 feet. The surface drilling would proceed progressively north and the underground drilling would proceed progressively south from near the north end of the mine. With this sequence of drilling from the more favorable to the less favorable ground, the project could be periodically evaluated so that in the event of unfavorable results the work could be stopped. The proposed project is in two stages. The first stage would require $64,[illegible].00 for 3,900 feet of surface drilling and 4,000 feet of underground drilling, or the amount needed to complete the first two lines of holes on the surface and the first three lines of

holes underground. Only if the results of this drilling were decidedly favorable would the second stage be undertaken. The second stage would require $61,493.04 for 4,890 feet of surface and 3,000 feet of underground drilling. The approximate location of the drilling is shown in figures 5, 6, 7, and 8 in the Engineering report. Figure 3 in the Geologic report shows the location of surface drilling.

The west limit of potentially mineralized ground probably corresponds to the granite-quartz monzonite contact and the position of this contact is inferred rather than known in the area north of the mine. Two viewpoints can be taken of this fact:

1) The contact might be sought prior to other drilling in order to control locations of the holes, which should be drilled no closer than 100 to 200 feet from the granite, or

2) The granite contact should be ignored to the extent that if granite is not cut by the most westerly hole in each line before a limestone-quartz monzonite contact is cut, that hole should be drilled as planned; but if that hole cuts granite before encountering a limestone-quartz monzonite contact, drilling should be stopped and the hole moved east one or two hundred feet.

In either case the belt of favorable ground between the Shannon and Hope workings is the controlling factor in locating most of the surface drilling. Though the engineers at first were inclined to take the first viewpoint they now think that this may well be an unnecessary refinement in the exploration program. However, in case the field team favors preliminary exploration for the granite contact, three shallow holes in drill section B-B', near the inferred granite contact are included in the exploration program.

Although the mine engineer, Jack Seeley, has been doing a conscientious job of logging diamond drill core and of geologic mapping in the newly opened workings, the guidance of an experienced mining geologist would be desirable in this work. Consequently the services of a consulting geologist are provided for in the exploration proposal. With this provision the applicant should be ready at any time during the program to furnish up-to-date and accurate geologic sections or any other geologic data useful in evaluating the exploration.

The examiners doubt whether geophysical exploration would contribute much in exploring this property, because the geology and property limitations together narrow the area of search sufficiently for diamond drill exploration. No allowance is made for geophysical exploration.

RESERVES

The combined indicated and inferred reserves in the immediate vicinity of the Shannon workings are estimated at 70,000 tons of 2 percent copper with 0.035 oz. gold and 1.4 oz. silver per ton. This estimate is based on probable lateral and vertical extensions of 50 to 100 feet of known mineable lenses and the grade estimate is based on the grade of stope production. The grade of 2 percent is probably conservative, and without much sacrifice in tonnage the ore might average 2½ percent. There is a fair chance of doubling this reserve figure by drilling beneath the 300 and 400 levels as outlined in the proposed drilling program.

The proposed surface drilling would test the ground between the Shannon deposit and Hess deposits to the north, as this unexplored interval is potentially ore-bearing. As the volume of ground to be

tested in this interval is approximately equal to the volume of ore-bearing ground in the Shannon Mine, a tonnage of ore comparable to that produced from Shannon Mine might be discovered. It is possible, therefore, that the surface drilling would discover two or three hundred thousand tons of reserves. Such reserves are designated potential reserves as they are postulated on less evidence than ordinarily would be required for inferred reserves.

Lacking the necessary basic data, a reserve estimate of lead-zinc ore is not attempted here. It can only be said that one high grade body of lead-zinc ore, perhaps containing 10,000 tons, has been found, and there is a fair chance that one more comparable body might be discovered by the drilling near the present workings. In this connection it should be reported that Faust estimates that this body contains 25,000 tons and Faust reports that Harrison Schmitt, as consultant to the company, estimated it at 50,000 tons.

CONCLUSIONS AND RECOMMENDATIONS

The property shows potentialities for the development of a moderate-sized reserve of medium grade copper ore, and a small reserve of high grade lead-zinc ore. Also, the discovery of additional ore bodies on this property might stimulate search in the immediate area; especially further to the north and to the east where the possibilities for discoveries are best. Therefore, it is recommended that diamond drilling up to about 15,700 feet be done in order to find more reserves. The diamond drill core should be logged, and mineralized intervals should be sampled and assayed for copper, lead, and zinc.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 23 1955

224 New Customhouse
Denver 2, Colorado

May 23, 1955

Docket

Memorandum

To: Chairman of the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-3515 (Copper-Lead-Zinc), Shannon Mining Company, Shannon mine, Cochise County, Arizona

This responds to your letter of May 18, 1955 requesting the status of the subject docket.

The Report of Examination was returned to the field for their further consideration on May 4, 1955. A copy of the memorandum from the Field Team returning the Report of Examination to them is attached.

W. M. Traver

Enclosure

Bureau of Mines
Defense Minerals Administration
RECEIVED

22A New Customhouse
Denver 2, Colorado

May 4, 1955

Memorandum

To: W. R. Storms
J. N. Faick

From: Executive Officer, DMEA Field Team, Region III

Subject: Report of Field Examination, DMEA Docket 3515 (Copper-Lead-Zinc), Shannon Mine, Cochise County, Arizona

Enclosed herewith for your further consideration are the original and eight copies of the subject Engineering and Geologic Report of Examination and Summary, Conclusions, and Recommendations.

A review of the Engineering Report indicates that any possible contract based thereon would be too indefinite to administer. The statement on page 10 is indefinite: "Results obtained after completion of possibly one-half of the proposed work would be used to determine the advisability of continuing the project." A definite stopping point to reappraise the program for possible continuation should be stated.

On page 10 the statement, "The position of the contact will be established by the applicant prior to initiation of the proposed project.", indicates another examination will be necessary before a contract is made. The following statements on underground drilling are not in accordance with DMEA policy. "The first drilling should be from the presently inaccessible area provided it has been reopened and conditions are found favorable for exploration," and "A reasonably accurate estimate of the cost of rehabilitation and preparation of drill sites cannot be made under prevailing conditions, consequently, this phase of the proposed work should be carried out on an actual cost basis." Regardless of whether the work is performed on an agreed unit cost or cost incurred basis, it is necessary to have an estimate of the costs involved as a basis to allocate funds under the contract. If work is to be performed on a cost incurred basis, it would be necessary to prepare it on Form MF-200; therefore, all eight categories under Article 6 of the form as component parts of the costs involved must be included in your estimate of costs. If conditions are so uncertain a contract should not be considered until the applicant has performed sufficient rehabilitation to permit a thorough examination and an accurate cost figure obtained.

It is noted that "Shannon Mining Company is attempting to obtain control of several mining claims that adjoin its current holdings to the east and north.", and "if drilling of some of the initial and intermediate holes from sites to the east of the present property line is found warranted, it should be allowed in event the pertinent property is acquired by the applicant and subordinated to the Government."

The Survey report states that "Remapping the geology of the mine and surface would be a worthwhile project." Should not this be done at the applicant's expense prior to a field examination?

From the data at hand, it appears that recommendations should be reserved until such time as considerably more information is made available. Possibly the application should be denied without prejudice.

On the basis of data presented in the Engineering and Geologic reports we see no alternative except to deny this application without prejudice. However, you may have additional information not available to the Region III Field Team other than mentioned in this memorandum and not disclosed in the report.

We will appreciate your completing these reports so that we may transmit them to Washington at an early date.

W. M. Traver

E. N. Harshman

Enclosures

HMC:pw

cc: Subject
Chron
Harshman

File Copy
Surname
J. ccp.
Selfridge
Fleming
Mitchell

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

MAY 1 8 1955

Mr. W. M. Traver, Executive Officer
DMEA Field Team, Region III
224 New Customhouse Building
Denver 2, Colorado

Re: Docket No. DMEA-3515 (Copper, Lead-Zinc)
Shannon Mining Company
Shannon Mine
Cochise County, Arizona

Dear Mr. Traver:

Will you please advise us regarding the status of the cited application. The report for April 1955, Region III, DMEA Activities - 988, states that a report was submitted on April 20, recommending Government exploration assistance.

To date we have not received this report and are naturally concerned about it. Will you please advise us at your earliest convenience regarding this.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

APPROVED:

J. H. Hedges

Member, Bureau of Mines

Thor H. Kiilsgaard

Member, Geological Survey

JWAlt/er 5/17/55

Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Chron.

R.C.S.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

December 3, 1954

Docket

Memorandum

To: Chairman, Operating Committee

From: Executive Officer, DMEA Field Team, Region IV

Subject: Docket No. DMEA 3515 (Copper-Lead-Zinc), Shannon Mining Co., Shannon Mine, Cochise County, Arizona.

Enclosed are three copies of the letter from the applicant in reply to our letter of November 9, 1954, requesting additional information. Also attached are the following:

1. Three copies of a claim map which also shows the surface geology.

2. Three copies of a composite map of the underground level showing the proposed exploration work.

3. Three copies of Section 3500 N.

4. Three copies of Section 2900 N through Pemberthy Shaft, and 2100 N. These sections are prepared to show the approximate contacts which should be explored.

5. One signed copy of the assignment to Shannon Mining Company from Joseph H. Taylor and Roberta W. Taylor.

6. One signed copy of the Quitclaim Deed from Joseph H. Taylor and Roberta W. Taylor to Shannon Mining Company.

7. One photostat of a signed copy of the Lease and Option agreement.

One copy of each of the above listed maps is being retained in this office with our copy of the application and a field examination now appears to be in order.

W H King

W. H. King

Enclosures

SHANNON

xxxxxxxx

December 1, 1954

Re: DMEA Docket 3515 (Copper, Lead, Zinc)
Shannon Mining Company, Shannon Mine
Cochise County, Arizona

Mr. W. H. King, Executive Officier
Field Team, Region IV
Defense Minerals Exploration Administration
224 New Customhouse
Denver 2, Colorado

Dear Mr. King:

In accordance with Mr. Shaw's letter of November 9th there have been prepared:

1. Four copies of a claim map showing the Empire, Copper Belle, Charleston, Elizabeth, Durand, Dandy, Oak Grove, Joe, and Katherine A claims. This claim map is also a surface geology map with contours and has been prepared largely from old maps and records and partly from our recent surveys.

2. Four copies of a composite map of the underground levels showing the workings as they existed when the mine was closed down at the end of 1918. This composite map outlines the drifting and diamond drilling which it is planned to do.

3. There are also enclosed four copies of sections 3500N, 2900N through Pemberthy Shaft and 2100N. These sections are prepared to show the approximate contacts which should be explored.

4. Also you will find one signed copy of the assignment to Shannon Mining Company and one signed copy of the quitclaim deed and a photostatic copy of the lease agreement.

Since my letter of September 15th, 1954, we have repaired the Pemberthy Shaft timber to the 300 Level, at a considerable expense, and have been able to make some exploration on the 300 Level. The water is now being pumped from below the 300 Level. The levels entered and checked against the maps are the 200 Level and the 300 Level and the following exploration proposals are based on the assumption that the lower level maps are also correct and up to date.

The program for exploration is divided roughly into three general catagories as follows:

A. Rehabilitation of the Pemberthy Shaft and pumping out water which is now twenty feet below 300 Level.

B. Drifting to contacts, fault intersections, and to proposed diamond drill stations, to drill these contacts and intersections.

C. Diamond drilling, both surface and underground to explore these contacts and intersections as well as further our general knowledge of the geology.

The rehabilitation of the Pemberthy Shaft is well on toward completion at this date. The shaft has been completely retimbered to the water level and there remains only the joining of the new to the old timber to be done. The old timber, below water level seems to be in very good shape and little repair work is expected to finish this part of the job. The pump has been installed and dewatering operations have begun.

In general the drift work will be done to explore actual contacts, fault intersections and fault and fracture intersections with contacts. The interesting contacts, of course, are those between the limestones and the igneous rocks, especially those that are projections of those known to have made ore elsewhere in the mine.

A. 200 level drift from coordinates N 2980, E 1380 to approximately N 3200, E1270, to explore intersection of faults K and L with quartz monzonite. Limestone contact. (See section N 7 E)

B. 200 level drift from coordinates N 3230, E 1650 to approximately N 3500, E1610 to explore contacts D and E (See section 3500 North)

C. 200 level diamond drilling to explore intersection of fault L with contact E. (See surface geological plan)

D. 200 level drift from coordinates N 2385, E 2065 to approximately N 2350, E 2160 to explore possible Southeast extension of known ore along quartz monzonite porphyry. Limestone contact B.

E and F. 200 level drift from coordinates N 2285, E 2035, to approximate coordinates N 2100, E 2060 (E), and continued to approximately N 1860, E 2150 (F). Station E will explore limestone-quartz monzonite contact and possible ore in churn hole #4. (See section 2100 N) Station F will explore the intersection of two major SE trending faults with limestone -- quartz monzonite contact.

G. 400 level diamond drilling from approximate coordinates N 2155, E 1915 to explore contacts shown on section 2100 N.

H. 400 level drift from coordinate N 2460, E 1610, to approximately N 2290, E 1660 to explore fault intersections with granite and quartz monzonite - limestone contacts. (See surface geological plan)

I. 400 level drilling from approximate coordinate N 2750, E 1990 to explore contact D (see section 2900 N) below known mineralization.

J. 400 level drilling from approximately N 3120, E 1160 to explore fault L intersection with lime - quartz monzonite contacts.

K. 400 level drift from coordinate N 3400, E 1290 to approximate coordinate N 3500, E 1300 to explore contacts G & F (see section N 7 E)

L. 400 level diamond drilling from approximate coordinate N 3500, E 1630 to explore contacts E & F as shown on section 3500 North.

M. 300 level drift from coordinates N 3300, E 1250, to coordinates N 3500, E 1320 to explore dike contact in limestone and also to explore contact F. (See section 3500 North)

N. 300 drift from coordinates N 3175, E 1680 to approximate coordinates N 3330, E 1675, to explore intersections of faults J and K with contacts B and E.

O. 300 level diamond drilling from coordinate N 1930, 1820 E to explore granite limestone contact.

P. 500 level diamond drilling from coordinates N 2755, E 1530 to explore shattered limestone area at depth under known ore bodies.

Q. 500 level diamond drilling from coordinates N 3110, E 1525 to explore shattered limestone at depth under known mineralization.

In addition to the underground drilling mentioned above, some surface diamond drilling is indicated.

Surface drilling along 1500 N pending results of underground work at F.

Surface drilling along 3800 N pending results of underground work on North end.

Surface drilling in the area Southwest of the workings, through the overthrust.

We now estimate the cost of exploring the Shannon Mine for copper, lead, and zinc to be as follows:

1.	Pumping the water out of the mine from the 300 Level to the 600 Level	$ 3,000.00
2.	Repairing the Pemberthy Shaft timber from the 300 Level to the 600 Level	1,500.00
3.	Repairing the drift timber on the 300 Level so that we can get to the faces for exploration	1,500.00
4.	Repairing drift timber on the 400 Level so that we can get to the faces for exploration	1,500.00
5.	Repairing drift timber on the 500 Level so we can get to the faces for exploration	1,000.00
6.	Repairing drift timber on the 600 Level so that we can get to the faces for exploration.	500.00

7. Drifting to the contacts so that diamond drilling can be done:

200 Level - 1,030 feet		
300 Level - 340 feet		
400 Level - 230 feet		
Total	1,600 feet at $30.00 per feet	$ 48,000.00

8. Diamond drilling on the 200 Level - 2,200 feet
300 Level - 1,300 feet
400 Level - 3,500 feet
500 Level - 1,000 feet

Total	8,000 ft. @ $4.00 per ft.	32,000.00

9. Surface diamond drilling and geological surveying:

5,000 feet of drilling at $5.00 per foot	25,000.00

10. Geophysical surveying to determine additional ore on all of the claims as follows: Empire, Copper Belle, Charleston, Elizabeth, Durand, Dandy, Oak Grove, Joe, and Katherine A 5,000.00

TOTAL	$119,000.00

We are proceeding with the installation of equipment necessary to do this work and are now cleaning up drifts on the 200 Level and 300 Level. We are also making surveys wherever we can and are going ahead with the general rehabilitation of the mine preparatory to the production of ore as rapidly as possible.

We trust that in the near future your engineer and geologist will be free to examine the operation and proposals because we are fully convinced that we will be able to find a considerable amount of copper, lead and zinc ore.

Sincerely yours,

SHAMROCK MINING COMPANY

Jos. H. Taylor

Jos. H. Taylor
Vice President

JHT:F
Enc.

558

STATE OF ARIZONA)
) SS:
COUNTY OF COCHISE)

On this the 10th day of ~~April~~ May, 1954, before me, Frances D. Castro, the undersigned Notary Public, personally appeared K. C. MOON and A. J. HUTCHINSON, known to me, or satisfactorily proven, to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Frances D. Castro
Notary Public

FRANCES D. CASTRO NOTARY PUBLIC COCHISE COUNTY, ARIZONA

My commission expires
May 31 1956.

STATE OF Arizona)
) SS:
COUNTY OF Cochise)

On this the 10th day of ~~April~~ May, 1954, before me, Frances D. Castro, the undersigned Notary Public, personally appeared JOSEPH H. TAYLOR, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

Frances D. Castro
Notary Public

FRANCES D. CASTRO NOTARY PUBLIC COCHISE COUNTY, ARIZONA

My commission expires,
May 31 1956

STATE OF ARIZONA
COUNTY OF COCHISE } ss
Witness my hand and Official Seal
P. W. NEWBURY, County Recorder
P. W. Newbury Deputy

Indexed	Photostat-Compared	Blotted

I hereby certify that the within instrument was filed and recorded at request of J. Wayne Woodbury Box 857 Silver City N. Mex.

Fee $ 5.35
I. R. S.
Total $
Docket 101

Date MAY 10 1954 - 3 30 PM
Page 549-558 No. 4431

STATE OF INDIANA)
) SS:
COUNTY OF VANDERBURGH)

557

On this the 7th day of April, 1954, before me, Rachel Moosberg, the undersigned Notary Public, personally appeared IRA VAN TUYL, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

NOTARY PUBLIC SEAL INDIANA

IN WITNESS WHEREOF, I hereunto set my hand and official

Rachel Moosberg
Notary Public

My commission expires,
Jan. 2, 1955

STATE OF TEXAS)
) SS:
COUNTY OF ECTOR)

On this the 30th day of April, 1954, before me, James DeMoville, the undersigned Notary Public, personally appeared J. D. HAYNES, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official

James DeMoville
Notary Public

My commission expires,
6-1-55

17. Subject to the provisions of paragraph 15. hereof, each and every clause, condition, covenant and agreement hereof shall be binding upon and inure to the benefit of the respective heirs, executors, administrators, legal representatives and assigns of each of the parties hereto.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands in triplicate originals on the day and year in this agreement first written, one of which shall be lodged with said bank as its escrow instructions. It is understood and agreed that said bank, as escrow holder, shall have no further responsibility than to accept payments under this agreement for the account of Owners, to remit the same as above provided, and to deliver the deed according to the provisions of paragraph 2. hereof, anything to the contrary herein notwithstanding.

IRA VAN TUYL

J. D. HAYNES

K. C. MOON

A. J. HUTCHINSON

JOSEPH H. TAYLOR

Richey, Attorney at Law, Douglas, Arizona, and in care of Ira Van Tuyl, 711 Hulman Building, Evansville, Indiana, and to Taylor, Box 309, Silver City, New Mexico, with copies thereof to the Valley National Bank, Douglas, Arizona, escrow agent.

15. It is understood and agreed that Joseph H. Taylor may assign this agreement to the Illinois Zinc Company, the Peru Mining Company or to any wholly owned subsidiary of said companies which either of them may cause to be organized within the State of Arizona, and any such assignee shall be responsible to Owners for the performance of the covenants and agreements herein contained and set forth to be kept and performed by Taylor from the date hereof (except to the extent that Taylor shall have performed the same prior to the making of such assignment) as if such assignee had been named in and executed this agreement instead of Taylor. Concurrently with the execution and delivery of this agreement Taylor shall deliver to Owners, as an additional inducement to Owners to execute this agreement, an agreement executed by ~~Illinois Zinc Company~~ Peru Mining Company wherein ~~Illinois Zinc Company~~ Peru Mining Company shall indemnify Owners from and against any and all liens, taxes, or other claims against said mining properties arising by virtue of the use, occupation and operation thereof by Taylor or by any assignee of Taylor, or in lieu of such agreement from ~~Illinois Zinc Company~~ Peru Mining Company Taylor shall, concurrently with the execution of this agreement, furnish to Owners a bond in form and with surety satisfactory to Owners indemnifying Owners from and against all such liens, taxes, or other claims.

16. The term of this lease and option, unless sooner terminated as hereinbefore provided, shall commence on the date in this agreement first written and shall be for the full term or period, terminating at twelve o'clock noon on the 1st day of May, 1961.

ment, and the failure of Owners to exercise such right at any time shall not preclude or estop them from thereafter exercising the same when such right might otherwise be exercised in accordance with the foregoing provisions.

11. Upon the termination of this agreement for any cause other than by fulfillment of the terms hereof, the right of Taylor to purchase said premises and the right to the possession of the same and the right to work and mine said premises and remove, ship and sell ores therefrom shall at once cease and determine and Taylor agrees in any such event to at once, without demand or notice, deliver up unto the Owners the possession of said premises and all permanent or non-removable improvements thereon, and in any such case any and all sums of money theretofore paid hereunder upon the purchase price, shall be and become the property of the Owners.

12. It is expressly understood between the parties hereto, anything herein contained to the contrary notwithstanding, that this agreement is an option given by the Owners to Taylor and no penalty shall accrue or be asserted against Taylor for failure to perform any of the conditions, terms and agreements hereof, and that Taylor may surrender and terminate this agreement at any time and thereupon any liabilities of Taylor hereunder shall immediately cease and terminate, except liability on account of any obligation arising out of his mining operations on said premises incurred and owing at the time of such termination.

13. In case of the termination of this agreement for any cause Taylor shall have the right, within ninety (90) days from the date of such termination, to remove from the premises all tools, equipment, machinery and other property placed therein and thereon by him, excepting ties, rails, pipe and timbers in place below the surface.

14. All notices required to be sent under any provision of this agreement shall be sent to Owners in care of W. Shelley

legislation, federal and state, applicable to the working and operations of said premises and shall make all payments, returns, and reports required by such acts and shall at all times protect and save harmless said premises and the Owners of and from any and all claims, actions, suits, liabilities for damages or compensation for any matter or thing arising out of the work and operation conducted in or upon said premises.

8. Taylor shall promptly pay for all labor, services and materials done, performed or furnished to or for said premises or for the work done therein and shall not allow any claims of lien for any such thing to be effectually made or asserted against said premises or the Owners and shall keep said premises at all times posted with notices against liens in accordance with the statutes of the State of Arizona in that behalf, and shall record said notices as required by the laws of the State of Arizona.

9. The Owners or their agent authorized in writing, shall have the right at all reasonable times to enter into and upon said premises and the workings therein for the purpose of examining and inspecting the same, and ascertaining whether the terms and conditions hereof are being carried out and performed by Taylor.

10. If Taylor shall at any time be in default in the performance of any of the terms and conditions hereof upon him made incumbent, other than the payment of any instalment or instalments upon the purchase price as herein provided, such default shall not operate to or give the Owners the right to cancel or terminate this agreement unless the Owners, or any of them, shall notify Taylor in writing specifying the exact nature of such default and unless Taylor shall, within thirty (30) days from the date of the receipt of such notification, fail to cure such default; but in the event of the failure of Taylor to pay any such instalment when due, or in the event of any such other default and the failure of Taylor to cure the same within the above limited time, Owners shall have the right to cancel or terminate this agree-

4. It is further agreed and understood between the parties hereto that in the month of June, 1944, previous owners of the above described property, namely, R. L. BROWN and C. M. BROWN, secured a loan from the Reconstruction Finance Corporation on the above described property in the sum of Five Thousand Dollars ($5,000.00), which loan is filed in the records of the Reconstruction Finance Corporation at 417 South Hill Street, in Los Angeles, California, in Docket No. ND-8593, and upon which there remains a present unpaid balance of less than Twenty-five Hundred Dollars ($2500.00). Said loan is payable at the rate of five (5) percent of net smelter returns to apply on principal only, all interest thereon having been waived. It is hereby agreed and understood that the said Taylor shall cause to be paid to the Reconstruction Finance Corporation on said obligation five (5) percent of the net smelter or mill returns after deducting all mill, smelter and treatment charges, which payments shall apply upon the purchase price hereunder and shall be deducted only from the final annual payment hereunder and shall be anticipated only as applying to the final payment hereunder.

5. All work done hereunder shall be performed in a good and minerlike fashion with a view to the preservation of the premises as a workable mine, timbering wherever the same shall be or become necessary, and maintaining all drifts, shafts, levels and other workings well drained, free from loose rock, waste and rubbish and in condition for continued mining, unless prevented from so doing by strikes, labor troubles, accidents, breakdowns or other causes beyond the reasonable control of Taylor.

6. Taylor shall pay all taxes levied and assessed against said premises and the improvements thereon before the same become delinquent.

7. Taylor shall comply with the provisions of the Workmen's Compensation law and the Occupational Disease law of the State of Arizona, the Federal Social Security Act and all other

2. Owners, upon demand, agree to make, execute, acknowledge and place in escrow in said bank their limited warranty deed conveying said premises to Taylor, or to his nominee, warranting only that the same are free and clear of any and all liens, encumbrances, adverse claims, or prior transfers suffered or imposed by Owners, and providing that the liability of Owners under or by virtue of such limited warranty shall be several and not joint in the proportions in which the instalments provided for in paragraph 1. hereof are distributable to Owners. Said bank is instructed that if full payment of the purchase price for said premises is made as herein provided, the said bank shall deliver said deed to Taylor or his nominee; otherwise said bank shall hold said deed subject only to the order of Owners.

3. From the date hereof and during the life of this agreement, Taylor shall have the right to the possession of all of said premises and the exclusive right to work and mine the same and to extract, remove, ship and sell therefrom all ores and minerals found therein but upon all such ores and minerals extracted, removed and sold from said premises Taylor shall pay to the Owners royalties as follows:

> 10% of the net smelter or mill returns after deducting all mill, smelter and treatment charges.

Said payments shall be made within ten (10) days after receipt of mill or smelter returns at the Valley National Bank, Douglas, Arizona, accompanied by duplicate mill, smelter or treatment works settlement sheets and shall be credited to the order of and remitted to Owners as hereinbefore provided. All said payments shall apply upon the purchase price and shall likewise apply upon the annual payments listed in paragraph 1. hereof, permission to so anticipate such payments being hereby granted.

and any interest of the Owners in and to the PICK fraction, an unpatented mining claim, upon the following terms and conditions:

1. The purchase price for said premises is the sum of Fifty Thousand Dollars ($50,000.00), payable as follows:

a. Eleven Thousand Dollars ($11,000.00) concurrently with the execution and delivery of this agreement, which sum shall be paid to parties of the first part as follows:

Ira Van Tuyl and J. D. Haynes, d/b/a Haynes & V-T Drilling Company -	$8,350.00
K. C. Moon and A. J. Hutchinson-	2,650.00,

and

b. Thirty-nine Thousand Dollars ($39,000.00) in instalments on or before the dates and in the manner following:

November 1, 1954	$ 2,500.00
May 1, 1955	2,500.00
November 1, 1955	2,500.00
May 1, 1956	2,500.00
November 1, 1956	2,500.00
May 1, 1957	2,500.00
November 1, 1957	2,500.00
May 1, 1958	2,500.00
November 1, 1958	2,500.00
May 1, 1959	2,500.00
November 1, 1959	2,500.00
May 1, 1960	2,500.00
November 1, 1960	2,500.00
May 1, 1961	6,500.00
	$ 39,000.00

which instalment payments shall be made by depositing the same in the Valley National Bank, Douglas, Arizona unto the order and credit of Owners in the following proportions:

Ira Van Tuyl and J. D. Haynes, d/b/a Haynes & V-T Drilling Company, 725 North Grant St., Odessa, Texas	-	Fifty percent (50%)
K. C. Moon, Douglas, Arizona	-	Twenty-five percent (25%)
A. J. Hutchinson, Douglas, Arizona	-	Twenty-five percent (25%)

which bank shall, upon receipt of each of such payments, forthwith remit the same to parties of the first part severally in the proportions above designated and to the addresses above designated.

LEASE AND OPTION

THIS LEASE AND OPTION AGREEMENT, made and entered into this 7th day of April, 1954, by and between IRA VAN TUYL, J. D. HAYNES, K. C. MOON and A. J. HUTCHINSON, parties of the first part, hereinafter referred to as "Owners", and JOSEPH H. TAYLOR, party of the second part, hereinafter referred to as "Taylor".

WITNESSETH:

That the Owners in consideration of the payments to be made by Taylor and the covenants and agreements herein contained and set forth to be kept and performed by Taylor, do hereby give and grant unto Taylor the exclusive right and option to purchase the following named patented lode mining claims situate in the Turquoise Mining District, Cochise County, Arizona, the names of which and Mineral Survey Numbers are as follows, to-wit:

Name	Number
Empire	2724 $\frac{A9}{5}$
Copper Belle	2724 $\frac{A9}{5}$
Charleston	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Elizabeth	2724 $\frac{A9}{5}$
Durand	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Dandy	2724 $\frac{A9}{5}$
Oak Grove	2724 $\frac{A9}{5}$
Joe	2724 $\frac{A9}{5}$
Katherine A.	2724 $\frac{A9}{5}$

QUITCLAIM DEED

THIS INDENTURE, made the 7th day of June, 1954, between JOSEPH H. TAYLOR and ROBERTA W. TAYLOR, his wife, Grantors, and SHANNON MINING COMPANY, a Delaware Corporation, Grantee,

WITNESSETH: That the said grantors, for and in consideration of the sum of One Dollar ($1.00) to them in hand paid by the said grantee, the receipt whereof is hereby confessed and acknowledged, have, released and quitclaimed, and by these presents do release and quitclaim unto the said grantee, and to its successors and assigns forever, all the right, title, interest, claim and demand which the said grantors have;in and to the following described property situated in the County of Cochise, and State of Arizona, to-wit:

> All of those certain patented mining claims located in the Turquoise Mining District in Cochise County, State of Arizona, designated as: "THE EMPIRE", "CHARLESTON", "COPPER BELLE", "ELIZABETH", "DURAND", "DANDY", "OAK GROVE", "JOE" and "KATHERINE A", United States Patent to which said mines is recorded in the Office of the County Recorder of Cochise County, State of Arizona, in Book 26 of Deeds of mines, at Page 580, together with any interest of the grantors in and to the "PICK", an unpatented mining claim in the Turquoise Mining District, Cochise County, State of Arizona.

TO HAVE AND TO HOLD the same together with all the appurtenances thereunto belonging to the grantee, its successors and assigns forever.

IN WITNESS WHEREOF, the said grantors have hereunto set their hands the day and year first above written.

Joseph H. Taylor

Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of ~~May~~ June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

J. Wayne Woodson
Notary Public.

My Commission expires:
Sept. 28, 1954

QUITCLAIM DEED

THIS INDENTURE, made the 7th day of June, 1954, between JOSEPH H. TAYLOR and ROBERTA W. TAYLOR, his wife, Grantors, and SHANNON MINING COMPANY, a Delaware Corporation, Grantee,

WITNESSETH: That the said grantors, for and in consideration of the sum of One Dollar ($1.00) to them in hand paid by the said grantee, the receipt whereof is hereby confessed and acknowledged, have, released and quitclaimed, and by these presents do release and quitclaim unto the said grantee, and to its successors and assigns forever, all the right, title, interest, claim and demand which the said grantors have;in and to the following described property situated in the County of Cochise, and State of Arizona, to-wit:

> All of those certain patented mining claims located in the Turquoise Mining District in Cochise County, State of Arizona, designated as: "THE EMPIRE", "CHARLESTON", "COPPER BELLE", "ELIZABETH", "DURAND", "DANDY", "OAK GROVE", "JOE" and "KATHERINE A", United States Patent to which said mines is recorded in the Office of the County Recorder of Cochise County, State of Arizona, in Book 26 of Deeds of mines, at Page 580, together with any interest of the grantors in and to the "PICK", an unpatented mining claim in the Turquoise Mining District, Cochise County, State of Arizona.

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IN WITNESS WHEREOF, the said grantors have hereunto set their hands the day and year first above written.

Joseph H. Taylor

Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

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IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

J. Wayne Woodbury
Notary Public.

My Commission expires:
Sept. 28, 1954

ASSIGNMENT

KNOW ALL MEN BY THESE PRESENTS: That we, Joseph H. Taylor and Roberta W. Taylor, his wife, hereinafter called the assignors, in consideration of One Dollar ($1.00) and other valuable considerations paid by the Shannon Mining Company, a Delaware Corporation, hereinafter called assignee, do hereby sell, assign, transfer and set over to the assignee all of our right, title and interest in and to that certain lease and option agreement dated April 7, 1954, by and between Ira Van Tuyl, J. D. Haynes, K. C. Moon and A. J. Hutchinson, parties of the first part, and Joseph H. Taylor, party of the second part, one of the assignors herein, covering the following named patented lode mining claims situate in the Turquoise Mining District, Cochise County, Arizona, the names of which and Mineral Survey Numbers are as follows, to-wit:

Name	Number
Empire	2724 $\frac{A9}{5}$
Copper Belle	2724 $\frac{A9}{5}$
Charleston	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Elizabeth	2724 $\frac{A9}{5}$
Durand	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Dandy	2724 $\frac{A9}{5}$
Oak Grove	2724 $\frac{A9}{5}$

Name	Number
Joe	2724 $\frac{A9}{5}$
Katherine A.	2724 $\frac{A9}{5}$

together with any interest in and to the "Pick" unpatented mining claim situate in said mining district.

IN WITNESS WHEREOF, the assignors have hereunto set their hands this 7th day of June, A. D. 1954.

Joseph H. Taylor
Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

J. Wayne Woodmansy
Notary Public

My Commission expires:
Sept. 28, 1954

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Joe	2724 $\frac{A9}{5}$
Katherine A.	2724 $\frac{A9}{5}$

together with any interest in and to the "Pick" unpatented mining claim situate in said mining district.

IN WITNESS WHEREOF, the assignors have hereunto set their hands this 7th day of June, A. D. 1954.

Joseph H. Taylor
Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

J. Wayne Westerman
Notary Public

My Commission expires:
Sept. 28, 1954

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

November 9, 1954

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
NOV 12 1954

Joseph H. Taylor, Vice-President
Shannon Mining Company
P. O. Box 309
Silver City, New Mexico

Re: DMEA Docket 3515 (Copper, Lead, Zinc)
Shannon Mining Company, Shannon mine
Cochise County, Arizona

Dear Mr. Taylor:

Your application for DMEA assistance to explore the Shannon mine for Copper, Lead, and Zinc has been referred to this office for a field examination. Before a field examination of your property can be scheduled, we will require four copies of a claim map of the Empire, Copper Belle, Charleston, Elizabeth, Durand, Dandy, Oak Grove, Joe, and Katherine A claims upon which is shown the existing workings and your proposed work. In this case, we would also appreciate having four copies of a section map through the plane of the proposed work. We must know the location of your work proposals in relation to your property boundaries.

Also before a possible contract can be formulated, one signed copy of your lease and assignment must be furnished for the use of the Washington office. A photostat of a signed lease and assignment will be acceptable.

Your application will be held in abeyance pending receipt of the above requested information. Any additional information you can furnish which will explain the feasibility of your proposed exploration program should also be forwarded to this office in quintuplicate.

Yours very truly,

John F. Shaw

John F. Shaw
For W. H. King
Executive Officer, DMEA
Field Team, Region IV

RDB:mn

cc: DMEA Docket 3515
Sec. to the Oper. Comm. (2)
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

November 9, 1954

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
NOV 12 1954

Joseph H. Taylor, Vice-President
Shannon Mining Company
P. O. Box 309
Silver City, New Mexico

Re: DMEA Docket 3515 (Copper, Lead, Zinc)
Shannon Mining Company, Shannon mine
Cochise County, Arizona

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Your application will be held in abeyance pending receipt of the above requested information. Any additional information you can furnish which will explain the feasibility of your proposed exploration program should also be forwarded to this office in quintuplicate.

Yours very truly,

John F. Shaw

John F. Shaw
For W. H. King
Executive Officer, DMEA
Field Team, Region IV

RDB:mn

cc: DMEA Docket 3515
Sec. to the Oper. Comm. (2)
Chron.

File Copy
Surname

J. W. Alt.
Swisher
Hedges
Kilsgaard
Selfridge

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

NOV 3 - 1954

Shannon Mining Company
Post Office Box 309
Silver City, New Mexico

Re: Docket No. DMEA-3515 (Copper, lead-zinc)
Shannon Mining Company
Shannon Mine
Cochise County, Arizona

Gentlemen:

Your application for Government assistance to explore your property has been reviewed by the Base Metals Division of the Defense Minerals Exploration Administration, and has been referred for a field examination to:

Mr. W. H. King, Executive Officer
DMEA Field Team, Region IV
224 New Customhouse Building
Denver 2, Colorado

The Regional Office will contact you at an early date as to when an examination is to be made. Any assistance that you may give the members of the Field Team during the examination will be appreciated.

Sincerely yours,

C. O. Mittendorf

Administrator

JWALT/er 11/2/54

Copy to: Docket
Admr R File
Op. Committee
Base Metals
Region IV (2)
C. H. Johnson, USBM
Mr. Kiilsgaard, USGS
Chron.

R.C.A.

File Copy
Surname
J. W. Alt
Insured
Hedges
Selfridge

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

NOV 3 - 1954

Mr. W. H. King, Executive Officer
DMEA Field Team, Region IV
224 New Customhouse Building
Denver 2, Colorado

Re: Docket No. DMEA-3515 (Copper, lead-zinc)
Shannon Mining Company
Shannon Mine
Cochise County, Arizona

Dear Mr. King:

A review of the cited application, of which you have retained a copy, indicates that an examination of the property is necessary. Will you please have such an examination made and submit your report and recommendations to us.

The Applicant should be requested to submit a property map showing the location of his leases and on this map he should show the location of the proposed work.

The application is poorly prepared and the amount of information contained in it is very limited. There is no object in pointing out to you information that is needed to complete the processing of this application.

Enclosed are copies of memorandums from the Commodity members, H. M. Meyer, for C. H. Johnson, USBM, dated October 7, 1954, and E. L. Newcomb, USGS, dated October 18, 1954, giving their recommendations and comments regarding the application.

Sincerely yours,

George C. Selfridge
Chairman, Operating Committee (GCS)

Enclosures 2

APPROVED:

J. H. Hedges
Member, Bureau of Mines (JHH)

Thor H. Kiilsgaard
Member, Geological Survey (THK)

JWAlt/er 11/2/54
Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. C. H. Johnson, USBM
Mr. Kiilsgaards, USGS
Chron.

R.C.H.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

October 7, 1954

Memorandum

To: W. R. Griswold, DMEA

From: H. M. Meyer (for C. H. Johnson) Bureau of Mines

Subject: DMEA-3515 (Copper) Shannon Mining Company, Shannon mine, Cochise County, Arizona

I have reviewed the above-named application and recommend referral to the Field Team for investigation and report.

The Bureau of Mines has in its file some reports on the Shannon mine, which I am sending for and will make available to you if they appear to contain any useful information.

Our report record suggests that the DMA may have received a previous application concerning this property, and I suggest you check with your central office.

Helena M. Meyer

Helena M. Meyer, for
C. H. Johnson

Attachment

Copy to - Mr. Kiilsgaard, Room 5227
Minerals Division
C. H. Johnson
Files

Mine: Hanover, N.M. Mill: Peruhill, N.M.

C
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P
Y

SHANNON MINING COMPANY
Silver City, New Mexico

September 9, 1954

Mr. W. H. King, Executive Officer
Field Team, Region IV
Defense Minerals Exploration Administration
224 New Customhouse
Denver 2, Colorado

Dear Mr. King:

Two months ago I wrote to the Washington office in regard to an application for aid in an exploration project pursuant to DMEA Order-1 under the Defense Procurement Act of 1950.

We took a lease and option on the old "Shannon Mine" which was operated from 1900 to 1918, producing large quantities of cooper sulphide ores which were shipped to Morenci and Douglas. This property did not produce much of anything after this period, although a few shipments were made of copper ore and lead-zinc ore to mills and smelters. This property is described as the old "Copper Bell" or Leonard" in the University of Arizona Bulletin "Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona" by Eldred D. Wilson, Bulletin Number 123, Geological Series No. 5, Page 68, 69, 70 and 71.

We have installed a 100 hp compressor, a 100 hp hoist, hoist house and there is a headframe at the Pemberthy Shaft. We are now repairing the timber in the Pemberthy Shaft and expect to have this repaired down to the 300 level soon. Below the 300 level, the shaft is full of water and we do not know the condition of the timber. We have done some exploratory work on the 200 level and have found some 30,000 to 50,000 tons of zinc-lead ore. The old records show that copper ore was mined at various levels down to the 600 level and we plan on unwatering the mine and exploring the lower levels. It is our plan to make application for a Defense Minerals Exploration Program within the next few days.

We have barely enough forms for making this and would like four additional copies of MF-103 so that we can have a record for our various offices. We trust we will receive these forms early next week and will proceed with getting copies of maps and so forth so that we can make application next week.

Very truly yours,

SHANNON MINING COMPANY

/s/ Jos. H. Taylor

Jos. H. Taylor
Vice President

cc: Mr. Morris Blumberg, President
Mr. L. R. Berkey, Vice President

SHANNON MINING COMPANY

September 15, 1954

Minerals Administration
RECEIVED
OCT 4 1954

Mr. W. H. King, Executive Officer
Field Team, Region IV
Defense Minerals Exploration Administration
224 New Customhouse
Denver 2, Colorado

Dear Mr. King:

Enclosed you will find four copies of application for aid in an exploration project, pursuant to DMEA Order 1, under the Defense Production Act of 1950, as amended, also four copies of our lease and option agreement and assignment to the Shannon Mining Company and four copies of composite map made more than thirty years ago.

To repeat parts of my letter of September 9th, we took a lease and option on the old "Shannon Mine" which was operated from 1900 to 1918, producing large quantities of copper sulphide ores which were shipped to Morenci and Douglas. This property did not produce much of anything after this period, although a few shipments were made of copper ore and lead-zinc ore to mills and smelters. This property is described as the old "Copper Belle" or "Leonard" in the University of Arizona Bulletin "Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona" by Eldred D. Wilson, Bulletin Number 123, Geological Series No. 5, Page 68, 69, 70 and 71.

We have installed a 100 hp compressor, a 100 hp hoist, hoist house and there is a headframe at the Pemberthy Shaft. We are now repairing the timber in the Pemberthy Shaft and expect to have this repaired down to the 300 level soon. Below the 300 level, the shaft is full of water and we do not know the condition of the timber. We have done some exploratory work on the 200 level and have found some 30,000 to 50,000 tons of zinc-lead ore. The old records show that copper ore was mined at various levels down to the 600 level and we plan on unwatering the mine and exploring the lower levels.

It is now planned to carry on the following exploratory work to find sufficient ore so that we can build a mill on the property. This exploratory work is listed as follows:

1.	Repairing shaft timber to the 300 Level	$ 8,000.00
2.	Pumping the water out of the mine from the 300 Level to the 600 Level	3,000.00
3.	Repairing the timber in the shaft from the 300 Level to the 600 Level. This may be accomplished for as little as $5,000.00; however, it may cost $20,000.00 if the timber is in bad shape	20,000.00
4.	Repairing drift timber on the 300 Level so that we can get to the faces for exploration	1,500.00

5.	Repairing drift timber on the 400 Level so that we can get to the faces for exploration	$ 1,500.00
6.	Repairing drift timber on the 500 Level so we can get to the faces for exploration	1,000.00
7.	Repairing drifts and timber on the 600 Level so that we can to the faces for exploration	500.00
8.	Diamond Drilling from the faces on 400, 500 and 600 Levels 5,000 feet at $4.00 per foot	20,000.00
9.	Drifting to indicated ore on 400, 500 and 600 Levels, 1,000 feet at $34.50 per foot	34,500.00
10.	Geophysical surveying to determine additional ore on all of the claims as follows: Empire, Copper Belle, Charleston, Elizabeth, Durand, Dandy, Oak Grove, Joe, Katherine A	5,000.00
11.	Geological surveying of the surface and underground levels	5,000.00
	Total	$100,000.00

We are proceeding at present with the rehabilitation of the timber down to the 200 Level and do not wish to stop this work awaiting an aid contract; however, we trust that we will receive this agreement without great delay. We trust that in the near future you will have your engineer or geologist examine the operation, because we believe there is an opportunity to find a considerable amount of copper ore as well as lead and zinc ore.

With kindest personal regards, I remain,

Sincerely yours,

SHANNON MINING COMPANY

Jos. H. Taylor

Jos. H. Taylor
Vice President

JHT:F

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

OCT - 4 1954

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. ~~3715~~ 3515.
Metal or Mineral Cu., Lead, & Zinc
Date Received
Estimated Cost $100,000
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Shannon Mining Company, a subsidiary of Peru Mining Company which in turn is owned by Illinois Zinc Company, Mailing address: P. O. Box 309, Silver City, New Mexico

A corporation, incorporated under the laws of Deleware and authorized to do business in Ariz.

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers. see attached sheet

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract Empire #2724 A9 Copper Belle 2724 A9
Charleston 2724 A9 1508 GT Elizabeth 2724 A9 5 Durand 2724 A9 5 1508 GT
Dandy 2724 A9 5 100 Oak Grove 2724A9 5 Joe 2724 A9 5 100
5 5 5 Katherine A 2724 A9
5

(*b*) State any mine name by which the property is known. Shannon Mine

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Shannon Mining Company has a lease and purchase option contract on the Shannon Mine claims on which has now been paid $11,000.00.

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. copies of lease contract are enclosed

(*e*) If you own the land, describe any liens or encumbrances on it

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. all patented claims

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. see letter

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. see letter

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. see letter

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. Property at Gleeson, Cochise Co. 18 miles from Tombstone, Southern Pacific shipping point, good gravel road

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. Men are available in the area. Electric power is at the property. Water for a mill will have to be piped several miles but for other uses a well can be used.

16—66551-1

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Copper, lead and zinc

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc. see letter and maps

(*c*) The work will start in progress days and be completed within 24 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. Peru Mng. Co. has had years of experience

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet) under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants. Prevailing rates in the area

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs?

[x] Money [x] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper.

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated September 15, 1954

SHANNON MINING COMPANY
(Applicant)

By Jos. H. Taylor

Vice President

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

SHANNON MINING COMPANY, P. O. Box 308, Silver City, New Mexico

1. (c) Titles, names and addresses of officers:

President:	Morris Blumberg, 630 Fifth Avenue, New York 20, N. Y.
Vice President:	Joseph H. Taylor, Silver City, New Mexico
Vice President and Treasurer:	L. R. Berkey, 2959 West 47th Street, Chicago 32, Illinois
Secretary:	John S. Flory, Jr., 2959 West 47th Street, Chicago 32, Illinois
Assistant Secretary:	Adah V. Fleming, Hanover, New Mexico

J. W. Faust, Assistant Manager is in charge of the operations at Gleeson, Arizona

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LEASE AND OPTION

THIS LEASE AND OPTION AGREEMENT, made and entered into this 7th day of April, 1954, by and between IRA VAN TUYL, J. D. HAYNES, K. C. MOON and A. J. HUTCHINSON, parties of the first part, hereinafter referred to as "Owners", and JOSEPH H. TAYLOR, party of the second part, hereinafter referred to as "Taylor".

WITNESSETH:

That the Owners in consideration of the payments to be made by Taylor and the covenants and agreements herein contained and set forth to be kept and performed by Taylor, do hereby give and grant unto Taylor the exclusive right and option to purchase the following named patented lode mining claims situate in the Turquoise Mining District, Cochise County, Arizona, the names of which and Mineral Survey Numbers are as follows, to-wit:

Name	Number
Empire	2724 A9/5
Copper Belle	2724 A9/5
Charleston	2724 A9/5
	1508 GT/100
Elizabeth	2724 A9/5
Durand	2724 A9/5
	1508 GT/100
Dandy	2724 A9/5
Oak Grove	2724 A9/5
Joe	2724 A9/5
Katherine A.	2724 A9/5

and any interest of the Owners in and to the PICK fraction, an unpatented mining claim, upon the following terms and conditions:

1. The purchase price for said premises is the sum of Fifty Thousand Dollars ($50,000.00), payable as follows:

a. Eleven Thousand Dollars ($11,000.00) concurrently with the execution and delivery of this agreement, which sum shall be paid to parties of the first part as follows:

Ira Van Tuyl and J. D. Haynes, d/b/a Haynes & V-T Drilling Company -	$8,350.00
K. C. Moon and A. J. Hutchinson -	2,650.00,

and

b. Thirty-nine Thousand Dollars ($39,000.00) in instalments on or before the dates and in the manner following:

November 1, 1954	$ 2,500.00
May 1, 1955	2,500.00
November 1, 1955	2,500.00
May 1, 1956	2,500.00
November 1, 1956	2,500.00
May 1, 1957	2,500.00
November 1, 1957	2,500.00
May 1, 1958	2,500.00
November 1, 1958	2,500.00
May 1, 1959	2,500.00
November 1, 1959	2,500.00
May 1, 1960	2,500.00
November 1, 1960	2,500.00
May 1, 1961	6,500.00
	$ 39,000.00

Which instalment payments shall be made by depositing the same in the Valley National Bank, Douglas, Arizona unto the order and credit of Owners in the following proportions:

Ira Van Tuyl and J. D. Haynes, d/b/a Haynes & V-T Drilling Company, 725 North Grant St., Odessa, Texas	-	Fifty percent (50%)
K. C. Moon, Douglas, Arizona	-	Twenty-Five percent (25%)
A. J. Hutchinson, Douglas, Arizona	-	Twenty-five percent (25%)

which bank shall, upon receipt of each of such payments, forthwith remit the same to parties of the first part severally in the proportions above designated and to the addresses above designated.

2. Owners, upon demand, agree to make, execute, acknowledge and place in escrow in said bank their limited warranty deed conveying said premises to Taylor, or to his nominee, warranting only that the same are free and clear of any and all liens, encumbrances, adverse claims, or prior transfers suffered or imposed by Owners, and providing that the liability of Owners under or by virtue of such limited warranty shall be several and not joint in the proportions in which the instalments provided for in paragraph 1. hereof are distributable to Owners. Said bank is instructed that if full payment of the purchase price for said premises is made as herein provided, the said bank shall deliver said deed to Taylor or his nominee; otherwise said bank shall hold said deed subject only to the order or Owners.

3. From the date hereof and during the life of this agreement, Taylor shall have the right to the possession of all of said premises and the exclusive right to work and mine the same and to extract, remove, ship and sell therefrom all ores and minerals found therein but upon all such ores and minerals extracted, removed and sold from said premises Taylor shall pay to the Owners royalties as follows:

> 10% of the net smelter or mill returns after deducting all mill, smelter and treatment charges.

Said payments shall be made within ten (10) days after receipt of said mill or smelter returns at the Valley National Bank, Douglas, Arizona, accompanied by duplicate mill, smelter or treatment works settlement sheets and shall be credited to the order of and remitted to Owners as hereinbefore provided. All said payments shall apply upon the purchase price and shall likewise apply upon the annual payments listed in paragraph 1. hereof, permission to so anticipate such payments being hereby granted.

4. It is further agreed and understood between the parties hereto that in the month of June, 1944, previous owners of the above described property, namely, R. L. BROWN and C. M. BROWN, secured a loan from The Reconstruction Finance Corporation on the above described property in the sum of Five Thousand Dollars ($5,000.00), which loan is filed in the records of the Reconstruction Finance Corporation at 417 South Hill Street, in Los Angeles, California, in Docket No. ND-8593, and upon which there remains a present unpaid balance of less then Twenty-five Hundred Dollars ($2500.00). Said loan is payable at the rate of five (5) percent of net smelter returns to apply on principal only, all interest thereon having been waived. It is hereby agreed and understood that the said Taylor shall cause to be paid to the Reconstruction Finance Corporation on said obligation five (5) percent of the net smelter or mill returns after deducting all mill, smelter and treatment charges, which payments shall apply upon the purchase price hereunder and shall be deducted only from the final annual payment hereunder and shall be anticipated only as applying to the final payment hereunder.

5. All work done hereunder shall be performed in a good and minerlike fashion with a view to the preservation of the premises as a workable mine, timbering wherever the same shall be or become necessary, and maintaining all drifts, shafts, levels and other workings well drained, free from loose rock, waste and rubbish and in condition for continued mining, unless prevented from so doing by strikes, labor troubles, accidents, breakdowns or other causes beyond the reasonable control of Taylor.

6. Taylor shall pay all taxes levied and assessed against said premises and the improvements thereon before the same become delinquent.

7. Taylor shall comply with the provisions of the Workmen's Compensation law and the Occupational Disease law of the State of Arizona, the Federal Social Security Act and all other

legislation, federal and state, applicable to the working and operations of said premises and shall make all payments, returns, and reports required by such acts and shall at all times protect and save harmless said premises and the Owners of and from any and all claims, actions, suits, liabilities for damages or compensation for any matter or thing arising out of the work and operation conducted in or upon said premises.

8. Taylor shall promptly pay for all labor, services and materials done, performed or furnished to or for said premises or for the work done therein and shall not allow any claims of lien for any such thing to be effectually made or asserted against said premises or the Owners and shall keep said premises at all times posted with notices against liens in accordance with the statutes of the State of Arizona in that behalf, and shall record said notices as required by the laws of the State of Arizona.

9. The Owners or their agent authorized in writing, shall have the right at all reasonable times to enter into and upon said premises and the workings therein for the purpose of examining and inspecting the same, and ascertaining whether the terms and conditions hereof are being carried out and performed by Taylor.

10. If Taylor shall at any time be in default in the performance of any of the terms and conditions hereof upon him made incumbent, other than the payment of any instalment or instalments upon the purchase price as herein provided, such default shall not operate to or give the Owners the right to cancel or terminate this agreement unless the Owners, or any of them, shall notify Taylor in writing specifying the exact nature of such default and unless Taylor shall, within thirty (30) days from the date of the receipt of such notification, fail to cure such default; but in the event of the failure of Taylor to pay any such instalment when due, or in the event of any such other default and the failure of Taylor to cure the same within the above limited time, Owners shall have the right to cancel or terminate this agree-

ment, and the failure of Owners to exercise such right at any time shall not preclude or estop them from thereafter exercising the same when such right might otherwise be exercised in accordance with the foregoing provisions.

11. Upon the termination of this agreement for any cause other than by fulfillment of the terms hereof, the right of Taylor to purchase said premises and the right to the possession of the same and the right to work and mine said premises and remove, ship and sell ores therefrom shall at once cease and determine and Taylor agrees in any such event to at once, without demand or notice, deliver up unto the Owners the possession of said premises and all permanent or non-removable improvements thereon, and in any such case any and all sums of money theretofore paid hereunder upon the purchase price, shall be and become the property of the Owners.

12. It is expressly understood between the parties hereto, anything herein contained to the contrary notwithstanding, that this agreement is an option given by the Owners to Taylor and no penalty shall accrue or be asserted against Taylor for failure to perform any of the conditions, terms and agreements hereof, and that Taylor may surrender and terminate this agreement at any time and thereupon any liabilities of Taylor hereunder shall immediately cease and terminate, except liability on account of any obligation arising out of his mining operations on said premises incurred and owing at the time of such termination.

13. In case of the termination of this agreement for any cause Taylor shall have the right, within ninety (90) days from the date of such termination, to remove from the premises all tools, equipment, machinery and other property placed therein and thereon by him, excepting ties, rails, pipe and timbers in place below the surface.

14. All notices required to be sent under any provision of this agreement shall be sent to Owners in care of W. Shelley

Richey, Attorney at Law, Douglas, Arizona, and in care of Ira Van Tuyl, 711 Hulman Building, Evansville, Indiana, and to Taylor, Box 309, Silver City, New Mexico, with copies thereof to the Valley National Bank, Douglas, Arizona, escrow agent.

15. It is understood and agreed that Joseph H. Taylor may assign this agreement to the Illinois Zinc Company, the Peru Mining Company or to any wholly owned subsidiary of said companies which either of them may cause to be organized within the State of Arizona, and any such assignee shall be responsible to Owners for the performance of the covenants and agreements herein contained and set forth to be kept and performed by Taylor from the date hereof (except to the extent that Taylor shall have performed the same prior to the making of such assignment) as if such assignee had been named in and executed this agreement instead of Taylor. Concurrently with the execution and delivery of this agreement Taylor shall deliver to Owners, as an additional inducement to Owners to execute this agreement an agreement executed by ~~Illinois Zinc Company~~ Peru Mining Company wherein ~~Illinois Zinc Company~~ Peru Mining Company shall indemnify Owners from and against any and all liens, taxes, or other claims against said mining properties arising by virtue of the use, occupation and operation thereof by Taylor or by and assignee of Taylor, or in lieu of such agreement from ~~Illinois Zinc Company~~ Peru Mining Company Taylor shall, concurrently with the execution of this agreement, furnish to Owners a bond in form and with surety satisfactory to Owners indemnifying Owners from and against all such liens, taxes, or other claims.

(Initialed)
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JDH
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KLM
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(Initialed)
IVT
JDH
JHT
KLM
AJH

16. The term of this lease and option, unless sooner terminated as hereinbefore provided, shall commence on the date in this agreement first written and shall be for the full term or period, terminating at twelve o'clock noon on the 1st day of May, 1961.

17. Subject to the provisions of paragraph 15, hereof, each and every clause, condition, covenant and agreement hereof shall be binding upon and inure to the benefit of the respective heirs, executors, administrators, legal representatives and assigns of each of the parties hereto.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands in triplicate originals on the day and year in this agreement first written, one of which shall be lodged with said bank as its escrow instructions. It is understood and agreed that said bank, as escrow holder, shall have no further responsibility than to accept payments under this agreement for the account of Owners, to remit the same as above provided, and to deliver the deed according to the provisions of paragraph 2. hereof, anything to the contrary herein notwithstanding.

/s/ Ira Van Tuyl
IRA VAN TUYL

/s/ J. D. Haynes
J. D. HAYNES

/s/ K. C. Moon
K. C. MOON

/s/ A. J. Hutchinson
A. J. HUTCHINSON

/s/ Joseph H. Taylor
JOSEPH H. TAYLOR

STATE OF INDIANA)
) SS:
COUNTY OF VANDERBURGH)

On this the 7th day of April, 1954, before me, Rachel Massberg, the undersigned Notary Public, personally appeared IRA VAN TUYL, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ Rachel Maasberg
Notary Public

My commission expires,
January 2, 1955

STATE OF TEXAS)
) SS:
COUNTY OF ECTOR)

On this the 30th day of April, 1954, before me, James De Moville, the undersigned Notary Public, personally appeared J. D. HAYNES, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ James DeMoville

My commission expires,
June 1, 1955

STATE OF ARIZONA)
) SS:
COUNTY OF COCHISE)

On this the 10th day of ~~April~~ May, 1954, before me, Frances D. Castro, the undersigned Notary Public, personally appeared K. C. MOON and A. J. HUTCHINSON, known to me, or satisfactorily proven, to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ Frances D. Castro
Notary Public

My commission expires
May 31, 1956

STATE OF Arizona)
) SS:
COUNTY OF Cochise)

On this the 10th day of ~~April~~ May, 1954, before me, Frances D. Castro, the undersigned Notary Public, personally appeared JOSEPH H. TAYLOR, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ Frances D. Castro
Notary Public

My commission expires,

May 31, 1956

STATE OF ARIZONA) SS
COUNTY OF COCHISE)

I hereby certify that the within instrument was filed and recorded at request of: J. Wayne Woodbury
Fee $ 5.35 Box 857, Silver City, N. M.

Witness my hand and Official Seal
P. W. NEWBURY, County Recorder
/s/ P. W. Newbury Docket 101

Date May 10, 1954 - 3:30PM

Page 549-558 No. 4431

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ASSIGNMENT

KNOW ALL MEN BY THESE PRESENTS: That we, Joseph H. Taylor and Roberta W. Taylor, his wife, hereinafter called the assignors, in consideration of One Dollar ($1.00) and other valuable considerations paid by the Shannon Mining Company, a Delaware Corporation, hereinafter called assignee, do hereby sell, assign, transfer and set over to the assignee all of our right, title and interest in and to that certain lease and option agreement dated April 7, 1954, by and between Ira Van Tuyl, J. D. Haynes, K. C. Moon and A. J. Hutchinson, parties of the first part, and Joseph H. Taylor, party of the second part, one of the assignors herein, covering the following named patented lode mining claims situate in the Turquoise Mining District, Cochise County, Arizona, the names of which and Mineral Survey Numbers are as follows, to-wit:

Name	Number
Empire	2724 $\frac{A9}{5}$
Copper Belle	2724 $\frac{A9}{5}$
Charleston	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Elizabeth	2724 $\frac{A9}{5}$
Durand	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Dandy	2724 $\frac{A9}{5}$
Oak Grove	2724 $\frac{A9}{5}$

Name	Number
Joe	2724 $\frac{A9}{5}$
Katherine A.	2724 $\frac{A9}{5}$

together with any interest in and to the "Pick" unpatented mining claim situate in said mining district.

IN WITNESS WHEREOF, the assignors have hereunto set their hands this 7th day of June, A. D. 1954.

/s/ Joseph H. Taylor

/s/ Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

(SEAL)

/s/ J. Wayne Woodbury
Notary Public.

My Commission expires:

Sept. 28, 1954

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QUITCLAIM DEED

THIS INDENTURE, made the 7th day of June, 1954, between JOSEPH H. TAYLOR and ROBERTA W. TAYLOR, his wife, Grantors, and SHANNON MINING COMPANY, a Delaware Corporation, Grantee,

WITNESSETH: That the said grantors, for and in consideration of the sum of One Dollar ($1.00) to them in hand paid by the said grantee, the receipt whereof is hereby confessed and acknowledged, have, released and quitclaimed, and by these presents do release and quitclaim unto the said grantee, and to its successors and assigns forever, all the right, title, interest, claim and demand which the said grantors have; in and to the following described property situated in the County of Cochise, and State of Arizona, to-wit:

> All of those certain patented mining claims located in the Turquoise Mining District in Cochise County, State of Arizona, designated as: "THE EMPIRE", "CHARLESTON", "COPPER BELLE", "ELIZABETH", "DURAND", "DANDY", "OAK GROVE", "JOE" and "KATHERINE A", United States Patent to which said mines is recorded in the Office of the County Recorder of Cochise County, State of Arizona, in Book 26 of Deeds of mines, at Page 580, together with any interest of the grantors in and to the "PICK", an unpatented mining claim in the Turquoise Mining District, Cochise County, State of Arizona.

TO HAVE AND TO HOLD the same together with all the appurtenances thereunto belonging to the grantee, its successors and assigns forever.

IN WITNESS WHEREOF, the said grantors have hereunto set their hands the day and year first above written.

/s/ Joseph H. Taylor

/s/ Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

(SEAL)

/s/ J. Wayne Woodbury
Notary Public.

My Commission expires:
Sept. 28, 1954

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

Department of the Interior
Defense Minerals Administration
RECEIVED
OCT 19 1954

October 18, 1954

Re: DMEA-3515
Shannon Mining Co.
Cochise Co., Ariz.
$100,000
Copper-Lead-Zinc

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

From: E. L. Newcomb, U. S. Geological Survey

Subject: Review of application

The applicant has proposed an extensive program of unwatering, rehabilitation, and drifting on the 300, 400, 500 and 600 levels of the Copper Belle (Leonard) mine.

The only data presented in support of this project is a composite plan of levels and stopes on the Charleston, Elizabeth, Copper Belle and Empire Mine claims. Further pertinent information should be requested from the applicant.

The following material was taken from the University of Arizona Bulletin 123, (1927), "Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona" by Eldred D. Wilson.

At the time of Wilson's visit to the mine only the mine dumps and surface exposures were available for examination. However, the Shannon Copper Company permitted him to review the Company's maps and reports by Augustus Locke and A. S. R. Wilson.

Most of the ore bodies occur in a limestone formation which dips 40° E. They are limited mainly to contacts with underlying quartz monzonite. The ore occurs as irregular lenses which usually are tabular and widest where locally the dip flattens. The ore minerals are massive pyrite with minor amounts of chalcopyrite and bornite, and occasionally very small amounts of galena and sphalerite. Some oxidized ore was present in the upper 100 feet of the mine.

In 1907, the Shannon Copper Co. produced 65,000 pounds of copper, 21,000 ounces of silver, and 307 ounces of gold. Between 1911 and 1922, the property produced 305,000 tons of ore. Most of this ore went to Clifton where its high sulfur content and lack of gangue were at a premium for fluxing other ores.

The workings of the Copper Belle mine total about 38,000 feet. The original Copper Belle shaft is about 400 feet deep and Pemberthy shaft (3-compartment) is 581 feet deep.

E. D. Wilson has referred to old geologic reports and maps prepared for the Shannon Copper Co. It is quite possible these maps and reports were acquired by the applicant. An effort should be made to get these maps and reports before a firm recommendation is made on the applicant's proposed project.

I do not recommend a field referral be made until after we receive more information from the Shannon Mining Company.

E. L. Newcomb

E. L. Newcomb

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

Defense Minerals Administration
RECEIVED
OCT 19 1954

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I do not recommend a field referral be made until after we receive more information from the Shannon Mining Company.

E. L. Newcomb

ELNewcomb:hlm
G-10/18/54

Copy to: Director's reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
C. H. Johnson, 3621

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

October 5, 1954

Memorandum

To: Executive Officer, DMEA Field Team, Region IV

From: Chief, Operation's Control and Statistics Division

Subject: Assignment of Docket Number

There is listed below the assigned docket number to an application recently received from Region IV.

DMEA-3515 Shannon Mining Co.

Robert E. Adams,
Chief, Operation's Control
and Statistics Division

October 5, 1954

Shannon Mining Co.
P. O. Box 309
Silver City
New Mexico

Subject: DMEA-3515
Re: Exploration Assistance

Gentlemen:

The receipt of your application dated September 15, 1954 for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-3515 and referred to the Base Metals Division.

Kindly refer to in any future correspondence relating to your application.

Sincerely yours,

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

224 New Customhouse
Denver 2, Colorado

September 30, 1954

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region lV

Subject: Application of Shannon Mining Company, (Copper-Lead-Zinc) Cochise County, Arizona

Enclosed are three copies of an application for exploration assistance in the amount of $100,000.00 submitted by Shannon Mining Company.

W. H. King

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Defense Minerals Administration
RECEIVED
OCT 4 1954

224 New Customhouse
Denver 2, Colorado

September 30, 1954

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region IV

Subject: Application of Shannon Mining Company, (Copper-Lead-Zinc) Cochise County, Arizona

Enclosed are three copies of an application for exploration assistance in the amount of $100,000.00 submitted by Shannon Mining Company.

W. H. King

Enclosures

RDB:mn

cc: Docket
C. O. Mittendorf
Chron.

Mine: Hanover, N.M. Mill: Peruhill, N.M.

C
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P
Y

SHANNON MINING COMPANY
Silver City, New Mexico

September 9, 1954

Defense Minerals Administration
RECEIVED
OCT - 4 1954

Mr. W. H. King, Executive Officer
Field Team, Region IV
Defense Minerals Exploration Administration
224 New Customhouse
Denver 2, Colorado

Dear Mr. King:

Two months ago I wrote to the Washington office in regard to an application for aid in an exploration project pursuant to DMEA Order-1 under the Defense Procurement Act of 1950.

We took a lease and option on the old "Shannon Mine" which was operated from 1900 to 1918, producing large quantities of cooper sulphide ores which were shipped to Morenci and Douglas. This property did not produce much of anything after this period, although a few shipments were made of copper ore and lead-zinc ore to mills and smelters. This property is described as the old "Copper Bell" or Leonard" in the University of Arizona Bulletin "Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona" by Eldred D. Wilson, Bulletin Number 123, Geological Series No. 5, Page 68, 69, 70 and 71.

We have installed a 100 hp compressor, a 100 hp hoist, hoist house and there is a headframe at the Pemberthy Shaft. We are now repairing the timber in the Pemberthy Shaft and expect to have this repaired down to the 300 level soon. Below the 300 level, the shaft is full of water and we do not know the condition of the timber. We have done some exploratory work on the 200 level and have found some 30,000 to 50,000 tons of zinc-lead ore. The old records show that copper ore was mined at various levels down to the 600 level and we plan on unwatering the mine and exploring the lower levels. It is our plan to make application for a Defense Minerals Exploration Program within the next few days.

We have barely enough forms for making this and would like four additional copies of MF-103 so that we can have a record for our various offices. We trust we will receive these forms early next week and will proceed with getting copies of maps and so forth so that we can make application next week.

Very truly yours,

SHANNON MINING COMPANY

/s/ Jos. H. Taylor

Jos. H. Taylor
Vice President

cc: Mr. Morris Blumberg, President
Mr. L. R. Berkey, Vice President

MINE: HANOVER, N. M.

SHANNON
PERU MINING COMPANY
SILVER CITY, NEW MEXICO

MILL: PERUHILL, N. M.

September 15, 1954

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT - 4 1954
Mining Division
Date Rec'd.
SEP 29 1954
BUREAU OF MINES
Denver, Colorado

Mr. W. H. King, Executive Officer
Field Team, Region IV
Defense Minerals Exploration Administration
224 New Customhouse
Denver 2, Colorado

Dear Mr. King:

Enclosed you will find four copies of application for aid in an exploration project, pursuant to DMEA Order 1, under the Defense Production Act of 1950, as amended, also four copies of our lease and option agreement and assignment to the Shannon Mining Company and four copies of composite map made more than thirty years ago.

To repeat parts of my letter of September 9th, we took a lease and option on the old "Shannon Mine" which was operated from 1900 to 1918, producing large quantities of copper sulphide ores which were shipped to Morenci and Douglas. This property did not produce much of anything after this period, although a few shipments were made of copper ore and lead-zinc ore to mills and smelters. This property is described as the old "Copper Belle" or "Leonard" in the University of Arizona Bulletin "Geology and Ore Deposits of the Courtland-Gleeson Region, Arizona" by Eldred D. Wilson, Bulletin Number 123, Geological Series No. 5, Page 68, 69, 70 and 71.

We have installed a 100 hp compressor, a 100 hp hoist, hoist house and there is a headframe at the Pemberthy Shaft. We are now repairing the timber in the Pemberthy Shaft and expect to have this repaired down to the 300 level soon. Below the 300 level, the shaft is full of water and we do not know the condition of the timber. We have done some exploratory work on the 200 level and have found some 30,000 to 50,000 tons of zinc-lead ore. The old records show that copper ore was mined at various levels down to the 600 level and we plan on unwatering the mine and exploring the lower levels.

It is now planned to carry on the following exploratory work to find sufficient ore so that we can build a mill on the property. This exploratory work is listed as follows:

1.	Repairing shaft timber to the 300 Level	$ 8,000.00
2.	Pumping the water out of the mine from the 300 Level to the 600 Level	3,000.00
3.	Repairing the timber in the shaft from the 300 Level to the 600 Level. This may be accomplished for as little as $5,000.00; however, it may cost $20,000.00 if the timber is in bad shape	20,000.00
4.	Repairing drift timber on the 300 Level so that we can get to the faces for exploration	1,500.00

5.	Repairing drift timber on the 400 Level so that we can get to the faces for exploration	$ 1,500.00
6.	Repairing drift timber on the 500 Level so we can get to the faces for exploration	1,000.00
7.	Repairing drifts and timber on the 600 Level so that we can to the faces for exploration	500.00
8.	Diamond Drilling from the faces on 400, 500 and 600 Levels 5,000 feet at $4.00 per foot	20,000.00
9.	Drifting to indicated ore on 400, 500 and 600 Levels, 1,000 feet at $34.50 per foot	34,500.00
10.	Geophysical surveying to determine additional ore on all of the claims as follows: Empire, Copper Belle, Charleston, Elizabeth, Durand, Dandy, Oak Grove, Joe, Katherine A	5,000.00
11.	Geological surveying of the surface and underground levels	5,000.00
	Total	$100,000.00

We are proceeding at present with the rehabilitation of the timber down to the 200 Level and do not wish to stop this work awaiting an aid contract; however, we trust that we will receive this agreement without great delay. We trust that in the near future you will have your engineer or geologist examine the operation, because we believe there is an opportunity to find a considerable amount of copper ore as well as lead and zinc ore.

With kindest personal regards, I remain,

Sincerely yours,

SHANNON MINING COMPANY

Jos. H. Taylor

Jos. H. Taylor
Vice President

JHT:H

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

DEPARTMENT OF THE INTERIOR
Form Approved. Administration
Budget Bureau No. 42-R1035.2.
RECEIVED
OCT - 4 1954

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. ~~3475~~ 3515
Metal or Mineral Cu, Lead, & Zinc
Date Received
Estimated Cost $100,000
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Shannon Mining Company, a subsidiary of Peru Mining Company which in turn is owned by Illinois Zinc Company, Mailing address: P. O. Box 309, Silver City, New Mexico
A corporation, incorporated under the laws of Deleware and authorized to do business in Ariz

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers. see attached sheet

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract Empire #2724 A9 Copper Belle 2724 A9
Charleston 2724 A9 1508 GT Elizabeth 2724 A9 5 Durand 2724 A9 5 1508 GT
Dandy 2724 A9 5 100 Oak Grove 2724A9 5 Joe 2724 A9 5 100
5 5 5 Katherine A 2724 A9
5

(*b*) State any mine name by which the property is known. Shannon Mine

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Shannon Mining Company has a lease and purchase option contract on the Shannon Mine claims on which has now been paid $11,000.00.

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. copies of lease contract are enclosed

(*e*) If you own the land, describe any liens or encumbrances on it

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. all patented claims

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. see letter

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. see letter

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. see letter

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. Property at Gleeson, Cochise Co. 18 miles from Tonbstone, Southern Pacific shipping point, good gravel road

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. Men are available in the area. Electric power is at the property. Water for a mill will have to be piped several miles but for other uses a well can be used.

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Copper, lead and zinc

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc. see letter and maps

(*c*) The work ~~will start within~~ in progress days and be completed within 24 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. Peru Mng. Co. has had years of experience

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants. Prevailing rates in the area

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs?

[x] Money [x] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper.

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated September 15, 1954

SHANNON MINING COMPANY
(Applicant)

By Jos. H. Taylor

Vice President

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

SHANNON MINING COMPANY, P. O. Box 308, Silver City, New Mexico

1. (c) Titles, names and addresses of officers:

President:	Morris Blumberg, 630 Fifth Avenue, New York 20, N. Y.
Vice President:	Joseph H. Taylor, Silver City, New Mexico
Vice President and Treasurer:	L. R. Berkey, 2959 West 47th Street, Chicago 32, Illinois
Secretary:	John S. Flory, Jr., 2959 West 47th Street, Chicago 32, Illinois
Assistant Secretary:	Adah V. Fleming, Hanover, New Mexico

J. W. Faust, Assistant Manager is in charge of the operations at Gleeson, Arizona

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LEASE AND OPTION

THIS LEASE AND OPTION AGREEMENT, made and entered into this 7th day of April, 1954, by and between IRA VAN TUYL, J. D. HAYNES, K. C. MOON and A. J. HUTCHINSON, parties of the first part, hereinafter referred to as "Owners", and JOSEPH H. TAYLOR, party of the second part, hereinafter referred to as "Taylor".

WITNESSETH:

That the Owners in consideration of the payments to be made by Taylor and the covenants and agreements herein contained and set forth to be kept and performed by Taylor, do hereby give and grant unto Taylor the exclusive right and option to purchase the following named patented lode mining claims situate in the Turquoise Mining District, Cochise County, Arizona, the names of which and Mineral Survey Numbers are as follows, to-wit:

Name	Number
Empire	2724 A9/5
Copper Belle	2724 A9/5
Charleston	2724 A9/5
	1508 GT/100
Elizabeth	2724 A9/5
Durand	2724 A9/5
	1508 GT/100
Dandy	2724 A9/5
Oak Grove	2724 A9/5
Joe	2724 A9/5
Katherine A.	2724 A9/5

OCT - 4 1954

and any interest of the Owners in and to the PICK fraction, an unpatented mining claim, upon the following terms and conditions:

1. The purchase price for said premises is the sum of Fifty Thousand Dollars ($50,000.00), payable as follows:

a. Eleven Thousand Dollars ($11,000.00) concurrently with the execution and delivery of this agreement, which sum shall be paid to parties of the first part as follows:

Ira Van Tuyl and J. D. Haynes, d/b/a Haynes & V-T Drilling Company -	$8,350.00
K. C. Moon and A. J. Hutchinson -	2,650.00,

and

b. Thirty-nine Thousand Dollars ($39,000.00) in instalments on or before the dates and in the manner following:

November 1, 1954	$ 2,500.00
May 1, 1955	2,500.00
November 1, 1955	2,500.00
May 1, 1956	2,500.00
November 1, 1956	2,500.00
May 1, 1957	2,500.00
November 1, 1957	2,500.00
May 1, 1958	2,500.00
November 1, 1958	2,500.00
May 1, 1959	2,500.00
November 1, 1959	2,500.00
May 1, 1960	2,500.00
November 1, 1960	2,500.00
May 1, 1961	6,500.00
	$ 39,000.00

Which instalment payments shall be made by depositing the same in the Valley National Bank, Douglas, Arizona unto the order and credit of Owners in the following proportions:

Ira Van Tuyl and J. D. Haynes, d/b/a Haynes & V-T Drilling Company, 725 North Grant St., Odessa, Texas	-	Fifty percent (50%)
K. C. Moon, Douglas, Arizona	-	Twenty-Five percent (25%)
A. J. Hutchinson, Douglas, Arizona	-	Twenty-Five percent (25%)

which bank shall, upon receipt of each of such payments, forthwith remit the same to parties of the first part severally in the proportions above designated and to the addresses above designated.

2. Owners, upon demand, agree to make, execute, acknowledge and place in escrow in said bank their limited warranty deed conveying said premises to Taylor, or to his nominee, warranting only that the same are free and clear of any and all liens, encumbrances, adverse claims, or prior transfers suffered or imposed by Owners, and providing that the liability of Owners under or by virtue of such limited warranty shall be several and not joint in the proportions in which the instalments provided for in paragraph 1. hereof are distributable to Owners. Said bank is instructed that if full payment of the purchase price for said premises is made as herein provided, the said bank shall deliver said deed to Taylor or his nominee; otherwise said bank shall hold said deed subject only to the order or Owners.

3. From the date hereof and during the life of this agreement, Taylor shall have the right to the possession of all of said premises and the exclusive right to work and mine the same and to extract, remove, ship and sell therefrom all ores and minerals found therein but upon all such ores and minerals extracted, removed and sold from said premises Taylor shall pay to the Owners royalties as follows:

> 10% of the net smelter or mill returns after deducting all mill, smelter and treatment charges.

Said payments shall be made within ten (10) days after receipt of said mill or smelter returns at the Valley National Bank, Douglas, Arizona, accompanied by duplicate mill, smelter or treatment works settlement sheets and shall be credited to the order of and remitted to Owners as hereinbefore provided. All said payments shall apply upon the purchase price and shall likewise apply upon the annual payments listed in paragraph 1. hereof, permission to so anticipate such payments being hereby granted.

4. It is further agreed and understood between the parties hereto that in the month of June, 1944, previous owners of the above described property, namely, R. L. BROWN and C. M. BROWN, secured a loan from The Reconstruction Finance Corporation on the above described property in the sum of Five Thousand Dollars ($5,000.00), which loan is filed in the records of the Reconstruction Finance Corporation at 417 South Hill Street, in Los Angeles, California, in Docket No. ND-8593, and upon which there remains a present unpaid balance of less then Twenty-five Hundred Dollars ($2500.00). Said loan is payable at the rate of five (5) percent of net smelter returns to apply on principal only, all interest thereon having been waived. It is hereby agreed and understood that the said Taylor shall cause to be paid to the Reconstruction Finance Corporation on said obligation five (5) percent of the net smelter or mill returns after deducting all mill, smelter and treatment charges, which payments shall apply upon the purchase price hereunder and shall be deducted only from the final annual payment hereunder and shall be anticipated only as applying to the final payment hereunder.

5. All work done hereunder shall be performed in a good and minerlike fashion with a view to the preservation of the premises as a workable mine, timbering wherever the same shall be or become necessary, and maintaining all drifts, shafts, levels and other workings well drained, free from loose rock, waste and rubbish and in condition for continued mining, unless prevented from so doing by strikes, labor troubles, accidents, breakdowns or other causes beyond the reasonable control of Taylor.

6. Taylor shall pay all taxes levied and assessed against said premises and the improvements thereon before the same become delinquent.

7. Taylor shall comply with the provisions of the Workmen's Compensation law and the Occupational Disease law of the State of Arizona, the Federal Social Security Act and all other

legislation, federal and state, applicable to the working and operations of said premises and shall make all payments, returns, and reports required by such acts and shall at all times protect and save harmless said premises and the Owners of and from any and all claims, actions, suits, liabilities for damages or compensation for any matter or thing arising out of the work and operation conducted in or upon said premises.

8. Taylor shall promptly pay for all labor, services and materials done, performed or furnished to or for said premises or for the work done therein and shall not allow any claims of lien for any such thing to be effectually made or asserted against said premises or the Owners and shall keep said premises at all times posted with notices against liens in accordance with the statutes of the State of Arizona in that behalf, and shall record said notices as required by the laws of the State of Arizona.

9. The Owners or their agent authorized in writing, shall have the right at all reasonable times to enter into and upon said premises and the workings therein for the purpose of examining and inspecting the same, and ascertaining whether the terms and conditions hereof are being carried out and performed by Taylor.

10. If Taylor shall at any time be in default in the performance of any of the terms and conditions hereof upon him made incumbent, other than the payment of any instalment or instalments upon the purchase price as herein provided, such default shall not operate to or give the Owners the right to cancel or terminate this agreement unless the Owners, or any of them, shall notify Taylor in writing specifying the exact nature of such default and unless Taylor shall, within thirty (30) days from the date of the receipt of such notification, fail to cure such default; but in the event of the failure of Taylor to pay any such instalment when due, or in the event of any such other default and the failure of Taylor to cure the same within the above limited time, Owners shall have the right to cancel or terminate this agree-

ment, and the failure of Owners to exercise such right at any time shall not preclude or estop them from thereafter exercising the same when such right might otherwise be exercised in accordance with the foregoing provisions.

11. Upon the termination of this agreement for any cause other than by fulfillment of the terms hereof, the right of Taylor to purchase said premises and the right to the possession of the same and the right to work and mine said premises and remove, ship and sell ores therefrom shall at once cease and determine and Taylor agrees in any such event to at once, without demand or notice, deliver up unto the Owners the possession of said premises and all permanent or non-removable improvements thereon, and in any such case any and all sums of money theretofore paid hereunder upon the purchase price, shall be and become the property of the Owners.

12. It is expressly understood between the parties hereto, anything herein contained to the contrary notwithstanding, that this agreement is an option given by the Owners to Taylor and no penalty shall accrue or be asserted against Taylor for failure to perform any of the conditions, terms and agreements hereof, and that Taylor may surrender and terminate this agreement at any time and thereupon any liabilities of Taylor hereunder shall immediately cease and terminate, except liability on account of any obligation arising out of his mining operations on said premises incurred and owing at the time of such termination.

13. In case of the termination of this agreement for any cause Taylor shall have the right, within ninety (90) days from the date of such termination, to remove from the premises all tools, equipment, machinery and other property placed therein and thereon by him, excepting ties, rails, pipe and timbers in place below the surface.

14. All notices required to be sent under any provision of this agreement shall be sent to Owners in care of W. Shelley

Richey, Attorney at Law, Douglas, Arizona, and in care of Ira Van Tuyl, 711 Hulman Building, Evansville, Indiana, and to Taylor, Box 309, Silver City, New Mexico, with copies thereof to the Valley National Bank, Douglas, Arizona, escrow agent.

15. It is understood and agreed that Joseph H. Taylor may assign this agreement to the Illinois Zinc Company, the Peru Mining Company or to any wholly owned subsidiary of said companies which either of them may cause to be organized within the State of Arizona, and any such assignee shall be responsible to Owners for the performance of the covenants and agreements herein contained and set forth to be kept and performed by Taylor from the date hereof (except to the extent that Taylor shall have performed the same prior to the making of such assignment) as if such assignee had been named in and executed this agreement instead of Taylor. Concurrently with the execution and delivery of this agreement Taylor shall deliver to Owners, as an additional inducement to Owners to execute this agreement an agreement executed by ~~Illinois Zinc Company~~ Peru Mining Company wherein ~~Illinois Zinc Company~~ Peru Mining Company shall indemnify Owners from and against any and all liens, taxes, or other claims against said mining properties arising by virtue of the use, occupation and operation thereof by Taylor or by and assignee of Taylor, or in lieu of such agreement from ~~Illinois Zinc Company~~ Peru Mining Company Taylor shall, concurrently with the execution of this agreement, furnish to Owners a bond in form and with surety satisfactory to Owners indemnifying Owners from and against all such liens, taxes, or other claims.

(Initialed)
IVT
JDH
JHT
KLM
AJH

(Initialed)
IVT
JDH
JHT
KLM
AJH

16. The term of this lease and option, unless sooner terminated as hereinbefore provided, shall commence on the date in this agreement first written and shall be for the full term or period, terminating at twelve o'clock noon on the 1st day of May, 1961.

17. Subject to the provisions of paragraph 15, hereof, each and every clause, condition, covenant and agreement hereof shall be binding upon and inure to the benefit of the respective heirs, executors, administrators, legal representatives and assigns of each of the parties hereto.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands in triplicate originals on the day and year in this agreement first written, one of which shall be lodged with said bank as its escrow instructions. It is undersood and agreed that said bank, as escrow holder, shall have no further responsibility than to accept payments under this agreement for the account of Owners, to remit the same as above provided, and to deliver the deed according to the provisions of paragraph 2. hereof, anything to the contrary herein notwithstanding.

/s/ Ira Van Tuyl
IRA VAN TUYL

/s/ J. D. Haynes
J. D. HAYNES

/s/ K. C. Moon
K. C. MOON

/s/ A. J. Hutchinson
A. J. HUTCHINSON

/s/ Joseph H. Taylor
JOSEPH H. TAYLOR

STATE OF INDIANA)
) SS:
COUNTY OF VANDERBURGH)

On this the 7th day of April, 1954, before me, Rachel Massberg, the undersigned Notary Public, personally appeared IRA VAN TUYL, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ Rachel Maasberg
Notary Public

My commission expires,
January 2, 1955

STATE OF TEXAS)
) SS:
COUNTY OF ECTOR)

On this the 30th day of April, 1954, before me, James De Moville, the undersigned Notary Public, personally appeared J. D. HAYNES, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ James DeMoville

My commission expires,
June 1, 1955

STATE OF ARIZONA)
) SS:
COUNTY OF COCHISE)

On this the 10th day of ~~April~~ May, 1954, before me, Frances D. Castro, the undersigned Notary Public, personally appeared K. C. MOON and A. J. HUTCHINSON, known to me, or satisfactorily proven, to be the persons whose names are subscribed to the within instrument and acknowledged that they executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ Frances D. Castro
Notary Public

My commission expires
May 31, 1956

STATE OF Arizona)
) SS:
COUNTY OF Cochise)

On this the 10th day of ~~April~~ May, 1954, before me, Frances D. Castro, the undersigned Notary Public, personally appeared JOSEPH H. TAYLOR, known to me, or satisfactorily proven, to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

/s/ Frances D. Castro
Notary Public

My commission expires,

May 31, 1956

STATE OF ARIZONA) SS
COUNTY OF COCHISE)

I hereby certify that the within instrument was filed and recorded at request of: J. Wayne Woodbury
Box 857, Silver City, N. M.
Fee $ 5.35

Witness my hand and Official Seal
P. W. NEWBURY, County Recorder
/s/ P. W. Newbury

Docket 101

Date May 10, 1954 - 3:30PM

Page 549-558 No. 4431

C
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P
Y

ASSIGNMENT

KNOW ALL MEN BY THESE PRESENTS: That we, Joseph H. Taylor and Roberta W. Taylor, his wife, hereinafter called the assignors, in consideration of One Dollar ($1.00) and other valuable considerations paid by the Shannon Mining Company, a Delaware Corporation, hereinafter called assignee, do hereby sell, assign, transfer and set over to the assignee all of our right, title and interest in and to that certain lease and option agreement dated April 7, 1954, by and between Ira Van Tuyl, J. D. Haynes, K. C. Moon and A. J. Hutchinson, parties of the first part, and Joseph H. Taylor, party of the second part, one of the assignors herein, covering the following named patented lode mining claims situate in the Turquoise Mining District, Cochise County, Arizona, the names of which and Mineral Survey Numbers are as follows, to-wit:

Name	Number
Empire	2724 $\frac{A9}{5}$
Copper Belle	2724 $\frac{A9}{5}$
Charleston	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Elizabeth	2724 $\frac{A9}{5}$
Durand	2724 $\frac{A9}{5}$
	1508 $\frac{GT}{100}$
Dandy	2724 $\frac{A9}{5}$
Oak Grove	2724 $\frac{A9}{5}$

Name	Number
Joe	2724 $\frac{A9}{5}$
Katherine A.	2724 $\frac{A9}{5}$

together with any interest in and to the "Pick" unpatented mining claim situate in said mining district.

IN WITNESS WHEREOF, the assignors have hereunto set their hands this 7th day of June, A. D. 1954.

/s/ Joseph H. Taylor

/s/ Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

(SEAL)

/s/ J. Wayne Woodbury
Notary Public.

My Commission expires:

Sept. 28, 1954

C
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P
Y

QUITCLAIM DEED

THIS INDENTURE, made the 7th day of June, 1954, between JOSEPH H. TAYLOR and ROBERTA W. TAYLOR, his wife, Grantors, and SHANNON MINING COMPANY, a Delaware Corporation, Grantee,

WITNESSETH: That the said grantors, for and in consideration of the sum of One Dollar ($1.00) to them in hand paid by the said grantee, the receipt whereof is hereby confessed and acknowledged, have, released and quitclaimed, and by these presents do release and quitclaim unto the said grantee, and to its successors and assigns forever, all the right, title, interest, claim and demand which the said grantors have; in and to the following described property situated in the County of Cochise, and State of Arizona, to-wit:

> All of those certain patented mining claims located in the Turquoise Mining District in Cochise County, State of Arizona, designated as: "THE EMPIRE", "CHARLESTON", "COPPER BELLE", "ELIZABETH", "DURAND", "DANDY", "OAK GROVE", "JOE" and "KATHERINE A", United States Patent to which said mines is recorded in the Office of the County Recorder of Cochise County, State of Arizona, in Book 26 of Deeds of mines, at Page 580, together with any interest of the grantors in and to the "PICK", an unpatented mining claim in the Turquoise Mining District, Cochise County, State of Arizona.

TO HAVE AND TO HOLD the same together with all the appurtenances thereunto belonging to the grantee, its successors and assigns forever.

IN WITNESS WHEREOF, the said grantors have hereunto set their hands the day and year first above written.

/s/ Joseph H. Taylor

/s/ Roberta W. Taylor

STATE OF NEW MEXICO,)
: SS.
County of Grant.)

On this 7th day of June, A. D. 1954, before me personally appeared Joseph H. Taylor and Roberta W. Taylor, his wife, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Notarial Seal the day and year in this certificate first written.

(SEAL)

/s/ J. Wayne Woodbury
Notary Public.

My Commission expires:
Sept. 28, 1954

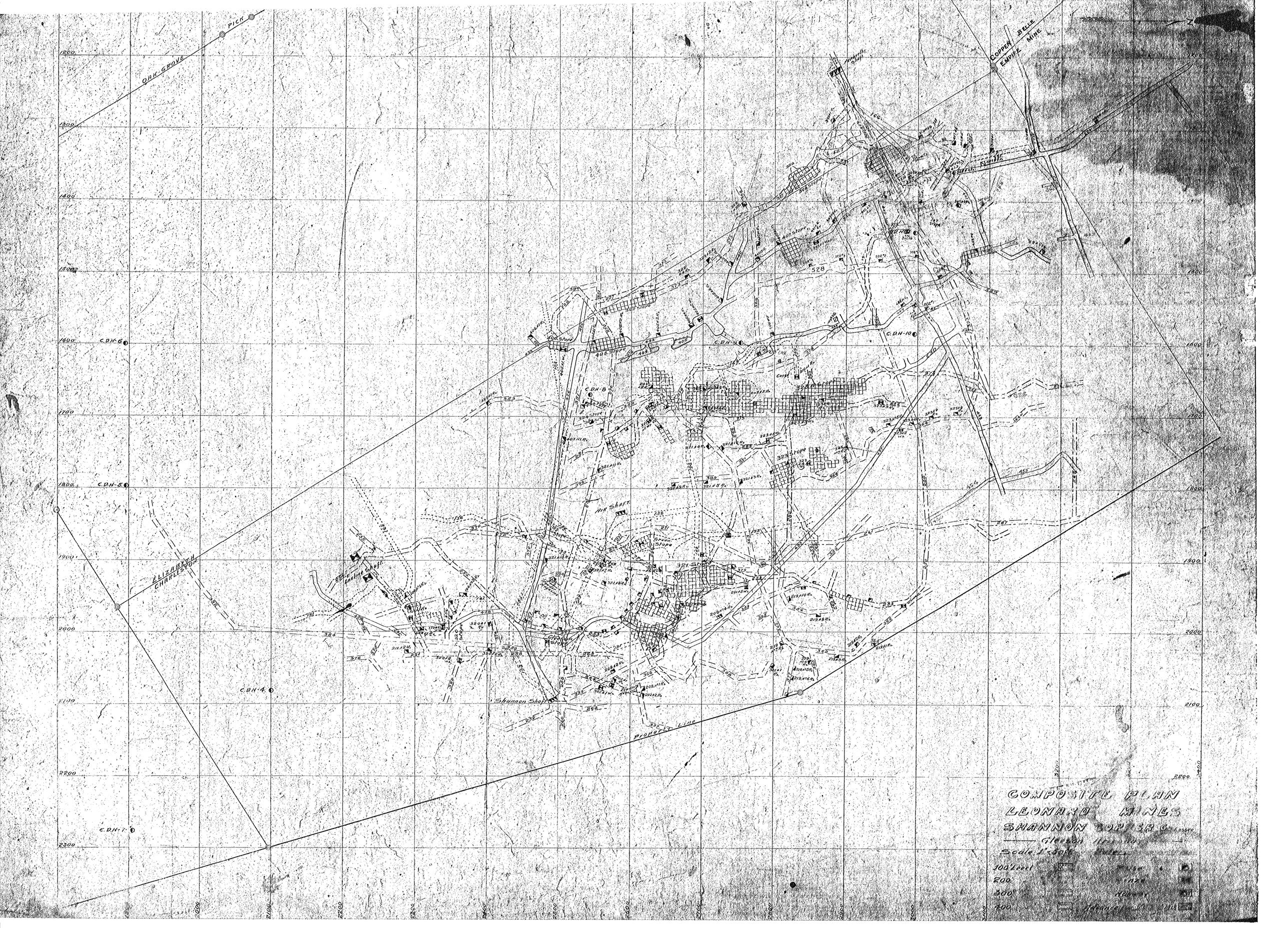
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS
EXPLORATION ADMINISTRATION
~~WASHINGTON 25, D.~~ C.

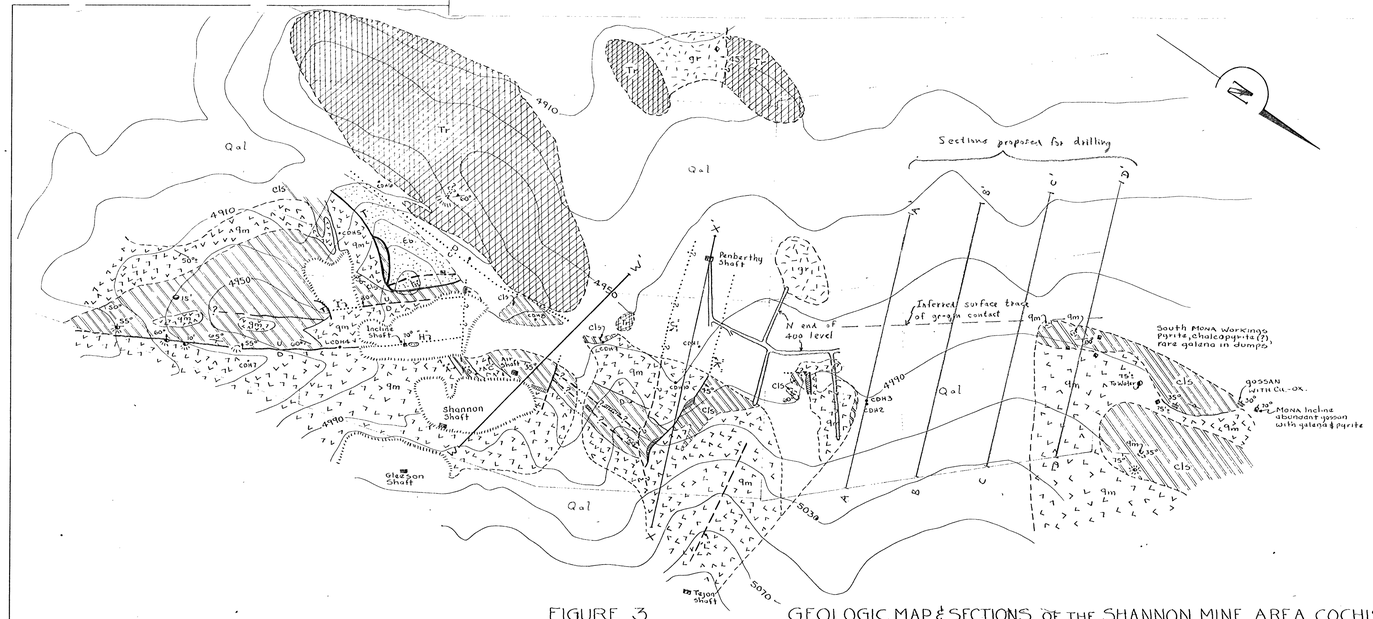
OFFICIAL BUSINESS

ROOM 8, POST OFFICE BLDG.
KNOXVILLE 2, TENN.

KNOXVILLE TENN.
Sep 22
5 30 PM
1954

Mr. George C. Selfridge, Chairman
Operating Committee, D.M.E.A.
Dept. of the Interior
Washington 25, D.C.


OAK GROVE
PICK
COPPER BELLE
EMPIRE MINE
ELIZABETH
CHARLESTON
C.D.H-6
C.D.H-5
C.D.H-4
C.D.H-7
C.D.H-8
C.D.H-9
C.D.H-10
Air Shaft
Shannon Shaft
Tramline Shaft
Property Line
COMPOSITE PLAN
LEONARD MINES
SHANNON
100 feet
200
300
400



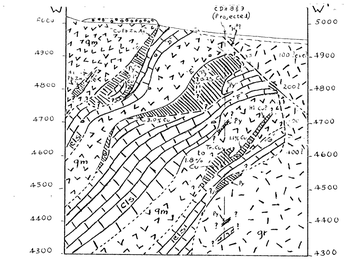
EXPLANATION

- Qal — Quaternary & recent alluvium & talus (includes mine dumps)
- Tr — Tertiary rhyolite
- Pennsylvania Naco limestone
- Cambrian Bolsa Quartzite
- Quartz monzonite
- Granite
- Contact (dashes where approximately located)
- Fault, showing dip & relative movement; T indicates thrust fault (dashed where approximately located, dotted where concealed; question marks indicate uncertainty as to existence of fault)
- 15 — Strike and dip of beds
- Strike of vertical beds
- 50 — Strike and dip of overturned beds
- 60 — Strike and dip of primary foliation of rhyolite
- 35 — Gossan, showing strike and dip of outcrop
- CDH8 — Churn drill hole and number

Map from Shannon Mining Co. with additions & modifications from a Brunton survey by Leonid Bryner U.S.G.S.

Sulphide bodies known by stoping & churn drilling are shown in the geologic sections but the stopes are not shown.

200 0 200 400 600
Scale in Feet



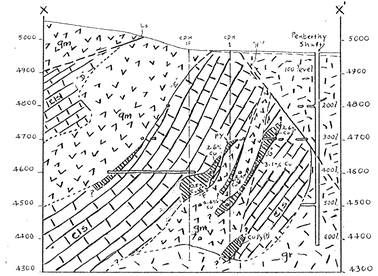


FIGURE 3 GEOLOGIC MAP & SECTIONS OF THE SHANNON MINE AREA, COCHISE COUNTY, ARIZONA

GEOLOGIC SECTIONS W-W' & X-X'

DMEA 3515

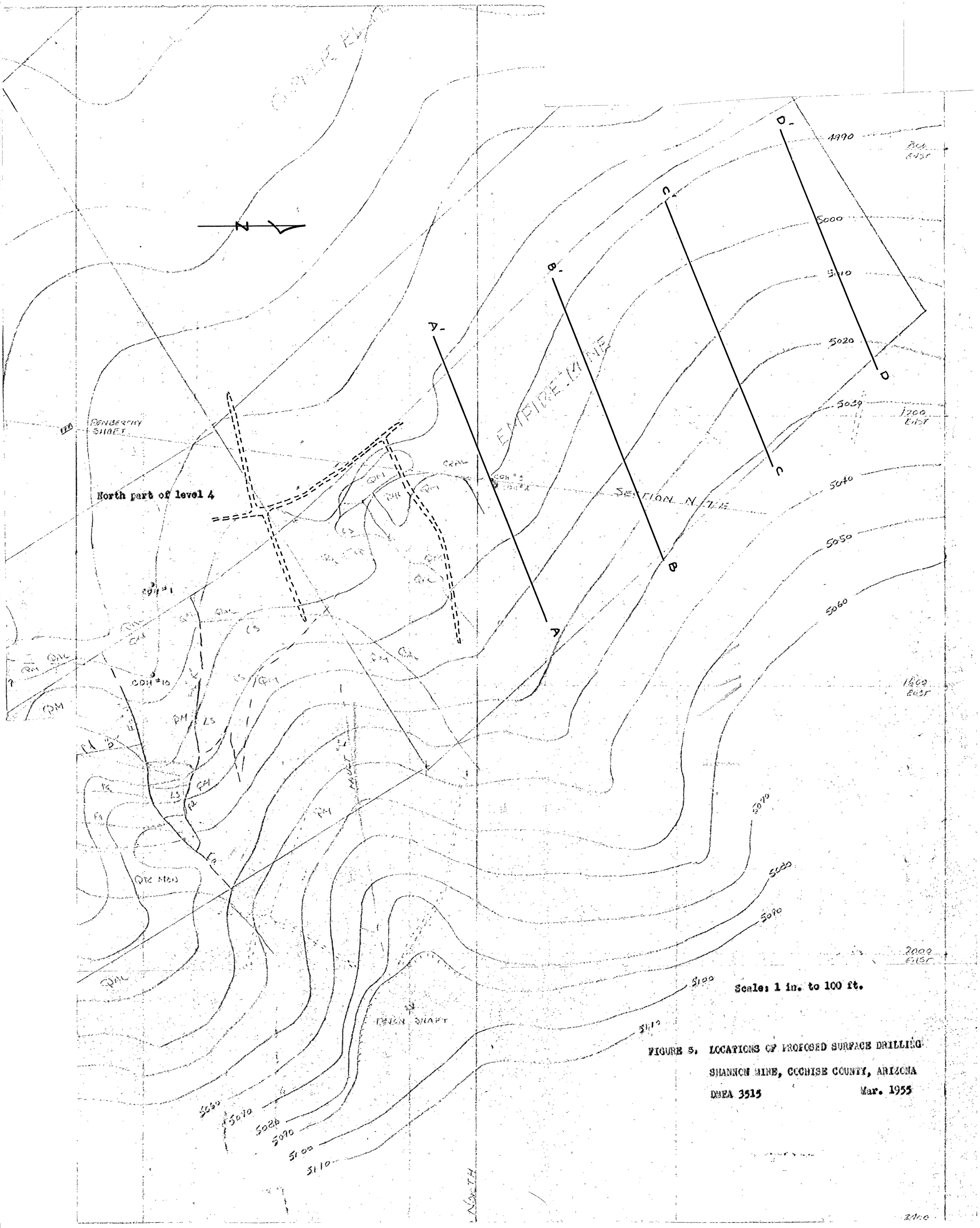
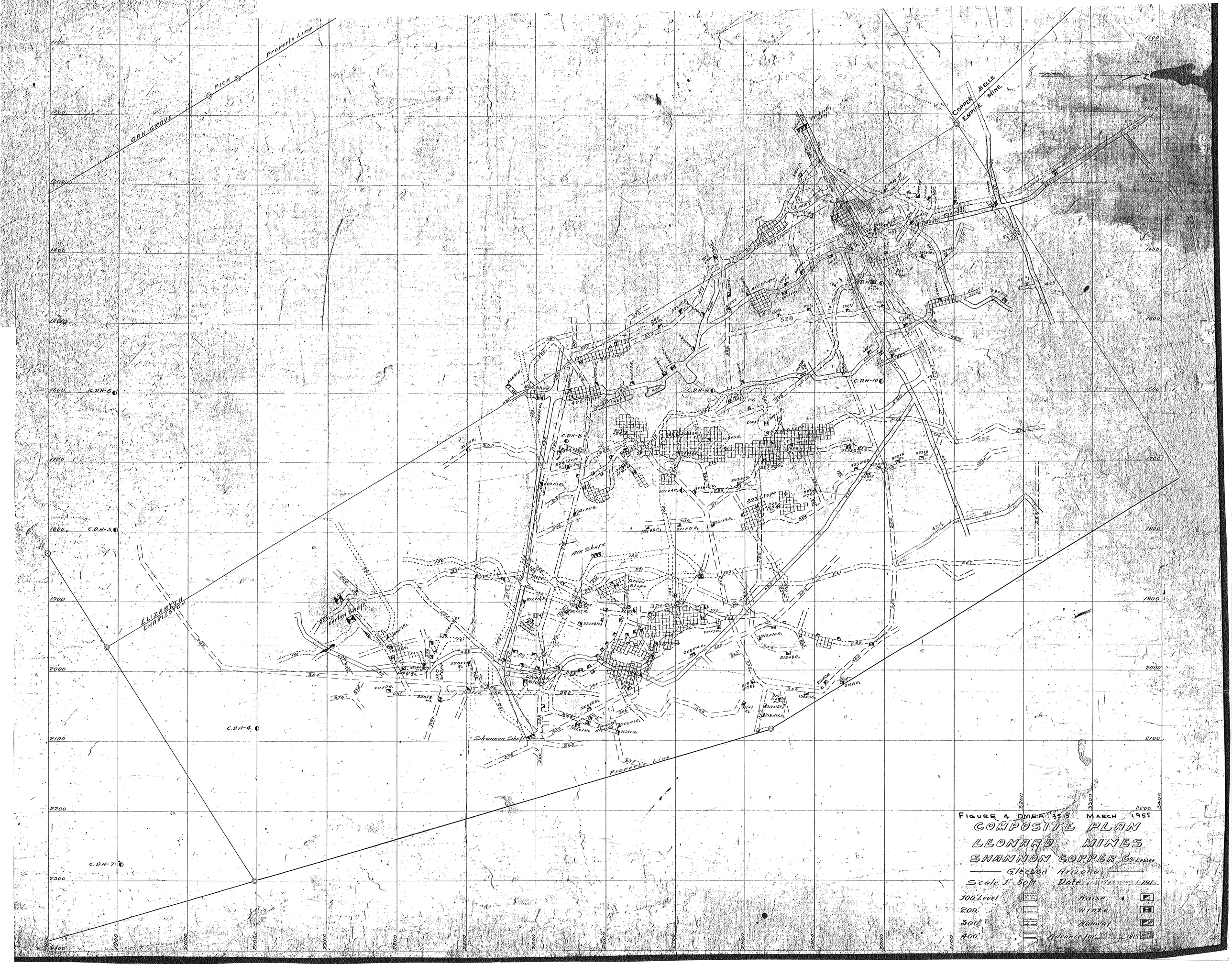
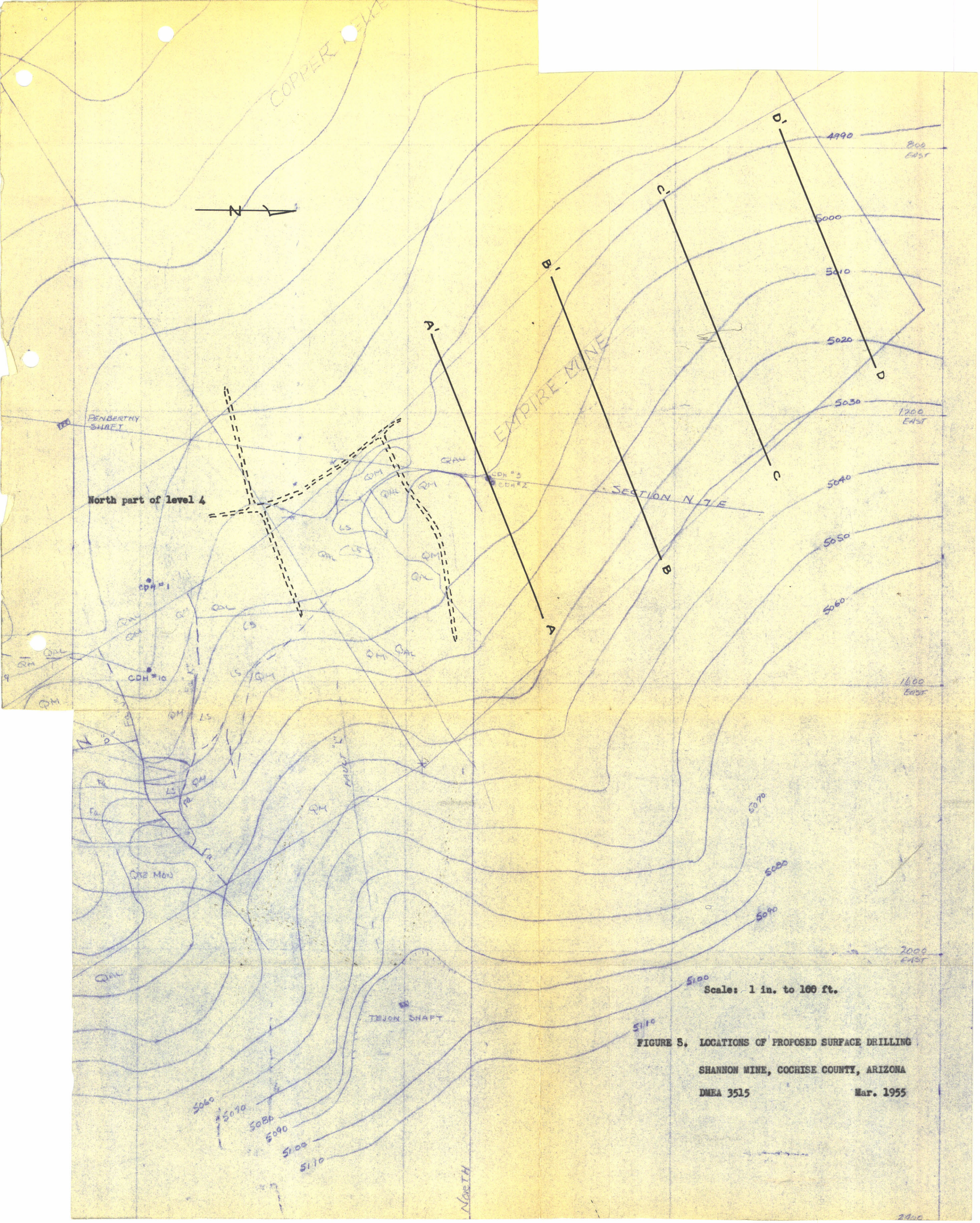


FIGURE 5. LOCATIONS OF PROPOSED SURFACE DRILLING
SHANNON MINE, COCHISE COUNTY, ARIZONA
DMEA 3515 Mar. 1955


Property Line
PICK
OAK GROVE
COPPER BELLE
EMPIRE MINE
ELIZABETH
CHARLESTON
C.D.H-6
C.D.H-5
C.D.H-4
C.D.H-7
C.D.H-8
C.D.H-9
C.D.H-10
Air Shaft
Green Slope
Shannon Shaft
Property Line
FIGURE 4 DMEA 3515 MARCH 1955
COMPOSITE PLAN
LEONARD MINES
SHANNON COPPER Co. Lessee
Gleeson Arizona
Scale 1" = 50 ft Date 191
100' Level
200'
300'
400'
Raise
Winze
Manway
Advance for 191

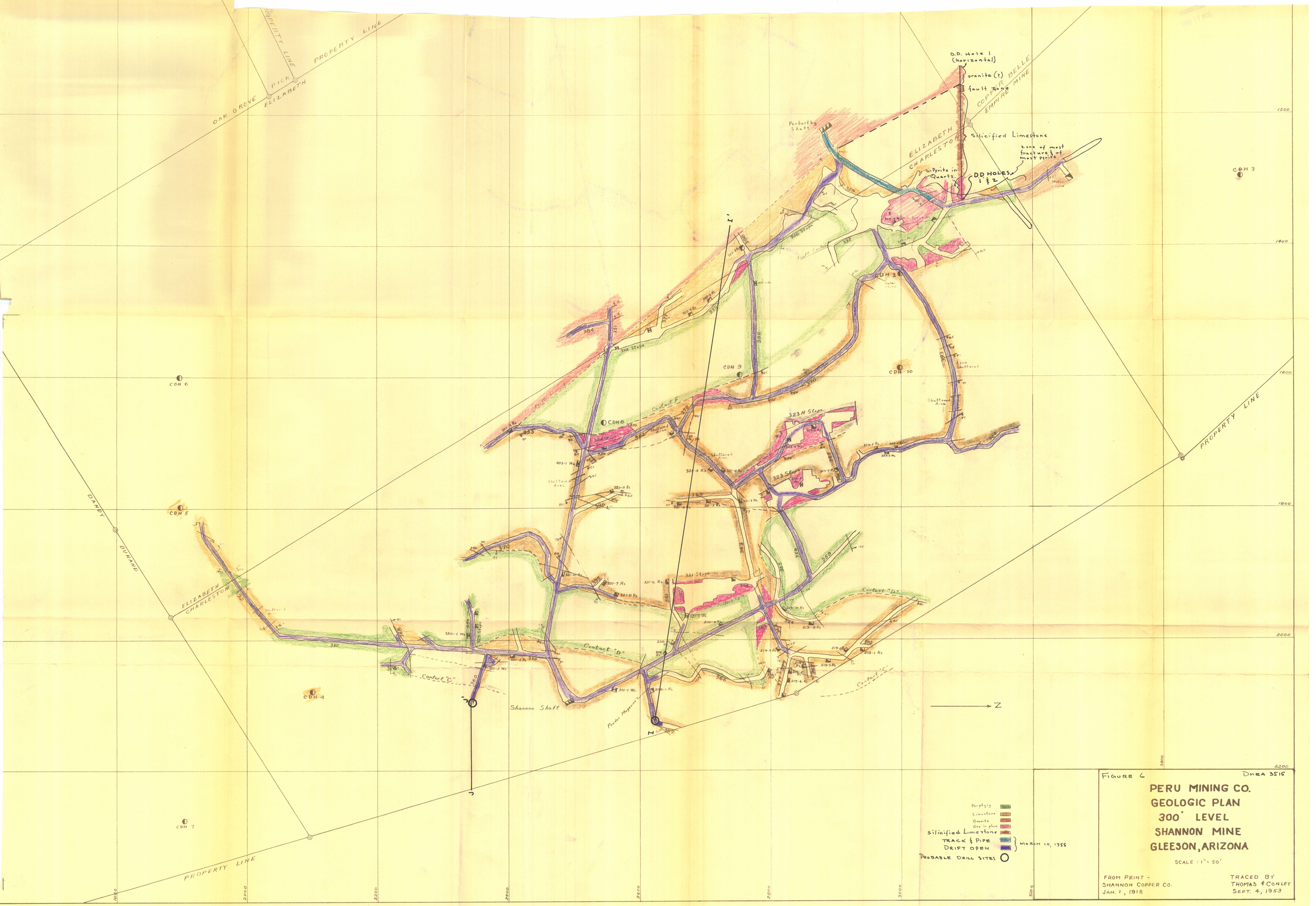


Scale: 1 in. to 100 ft.

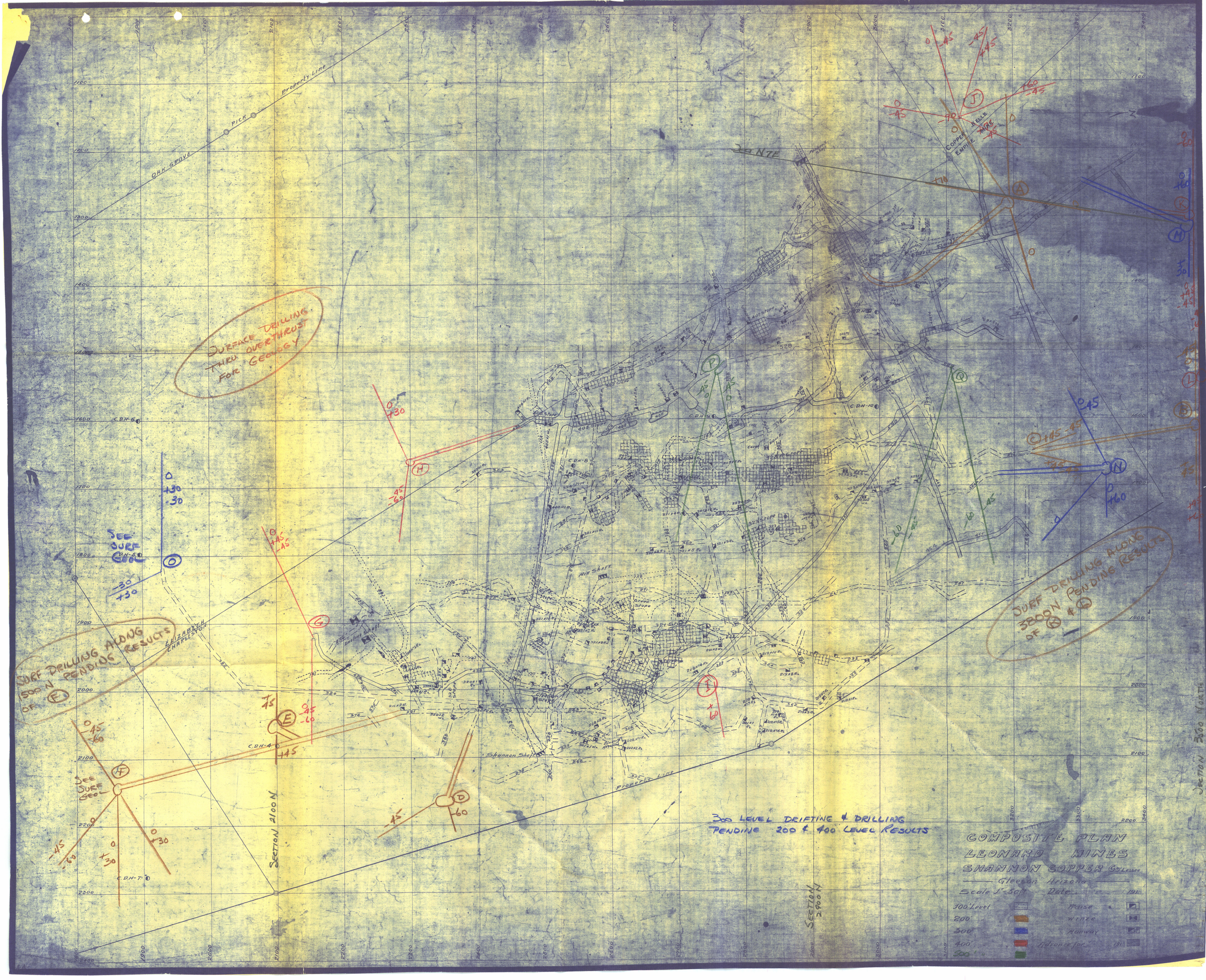
FIGURE 5. LOCATIONS OF PROPOSED SURFACE DRILLING

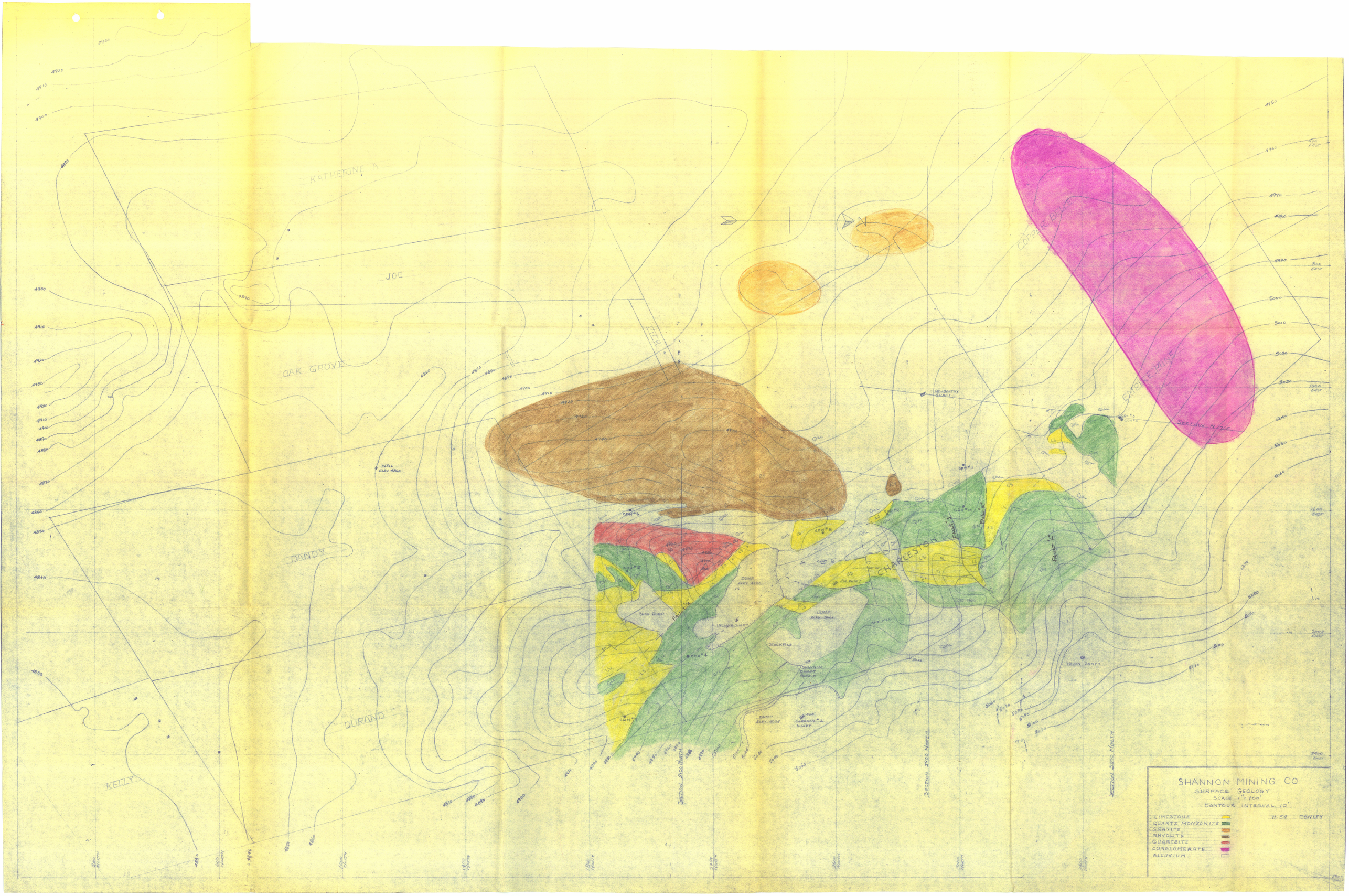
SHANNON MINE, COCHISE COUNTY, ARIZONA

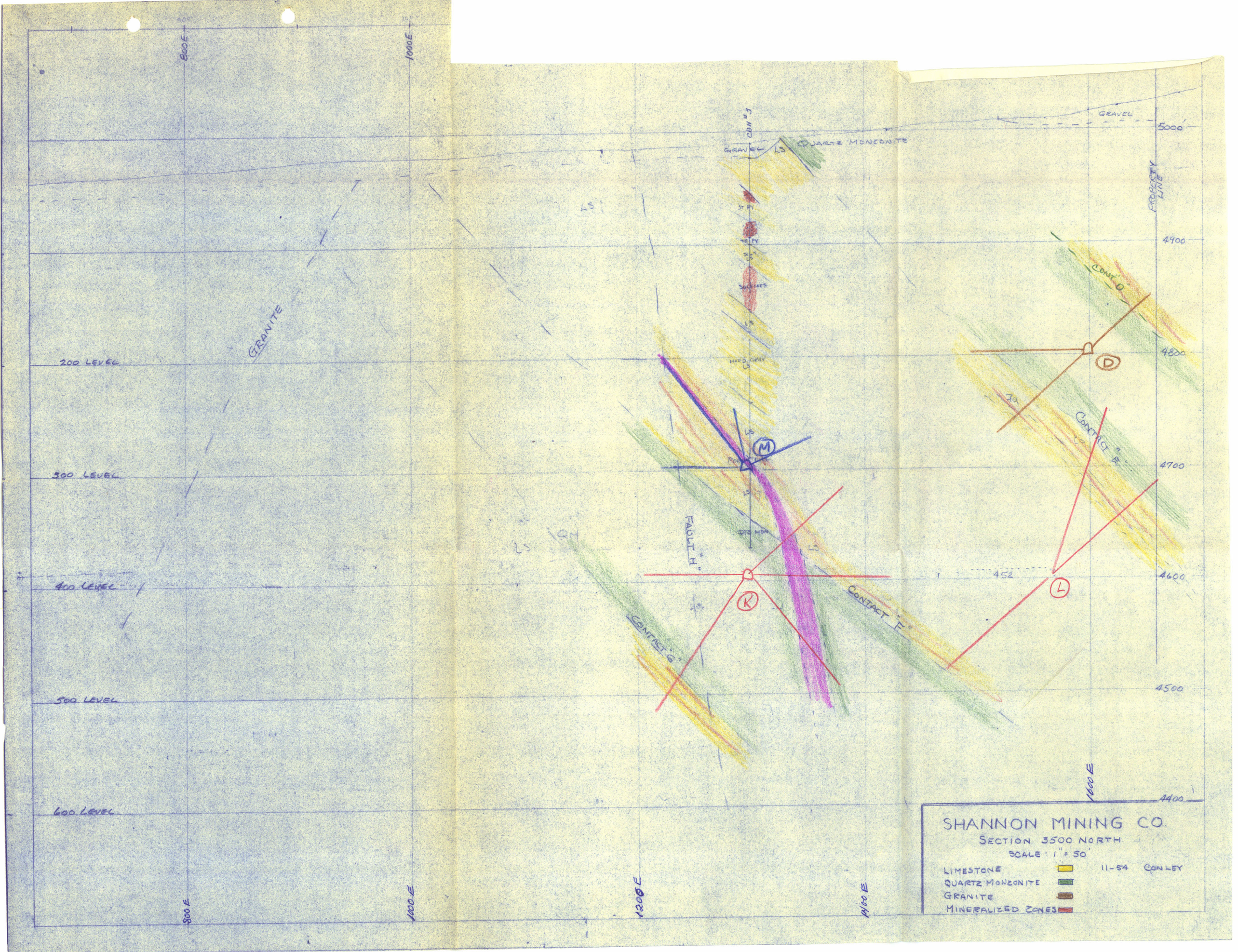
DMEA 3515 Mar. 1955

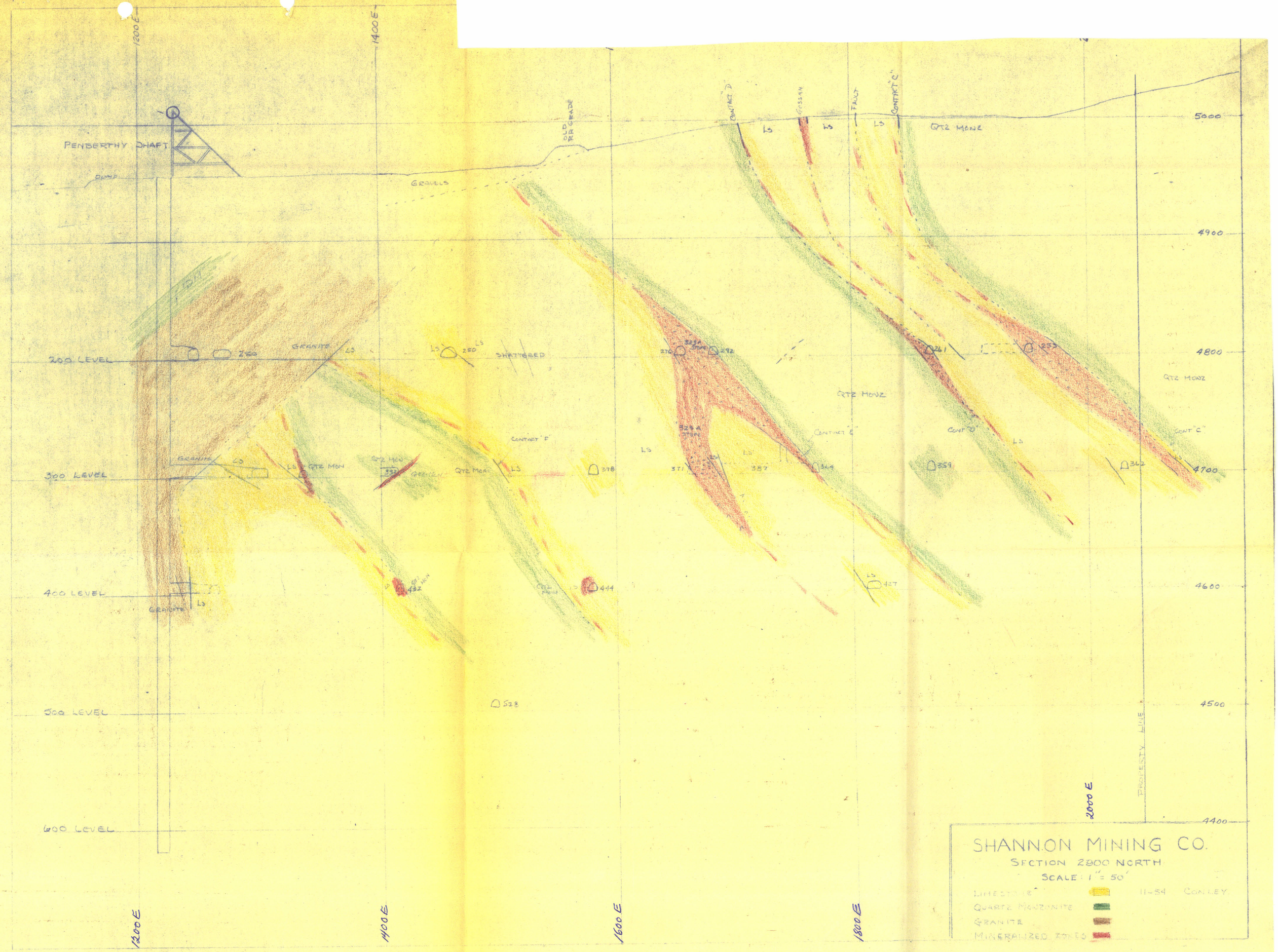

PROPERTY LINE
OAK GROVE PICK
ELIZABETH
DANDY
DURAND
ELIZABETH CHARLESTON
COPPER BELLE EMPIRE MINE
D.D. Hole 1 (horizontal)
granite (?)
fault zone
Silicified Limestone
zone of most fracture & most pyrite
Pyrite in Quartz
DD HOLES 1 & 2
Penberthy Shaft
Shannon Shaft
Powder Magazine
Contact "C"
Contact "D"
Contact "E"
CDH 1
CDH 3
CDH 4
CDH 5
CDH 6
CDH 7
CDH 8
CDH 9
CDH 10
323 A Stope
323 Stope
321 Stope
Shattered Area
Lime Shattered
Fault Contact
N
Porphyry
Limestone
Granite
Ore in place
Silicified Limestone
TRACK & PIPE
DRIFT OPEN
MARCH 10, 1955
PROBABLE DRILL SITES
FIGURE 6
DMEA 3515
PERU MINING CO.
GEOLOGIC PLAN
300' LEVEL
SHANNON MINE
GLEESON, ARIZONA
SCALE : 1" = 50'
FROM PRINT -
SHANNON COPPER CO.
JAN. 1, 1918
TRACED BY
THOMAS & CONLEY
SEPT. 4, 1953

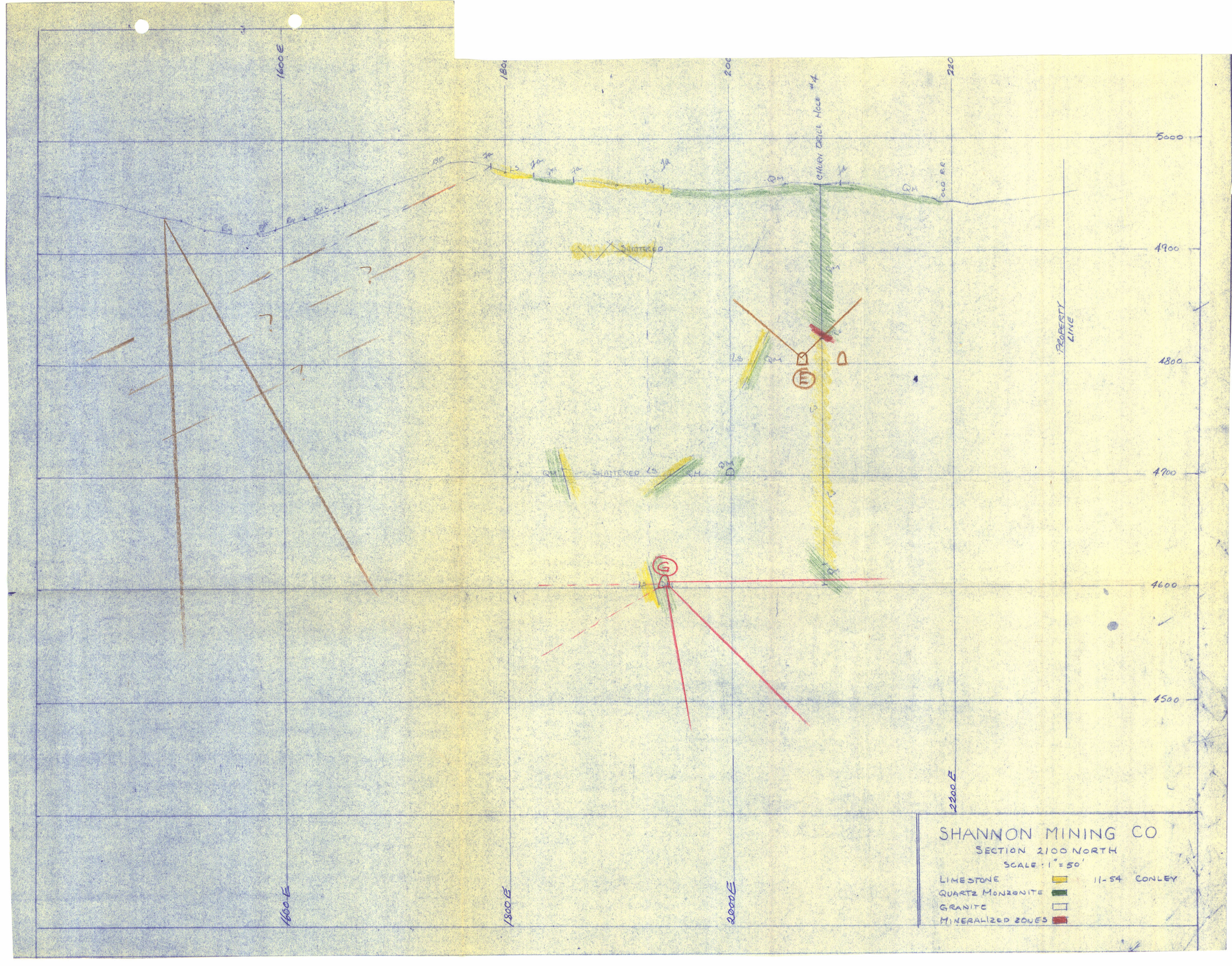
Horizontal d.d. hole being drilled 1'-15' ov. 1% Zn; < 1% Cu.
Pyrite most abund. in this interval; also most abund. in faulting. Most faults in X-cuts not shown.
Legend
Porphyry
Limestone
Granite
Ore in Place
Advance for 1917
Silicified Limestone
Track & Pipe
Drift open
Probable Drill Site
Figure 7 GEOLOGICAL
PLAN
400 FT LEVEL
LEONARD MINE
SHANNON COPPER CO. LESSEE
GLEESON ARIZ
Jan. 1st 1918
SCALE 1 in. = 50 FT.
DMEA 3515
Shannon Shaft
Filled with debris
Contact F
Elizabeth Charleston
Oak Grove
Pick
Property Line
Danby
Durand
C.D.H-4
C.D.H-5
C.D.H-6
C.D.H-7
C.D.H-10
Pyrite

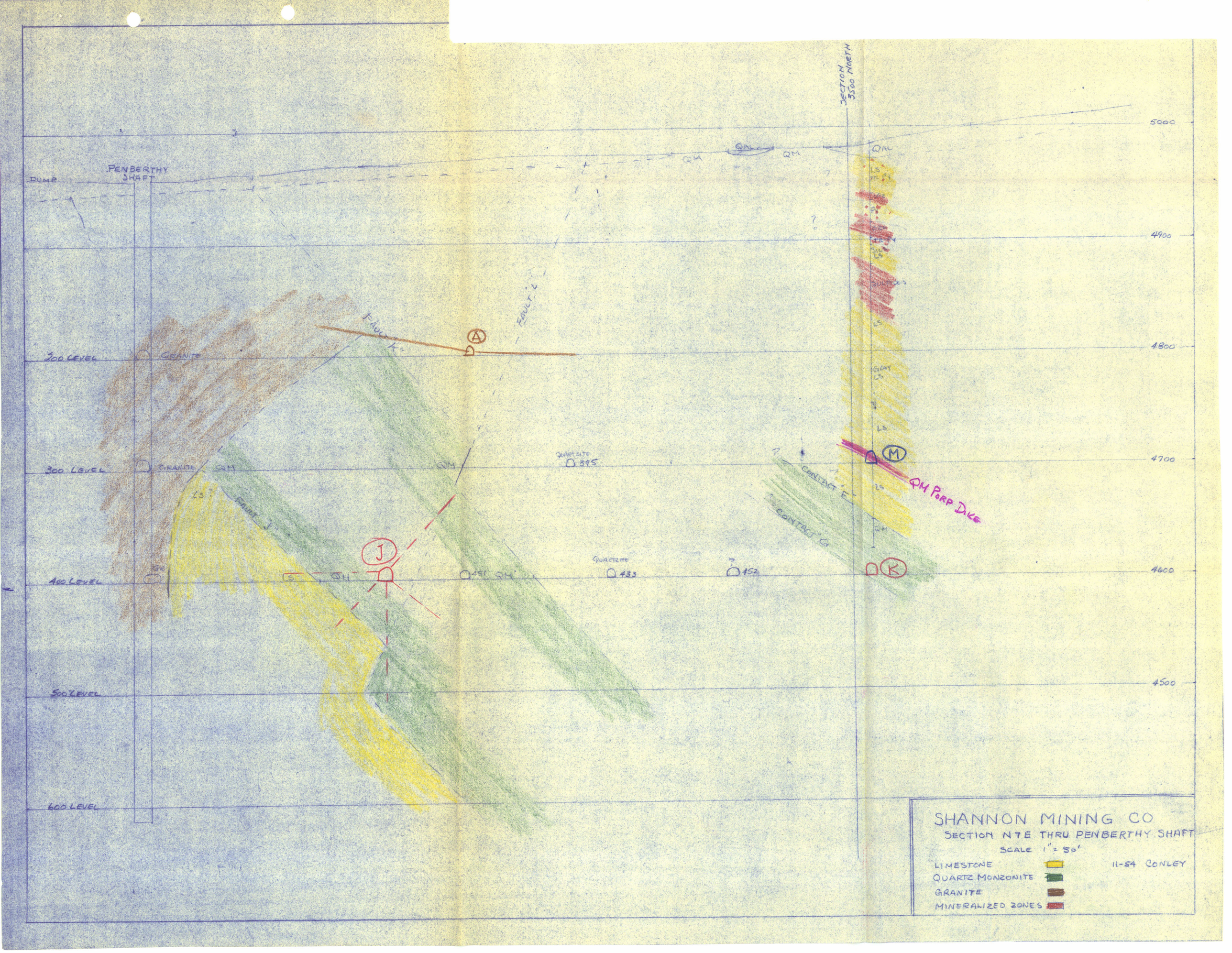

OAK GROVE
PICK
Property Line
SURFACE DRILLING THRU OVERTHRUST FOR GEOLOGY
SEE SURF GEOL
SURF DRILLING ALONG 1500 N PENDING RESULTS OF E
SURF DRILLING ALONG 3800 N PENDING RESULTS OF K & L
300 LEVEL DRIFTING & DRILLING PENDING 200 & 400 LEVEL RESULTS
SECTION 2100 N
SECTION 2900 N
SECTION 3600 N
ELIZABETH
CHARLESTON
COPPER BELLE
EMPIRE
Shannon Shaft
Air Shaft
Incline Shaft
Gleeson Mine
C.D.H-6
C.D.H-8
C.D.H-10
C.D.H-4
C.D.H-7
COMPOSITE PLAN
LEONARD MINES
SHANNON COPPER Co. Lessee
Gleeson Arizona
Scale 1"=50ft Date 191
300' Level
200'
300'
400'
500'
Raise
Winze
Roadway
Advance for 191


KATHERINE A
JOE
OAK GROVE
DANDY
DURAND
KELLY
ELK R.
COPPER BOX
EAGLE MINE
CHARLESTON
FAULT
SECTION N 17 E
SECTION 2100 NORTH
SECTION 2700 NORTH
SECTION 3300 NORTH
PENNSYLVANIA SHAFT
AIR SHAFT
TRAIN SHAFT
WELL ELEV. 4860
DUMP ELEV. 4880
DUMP ELEV. 5021
DUMP ELEV. 5025
SLAG DUMP
STOCKPILE
CDH #1
CDH #2
CDH #3
CDH #4
CDH #5
CDH #6
CDH #7
CDH #8
CDH #9
CDH #10
SHANNON MINING CO
SURFACE GEOLOGY
SCALE 1" = 100'
CONTOUR INTERVAL 10'
LIMESTONE
QUARTZ MONZONITE
GRANITE
RHYOLITE
QUARTZITE
CONGLOMERATE
ALLUVIUM
11-54 CONLEY


SHANNON MINING CO.
SECTION 3500 NORTH
SCALE: 1" = 50'
LIMESTONE
QUARTZ MONZONITE
GRANITE
MINERALIZED ZONES
11-54 CONLEY
800 E
1000 E
1200 E
1400 E
1600 E
200 LEVEL
300 LEVEL
400 LEVEL
500 LEVEL
600 LEVEL
5000'
4900
4800
4700
4600
4500
4400
PROPERTY LINE
GRAVEL
CDH #3
QUARTZ MONZONITE
LS
GRANITE
TRIPY
SILICEOUS
HARD GRAY LS
QTZ MON
FAULT "H"
CONTACT "G"
CONTACT "F"
CONTACT "E"
CONTACT "D"
452
K
L
M
D


1200 E
1400 E
1600 E
1800 E
2000 E
PENBERTHY SHAFT
DUMP
GRAVELS
DUMP GRADE
CONTACT "D"
FAULT
CONTACT "C"
QTZ MONZ
5000
4900
4800
4700
4600
4500
4400
200 LEVEL
300 LEVEL
400 LEVEL
500 LEVEL
600 LEVEL
GRANITE
SHATTERED
CONTACT "F"
CONTACT "E"
CONT "D"
CONT "C"
PROPERTY LINE
SHANNON MINING CO.
SECTION 2900 NORTH
SCALE: 1" = 50'
LIMESTONE
QUARTZ MONZONITE
GRANITE
MINERALIZED ZONE
11-54
CONLEY


1600 E
1800
2000
2200
CHURN DRILL HOLE #4
OLD R.R.
5000
4900
4800
4700
4600
4500
SHATTERED
PROPERTY LINE
1600 E
1800 E
2000 E
2200 E
SHANNON MINING CO
SECTION 2100 NORTH
SCALE: 1" = 50'
LIMESTONE
QUARTZ MONZONITE
GRANITE
MINERALIZED ZONES
11-54 CONLEY


SECTION 3500 NORTH
PENBERTHY SHAFT
DUMP
5000
4900
4800
4700
4600
4500
200 LEVEL
300 LEVEL
400 LEVEL
500 LEVEL
600 LEVEL
GRANITE
QM
LS
FAULT 'K'
FAULT 'L'
FAULT 'J'
CONTACT 'F'
CONTACT 'G'
QUARTZITE
D 395
D 451
D 433
D 452
A
M
J
K
QM PORP DIKE
SHANNON MINING CO
SECTION N7E THRU PENBERTHY SHAFT
SCALE 1" = 50'
LIMESTONE
QUARTZ MONZONITE
GRANITE
MINERALIZED ZONES
11-54 CONLEY