DMEA Form 9
Rev. 6/57

UNITED STATES
DEPARTMENT OF THE INTERIOR
Defense Minerals Exploration Administration

OFFICIAL DOCKET FILE — Idm-E NO. 457 — DMEA NO. 2512

Application
- [ ] Denied
- [ ] Withdrawn

Contract
- [ ] Terminated - Not Certified
- [x] Terminated - Certified
- [ ] Cancelled
- [ ] Royalty Agreement

The records contained in this file are marked (x) and arranged in this order:

Folder No. 1:

Left Side

- [x] Royalty Audits
- [x] Certification of Discovery
- [ ] Closing Letter
- [x] Cost Audits
- [ ] Termination Notice or Agreement
- [ ] Recision Notice
- [ ] Assignment of Contract
- [x] Contract Amendments
- [x] Contract with all exhibits and annexes
- [x] Owner's Consent to Lien and Subordination Agreement
- [x] Application and attachments in seperate folder with folder #3 open final yet

Right Side

- [x] Project summary (final)
- [x] Work Completed analysis (final)
- All other material filed in chronological order including the following reports if checked:
- [ ] Field Team Semi-Annual Report for Certified Project
- [x] Final Field Team Report (Tab)
- [ ] Operator's Final Report (Tab) - in Seperate folder #3
- [ ] Interim Field Team Reports
- [ ] Operator's monthly reports and all attachments
- [x] On-site Exam Report (Tab)
- [ ] Settlement Sheets
- [ ] Drill Logs

Additional Folders:

Left Side

Folders No. 2 : Reports
- [x] Analysis of Semi-Annual Inspection Reports
- [ ] Project Summary (Interim) by DMEA Engineers

Right Side

- [x] Field Team Semi-Annual Report for Certified Project
- [x] Field Team Interim Reports
- [x] Operator's Monthly Reports with transmittal, narrative and maps.

Folders No. _____ : Maps (Use pocket folder or envelope)

Folders No. _____ : Settlement Sheets

Folders No. _____ : Drill Logs

Folders No. _____ : Royalty material

17963

OFFICE OF MINERALS EXPLORATION
CONTRACT ADMINISTRATION AND AUDIT DIVISION

REPORT OF ROYALTY REVIEW

I have reviewed the files of the Washington office pertaining to Contract Idm-B457, Docket DMEA-2512 (corundum-andalusite), dated December 5, 1952, with

Coranda Corporation
386 Race Street
San Jose, California

for the purpose of determining the amount of royalty payable to the U. S. Government on sales of minerals from property referred to as the Green Talc and Bismark Mines located in Mineral County, Nevada, during the period January 1, 1959, through June 1, 1962.

A certification of discovery or development was issued on April 23, 1954, and, in accordance with Article 8 of the contract, royalty is payable on all minerals produced from the land described in Article 2 of the contract for a period of 10 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. A Report of Review dated November 18, 1953, indicated accepted costs under the exploration contract amounting to $36,000.00 with the Government's contribution on a 90 percent basis being $32,400.00.

The status of the project, the scope of review, and the reasons therefor are stated on page 2.

This review established no sales subject to the Government's royalty subsequent to the period covered by a prior Report of Royalty Review which also found no sales subject to the Government's royalty through December 31, 1958. The royalty account as of December 31, 1958, was:

Total Royalty Payable	$ -0-
Total Royalty Paid	-0-
Balance of Royalty Due	$ -0-

As of June 1, 1962, the royalty account of this project was found to be:

Total Royalty Payable	$ -0-
Total Royalty Paid	-0-
Balance of Royalty Due	$ -0-

E. D. Talbert

E. D. Talbert, OME Auditor

June 13, 1962

STATUS OF PROJECT, SCOPE OF REVIEW
AND REASONS THEREFOR

This contract provides that the Operator or his successor in interest shall pay to the Government a percentage royalty on any mineral production from the land thereunder. At the time this contract was executed the Operator was in possession by virtue of an April 28, 1952, operating agreement with six lessees of the property, all of whom were officers or directors of the Operator.

The property consists of two groups of unpatented lode mining claims in the Gillis Range Mining District. The Green Talc Group of 7 claims, located in secs. 22,23, 26, and 27, T. 9 N., R. 31 E., M.D.B. & M., was owned by Esther Rea and John Vuich. The Bismark Group of 2 claims, located in secs. 31 and 32, T. 9 N., R. 32 E., M.D.B. & M., was owned by Esther Rea, Joe Malatesta, Eugene Ferretti, and John Vuich. The landowners on April 24, 1952, executed Owner's Consents to Lien, which grant to the Government liens on the mineral deposits and production therefrom "upon the terms and conditions set forth in said Contract". The contract contains the so-called "abandonment" provision.

Work under the contract was started in January 1953 and completed during October 1953. No minerals were produced during the exploration period. Subsequent examinations of the property and inquiries by field representatives disclosed no activity through December 31, 1957.

A letter dated July 19, 1956, from one of the landowners, Esther Rea, includes the advice that the Coranda Corporation defaulted under their lease of January 1, 1952, and the property had reverted to the owners. In a June 1, 1962, reply to a MME Form 63 inquiry, J. H. Rodda, 547 South Bascom, San Jose, California, stated that "as far as I know" the property is in the lands of the owners and there has been no production since December 31, 1957. Mr. Rodda was the Operator's president at the time the exploration project contract was executed.

This review was made in lieu of an on-site audit of the Operator's accounts and records for the following reasons:

(1) The files contain no evidence of any production from the property under the contract during the period covered by this review; and
(2) The administrative cost to the Government of an on-site royalty audit at this time would be excessive in relation to the amount of possible royalty which might be disclosed.

MAY 20 1959
O.M.E.

OFFICE OF MINERALS EXPLORATION
CONTRACT ADMINISTRATION AND AUDIT DIVISION

REPORT OF ROYALTY REVIEW

I have reviewed the files and records of the OME Field Team, Region II, pertaining to Contract No. Idm-E457, Docket No. DMEA-2512 (Corundum-Andalusite), dated December 5, 1952, including Amendment Nos. 1 and 2, with

Coranda Corporation
386 Race Street
San Jose, California

for the purpose of determining the amount of royalties due the U. S. Government on sales of corundum-andalusite ore, from property known as the Green Talc Mine and Bismark Mine, located in Mineral County, Nevada, during the period December 5, 1952 to December 31, 1958.

A certification of discovery or development was issued on April 23, 1954 and accordingly royalty is payable on all production from the land described in Article 2 and Annex I of the contract, for a maximum period of 10 years from the date of contract. A Report of Review in lieu of final cost audit dated November 18, 1953, indicated acceptable costs under the exploration contract amounted to $36,000.00 with the Government's contribution on a 90 percent basis, being $32,400.00.

No royalties have been paid to date in connection with this contract.

This review was made in lieu of an on-site audit of the Operator's accounts and records for the following reasons:

(a) According to the Field Team's Semi-Annual Report of Certified Projects for the period July 1, 1958 to December 31, 1958, there was no production from the property during the period covered by this review.

(b) The administrative cost to the Government of an on-site royalty audit at this time would be excessive in relation to the amount of possible royalty which might be disclosed.

May 18, 1959

George Mavor, OME Auditor

File Copy
Surname:

Houk
Alexander
Ontiv
Hotlund
Turner
Hedges
Schantz
Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

CERTIFICATION BY THE UNITED STATES OF AMERICA OF A DISCOVERY OR DEVELOPMENT UNDER AN EXPLORATION PROJECT CONTRACT

To: Corunda Corporation
386 Race Street
San Jose, California

Pursuant to the provisions of Exploration Project Contract No. Idm-2497, dated December 5, 1952 (Docket No. DMEA-2512), hereinafter called the "contract" between you and the United States of America, hereinafter called the "Government"; to establish and fix the Government's percentage royalty on production and its lien thereon and on the land described in the contract, the Government considers and therefore certifies that discovery or development from which production may be made has resulted from the exploration work.

The nature of said discovery or development is described broadly or indicated as follows:

Surface diamond drilling has indicated crystalline aluminum silicates in irregular replacement type deposits in meta-volcanics of Kwalaier formation of the Triassic age. Sufficient data were developed to infer reserves of crystalline aluminum silicates.

THE UNITED STATES OF AMERICA

By C. Mitchell Dow
Administrator, Defense Minerals Exploration Administration

Dated: APR 23 1954

LCHouk:gad 4/21/54
Copy to: Mr. Irving Gumbel, EPS, GSA
Mr. Thayer, 5216 GSA Bldg.
Mr. Hedges, 4604
Admr. R. File
Field Team, Region III
Docket File
Operating Committee
Mr. Johnson
Mr. Chambers
Finance Office
Mr. Houk

DEFENSE MINERALS EXPLORATION ADMINISTRATION
CONTRACT ADMINISTRATION AND AUDIT DIVISION

Defense Minerals Administration
RECEIVED
NOV 23 1953

REPORT OF REVIEW

I have reviewed the Monthly Reports of

Ceranda Corporation, a corporation
duly organized and existing under
and by virtue of the laws of the
State of Nevada
386 Race Street
San Jose, California

pertaining to Exploration Project Contract No. Idm-E457, Docket No. DMEA-2512, including Amendments No. 1 and No. 2, for the period January 7, 1953, to October 31, 1953, covering a project of exploration for corundum and andalusite, located in Mineral County, Nevada, commonly known as the Green Talc Mine and Bismark Mine.

My review included an examination of the Monthly Reports (Form MF-104) and supporting documents attached thereto, comparison of the costs claimed with the contract and pertinent schedules, consultation with Executive Officer in charge of the project, and a determination of the reasonableness and propriety of the costs.

This review was made in lieu of a final audit of the Operator's accounts and records for the following reason:

The contract provides for payment by the Government on the basis of agreed costs of units of work actually performed.

The review disclosed the following facts in regard to the amount paid or to be paid the contractor:

Total cost as billed by contractor	$36,000.00
Exceptions	None
Total Accepted cost	$36,000.00

The contract calls for a 90 per cent participation of exploration expenses by the United States Government. Therefore, payment to the contractor by the Government in the amount of Thirty-Two Thousand Four Hundred and no/100 Dollars

- $32,400.00 -

is considered valid and proper.

George Mayer
George Mayer
Auditor

November 18, 1953

Docket Copy

DEPARTMENT OF Defense

10/2/53

DOCKET NO. DMEA-2512

AMENDMENT NO. 2

It is agreed this 2nd day of September, 1953, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, and Coranda Corporation, each acting in consideration of the agreement of the other to the terms hereinafter set forth, that Exploration Project Contract Idm-E457, Docket No. DMEA-2512, dated December 5, 1952, and amended May 13, 1953, be further modified and amended as of September 2, 1953, as follows:

Date of completion of the contract is extended two months to November 5, 1953.

This Amendment shall not be construed to increase the estimated total cost of the project, the aggregate total amount which the Government may be required to contribute, nor the amount of any item designated as "allowable maximum."

Executed in sextuplicate the day and year first above written.

THE UNITED STATES OF AMERICA

By H. C. Miller
H. C. Miller, Executive Officer
DMEA Field Team, Region III

CORANDA CORPORATION

By J. H. Rodda
President

Robert G. Hart
Secretary

AMENDMENT NO. 2

Docket No. 2512 Mineral [illegible]

Exploration Project Contract [illegible]

Date of Contract December 5, 1952

Date of Amendment September 2, 1953

Operator Corona Corporation

JUSTIFICATION

In order to allow sufficient time for completion of the analytical work and for preparation of the Operator's final report, a two-month extension to subject contract has been allowed. Accordingly, Amendment No. 2, dated September 2, 1953, established the completion date as of November 5, 1953.

H. C. Miller, Executive Officer
DMEA Field Team, Region III

Docket Copy

Unsigned

EXPLORATION PROJECT CONTRACT
CORANDA CORPORATION
DOCKET NO. DMEA-2512

AMENDMENT NO. 2

It is agreed this 15th day of June, 1953, between the United States of America acting through the Department of the Interior, Defense Minerals Exploration Administration, and Coranda Corporation, that, effective May 15, 1953, the Exploration Project Contract, Idm-E457, Docket No. DMEA-2512, dated December 5, 1952, as amended, is further modified and amended as follows:

1. In Exhibit "A —

A. Under Description of the Work, the following paragraph is deleted:

> Approximately 250 samples are to be given a Class #3 Analysis, and approximately 50 samples are to receive Pyrometric Equivalent Cone Tests. Analyses and cone tests are to be made by the Pittsburgh Testing Laboratory, or such other laboratory as may be approved by the DMEA Field Team, Executive Officer, Region III.

and substituted for the deleted paragraph is the following:

> Approximately 200 selected core samples are to be given Class #3 Analysis, and approximately 100 samples of laboratory sink-float concentrate or fractions are to be prepared and given Class #3 Analysis.
>
> Approximately 50 samples of prepared concentrate product are to receive Pyrometric Equivalent Cone Tests.
>
> Ground pulps shall be made of all samples to be analyzed and representative portions placed in duplicate pulp envelopes and made identifiable by number and description. One set of each pulp sample is to be retained by the Operator and the other delivered to the Defense Minerals Exploration Administration, Bureau of Mines, Reno, Nevada.

The analyses and pyrometric cone equivalent tests may be made in the Operator's own laboratory, Hawthorne, Nevada, and the laboratory procedure and all records of results shall be made available to the Government engineers. The analyses shall be limited to 300 in number, the pyrometric cone equivalent tests to 50 in number, and the total cost of both shall not exceed $7,250.00 (including cost of preparation of samples and all materials used).

B. Under "Agreed Project Costs, the following is deleted:

250 - Class #3 Chemical Analysis @ $25.00 each	$6,250.00
50 - Pyrometric Cone Equivalent Tests @ $20.00 each	1,000.00

and substituted therefor is the following:

200 - Class #3 Chemical Analysis @ $20.00 each core sample	$4,000.00
100 - Class #3 Chemical Analysis concentrate fractions (including preparation) @ $22.50 each	2,250.00
50 - Pyrometric Cone Equivalent Tests @ $20.00 each	1,000.00

2. This Amendment shall not be construed to increase the estimated total cost of the project, the aggregate total amount which the Government may be required to contribute, nor the agreed unit cost of any item of work.

Executed in sextuplicate the day and year first above written.

CORANDA CORPORATION

By _____
President

THE UNITED STATES OF AMERICA

By C O Mitteudorf
Administrator, Defense Minerals Exploration Administration

ACKaw
Rubin
Chamb

Docket's Copy

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 25 1953

Putin
C&E Tone

CORANDA CORPORATION

A CORPORATION DULY ORGANIZED AND EXISTING
UNDER AND BY VIRTUE OF THE LAWS OF THE STATE OF NEVADA

AMENDMENT NO. 1

Contract Idm-E457 (Docket DMEA-2512), dated December 5, 1952, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, and Coranda Corporation, is amended as follows:

To the list of "D.D. Holes for South Lens of Green Talc Deposit," given on page 1, of Exhibit "A" to Contract Idm-E457, add the following:

D. D. Hole, Green Talc #7, Size Bx, Length 200 feet, Inclination - 30 deg., Location 118.5 feet N 19 deg. W from D.D. Hole #6.

Total allowable footage (1600 feet) of holes on the Green Talc Deposit, including that of Hole #7 remains unchanged.

This amendment shall not be construed to increase the estimated total cost of the project, the amount of the Government's contribution, or any item of allowable cost which is especially designated "allowable maximum."

Dated May 13, 1953.

UNITED STATES OF AMERICA

By H. C. Miller
H. C. Miller, Executive Officer
DMEA Field Team, Region III

CORANDA CORPORATION

By J. H. Rodda
J. H. Rodda, President

Robert B. Holt
Robert B. Holt, Secretary

ACCOUNTING CONTROL

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REGION III
DEPARTMENT OF THE INTERIOR

DEPARTMENT OF INTERIOR
BUREAU OF MINES
REGION III
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1953 MAY 19 AM 9:02

SAN FRANCISCO, CALIFORNIA

DEPARTMENT OF THE INTERIOR
Bureau of Mines Information
RECEIVED
MAY 25 1953

AMENDMENT NO. 1

Docket No. 2512 Mineral Corundum-Andalusite

Exploration Project Contract Ida 2457

Date of Contract December 8, 1952

Date of Amendment May 13, 1953

Operator Corunda Corporation, 386 Race Street, San Jose, California

JUSTIFICATION

Through a misinterpretation of the contract, our field engineer recommended the drilling of a seventh hole on the Green Dale Deposit inasmuch as all allowable footage had not been used in drilling the six stipulated holes. If holes 5 and 6 had been drilled as prescribed to a depth of 350 feet, the additional information obtained would have been of little value as the mineralized structure had been penetrated and it would not be good practice to continue the holes through barren rock solely to use up footage. Therefor the 200 feet saved were used in hole #7 which seemed to be necessary to give the needed information on the deposit. This amendment is drawn to permit the drilling of Hole #7.

H. C. Miller, Executive Officer
DMEA Field Team, Region III

MF-200 (A)
(February 1952)

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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DEC 1 5 1952

DOCKET NO. DMEA 512

COMMODITY Corundum-Andalusite

Docket Copy

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

IDM-E 457

BL

EXPLORATION PROJECT CONTRACT[1]

(Short Form)

IT IS AGREED this 5th day of December, 195 2, between the United States of America, acting through the Department of the Interior, Defense Minerals Exploration Administration, hereinafter called the "Government," and[2] Coranda Corporation, a corporation duly organized and existing under and by virtue of the laws of the State of Nevada
336 Race Street
San Jose, California

hereinafter called the "Operator," as follows:

ARTICLE 1. *Authority for contract.*—This agreement is entered into under the authority of the Defense Production Act of 1950, as amended, pursuant to DMEA Order 1 entitled "Government Aid in Defense Exploration Projects."

ARTICLE 2. *Operator's property rights.*—With respect to that certain land situated in the State of Nevada, County of Mineral, described[3] in Annex I.

the Operator represents and undertakes:[4]

(*a*) ~~That the Operator is the owner in possession and entitled to possession and that the property is subject only to the following claims, liens or encumbrances as to each of which the Owner's Consent to the Lien is attached:~~

(*b*) That the Operator is a lessee, in possession and entitled to possession, and the Owner's Consent to Lien is attached.

The Operator shall devote the land and all existing improvements, facilities, buildings, installations, and appurtenances to the purposes of the exploration project without any allowance for the use, rental value, depreciation, depletion, or other cost of acquiring, owning, or holding possession thereof.

ARTICLE 3. *Exploration project.*—The Operator, within 90 days from the date of this contract shall commence work on a project of exploration for[5] corundum and andalusite

in or upon the described land; and shall bring the project to completion within a period of 9 months from the date of this contract. The work to be performed is more fully described in Exhibit "A" attached hereto, which, with any maps or drawings thereto attached, are made a part of this contract. The Government will contribute to the cost of this work as hereafter provided. The work shall be performed by the Operator or by independent contractor or contractors efficiently, expertly, in a workmanlike manner, in accordance with good mining standards and State regulations for health and safety and for workmen's compensation and employers' liability insurance, with suitable and adequate equipment, materials, and labor, to bring the project to completion within the time fixed. The Government shall have the right to enter and observe and inspect the work at all reasonable times, and the Operator shall provide the Government with all available means for doing so. The Government may consult with and advise the Operator on all phases of the work.

ARTICLE 4. *Costs of the project.*—The agreed, estimated costs of performing the work, expressed in terms of units of work to be performed (per foot of drifting, per foot of drilling, per cubic yard of material to be moved, etc.) are set forth in Exhibit "A," attached hereto. The Government will pay 90 percent of these agreed, estimated costs, as they accrue, for units of work actually performed that conform with the description or specifications for the work set forth in this contract, in an aggregate total amount not in excess of $32,400.00, which is 90 percent of $36,000.00 the agreed, estimated total cost of the project in which the Government will participate: *Provided,* That until the Operator's final report and final accounting have been rendered to the Government and any final check or 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 ten (10) percent of the maximum total which the Government might have been called upon to pay under the terms of the contract. The Government may, as it sees fit, make payments direct to the Operator's independent contractors, if any, for the account of the Operator, rather than to the Operator.

ARTICLE 5. *Reports, accounts, audits.*—(*a*) *Progress reports.* The Operator shall provide the Government with monthly reports of units of work performed under the contract, in quintuplicate (five copies), upon forms provided by the Government. These progress reports shall be certified by the Operator, and shall constitute both the Operator's invoice of units of work performed on the project during the period covered by the report and his voucher for repayment by the Government, unless the Government requires the use of a standard voucher form with invoice attached. Progress reports shall include surface and/or underground engineering-geological maps or sketches showing the progress of the exploration, with assay-reports on samples taken concurrently with the advance in mineralized ground.

[1] If sufficient space is not provided in any blank, use an extra sheet of paper and refer to it in the blank.
[2] State name, address, and nature of organization if any.
[3] Give legal description or enough to identify the property, particularly excluding any land or interest therein to which the Government's lien is not to attach or the production from which is not to be subject to the Government's percentage royalty.

U. S. GOVERNMENT PRINTING OFFICE 16—68329-1

(*b*) *Final report.*—Upon completion of the exploration work or termination of the contract the Operator shall provide the Government with an adequate geological and engineering report, in quintuplicate (five copies), including an estimate of ore reserves resulting from the exploration work.

(*c*) *Compliance with requirements.*—If, in the opinion of the Government, any of the Operator's reports are insufficient or incomplete, the Government may procure the making or completion of such reports and attachments as an expense of the exploration work; and the Government may withhold approval and payment of any vouchers depending upon insufficient or incomplete reports.

(*d*) *Accounts and audits.*—The Operator shall keep suitable records and accounts of the units of work performed, which the Government may inspect and audit at any time. The Government may at any time require a check of the work performed and an audit of the Operator's records and accounts, by a certified public accountant or otherwise, the cost thereof to be treated as a cost of the project. The Operator shall keep and preserve said records and accounts for at least 3 years after the completion of the project or the termination of this contract. Upon the completion of the project or termination of the contract the Operator shall render a final account and statement of work performed to accompany his final report.

ARTICLE 6. *Repayment by Operator.*—(*a*) If, at any time, the Government considers that a discovery or a development from which production may be made has resulted from the exploration work, the Government, at any time not later than 6 months after the Operator has rendered the required final report and final account, may so certify in writing to the Operator. The certification shall describe broadly or indicate the nature of the discovery or development. In the event of such certification, any minerals mined or produced from the land described in Article 2 within 10 years from the date of this contract, including any mined or produced before the certification, shall be subject to a percentage royalty which the Operator or his successor in interest shall pay to the Government, upon the net smelter returns, the net concentrator returns, or other net amounts realized from the sale or other disposition of any such production, in whatever form disposed of, including ore, concentrates, or metal, until the total amount contributed by the Government, without interest, is fully repaid, or said 10 years have elapsed, whichever occurs first, as follows:

(1) One and one-half (1½) percent of any such net amounts not in excess of eight dollars ($8.00) per ton.

(2) One and one-half (1½) percent of any such net amounts, plus one-half (½) percent of such net amounts for each additional full fifty cents ($0.50) by which such net amounts exceed eight dollars ($8.00) per ton, but not in excess of five (5) percent of such net amounts.

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

(*b*) As here used, "net smelter returns," "net concentrator returns," and "other net amounts realized from the sale or other disposition," mean gross revenue from sales, or if not sold, the market value of the material after it is mined in the form in which and the place where it is held. In the case of integrated operations in which the material is not disposed of as such, these terms mean what is or would be the gross income from mining operations for percentage depletion purposes in income-tax determination.

(*c*) To secure the payment of its percentage royalty, the Government shall have and is hereby granted a lien upon the land described in Article 2 and upon any production of minerals therefrom, until the royalty claim is extinguished by lapse of time or is fully paid.

(*d*) This article is not to be construed as imposing any obligation on the Operator or the Operator's successor in interest to engage in any mining or production operations.

ARTICLE 7. *Assignment, transfer, or loss of Operator's interest.*—Without the written consent of the Government, the Operator shall not assign or otherwise transfer or hypothecate this contract or any rights thereunder. The Operator shall not make any voluntary nor permit any involuntary transfer or conveyance of the Operator's rights in the land described in Article 2, without making suitable provision for the preservation of the Government's right to a percentage royalty on production and lien for the payment thereof; *Provided,* that mere failure by the Operator to maintain the Operator's rights in the land, without any consideration running to the Operator other than relief from the cost of maintaining such rights (as by surrender of a leasehold, failure to perform assessment work, or failure to exercise an option), coupled with complete abandonment by the Operator of all interest in or operations on the land for a period of 10 years from the date of this contract, shall not constitute such a transfer or conveyance. Should the Operator make or permit any transfer or conveyance in violation of this provision, the Operator shall be and remain liable for payment to the Government of the same amounts, at the same times, as would have been paid under the terms of the percentage royalty on production. If for any reason the net smelter returns, net concentrator returns, or other net amounts realized from the sale or other disposition of such production are not available as a means of measuring the amount of the Operator's liability, the amount thereof shall be estimated as well as may be, and in the event of dispute as to such estimates, the determination thereof by the Administrator of Defense Minerals Exploration Administration or by his successor shall be final and binding upon the Operator.

ARTICLE 8. *Termination and completion.*—The Government may, at any time, by written notice to the Operator, terminate this contract: (*a*) If the Operator fails to provide his share of the money necessary to prosecute operations pursuant to the terms of the contract; (*b*) if the Operator, in the opinion of the Government, fails to prosecute operations pursuant to the terms of the contract; or (*c*) if, in the opinion of the Government, operations up to the time of the notice have not indicated the probability of making any worth while discovery and in the opinion of the Government further operations are not justified.

ARTICLE 9. *Changes and added provisions* _____

Executed in sextuplicate the day and year first above written.

CORDOBA CORPORATION

By J. H. Rodda (President)

By Robert B. Halt (Secretary)

THE UNITED STATES OF AMERICA

By Frank E. Johnson

ACTING Administrator, Defense Minerals Exploration Administration

Robert B. Halt

I, Robert B. Halt, certify that I am the secretary of the corporation named as Operator herein; that J. H. Rodda President, 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.

Robert B. Halt

[CORPORATE SEAL]

EXPLORATION PROJECT CONTRACT
CORANDA CORPORATION
DOCKET NO. DMRA-2512

ANNEX I

The property referred to in Article 2 consists of two groups of unpatented lode mining claims known as the Bismark Mine Group and the Green Talc Mine Group, both groups located in the Gillis Range Mining District, Mineral County, Nevada. The notices of location hereinbelow noted are recorded in the Book of Mining Locations in the Office of the County Recorder of Mineral County, Hawthorne, Nevada.

NAME OF CLAIM	FILE NO.	BOOK NO.	PAGE	DATE DISCOVERED	DATE FILED
Green Talc	20,770	8	535	10-5-29	1-3-30
Green Talc No. 1	20,771	8	535	10-5-29	1-3-30
Green Talc No. 2	20,772	8	535) 536)	10-5-29	1-3-30
Green Talc No. 3	21,342	9	17	6-7-30	8-22-30
Green Talc No. 4	21,343	9	17	6-7-30	8-22-30
Alto Mining Claim	32,490	11	578) 579)	6-8-41	6-8-41
Green Talc Extension	32,498	11	587	6-8-41	6-8-41
Maps on above		12	583		
Bismark No. 1	25,323	10	110	7-11-35	9-14-35
Bismark Mine	25,324	10	110	7-11-35	9-14-35

Esther Rea and John Vuich, as Owners of the Green Talc Group of mining claims entered into an option and purchase agreement dated January 1, 1952, with Fred Fulkerson, Robert B. Holt, and J. H. Rodda, which authorized these individuals to go into possession of the Green Talc Group of claims for the purpose of preliminary development work, and Esther Rea, Joe Malatesta, Eugene Ferretti and John Vuich as Owners of the Bismark Group of mining claims entered into an option and purchase agreement dated January 1, 1952, with Fred Fulkerson, Robert B. Holt, and J. H. Rodda, which similarly authorized these individuals to go into possession of the Bismark Group of claims for the purpose of preliminary development work, and these individuals by an instrument dated April 9, 1952, duly assigned all their right, title and interest in and to the two aforesaid option and purchase agreements to Fred Fulkerson, Robert B. Holt, and J. H. Rodda, F. L. DiNapoli, Jos. P. Ferrucci, and James F. Boccardo, and these six individuals on April 28, 1952, entered into an operating agreement with the Operator granting the Operator for a term of 25 years the exclusive right to explore, develop, operate, mine and remove concentrates and minerals from the Green Talc and Bismark Groups of claims.

ANNEX I
(cont'd)

The Green Talc and the Bismark Claims before mentioned are indicated on the maps attached hereto and made a part hereof and entitled: "Green Talc Mine Groups of Claims, DMEA-2512;" "Bismark Group, DMEA 2512;" "South Lens of the Green Talc Deposit, DMEA-2512;" and "Bismark Analusite Deposit, DMEA-2512" respectively.

EXPLORATION PROJECT CONTRACT
CORANDA CORPORATION
DOCKET NO. DMEA-251

EXHIBIT "A"

Description of the Work

The project work will consist of exploring and testing to greater depth with diamond drill holes two outcrops of an aluminum silicate rock containing substantial amounts of the minerals, corundum and andalusite, in the Green Talc and Bismark Mines.

The Green Talc Mine Deposit: The larger of the two outcrops, known as the South Lens of the Green Talc Deposit, is approximately 200 feet wide by 400 feet long, and will be tested by six inclined diamond drill holes totaling 1600 feet.

The pattern or spacing of the individual holes is indicated on the map, Figure 3, attached hereto and made a part hereof and entitled "South Lens of the Green Talc Deposit, Hawthorne, Mineral County, Nevada, DMEA-251." The holes are listed as follows:

LIST OF D.D. HOLES FOR SOUTH LENS OF GREEN TALC DEPOSIT

D. D. Hole	Size	Length	Inclination	Location
Green Talc #1	Bx	250 ft.	- 45°	See Fig. 3
" #2	Bx	250	- 45°	Fig. 3
" #3	Bx	300	- 50°	Fig. 3
" #4	Bx	300	- 50°	Fig. 3
" #5	Bx	350	To be determined by Field Team	
" #6	Bx	350		

The Bismark Mine Deposit: The smaller of the two outcrops is known as the Bismark Mine. The west one-half of the Bismark Mine outcrop, an area about 50 feet wide by 150 feet long, is to be explored by 5 diamond drill holes totaling 900 feet.

The spacing of the 5 holes is as indicated on the map, Figure 4, attached hereto and made a part hereof and entitled "Bismark Andalusite Deposit, Hawthorne, Mineral County, Nevada. The holes are listed as follows:

LIST OF D. D. HOLES FOR BISMARK ANDALUSITE DEPOSIT

D. D. Hole	Size	Length	Inclination	Location
Bismark #1	Bx	150 ft.	- 30°	See Fig. 2
" #2	Bx	150 "	- 30°	" Fig. 2
" #3	Bx	200 "	- 30°	" Fig. 2
" #4	Bx	200 "	To be determined by Field Team	
" #5	Bx	200 "	" " "	" " "

Deviation from the above pattern or spacing of holes for both the Green Talc and Bismark Mine Deposits may be made provided that the maximum allowable footage is not exceeded, and provided that deviations are first approved by the Executive Officer, DMEA Field Team, Region III.

Preparations of Cores and Samples for Tests: Cores are to be carefully tagged and boxed at the drill sites and holes mapped and logged. The boxed cores are to be shipped to the Bureau of Mines, Reno, Nevada, or such other convenient place for sample preparation as may be decided upon by the DMEA Field Team in consultation with the Operator's project supervisor. The cores are then to be carefully tabulated, sorted, and prepared into the required number of samples for chemical determinations and for cone test samples.

Approximately 250 samples are to be given a Class #3 Analysis, and approximately 50 samples are to receive Pyrometric Equivalent Cone Tests. Analyses and cone tests are to be made by the Pittsburgh Testing Laboratory, or such other laboratory as may be approved by the DMEA Field Team Executive Officer, Region III.

Careful supervision shall be maintained at the drill sites over the drill operations, and over the preparation of samples for distribution and testing. The Operator's supervisors must be approved by the aforenamed Executive Officer. It is estimated that after actual drilling commences, about 6 months will be required to do the work.

Agreed Project Costs

2500 feet diamond drill hole (Bx)
@ $11.50 per foot 1/ $28,750.00

1/ This excludes the costs of Class #3 Chemical Analyses and Pyrometric Cone Equivalent Tests which are separately listed, but it includes every other cost.

250 - Class #3 Chemical Analyses @ $25.00 each 2/	$ 6,250.00	
50 - Pyrometric Cone Equivalent Tests @ $20.00 each 3/	1,000.00	
Total Estimated Cost of Project		**$36,000.00**
Government Participation @ 90%		**$32,400.00**

2/ The unit here is each analysis

3/ The unit here is each test.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Nevada, County of Mineral, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ CORANDA CORPORATION, a corporation,

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $200,000.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 24th day of April, 19[illegible].

Esther Rea

E. Kenneth

Joe Malatesta

John Vuich

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

10919

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Nevada, County of Mineral, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Geranda Corporation, a corporation

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 200,000.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 24th day of April, 1952.

Esther Rose

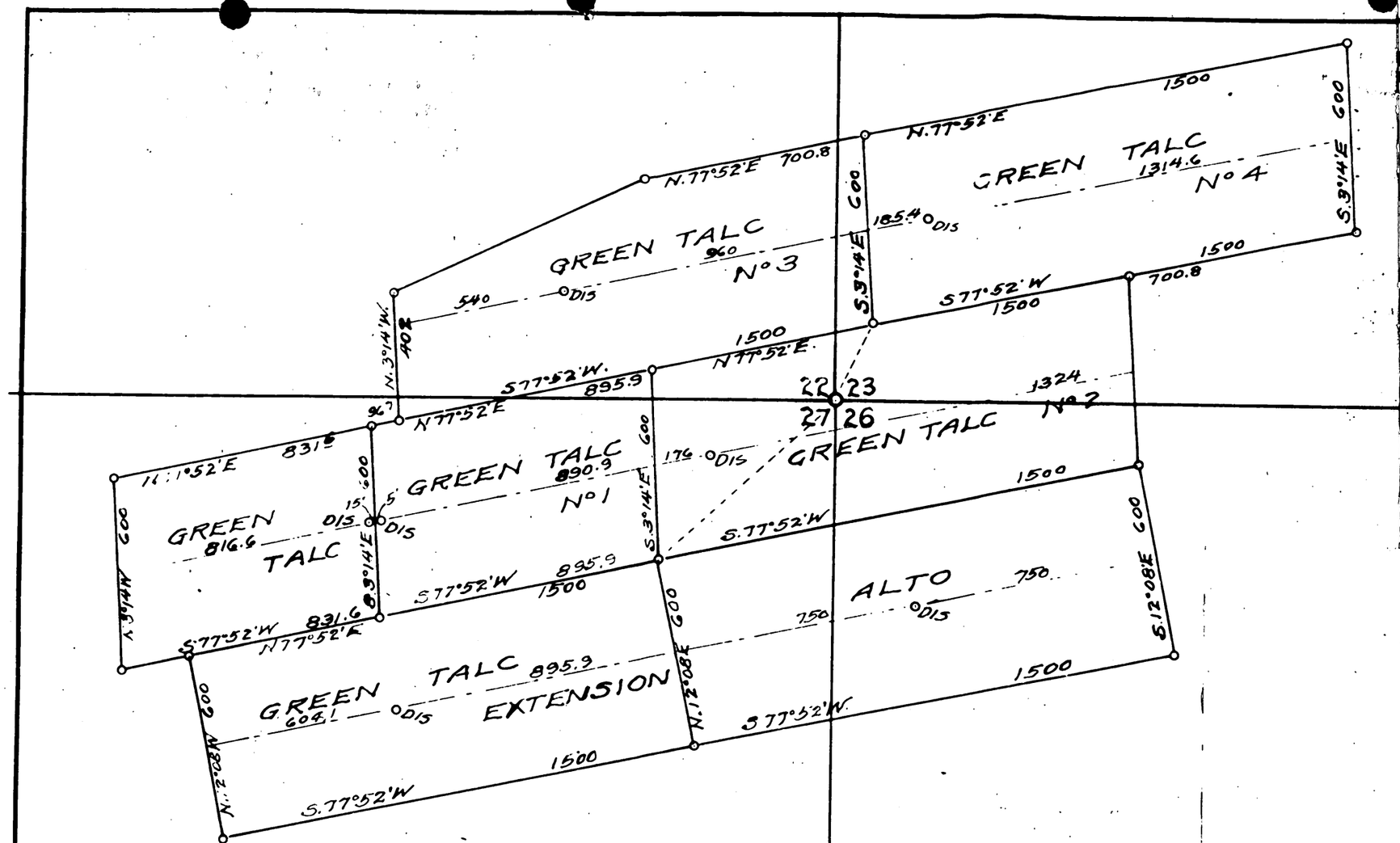
John Veich

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

10919

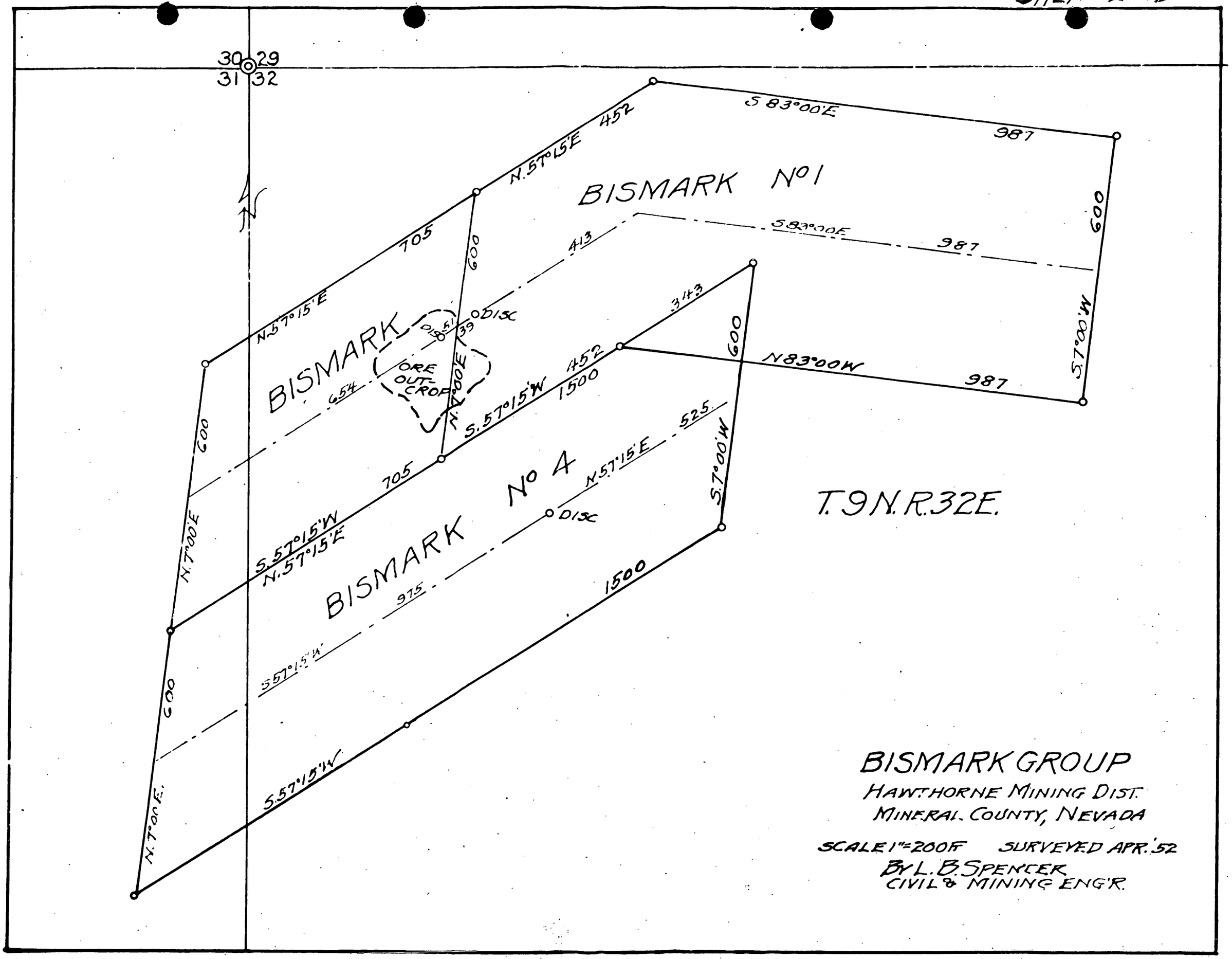
DMEA-2512



GREEN TALC MINE
GROUPS OF CLAIMS
HAWTHORNE MINING DIST
MINERAL COUNTY, NEV.

SCALE 1" = 400 FT. SURV'D APR' 1952
BY L. B. SPENCER
CIVIL & MINING ENG'R.

DMEA - 2512


30 29
31 32
N
BISMARK Nº1
S 83°00'E
987
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705
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654
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BISMARK GROUP
HAWTHORNE MINING DIST.
MINERAL COUNTY, NEVADA
SCALE 1"=200FT SURVEYED APR. '52
BY L.B. SPENCER
CIVIL & MINING ENG'R.

SUPPLEMENT TO CORANDA CORPORATION
EXPLORATION APPLICATION

INTRODUCTION

The following information and data are offered in supplement to the Coranda Exploration Application (DMEA No. 2512) for purposes of further reference and evaluation of the Andalusite Corundum deposits, controlled by Coranda Corporation, which are located in the vicinity of Hawthorne, Nevada. The general discussion, high alumina uses, markets, and economic evaluation (including processing technique and miscellaneous data) which follows are based on information and data now available. The economic evaluation is in all probability sufficiently accurate for the purposes at hand; however, one should bear in mind that certain phases will be subject to revision upon completion of exploration work.

GENERAL DISCUSSION

The refractories industry is not one of the largest industries but is considered one of the most important, as all high temperature processing is dependent on refractories in one form or another. In fact, many industries are absolutely dependent on refractories for their existence, such as the ferrous and non-ferrous industries. The steel industry, [1] as well as many others, are currently carrying on large research programs in conjunction with refractory manufacturers in the search for superior refractories for several reasons, namely, (1) increased use of oxygen enriched ore, (2) greatly increased production rates, (3) increased heating and cooling rates, etc. The aforementioned reasons that are currently being practiced in thermal processing have greatly decreased the life of various types of refractories and have greatly increased their wear and spalling conditions.

[1] Norton, F. H., Refractories, Third Ed.

The modern steel furnace operating at 100° to 200° F. higher than previously used is subject to more rapid shut-downs as the silica brick employed in roofs are severely attacked. Alkali and reducing conditions in other parts of the furnaces have long caused concern, as the refractories commonly employed are subject to rapid wear and deterioration. To fulfill the demands of present day applications, refractories must possess high mechanical strength at high and low operating temperatures, low porosity and shrinkage, high fusion points, low melts up to fusion temperature, etc. These conditions are often times best fulfilled by high alumina refractories containing the artificial mullites ($3\ Al_2O_3\ 2\ SiO_2$)[2]. All alumina brick excepting relatively pure alumina contain varying percentages of Mullite which has been found to be the most desirable constituent in alumina refractories.[3] Of prime importance concerning the thermal properties is the alkali and alkaline earth content of refractories as small and increasing percentages cause fluxing and severe lowering of Pyrometric cone equivalent values. Hence, the problem for producers of alumina refractories is one of manufacturing a product containing the maximum amount of mullite and a minimum of oxides other than aluminum. There are several sources of raw materials suitable for the manufacture of high alumina refractories and/or mullites. The raw materials commonly used are sillimanite minerals (andalusite, kyanite, topaz, dumorterite), bauxite, diaspore and various clays of the kaolin type.

(3) Industrial Minerals & Rocks, AIMME, 1949, Sillimanite Group, Thermal Properties.

(2) W. M. R. 388, Preliminary Pilot Plant Concentration of Andalusite Corundum Ore from vicinity of Hawthorne, Nevada.

The consumption of bauxite and diaspore for mullite type refractories is indeed very large, being in excess of 6,000,000 tons per year as listed for 1943[4], which is expected to be typical of present production. The availability of bauxite and diaspore for refractory purposes is becoming less and less,[4] subsequently a search has been conducted for some time for further deposits and allied minerals. Although the production of kaolin is very extensive for refractories, it is not particularly suited for mullite refractory manufacture due to alkali content which lowers P. C. E. values and its fine sizing demands pre-calcination to senter and agglomerate the material prior to brick manufacture. Sillimanite minerals are quite suited to mullite manufacture; however, the supply has been far outstripped by the demand and in fact, the availability of such minerals have been very limited due to the very small number of workable deposits, both domestic and foreign. A large portion of our domestic consumption has been imported from India, Australia and Africa. Actual production figures for sillimanite minerals are not available, as this information has been classified since 1943[5]; however, it is known that several kyanite deposits are being worked in the southeastern states, the production of which is largely held captive.[5] From the standpoint of refractory manufacturers, fine grained sillimanite minerals of disseminated type are preferred as coarse bladed and massive crystals foliate and produce a porous brick which is difficult to use in brick manufacture. Of the sillimanite minerals, andalusite is the best suited for mullite manufacture, as the physical properties very closely approach that of mullite.[5] This allows andalusite to be used directly in manufacture of mullite refractories, whereas kyanite,topaz[5]

(4) F. H. Norton, Refractories, Third Ed.

(5) AIMME Industrial Minerals & Rocks, Sillimanite Group, 1949

and dumorterite have to be pre-calcined.[5] Other advantages are gradual mullitization over definite ranges and little or no volume change upon firing to mullite.

MARKETS & USES

In the general discussion it was pointed out that several minerals are used for the manufacture of mullite or what is more commonly known as high alumina refractories. In that the consumption of sillimanite minerals is limited due to unavailability and not indicative of high alumina refractory production, a more true picture of potential markets and use for sillimanite minerals may be gained from alumina refractory production statistics.

Recent statistics of yearly production of alumina refractories are not available; however, the Bureau of Census (1947) reports F. O. B. plant values of clay type, high alumina refractories in excess of $50,000,000 (excluding fire brick). The high alumina non-clay refractories[6] production in 1946 was reported in excess of $30,000,000 and in excess of $20,000,000 for special high alumina refractories (mortars, glass house blocks, etc.). The above figures may be considered conservative for present production statistics, and it is interesting to note that non-clay high alumina refractories production has increased over 700% since 1926, whereas clay types have decreased in percentage since 1926.

Since the advent of the Korean war, several large refractory companies have established plants on the west coast; namely, Harbison Walker Co., E. J. Lavino & Sons and General Refractories, which indicates the general trend of increased production. Other companies on the Pacific Coast have shown considerable production increases. Several of these companies have been reported shipping high alumina raw materials from the east to supply their western plants, as relatively few deposits of high

(6) Norton, F. H., Refractories, 3rd Ed.

alumina minerals are found in the western United States.

The uses[7] of high alumina or mullite type refractories are many and varied. Principally, they are used in the metallurgical industries (electric arc furnaces, etc.), enameling, glass tank houses, ceramic insulators, chemical processing, cement kilns, kiln furniture, boiler settings, blast furnace regenerators, etc. Characteristically, the mullite refractories are excellent for use at high temperatures under reducing or oxidizing conditions, have very high load bearing strength, have high acid and basic slag resistance and the resistance to slag penetration and abrasion is very high.

ECONOMIC EVALUATION

For purposes of evaluating the Andalusite-Corundum ore deposits, located near Hawthorne, Nevada, several analyses have been considered. (See attached data). Most of the sampling and analyses have been performed on the Green Talc claims and, therefore, are being used as a basis for evaluation. It is noted from the various analyses that typical ore contains 40 - 45% Al_2O_3 but the percentages of Andalusite and Corundum vary somewhat. The variation is no doubt explained by the presence of pyrophyllite in differing amounts. The 59 ton sample taken by the // Bureau of Mines for beneficiation tests in 1945 is much the largest sample taken and is considered the most representative. For purposes of calculation, the lower andalusite-corundum values (20% andalusite, 20% corundum) as reported in W. M. R. 388 will be used.

Assuming that the Alumina values present in the andalusite and corundum are converted into mullite, then each ton of ore will theoretically yield 0.52 ton of mullite. If, however, the total

(7) AIMME, Industrial Minerals & Rocks, Sillimanite Group, 1949.

alumina values in the ore were to be considered, such as contained in the andalusite, corundum and phyrophyllite, then one ton of ore containing 40% Al_2O_3 could theoretically be converted into 0.63 tons of mullite. The lower figure showing 0.52 ton of mullite theoretically possible will be used for further calculations.

Using the present price for mullite of $150/ton the raw ore has a theoretical gross value of $78/ton.

To arrive a t a reasonable production cost analysis and profit margin, the percentage recovery of alumina values will have to be con-considered and arrived at in some manner. In discussing possible recovery efficiencies, attention is called to W. M. R. 388, R. I. 3895, Exploration of the Blue Metal Corundum Property, Douglas County, Nev.) and correspondence between Mr. H. G. Poole and Mr. Glenn L. Allen, dated March 14, 1945, concerning improved beneficiation of Andalusite-Corundum ore from Green Talc property, Hawthorne, Nevada, copies of which are attached. The following table illustrates the recovery efficiencies resulting from the aforementioned reports.

TEST	CORUNDUM CONTENT IN ORE %	ANDALUSITE CONTENT IN ORE %	CORUNDUM RECOVERY %	ANDALUSITE RECOVERY %	RECOVERY OF ORIGINAL ORE %	ALUMINA RECOVERY %
WMR 388	20.	20.	59.*	59.0*	23.8	35.3
R.I. 3895	7-9 8	11-14 12	99	75	--	--
Letter of correspondence						
Green Talc Pit Sample	9	18	100*	100*	28.1	43.2
Green Talc Dump Sample	11	21	100*	100*	55.8	60.2

*Percentages based on assumed equal recoveries of andalusite and corundum.

From the above table it is noted that the recovery efficiencies reported in W.M.R. 388 are the lowest in value. It is readily apparent upon studying W.M.R. 388 that one-half of the andalusite corundum values were lost due to crushing and grinding losses as extreme fines. RI 3895 and latter tests conducted on Green Talc samples show that with carefully staged grinding, jigging and tabling, little or no fines are produced and subsequently, good recoveries of values can be affected. The fact that recovery efficiencies performed on samples from the Green Talc Pit and Dump are obviously over 100% is readily explained by the presence of other high alumina material, namely, pyrophillite which is not considered objectionable. From the above it is considered reasonable to assume recovery efficiencies of 90% in calculating a production-profit and cost analysis as illustrated below.

OPERATING COSTS	100 tons moved[1] per day Costs/Ton	500 tons moved[1] per day Costs/ton
Exploration & development	$1.00	$1.00
Mining	3.00	2.00
Hauling	0.30	0.20
Milling	1.50	1.50
Concentrating	1.00	0.75
Calcining	3.50	3.50
Maintenance	0.40	0.30
Sales	0.15	1.15
Overhead	2.00	1.50
Amortization*	1.66	1.66
	$14.51	$12.56

1. Plant cost based on $1500.00/annual ton and calcining equipment costs of $100,000 and $500,000 respectively.

*Amortization based on five years.

As illustrated previously, the theoretical value of the ore is $78/ton. If 90% of this value can be expected, then the gross profits before other costs, depletion, etc., are deducted, are as follows:

100 ton plant		500 ton plant	
Recovered value 90% x $78..	$70.20	Recovered value	$70.20
Operating cost	14.50	Operating cost	12.60
Gross profit/ton	$55.70	Gross profit/ton	$57.60

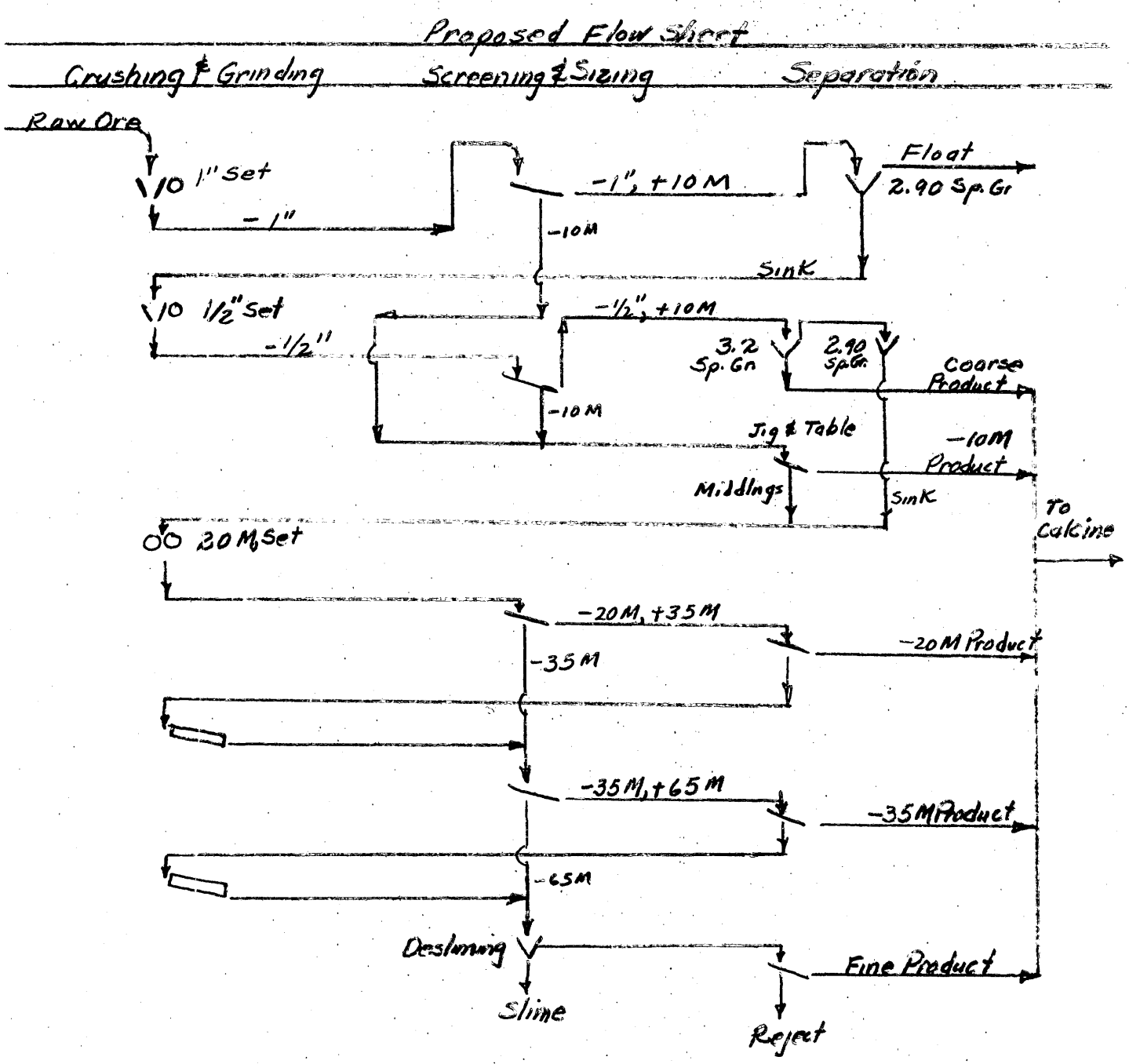
The above calculations show that on the basis used, which is considered fair and reasonable, that a wide margin of profit can be obtained and that production costs or theoretical ore values can vary considerably before adversely effecting the economics of the above outlined program.

Before discussing the proposed flow sheet, some mention should be made concerning the market specifications of aluminum sillicates, in the form of sillimanite minerals and mullites. In the particular case in question, andalusite requirements are 59% minimum Al_2O_3 and frequently on the basis of specific gravity, ranging between 3.05 and 3.15(7) (8) P.C.E. values are minimum of 37 as per A.S.T.M.C. 24-46. Mullite specifications are listed the same as for sillimanite minerals, excepting mullites made synthetically (from Bauxite, diaspore, etc.) The cone values reported in W.M.R. 388 are all well above market specifications, and show superior values, which is readily explained by the low impurity content.

The following flow sheet is based on previous work, including that of Coranda Coro. This scheme of processing is general, whereas further refinement will be made upon completion of exploration and milling experiments.

(7) W.M.R. 388

(8) National Stockpile specifications P.27



The ore is crushed to minus 1-inch, screened on a 10-mesh screen, plus 10M treated by sink float using heavy susoensoid having specific gravity of 2.90. Sink product crushed to minus 1/2 inch, screened on 10-mesh screen and plus 10-mesh retreated by sink float at gravities of 3.2 and 2.9 respectively. The sink from first stage (3.2 gravity) goes to coarse product stream. The minus 10-mesh from screening operations is jigged and tabled, with heavies going to product stream and middlings combined with sink from second stage (2.9 gravity)

and reground to minus 20-mesh and screened on 35-mesh screen. The plus 35-mesh is tabled, heavies going to product stream and the middling ground to minus 35 mesh and combined with minus 35 mesh from screen. The combined stream is screened on a 65 mesh screen and plus 65 mesh tabled. The middlings from secondary tables (+65M) are reground, combined with -65M from screen, deslimed and tabled.

March 14, 1945 HGP/ec

Mr. Glenn L. Allen,
224-8 West 1st Street,
Hughes-Porter Building
Reno, Nevada

Re: Green Talc Corundum-Andalusite,
Hawthorne, Nevada

Dear Mr. Allen:

The accompanying data sheets summarized results of test work conducted on two one-ton samples of corundum-andalusite ore submitted by G. L. Thompson from the Green Talc group, Hawthorne, Nevada. Sample Ne-30.1, identified as No. 504, consisted of ore as mined from a pit on Green Talc claim; Ne-30.2, identified as No. 505, contained coarse material only from dump of Green Talc claim. The samples were submitted for beneficiation studies by sink-and-float or heavy media methods. Since the samples are similar, the chief part of the test work was conducted on Ne-30.1, the pit sample, as being more representative of average ore.

Mineralogically, they consist of intimate mixtures of impure corundum, altered andalusite, and a variety of alteration products which as a group conform closely to the chemical analysis for common micas. Microscopic grain counts to determine andalusite and corundum content gives results that are too high owing to the impure character of the individual grains. In general, the samples treated have assayed 41-45 percent Al_2O_3. 52-56 percent SiO_2, with minor amounts of iron oxide, titania, and the alkali metals. In terms of corundum and andalusite, this would mean approximately 10-15 percent corundum and 15 to 20 percent andalusite.

As the samples were similar in character to those submitted to Boulder City station for fine grinding and table concentration tests, in the following summary the results obtained from Boulder mill test are included.

Boulder Mill Test

The concentrate obtained from Boulder mill test was predominately minus 65-mesh in size and assayed 61.8 percent Al_2O_3, 35.2 percent SiO_2, 0.43 percent Fe_2O_3, .86 percent TiO_2, and 0.29 percent $(Na,K)_2O$. Approximately 35 percent of the alumina in feed was recovered in above concentrate which represented 23.8 percent of original weight. Hence, 1 ton of concentrate would require 4.2 tons of original ore.

cc/ WR Files
SL Files
Day Files - Ne-30.1, 30.2.

Coarse Gravity Beneficiation

Pit Sample, Ne-30.1

Sink-and-float tests were tried on minus 2-inches, minus 1-inch, and minus 1/2-inch ore. The latter size gave the best over-all results from standpoint of waste rejection and permitted the recovery of a portion of the concentrate as a product assaying 59 percent Al_2O_3 and 36 percent SiO_2 in the minus 1/2-inch plus 10-mesh size range. Over 47 percent of ore was rejected as low-grade "float" and minus 10-mesh gravity tailing. The remaining ore was crushed to minus 20-mesh and re-treated by tabling concentration to produce a finished product.

The combined coarse and fine gravity concentrate assayed 62.4 percent Al_2O_3, 33.9 percent SiO_2, 0.5 percent Fe_2O_3, 0.7 percent TiO_2, and 0.5 percent $(Na,K)_2O$. Approximately 43 percent of the alumina in feed was recovered in above concentrate which represented 28.1 percent of original weight. Hence, 1 ton of concentrate would require 3.6 tons of original ore. A sizing analysis of concentrate showed 20.8 percent of minus 1/2-inch plus 10-mesh material, 16.8 percent of minus 20-plus 35-mesh, 21.0 percent minus 35-plus 65-mesh, and 41.4 percent in the minus 65-mesh sizes.

A similar test in which all the coarse concentrate was re-treated gave a minus 20-mesh product assaying 64.0 percent Al_2O_3 and 31.9 percent SiO_2.

Dump Sample, Ne-30.2

Since Ne-30.1 and Ne-30.2 samples were similar, only one test was run on Ne-30.2. Sink-and-float treatment of ore crushed to 2-inches gave results similar to those obtained on sample Ne-30.1. Over 44 percent of the ore was rejected as low-grade float and minus 10-mesh table tailing. The combined sink product and table concentrate assayed 47.9 percent Al_2O_3, 46.6 percent SiO_2, and 0.91 percent Fe_2O_3; this combined product is largely plus 10-mesh in size and requires crushing to minus 20-mesh and re-treatment by table concentration to produce a finished product.

Summary

Improved recoveries were obtained in combined coarse and fine concentrate by employing sink-and-float or heavy media methods to Green Talc andalusite ore, after crushing to minus 1/2-inch, followed by re-treatment of less than 1/2 of the ore by fine grinding and table concentration. A comparison of recovery and grade of concentrate for Boulder City mill fine grinding test and present coarse gravity test are given in following table:

Boulder Mill	% Wt.	Assay Percent Al_2O_3	SiO_2	Fe_2O_3	Recovery % Al_2O_3	SiO_2
Combined Concc.	23.8	61.8	35.2	0.43	35.3	15.1
Tailing	76.2	35.2	61.8	0.55	64.7	84.0
Feed	100.00	41.6	55.5	0.52	100.0	100.0

Coarse Gravity	% Wt.	Assay Percent Al_2O_3	SiO_2	Fe_2O_3	Recovery % Al_2O_3	SiO_2
Combined Concc.	28.1	62.4	33.9	0.5	43.2	17.4
Tailing	71.9	32.2	63.1	0.35	56.8	82.6
Feed	100.0	40.7	54.9	0.4	100.0	100.0

The Boulder test concentrate was predominately minus 65-mesh and the present coarse gravity product contains only 41 percent in minus 65-mesh size with over 20 percent in the minus ⅜ inch plus 10-mesh range.

By employing sink-and-float methods as a preliminary treatment to reject coarse waste, improved recoveries were obtained in coarser sizes of product and with decreased grinding charges for treatment. Owing to presence of corundum, it was possible to obtain fair recoveries of products assaying higher in alumina than the theoretical for andalusite.

No further work is planned and if additional information is required, please advise.

Very truly yours,

H. G. Poole

Enclosure.

U. S. Bureau of Mines
Western Region
Ore Dressing Report Date 1-24-45

Ore Ne-30.1. Green Talc Pit Class Corundum-Andalusite
Ne-30.2. Green Talc Dump
Source Hawthorne, Nevada

Owners Wm. Rea and John Buich of Hawthorne

State Engineer's Remarks Ne-30.1. Sample 504 - 1 ton of ore as mined from pit on "Green Talc" group of claims.

Ne-30.2 Sample 505 - 1 ton of ore from dump on "Green Talc" group of claims (same as Boulder Mill sample).

Physical Character Corundum, andalusite, quartz, and micaceous alteration products. Mineral content estimated by microscopic grid grain count. Liberation of minerals would require 35-65 mesh grinding.

Chemical Character

Sample	Al_2O_3	SiO_2	Fe_2O_3	TiO_2	Na_2O	K_2O	Andalusite	Corundum
Ne-30.1	41.4	55.9	.43	.80	.23	.44	18	9
Ne-30.2	44.8	51.9	.33	.72	.20	.42	21	11
Boulder Sample	42.7	54.8	.57	.96	.10	.31	20	20

Treatment Procedures 1. Sink-and-float concentration of ore crushed to minus 1-inch.

2. Sink-and-float concentration of ore crushed to minus 1/2-inch.

3. Table concentration of reground coarse gravity concentrate.

U. S. Bureau of Mines
Western Region
Ore Dressing Report Date 12-19944

Test Number Z-3240

Ore Ne-30.1 Green Tale Pit Class Corundum-andalusite

Treatment Ore crushed to minus 2-inches, screen sized wet on 3-and 10-mesh screens. Plus 10-mesh treated by sink-float using galena suspensions at gravities of 2.9 and 3.03. Minus 10-mesh screened on 20-mesh and tabled.

Metallurgical Data

-2-inch Sink-Float

Product	Assay No.	Grams Wt.	% Wt.	Assay, Percent Al_2O_3	Assay, Percent SiO_2	Assay, Percent Fe_2O_3	Distribution, Percent Al_2O_3	Distribution, Percent SiO_2	Distribution, Percent Fe_2O_3
Sink at 3.03									
Sp. Gr.	Comp.	12905.9	36.0	48.5	46.1	1.07	42.0	31.0	39.9
Table Conct."		627.1	1.7	50.6	48.4	1.07	2.1	1.6	1.9
Float at 3.03									
Sp. Gr.	Comp.	12088.8	33.7	41.8	53.5	0.95	34.0	33.7	33.4
Float at 2.9									
Sp. Gr.	Comp.	9083.0	25.4	31.6	63.7	0.86	19.2	30.2	22.5
Table Tai.	Comp.	855.7	2.4	36.0	62.9	0.72	2.0	2.7	1.8
Slime	40771	276.1	9.8	35.6	58.65	0.68	0.7	0.9	0.5
Cal.Head		35836.6	100.0	41.6	53.6	0.96	100.0	100.0	100.0

Remarks Comparison with test No. Z-3243-A shows that rejection of gangue is almost as good at 2 inches as 1/2 inch; however, no high grade is obtained of the coarser size.

Test Engineer H. Snedden
Walter J. Long

U. S. Bureau of Mines
Western Region
Ore Dressing Report Date 12-19-44

Test Number Z-3241

Ore Ne-30.2 Green Talc Dump Class Corundum-andalusite

Treatment Ore crushed to minus 2-inches and screen sized wet on 3- and 10-mesh screens. Plus 10-mesh treated by sink-float using galena suspensions at gravities of 2.92 and 3.01. Minus 10-mesh screen sized on 20- and 35-mesh screens and tabled.

Metallurgical Data

-2-inch Sink-Float

	Assay No.	Grams Wts.	% Wt.	Assay, Percent Al_2O_3	Assay, Percent SiO_2	Assay, Percent Fe_2O_3	Distribution % Al_2O_3	Distribution % SiO_2	Distribution % Fe_2O_3
Sink at 3.01 Sp.Gr.	Comp.	22197.2	54.4	47.8	46.7	0.91	58.6	50.8	51.0
Table Concentrate	Comp.	531.3	1.4	50.7	44.5	0.88	1.6	1.2	1.2
Float at 3.01 Sp. Gr.	Comp.	10733.8	26.4	42.1	51.8	1.09	25.0	27.3	29.5
Float at 2.92 Sp. Gr.	Comp.	6464.0	15.2	36.9	57.5	1.03	13.2	18.3	16.8
Table Tailing	Comp.	573.6	1.3	33.4	60.1	0.73	1.1	1.7	1.1
Slime	30926	259.0	0.6	37.4	53.2	0.64	0.5	0.7	0.4
Calculated Head		40758.5	100.0	44.4	49.9	0.97	100.0	100.0	100.0
Combined Sink 3.01 and table Concn.		--	55.8	47.9	46.6	0.91	60.2	52.0	52.2

Remarks Results obtained are very similar to those for Ne-30.1, Green Talc pit test No. Z-3240.

Test Engineer H. Snedden
Walter J. Long

U. S. Bureau of Mines
Western Region
Ore Dressing Report

Date 12-19-44

Test Number Z-3243

Ore Ne-30.1. Green Talc Pit Class Corundum-andalusite

Treatment Ore crushed to minus 1-inch, wet screened on 10-mesh (Ton-Cap) screen and plus 10-mesh treated by sink-float using a ferrosilicon media having a specific gravity of 2.96. Minus 10-mesh (Ton-Cap) sized and the sized fractions treated by jigging and tabling.

Metallurgical Data

-1-inch Sink-Float

Product	Assay No.	Wt.	% Wts.	Assay, Percent Al_2O_3	SiO_2	Fe_2O_3	Na_2O	K_2O	Distribution, % Al_2O_3	SiO_2
Sink at 2.96 Sp. Gr.	Comp.	53070	50.8	50.4	46.6	0.85	0.21	0.55	37.4	25.9
Jig-Table Conct.	Comp.	7420	4.3	47.2	47.2	-	-	-	4.9	3.7
Float at 2.96 Sp.Gr.	Comp.	95710	55.5	37.2	59.6	-	-	-	49.9	59.9
Jig-Table Tailing	Comp.	13880	8.0	34.6	62.0	-	-	-	6.7	9.0
Slime	Comp.	2340	1.4	33.4	57.7	0.72	0.28	0.56	1.1	1.5
Calc. Head		172420	100.0	41.4	55.2	--	0.23	0.44	100.0	100.0

Remarks Test Z-3240 on minus 2-inch ore which gave a 31.6 percent Al_2O_3 float product at 2.9 specific gravity indicates that a similar reject could have been made at this finer size if a similar low gravity suspension were used.

Test Engineer H. Snedden
B. K. Shibler
Walter J. Long

U. S. Bureau of Mines
Western Region
Ore Dressing Report Date 12-20-44

Test Number Z-3243-A

Ore Ne-30.1 Green Talc Pit Class Corundum-andalusite

Treatment Minus 1-inch sink-and-float products from test No. Z-3243 were each crushed to minus 1/2-inch screened on 10-mesh, the plus 10-mesh fractions by sink-float and minus 10-mesh by jigging and tabling. Data from the tests were combined to indicate the results obtained if the whole ore were crushed to minus 1/2-inch and treated.

Metallurgical Data

-1/2-inch Sink-Float

Product	Assay No.	Wt.	% Wt.	Assay, Percent Al_2O_3	SiO_2	Fe_2O_3	TiO_2	Na_2O	K_2O	Distribution, % Al_2O_3	SiO_2
Sink at 3.2 to 3.3 Sp. Gr.	Comp.	10100	5.9	59.0	35.8	1.28	0.52	0.23	0.41	8.6	3.8
Sink at 2.9 to 3.1 Sp. Gr.	Comp.	68595	39.8	48.7	48.2	0.90	0.75	0.22	0.44	46.1	34.7
3.1 Sp. Gr.	Com-.	4170	2.4	37.8	46.1	--	--	--	--	2.3	2.0
Float at 2.76 to 2.9 Sp. Gr.	Comp.	54250	31.5	30.0	65.6	--	--	--	--	23.4	37.3
-10-Mesh Gravity Conct.	Comp.	11629	6.7	46.8	57.3	--	--	--	--	7.8	7.0
-10-Mesh Gravity Tailing	Comp.	20739	12.0	35.0	61.6	--	--	--	--	10.4	13.4
Slime	Comp.	2950	1.7	34.0	57.4	0.90	0.89	0.27	0.57	1.4	1.8
Calc. Head		172433	100.0	40.4	55.3	--	--	--	--	100.0	100.0

REMARKS Mechanical gravity treatment of minus 10-mesh fractions indicates that fine grinding is needed to effect liberation, plus 60 percent Al_2O_3 products being obtained only at minus 65-mesh.

Test Engineer H. Snedden

U. S. Bureau of Mines
Western Region
Ore Dressing Report Date 1-13-45

Test Number Z-3243-E

Ore Ne-30.1 Green Talc Pit Class Andalusite-corundum

Treatment Ore crushed to minus 1-inch, screened on a 10-mesh (Ton-Cap) screen, plus 10-mesh treated by sink-float using a galena suspension having a specific gravity about 2.96. Sink product crushed to minus 1/2-inch, screened, and plus 10-mesh re-treated by sink-float at gravities of 3.2-3.3 and 2.9-3.1. All of primary minus 10-mesh treated by jigging and tabling. Primary jig-table concentrate bombined with sink from 2.9 to 3.1 specific gravity, crushed to minus 20-mesh, sized on 35-mesh, and plus 35-mesh tabled. The secondary table tailing rod milled to minus 35-mesh, all of minus 35-mesh screened on 65-mesh, plus 65-mesh tabled, and middling rod milled to minus 65-mesh, all of minus 65-mesh deslimed and sands tabled.

Metallurgical Data

Product	Assay No.	Wt.	% Wt.	Assay, Percent Al_2O_3	SiO_2	Fe_2O_3	TiO_2	Na_2O	K_2O	Distribution, % Al_2O_3	SiO_2
Sink at 3.2 to 3.3 Sp. Gr.	42675	10100	5.8	59.0	35.8	1.28	0.52	0.23	0.41	8.5	3.8
Secondary Table Conct.	Comp. 38405	22.3	63.3	33.4	0.30	0.74	0.15	0.32	34.7	13.6	
Comp. Float at 2.7-3.1 Sp. Gr	Comp 58420	33.9	30.6	64.2	--	--	--	--	25.4	39.7	
Primary-10-Mesh Tailing	Comp 20739	12.0	35.0	61.6	--	--	--	--	10.4	13.5	
Secondary-35-Mesh tailing	Comp 30306	17.6	31.5	65.0	--	--	--	--	13.6	20.8	
Primary Slime	" 2950	1.7	34.0	57.4	--	--	--	--	1.4	1.8	
Secondary Slime	44386	11515	6.7	36.5	56.1	--	--	--	--	6.0	6.8
Calc. Head		172435	100.0	40.7	54.9	--	--	--	--	100.0	100.0
Comp. Conct.		48505	28.1	62.4	33.9	0.5	0.7	0.2	0.3	43.2	17.4

Remarks In the Boulder City pilot plant run, on a head sample similar to that used for this test, 35.3 percent of the Al_2O_3 was recovered in a product assaying 61.8 percent Al_2O_3 and largely minus 65-mesh. These results, when compared to those obtained in the present test, indicate that a preliminary sink-float concentration step makes possible both a higher Al_2O_3 recovery and a coarser sized concentrate product. In the re-treatment stage 65.3 percent of the Al_2O_3 in the products treated was recovered.

Composite Concentrate
Screen Size Distribution

Screen Size	Percent
-1/2" 10-Mesh	20.8
-20+35-Mesh	16.8
-35+65-Mesh	21.0
-65-Mesh	41.4
Total	100.0

TEST Engineer H. Snedden

U. S. Bureau of Mines
Western Region
Ore Dressing Report Date 1-24-45

Test Number Z-3243-F

Ore Ne-30.1. Green Talc Pit Class Andalusite-corundum

treatment Ore crushed to minus 1-inch, screened on a 10-mesh (Ton-Cap) screen, plus 10-mesh treated by sink-float using a galena suspension having a specific gravity about 2.36. Sink product crushed to minus 1/2-inch, screened, and plus 10-mesh (Ton-Cap) retreated by sink-float at gravities of 3.2-3.3 and 2.7-3.1. All of primary minus 10-mesh treated by jigging and tabling. All of minus 1/2-inch sink products combined with primary minus 10-mesh jig-table concentrates crushed to minus 20-mesh, sized on a 35-mesh screen, and plus 35-mesh tabled. Plus 35-mesh secondary table tailing rod milled to minus 35-mesh. All of secondary minus 35-mesh screened on a 65-mesh screen, plus 65-mesh tabled, and middling rod milled to minus 65-mesh. All of secondary minus 65-mesh deslimed and sands tabled.

Metallurgical Data

Product	Assay No.	Wt.	% Wt.	Assay, Percent Al_2O_3	SiO_2	Fe_2O_3	TiO_2	Na_2O	K_2O	Distribution, % Al_2O_3	SiO_2
Secondary Table Concentrate	Comp.	45552	26.4	64.2	21.9	0.34	0.67	0.32	0.17	41.8	15.4
Comp. Float at 2.7-3.1 Sp. Gr.	"	58420	33.9	30.6	64.2	--	--	--	--	25.6	39.8
Primary-10-Mesh Tailing	Comp	20759	12.0	35.0	61.6	--	--	--	--	10.4	13.6
Secondary-35 Mesh	Comp	30031	17.4	29.5	66.1	--	--	--	--	12.7	21.1
Primary Slime	Comp	2950	1.7	34.0	57.4	--	--	--	--	1.4	1.8
Secondary Slime	44738	14741	8.6	36.5	56.1	--	--	--	--	8.1	8.3
Calc. Head		172433	100.0	40.4	54.6	--	--	--	--	100.0	100.0

Remarks In the secondary re-treatment stage, 66.9 percent of the Al_2O_3 in the products re-treated was recovered. As compared to test No. Z-3243-E, in which only part of the sink product was re-treated, this test results in a higher grade concentrate but lower over-all Al_2O_3 recovery and production of a final product with a higher percent of the undesirable fines.

Table Concentrate
Screen Size Distribution

Screen Size	Percent
-20+35-Mesh	20.2
-35+65-Mesh	27.5
-65-Mesh	52.3
Total	100.0

Test Engineer H. Snedden

PRELIMINARY PILOT-PLANT CONCENTRATION OF ANDALUSITE-CORUNDUM ORE FROM THE VICINITY OF HAWTHORNE, NEV.[1]

* * *

SUMMARY

The far-western area of the United States has relatively few developed deposits of minerals containing enough alumina to be used for the manufacture of high-alumina furnace refractories. The andalusite ore in the Hawthorne deposit is not sufficiently uniform to meet market specifications for refractory purposes, but it is possible that the ore may be beneficiated so as to produce a satisfactory concentrate. Preliminary tests have indicated that gravity concentration would produce the highest-grade product and would represent the simplest method of treatment.

Pilot-plant tabling tests were made on about 50 tons of ore that analyzed 42.5 percent Al_2O_3 and 54.2 percent SiO_2. Three flow sheets were used, each varying slightly in grinding and sizing procedure; 15 different concentrates were produced, which varied in grade from 52.1 to 72.4 percent Al_2O_3 and 44.9 to 25.2 percent SiO_2, the composited average being 62.3 percent Al_2O_3 and 35.1 percent SiO_2; the over-all ratio of concentration was 4.2 to 1. One special corundum concentrate containing 91.5 percent Al_2O_3 was made in addition.

The final value of the concentrates to the refractory industry will be determined by further large-scale tests conducted cooperatively by Pacific-coast refractory producers who will mix the concentrate with clay in an attempt to produce a super-duty fire brick.

INTRODUCTION

Modern industry steadily is increasing its demands for furnace refractories that possess a combination of high mechanical strength, low porosity and shrinkage, and resistance to abrasion at high temperatures. In many instances these demands have been fulfilled best by high-alumina refractories composed predominantly of the artificial mineral compound mullites, $3Al_2O_3.2SiO_2$. Mullite is a product formed by the interaction of silica and alumina in correct proportions at relatively high firing temperatures or may be obtained as a transition product of the decomposition of minerals of the kyanite group (andalusite, kyanite, and sillimanite) at high temperatures.

High-alumina refractories are neutral, and they flux or form slags with difficulty; consequently, they are used widely in lead and glass furnaces, clinker-zone linings in Portland cement kilns, in boiler-furnace settings used for high-ash coals, and in blast-furnace regenerators. A list of pyrometric cone equivalent values and chemical analyses

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[1] By C. T. Baroch, ass't. supervising engineer; H. D. Snedden and V. E. Homme, associate metallurgists; and E. T. Schrenk, assistant mineralogist, Bureau of Mines.

of various grades of typical high-alumina brick are given in table 1.[2]

TABLE 1. - Typical analyses of high-alumina refractories

High alumina, class	Analysis, percent			
	50	60	70	80
Al_2O_3	51.5	60.8	70.6	79.4
SiO_2	41.9	33.3	22.8	15.8
TiO_2	2.7	3.0	3.7	2.1
Fe_2O_3	1.8	1.7	1.8	1.7
CaO	.1	.2	.2	.2
MgO	.5	.3	.3	.3
Alkalies	1.2	1.1	1.0	1.0
P.C.E., cone number	34-35	36-37	38	39
Temperature equivalent, °C.	1,773	1,815	1,835	1,865

Specifications for marketable andalusite require a product containing 60 to 65 percent Al_2O_3; it is sold frequently on the basis of a specific gravity ranging between 3.05 and 3.15. The Hawthorne deposits are not directly marketable as an andalusite of refractory grade, because most of the ore contains only 40 to 50 percent Al_2O_3.

Preliminary concentration tests made at the ore-testing laboratories of the Bureau of Mines, Salt Lake City, Utah, early in 1943 included gravity separation by "sink-float;" jigging and tabling methods on minus 1/2-inch, 3-mesh, and 35-mesh ore; electrostatic and electromagnetic separation on gravity separation products; and flotation with fatty acids, cationic re-agents, and alcohols at high, intermediate, and low pH values.

Conclusions reached by the laboratory work showed that Hawthorne andalusite ore could be beneficiated as follows:

1. By table concentration of ore ground to minus 48-mesh and sized; 66.0 percent of the alumina was recovered in a product containing 63.2 percent Al_2O_3 and 35.8 percent SiO_2.

2. By cationic flotation of silica from ore ground to minus 100-mesh; 71.3 percent of the alumina was recovered in a product containing 60.0 percent Al_2O_3 and 39.4 percent SiO_2.

3. By fatty-acid flotation of ore ground to minus 100-mesh; 54.7 percent of the alumina was recovered in a product containing 60.7 percent Al_2O_3 and 37.8 percent SiO_2.

Gravity concentration gave the highest-grade product and represents the simplest method of treatment; therefore, it appears to be the preferable method.

The value of clays and other minerals for refractory purposes can not be determined solely by chemical analyses, as many physical attributes of the materials and variations of processing techniques enter into the quality of a refractory. Consequently, it became apparent early in the investigation that the ultimate use-value of Hawthorne concentrates could be determined only by trial firings. This meant that a sizable quantity of

2 Rochow, W. R., Properties and Applications of Modern Refractories: Chem. and Met. Eng., vol. 42, 1935, p. 76.

concentrates would [illegible] required; therefore, 59 [illegible]s of the ore was shipped to the Boulder City, Nev., pilot plant. This ore was treated by table concentration, and concentrates were made in small lots of different grades and particle sizes for subsequent use in refractory firing tests. The refractory test work probably will be performed partly under cooperative agreements with Pacific-coast refractory manufacturers and partly by Bureau of Mines specialists in nonmetallic minerals.

DESCRIPTION OF THE ORE

The ore deposits are in the southern foothills of the Gillis Range about 10 miles northeast of Hawthorne, Mineral County, Nev. The Federal Geological Survey reports five groups of claims in the district. They are the Green Talc, Dover, Bismarck, Victory, and Deep Mines. The Bureau of Mines has made ore-dressing tests on samples from two of the groups - the Green Talc, controlled by William Rae and John Buich, and the Dover, controlled by B. H. Donnelly and associates. The original (Eriksen) sample tested by the Bureau of Mines is reported by Donnelly to be from his property. The sample treated in the Boulder City pilot mill was taken from the Green Talc group of claims.

Reserves

Little developing has been done, and no mineral reserve has been technically blocked in any of the deposits. Tonnage estimates of inferred mineral are based upon surface outcrops assumed to extend to a depth of 100 feet.

Green Talc group. - The main outcrop is approximately 800 by 200 feet in surface area. If assumed to extend to 100 feet in depth and to be of milling grade, 1,300,000 tons of inferred material is indicated.

Dover group.- No tonnage estimates can be made of mineral in this group because of surface overburden and insufficient development.

Deep Mines group. Andalusite and associated aluminum silicate minerals outcrop over an area 300 by 300 feet. If mineralization is assumed to extend for a depth of 100 feet, 750,000 tons of milling-grade material may exist.

Victory group.- No mineral other than float has been found on this group. It was located recently and no work has yet been done.

Bismarck group.- Aluminum silicate minerals outcrop over an area 50 by 150 feet. If this deposit is assumed to extend to a depth of 100 feet, 62,500 tons of milling-grade minerals might be produced.

Estimated inferred mineral

	Tons
GREEN Talc group	1,300,000
Deep Mines group	750,000
Bismarck group	62,500
	2,112,500
Less 40 percent estimated for inclusions of dikes, quartzite, and submarginal material	845,000
Net	1,267,500

Submarginal material is that having a specific gravity less than 2.9.

The 59 tons of ore received for the test arrived in two truck-and-trailer shipments. The ore of the first truckload was characterized by large, conspicuous masses and veins of green sericite; the ore in the second shipment carried green sericite in small veins only. In general, the material is fine-grained, dense, and quite hard; it is gray to grayish-blue in color except in the zones or veins, in which the pale-green sericite predominates.

The rock appears to have been formed by contact metamorphism brought about by an igneous intrusion into argillaceous country rock and subsequently altered by hydrothermal action.

The principal minerals identified in thin sections include:

1. Andalusite. - Al_2SiO_5; specific gravity 3.16; hardness 7.5; usually breaks into prisms showing cleavage in one or two directions and an uneven fracture; changes to mullite at about 1,350° C. The andalusite in this ore is pale cream to milky white in color. It occurs chiefly as small crystals and remnants of crystals disseminated throughout the rock or occasionally as coarse crystals concentrated in short, thick, lenslike masses. In addition, all of the pale-green sericite veinlets examined contain small crystals of andalusite, typically shown in figure 1. Inclusions of sericite are common within individual andalusite crystals, and it appears that much of the original andalusite has been altered to sericite.

2. Corundum.- Al_2O_3; specific gravity 3.95-4.10; hardness 9; usually breaks into grains having irregular cleavage and uneven to conchoidal fracture; melting point, 2,050° C. Most of the corundum in this ore is deep blue in color, but some varies to almost white. It is disseminated throughout the ore, but areas of concentrated granular corundum are not uncommon. The crystals are very small, show inclusions of mica or mica-like minerals, and occur singly or in small clusters typically as shown in figure 2.

3. Mica. - Variable in composition but essentially acid salts of orthosilicic acid or acid aluminosilicate; specific gravity 2.7; hardness 2-2.25. Muscovite (potassium micas), sericite (fine-grained muscovite), and perhaps some paragonite (sodium mica) are present in the Hawthorne ore. Small books of muscovite were noted, but these are not abundant. However, sericite is abundant and occurs intimately mixed with the andalusite and corundum or independently in pale-green veinlets. Chemical analyses of selected material indicate that if the soda mica, paragonite, $H_2NaAl_3(SiO_4)3$ is present, it is minor as compared to sericite, and that the sericite is low in potash, as shown in table 2.

TABLE 2. - Chemical analysis of pale-green sericite

	Percent		Percent
Al_2O_3	38.40	MgO	0.65
SiO_2	47.19	CaO	.28
Fe_2O_3	.32	TiO_2	.10
K_2O	8.18	B	.08
Na_2O	.76	L.O.I.	4.32

4. Quartz. - SiO_2; specific gravity, 2.5; hardness, 7. Quartz is present throughout all of this material as very small anhedral crystals or else as small, rounded grains up to 0.2 mm. in diameter. It is most abundant as small anhedral grains associated with the sericite.

5. Pyrophyllite.- $H_2Al_2(SiO_3)_4$; specific gravity, 2.8-9; hardness, 1-2. One mica-like constituent of the ore was identified by X-ray and chemical analyses as pyrophyllite. The chemical and physical similarities of this mineral and mica prevent quantitative determination of either when both are present in an ore.

Several accessory minerals, including titanite, magnetite, and hematite, were noted in the thin sections, but their percentage is small. A chemical analysis of the ore is given in table 3.

TABLE 3. - Chemical analysis of ore

	Percent		Percent
Al_2O_3	42.50	Fe_2O_3	0.42
SiO_2	54.20	TiO_2	.77
K_2O	.73	Fe_m	.12
Na_2O	.29	L.O.I., 800° C.	2.13

*Metallic iron from grinding.

Mineralogical analyses were made by using two different techniques on representative portions of the ore, the first at the Boulder City station and the second at the Salt Lake station.

The first mineralogical analysis was made by using a combination of heavy-liquid separation and interpretation of chemical analysis. To assure accuracy, several tests were made and each product was examined under the petrographic microscope. Assuming that quartz, combined silica (mica), corundum, and andalusite are the variables in this ore, the percentage of minerals can be calculated from the chemical analysis if the percentage of corundum is known. Corundum was determined by separation with the heavy liquid methylene iodide, specific gravity 3.325, using a sample ground to pass a 150-mesh screen. The quantity of mica was calculated from the K_2O and Na_2O determined by chemical analysis, but insufficient alkali was present to account for the percentage of micas actually observed with the microscope. It is possible that pyrophyllite, $Al_2O_3 \cdot 4SiO_2 \cdot H_2O$, may be present and that it has been mistaken for sericite, because the optical properties of these two minerals are very similar.[3] If pyrophyllite is present in large amounts correct interpretation of chemical analyses is impossible, because andalusite and pyrophyllite are so closely related chemically and because heavy-liquid separation of pyrophyllite from sericite is not practical. Furthermore, if pyrophyllite is present, the percentage of andalusite and quartz must be reduced. The results of this analysis is given in table 4, column 1.

The second mineralogical analysis was made by microscopic grain count on closely sized and carefully split fractions of the ore, using oils of varying refractive indices to distinguish the various minerals. Corundum was the only mineral identified above the index of refraction of 1.7400. The micaceous minerals and quartz were all found to be below the index of refraction of 1.6031, and all the material above this index was considered to be either andalusite or corundum. A microscopic count was then made on the same fractions, using an oil with an index of refraction of

3 Rogers and Kerr, Optical Mineralogy, 2d ed.: McGraw-Hill Book Co., Inc., New York, 1942, p. 351.

1.7400, and all the material having a higher index was assumed to be corundum. The sample, ground to minus 100-mesh, was sized into eight products by screening and elutriation, and each fraction was weighed. A statistical count of each mineral type was taken on 500 grains in each fraction. The weighted average of the microscopic counts, which represents the volume of the different minerals, was transposed to weight percentage by assuming the gangue to have a specific gravity of 2.8, the andalusite 3.1, and the corundum 3.8. The results are given in table 4, column II.

TABLE 4. - Estimated mineral analysis of heads, specific gravity 2.95

	Weight, percent	
	I	II
Andalusite	30-35	20
Corundum	15-20	20
Mica	20-30	-
Quartz	20-30	-
Titanite	1-2	-
Miscellaneous	5-10	-
Gangue	-	60

The two methods of mineralogical analyses check well regarding the amount of corundum present, but the values for andalusite are controversial. The difference in the latter could be accounted for by the presence of pyrophyllite, which has been reported by others as being present in some samples from the Hawthorne deposits. If it was present in the test sample under consideration, it was evidently too fine-grained to be positively identified with the microscope. Other factors affecting the accuracy of any mineralogical analysis include (1) difficulty of identifying submicroscopic particles produced by grinding to obtain liberation, (2) difficulty of identifying various intermediate decomposition products that occur in the ore, (3) difficulty of obtaining a small sample for microscopic analysis that is wholly representative of the ore.

TEST PROCEDURE AND RESULTS

The original laboratory tests indicated that the valuable minerals were free only at sizes finer than 35-mesh; even finer grinding appears to be necessary to free completely the mineral particles in the ore received for the pilot-plant work. The mineral-dressing tests also showed that the determination of the point at which to make cuts on the table between concentrate, middling, and tailing is difficult because there is little difference in the appearance of these products. Some preliminary tests were made on a small laboratory table using ultraviolet light, with and without filters, and various colored and fluorescent lights, but of these, only white fluorescent light intensified the bluish color of the corundum slightly. A pale wine-colored andalusite, sized to the table feed, was added to the feed in one test to determine whether or not this would act as a guide to give a suitable indication where a separating cut might be made; the method is satisfactory, but a large amount of the colored mineral is required.

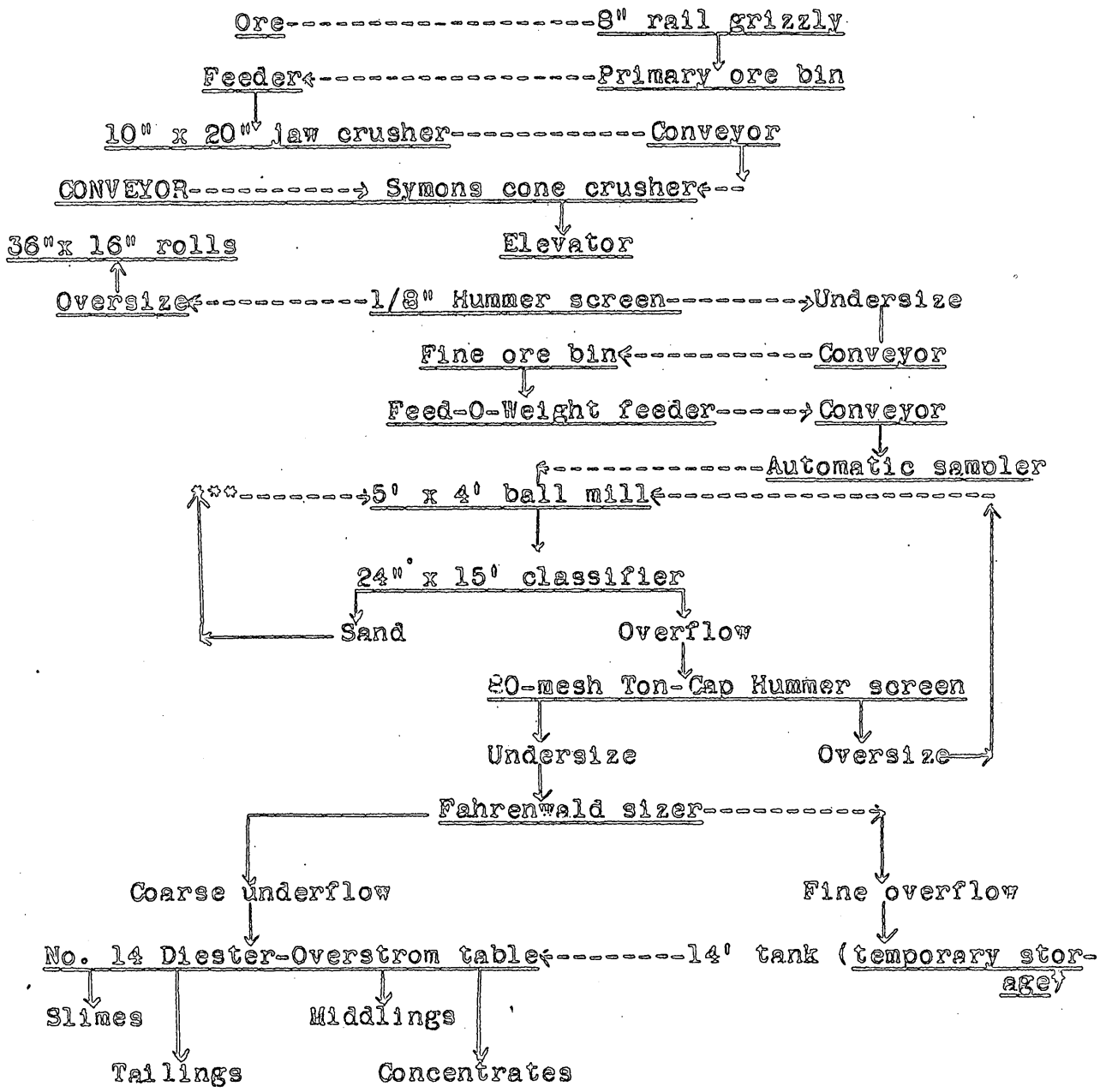
The ultimate control method adopted consisted of specific-gravity determinations and frequent vanner plaque tests on samples of the table products. The bluish corundum could be distinguished readily on the vanner; its presence could be determined in the tailings and middlings,

and the operators soon learned how to appraise the approximate grade of concentrate by the relative amount of the contained blue mineral.

The difference in specific gravity between andalusite, 3.16, and the quartz-mica gangue, 2.6-2.7, is not large, and their gravity separation by tabling requires careful adjustment of feed rate and close sizing of table feed. In the pilot-plant runs, ground ore was hydraulically classified or screen sized, the coarsest fraction tabled directly, and the finer sizes stored in tanks and tabled later. The same table was used for all the classified products. Three flow sheets were used, each varying in the method of preparing and sizing table feed.

First Flow Sheet

The first pilot-mill work was conducted according to the flow sheet shown in figure 3, and a screen analysis of the ball-mill feed is given in table 5.



Figures 3. - First flow sheet.

TABLE 5. - Screen analyses of 1/8-inch ball mill feed

Mesh	Weight, percent	Cumulative, percent
-6+8.	15.67	15.67
-8+10	15.54	31.21
-10+14	16.19	47.40
-14+20.	9.69	57.09
-20+28.	7.08	64.17
-28+35.	5.40	69.57
-35+48.	4.61	74.18
-48+65.	3.32	77.50
-65+100	3.71	81.21
-100+200. . . .	5.46	88.67
-200.	13.33	100.00

Fine ore was fed by means of a Merrick Feed-O-Weight constant-weight feeder, which recorded the weight of the ore. An automatic sampler cut the full stream of ore every 3 minutes. The ball mill, 5 feet in diameter by 4 feet long, was charged with 2,100 pounds of 4-inch balls, 2,250 pounds of 3-inch balls, and 650 pounds of 2-inch balls. The mill operated in closed circuit with a Dorr rake-type classifier 24 inches wide by 15 feet long, the overflow of which was pumped to a Hummer vibrating screen fitted with 80-mesh Ton-Cap sieve wire. Ball-mill feed rate was increased gradually to as high as 2,760 pounds per hour, but this is not the maximum capacity of the mill for this size feed, as very little sand was returned to the mill by the classifier. Pulp discharge from the ball mill contained 50 to 60 percent solids, and the classifier operated at 35 to 40 percent solids.

The original intention was to feed the 80-mesh screen oversize to the table, but flow of this product was too irregular for successful table operation, so the oversize was returned to the ball mill. Screen undersize contained a fair amount of material that was plus 80-mesh and all minus 48-mesh, as measured by standard Tyler sieves. This undersize was pumped to a 6-compartment type C Fahrenwald sizer used as a deslimer rather than as a sizer; overflow from the sizer was stored temporarily in a 14-foot tank, which, in turn, overflowed to a slime thickener and storage tank. The coarse fraction was treated while operating the grinding unit.

Only the cone of the Fahrenwald sizer was used to feed the table. A small amount of hydraulic water added to the cone when operating the grinding circuit removed most of the slime and fines, allowing the coarser particles to be fed to the table with the finer fraction. While tabling the stored overflow material, all of the hydraulic water was turned off, and the sizer was used only as a feeder for the table.

All of the material was tabled on a No. 14 Diester-Overstrom diagonal deck table 4 feet 8-3/4 inches wide at the head-motion end by 8 feet 3-3/4 inches long parallel to the head-motion axis; this table has less than half the area of a standard table with dimensions 6 feet 8-1/2 inches by 14 feet 3 inches. The table was pool-riffled for fine sands or slime separation, the ordinary riffles being 1/8-inch high at the head end by 1/4-inch wide, every eighth riffle was a pool riffle 1/4-inch high. The table speed was 272 strokes per minute, and the length of stroke ranged

from 3/8 to 3/4 inch, the shorter stroke being used on the finer feed. Vanning-plaque tests made in connection with tabling operations, particularly on the finer sizes, indicated that whenever the table was overloaded, fine corundum washed into the slimes and tailings.

A large, white, fluorescent light mounted over the table helped to determine the line of separation between the corundum and middling product, but andalusite was mostly obscured in the middling, and the depth of cut had to be determined by specific-gravity tests. These tests can be made quickly and accurately with the LeChatelier specific-gravity bottle.

To remove grinding iron from the concentrates, a narrow high cut was made on the table. This was treated later with an electromagnet to remove the iron. The remaining fraction, with an average specific gravity of 3.7, analyzed 91.5 percent Al_2O_3 and appeared to be principally corundum.

Six and one-half tons of ore was ground and classified in accordance with the first flow sheet, but the entire circuit was not cleaned out at the end of the run, and some of the finer material and the middling were left over, to be included in subsequent work. This portion of the work was a transitional stage devoted mainly to adapting the results of laboratory test work to large-scale equipment. The grinding procedure of the circuit produced excessive fines, showing that the Hawthorne ore is readily subject to overgrinding; this condition was the paramount reason for the change to the second flow sheet.

Chemical analyses and specific gravities of table products made while producing the second concentrate lot (first flow sheet) are shown in table 6.

TABLE 6. - Chemical analyses and specific gravities of table products, first flow sheet

Material	Specific gravity	Analysis, percent			
		Al_2O_3	SiO_2	Fe_2O_3	TiO_2
CONCENTRATE.	3.28	67.8	28.77	0.85	0.71
MIDDLING.	2.97	44.8	49.00	.43	.92
TAILING	2.85	33.0	57.24	.57	.87
SLIME	2.74	33.1	57.36	2.56	.77

Second Flow Sheet

The second flow sheet was similar to the first, except that a screen with a 1/2-inch opening replaced the 1/8-inch screen in the coarse-crushing section; the rolls were omitted, only the Symons cone crusher being used for secondary crushing, and a 48-mesh Ton-Cap screen replaced the 80-mesh screen used for sizing the ball mill classifier overflow. The screen analysis of table 7 was made on a representative sample of this coarser ore.

TABLE 7. - Analysis of ore crushed through a one-half inch screen

Mesh	Weight, percent	Cumulative, percent
-3/4" + 1/2.	4.27	4.27
-1/2" + 4.	58.30	62.57
-4 + 6	7.90	70.47
-6 + 8	5.70	76.17
-8 + 10.	4.96	81.13
-10 + 14.	3. 23	84.36
-14 + 20	2.89	87.25
-20 + 28	2.25	89.50
-28 + 35	1.90	91.40
-35 + 48	1.48	92.88
-48 + 65	1.38	94.26
-65 + 100.	1.28	95.54
-100 + 200	1.87	97.51
-200	2.49	100.00

Ball mill feed rate on this coarser material was started at a rate of 2,760 pounds per hour and was increased to the maximum continuous capacity of 3,630 pounds per hour while grinding through the 48-mesh Ton-Cap screen. The ball mill discharge pulp was maintained between 50 and 60 percent solids, which was diluted to give a classifier overflow product of between 40 and 45 percent solids. A screen analysis made on a sample of the 48-mesh Ton-Cap screen undersize is shown in table 8.

The coarser crushing and grinding still tended to create an excessive quantity of fines and slimes. For classifying, the cone of the Fahrenwald sizer was eliminated, and the third compartment was used to feed the table. A sample of the coarse table feed from the sizer, taken at the same time as the preceding screen undersize sample, yielded the screen analysis also shown in table 8. A screen analysis of the sizer overflow is given in the last column of table 8.

TABLE 8. - Screen analysis of 48-mesh screen undersize product and Fahrenwald sizer products

Mesh	Weight, percent		
	Screen undersize	Sizer underflow	Sizer overflow
-20+35. . .	0.61	3.41	-
-35+48. . .	7.40	24.06	-
-48+65. . .	7.56	35.74	0.52
-65+100 ...	13.13	23.51	3.57
-100+200. .	21.07	12.34	42.72
-200. . . .	50.23	.94	53.19

Table capacity of the coarser material was 350 to 450 pounds per hour. The small difference in specific gravity of the minerals prevented them from spreading out over the table, causing the entire table feed to follow along the ends of the riffles and to fan out to about 18 inches at the concentrate end. A narrow band of bluish-gray corundum was visible along the upper edge of the fan. The fine table feed formed a much wider corundum band, which was attributed to better liberation and a smaller amount of middling product. The spread of the fan in this case, virtually covered the entire concentrate end of the table, reducing the table capacity to 200 or 250 pounds of dry feed per hour. Tilting the table more would wash the concentrates over the tailing side. Most of the slime and coarse mica washed off the head end of the table, regardless of the feed size.

Approximately 33 tons of minus 1/2-inch ore was milled in accordance with flow sheet 2, producing concentrates 3 to 9, inclusive. Inasmuch as 50 percent of the ore was ground to minus 200-mesh in this circuit, it was decided to attempt a lighter grind and a coarser table feed with additional classification before tabling.

Third Flow Sheet

The third flow sheet is outlined in figure 4. The 2,100 pounds of 4-inch balls in the mill were removed and replaced with an equal weight of 1-1/2-inch balls in an effort to reduce over-grinding. The 48-mesh screen receiving the ball mill classifier overflow product was replaced by a 20-mesh screen, and the undersize from this passed to another rake classifier 24 inches wide by 15 feet long. Classifier sand product passed to the Fahrenwald sizer, where two pockets were used to produce two underflow sized products instead of one as in the previous flow sheets. The coarsest sizer product flowed directly to the table, the intermediate product was stored temporarily in a 7-foot tank, and the sizer overflow was combined with the classifier overflow to be stored in the 14-foot tank.

The change in the ball load did not noticeably affect operation of the ball mill; the maximum feed rate remained at 3,630 pounds per hour. Screen analyses of the classifier sand discharge and the three table feed products are shown in table 9.

TABLE 9. - Screen analyses of classifier and Fahrenwald sizer table feed products, flow sheet 3

	Weight, percent			
Mesh	CLASSIFIER 2 sand discharge	Fahrenwald Coarse	sizer products Intermediate	Classifier and Fahrenwald overflow products
-20+28	6.67	16.74	-	-
-28+35	8.05	17.61	1.60	-
-35+48	12.76	22.61	6.91	-
-48+65	16.88	17.39	14.63	-
-65+100	21.10	11.96	29.26	-
-100+200	21.49	10.87	43.09	16.87
-200	13.05	2.82	4.51	83.13

Approximately 8 tons of ore was treated by the process shown in the third flow sheet and produced concentrates 10 and 11, the former from the coarse and intermediate sizer products and the latter from the classifier and sizer overflows. The middling from this run was stored separately from the middling products made previously and was tabled again later to produce concentrate 14.

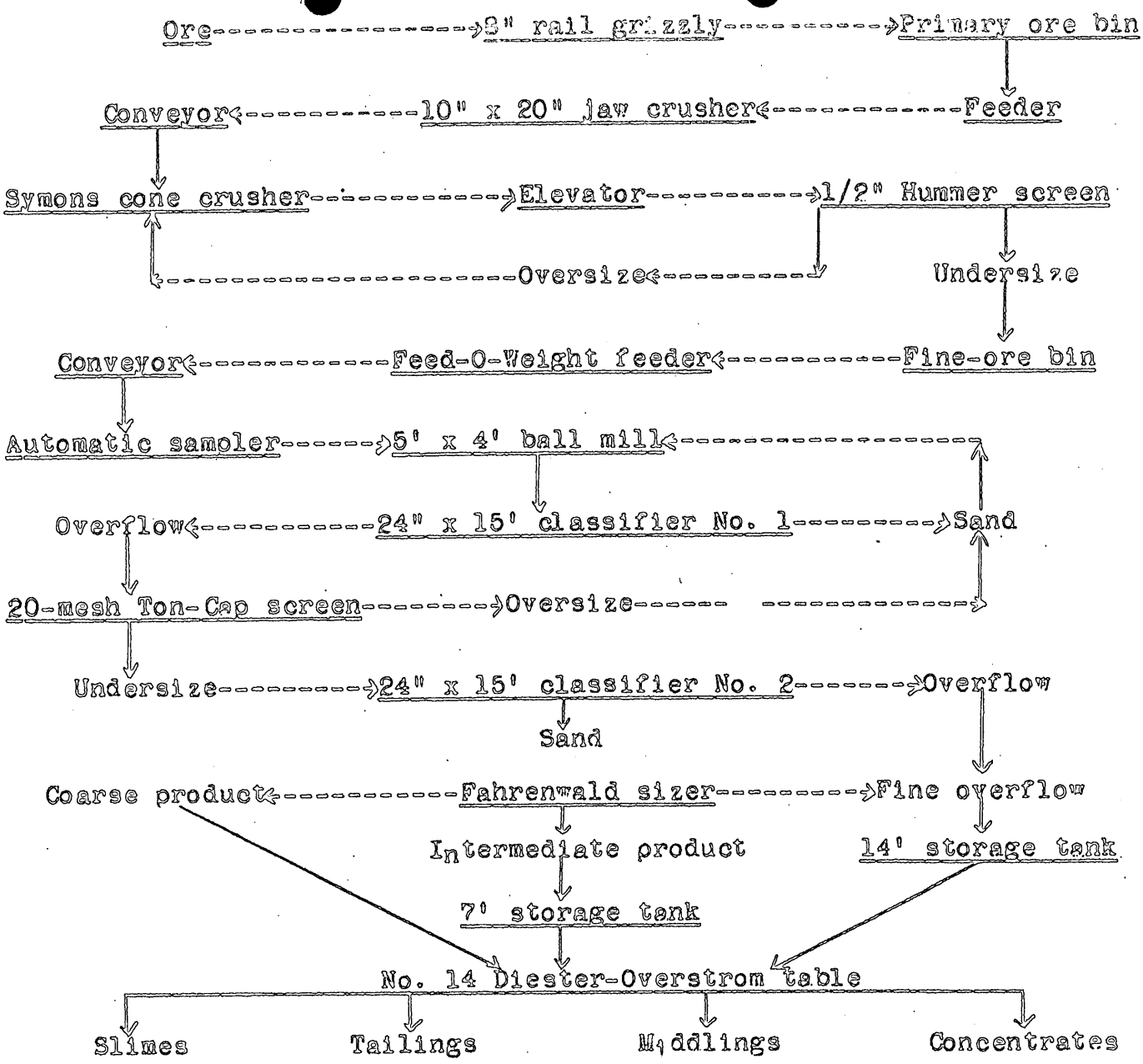


Figure 4. - Third flow sheet

Re-treatment of Middlings

A total of 8.94 tons of various middlings, dry weight, was produced from the 47.5 tons of ore used in the three flow-sheet processes. The middlings contained some free corundum and a fair amount of andalusite, which were recoverable by tabling without regrinding. Partial analyses of the middlings products are given in table 10.

The middlings from the first and second flow-sheet processes were passed over a 100-mesh Hummer screen and separated into a coarse and fine product, each of which was tabled separately to make concentrates 12 and 13, respectively. Middling from the third flow-sheet process was treated separately to produce concentrate 14. The rejected portion of the middling has been called coarse and fine middling tailing in the summarized data.

TABLE 10 - Analyses of middlings

Number	Percent			
	Al_2O_3	SiO_2	Fe_2O_3	TiO_2
1	44.6	46.5	0.99	0.82
2	44.8	49.0	.43	.92
3	41.3	51.2	.49	.61
4	48.9	45.9	.28	.66
5	51.4	42.1	.28	.77
6	47.7	42.6	.35	.92
7	45.2	46.8	.31	1.17
8	47.9	46.3	.35	.92
9	44.4	49.4	.42	.82
Weighted average.	45.3	47.4		

Concentrates and Recovery Data

Weights, particle size, specific gravity, and chemical analyses of all the concentrates are listed in table 11, and the pyrometric cone equivalents for each concentrate are listed in table 12.

The concentrates show a wide range in grade which, excluding the small amount of high-grade corundum recovered as concentrate 16, varied between 52.1 to 72.4 percent Al_2O_3 and 25.2 to 44.9 percent SiO_2. This range of concentrate grade may prove to be valuable, as the main objective of this work was to produce enough high-alumina material so that refractory tests could be made to determine the value of the products.

TABLE 12. - Pyrometric cone equivalents* andalusite-corundum concentrates

Concentrate	Assay, percent		P. C. E. No.	Temperature, °C.
	Al_2O_3	SiO_2		
1	62.6	34.5	37+	1,820+
2	60.4	37.6	37+	1,820+
3	60.3	35.9	38-	1,835-
4	67.6	29.3	38	1,835
5	69.2	28.7	39	1,865
6	67.1	28.7	40	1,885
7	66.3	29.5	38+	1,835+
8	72.4	25.2	38	1,835
9	68.0	30.2	40+	1,885+
10	65.4	33.6	38	1,835
11	65.8	32.3	39+	1,865+
12	52.1	44.9	35+	1,785+
13	62.2	35.7	38+	1,835+
14	52.3	44.1	~~35-~~	1,835-
15	59.0	39.6	~~37.5~~	1,827
16	91.5	5.7	41-	1,970-
17 . . . Composite	62.3	35.1	38	1,835

*As determined by Northwest Experiment Station, Bureau of Mines, Seattle, Wash.

A large proportion [illegible] to Flooding, McBean & Co. at Pittsburg, Calif., for testing their value as a refractory. Other proportionate parts of the concentrates have been distributed within the Bureau of Mines for refractory and other test work.

TABLE 11. - Andalusite-corundum concentrates

Flow sheet	Concentrate	Weight pounds	Particle size*	Specific gravity	CHEMICAL ANALYSES, PERCENT						
					Al_2O_3	SiO_2	Fe_2O_3	TiO_2	K_2O	Na_2O	MnO_2**
1...	1	440	Fine	3.37	62.6	34.5	0.89	0.71	0.27	0.11	0.75
1...	2	640	do.	3.28	60.4	37.6	.98	.71	.29	.03	.13
1-2.	3	1,587	Coarse	3.20	60.3	35.9	.63	.87	.36	.05	.10
2...	4	583	Fine	3.31	67.6	29.3	.42	.77	.25	.02	.05
2...	5	550	do.	3.36	69.2	28.7	.56	.87	.34	.02	.05
2...	6	555	do.	3.36	67.1	28.7	.56	.77	.31	.07	.09
2...	7	1,873	Coarse	3.33	66.3	29.5	.49	.77	.34	.07	.03
2...	8	1,171	do.	3.40	72.4	25.2	.78	.82	.25	.06	.04
2...	9	3,323	Fine	3.33	68.0	30.2	.42	.77	.17	.07	.10
3...	10	752	Coarse	3.27	65.4	33.6	.54	.87	.35	.13	-
3...	11	1,923	Fine	3.28	65.8	32.3	.58	.66	.29	.17	.10
Middling	12	5,214	Coarse	3.08	52.1	44.9	.49	.77	.48	.25	.05
Do..	13	3,030	Fine	3.24	62.2	35.7	.42	.66	.26	.17	.12
Do..	14	221	Coarse	3.10	52.3	44.1	1.09	.77	.53	.19	.08
Clean-up..	15	556	Fine	3.22	59.0	39.6	.41	.77	.38	.07	.70
Hi-grade	16	182	do.	3.76	91.5	5.7	.70	.77	.08	Tr.	.40
Composite		22,605		3.25	62.3	35.1	.53	.76	.32	0.15	-

*The fine size is approximately minus 65-mesh. The coarse size is approximately minus 20-mesh with some minus 100-mesh. **MnO_2 is an extraneous impurity resulting from contact of the ore with launders, pipe lines, and other equipment that had previously been used for manganese milling tests.

Andalusite is marketed on a specification of 60 to 65 percent Al_2O_3 content and a specific gravity of 3.05 to 3.15. Many buyers also specify that 25 to 50 percent of the product should be minus 4- and plus 10-mesh. This latter specification was not met by any of the test products. Furthermore, it does not appear possible that such a specification can be met on the type of ore received, because of the intimate mineralogical association as shown by microscopic examination and in photomicrographs (figs. 1 and 2).

A weighted composite of all the concentrates produced analyzes 62.03 percent Al_2O_3, which would place this material in a class equivalent to a marketable grade of andalusite, provided that mineralogical character and refractoriness prove satisfactory. Material between 50 and 70 percent Al_2O_3 can be composited from the various lots for the refractory tests.

The distribution by weight, the chemical analyses, and specific gravities of the heads, tailings, and concentrates, are given in table 13.

Table [illegible]. [illegible] of [illegible] concentrates

Material	Weight. pounds	Chemical analyses, percent Al_2O_3	SiO_2	Fe_2O_3	TiO_2	K_2O	Na_2O	Sp.g.	P.C.E.*
Concentrate	22,605	62.3	35.1	0.53	0.76	0.32	0.15	3.25	38
Coarse middling tailing. . . .	6,718	37.3	61.4	.19	.87	.66	.17	2.92	31.5
Fine middling tailing . . .	2,706	35.4	62.9	.14	.87	.52	.16	2.90	31+
Tailing. . . .	18,454	36.4	60.8	.19	.77	.61	.19	2.89	32.5-
Slime.	44,600	35.6	61.4	.32	.92	1.14	.17	2.87	31-
Calculated heading . . .	95,083	42.2	55.1	.42	.85	.79	.17	2.97	-
Heading by analysis. . .	-	42.5	54.2	.33	.77	.73	.29	2.95	32

*Pyrometric cone equivalent.

From the table, the ratio of concentration was 4.2 to 1. A lower-grade product containing between 50 and 55 percent Al_2O_3 may prove to be suitable for certain refractory purposes. A product made by combining the concentrates and the middlings as produced in this test operation would contain about 52.5 percent Al_2O_3; such a product would total 32,030 pounds, representing a ratio of concentration of 3.0 to 1.

CONCLUSIONS

1. Over 11 tons of table concentrates, in lots containing 50 to 70 percent Al_2O_3, were made from Hawthorne, Nev. ore. These are to be used for ceramic and refractory tests to determine their value in compounding high-alumina refractories.

2. If a certain standard quality of the concentrates analyzing between 50 and 65 percent Al_2O_3 proves to be of commercial value, such a product can be produced by table concentration. A commercial plant designed to provide well-classified and steady feed rates to tables undoubtedly could produce a fairly uniform product or a series of products varying in grade.

3. Specific-gravity determinations can be made quickly; they are reliable evidence of the product grade and may be used as a method of control in tabling operations.

4. The large proportion of minus 200-mesh fines produced by grinding suggests the possibility that additional recovery might be made by flotation on this material, provided such a product would have a value. The formation of excessive amounts of fines in grinding is apparently an inherent characteristic of the ore, which is a mixture of hard and soft minerals, most of them extremely fine-grained.

5. Economic evaluation of a process for producing concentrates from Hawthorne ore by table concentration will depend upon the outcome of ceramic and refractory tests. Before such an appraisal can be made, the value and grade of a standard concentrate, as well as the use-value of any substandard byproduct, must be determined.

oOo

ANALYSIS OF ANDALUSITE-CORUNDUM ORE SAMPLES
TAKEN FROM VICINITY
OF HAWTHORNE, NEVADA

SAMPLE NO.	LOCATION OF SAMPLING	SAMPLE DESCRIPTION	% IGN. LOSS	AS IS BASIS $\%SiO_2$	$\%Al_2O_3$	$\%Fe_2O_3$
GT-1	Green Talc Claim No. 1 Sample taken from Open Pit on Southwest corner of claim. Location from SW corner of claim, GT-1, 125 N along end line and 160 easterly and parallel to side line.	Gray with green streaks	2.89	40.72	54.30	Trace
GT-2	Green Talc claim No. 1 Sample taken on southern slope of hill approximately 500' easterly from SW corner and 100' N.	Typical ore taken at random	5.30	40.94	50.46	Trace
GT-3	Green Talc Claim No. 1. Sample taken from open cut located 500' easterly, and parallel, from SW corner and 100' N.	Soft light material occuring next to wall rocks-very friable	2.71	66.36	30.32	Slight
GT-4	Same location as GT-1 but taken from right side of open pit.	Wall rock-shale-dark red to black in color	7.93	44.98	26.20	Heavy
GT-14	Sample taken from stock pile of SP.R.R. Station at Thorne	Crushed ore-typical ore-gray-with green streaks	2.82	54.86	42.58	Trace
GT-15	Same location as GT-1 but taken from side of open pit typical overbearing material	Random sample taken for characterization-siliceous appearing	1.27	72.48	24.90	Trace

(Cont. from page 1)

GT-16	Sample location as GT-1	Sample taken from bottom of pit-typical ore	5.40	51.52	42.83	Trace
Bismark 1	Sample taken from Bismark claim 100' Westerly along center line from Disc. monument and 60' N.	Typical ore-blue with gray colors	Sp.Gr.	3.22		
Deep M. No. 1		Random samples-gray with blue spots	Sp. Gr.	3.24		

Analysis performed 8-25-51
by R. B. Holt & C. F. Redeker

R. I. 3895

AUGUST 1946

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

REPORT OF INVESTIGATIONS

EXPLORATION OF THE BLUE METAL CORUNDUM PROPERTY

DOUGLAS COUNTY, NEV.

BY

E. O. BINYON

R.I. 3895,
August 1946.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

EXPLORATION OF THE BLUE METAL CORUNDUM PROPERTY DOUGLAS COUNTY, NEV.[1]

By E. O. Binyon[2]

CONTENTS

	Page
Introduction	1
Acknowledgments	2
Location and communications	2
Physical features and climate	3
Ownership of property	3
History and past production	3
Description of deposit	3
Sampling and analyses	4
Mine workings	5
Work done by the Bureau	5
Beneficiation tests	6

INTRODUCTION

Corundum and andalusite were discovered in August 1944 on what is now known as the Blue Metal group of claims. The property, comprising five unpatented lode claims, is situated 20 miles northwest of Yerington in the Buckskin Mining District, Douglas County, Nevada. An engineer of the Bureau of Mines examined the property on November 1, 1944, and recommended a small amount of drifting and crosscutting to determine more definitely the extent and character of the ore deposit. The work that had been done by the owners was for sampling purposes only and was confined to a few small pits on the outcrop, and no effort had been made to delimit the ore zone. Samples taken from the best surface showings were sent to the experimental station in Salt Lake City for beneficiation tests. The results of the preliminary test work appeared favorable, and upon the strength of them and the recommendations made by the Bureau, 2.5 miles of access road was approved and completed early in 1945. Exploration was started on June 24 and completed September 26, 1945.

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2/ Mining engineer, Reno Division, Mining Branch, Bureau of Mines.

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LOCATION AND COMMUNICATIONS

The property is in sec. 14, T. 13 N., R. 23 E., Douglas County, Nev., on the west slope of the Singatze Range, approximately 20 miles northwest of Yerington, Nev., in Lyon County. Yerington is on the Nevada Copper Belt Railroad and is the business and communication center for mining and farming communities in and around Smith and Mason valleys. Telegraph and telephone services are maintained by the Western Union and Bell telephone systems, respectively.

The Buckskin mine, for which the district is named, is 1-1/2 miles southeast of the property. To reach the Blue Metal property from Yerlington, it is necessary to go west 1 mile on Highway 95 (alt.) to its junction with the Ludwig-Smith Valley road; continue on this for 17.9 miles; at this point leave the Smith Valley road and take the road on the right; continue to bear right for 2.1 miles on the newly constructed road until the main workings are reached. The roads are typical desert roads maintained in fair condition by the County.

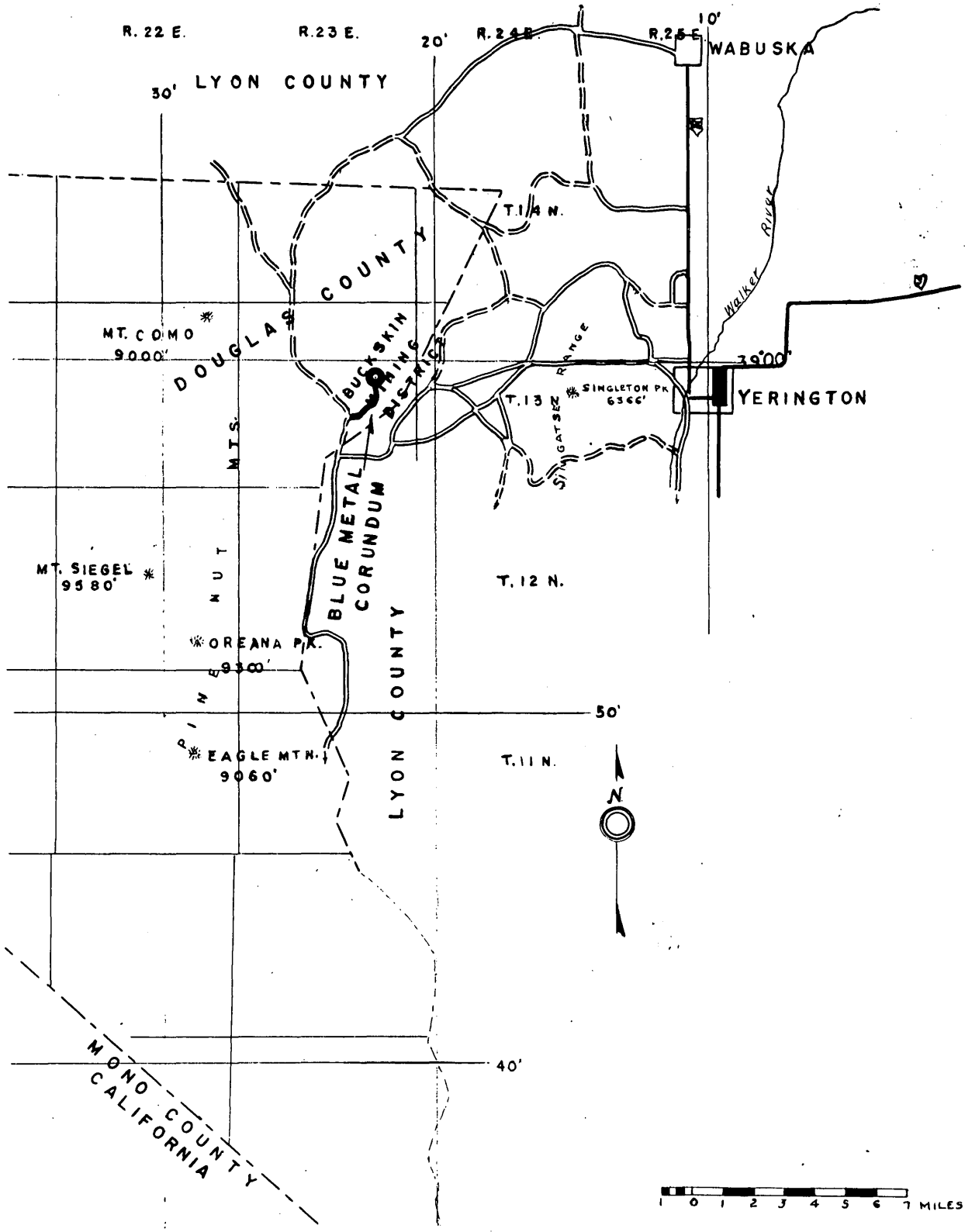


Figure 1. - Location map, Blue Metal corundum property.

PHYSICAL FEATURES AND CLIMATE

No outstanding surface features are noticeable in the immediate vicinity of the property. The relief is moderate and typical of the foothills of the mountain ranges throughout the State. The altitude at the property is approximately 5,800 feet. The foothills merge with Smith Valley to the south and west and rise gradually to the north and east to form a spur, which is a part of the Singatze Range.

Vegetation consists of desert grass and sagebrush, and no timber suitable for mine or other purposes is found on or near the property. A small quantity of water is available from an abandoned shaft on the Blue Metal No. 3 claim. The condition of the shaft, however, made accurate measurement of the quantity or reliability of flow impossible. The requirements for present operations are small and are met by hauling water from wells in Smith Valley, approximately 3 miles distant.

OWNERSHIP OF PROPERTY

The Blue Metal group of claims was located by the present owners, James S. Adams and Alex Castaing, of Yerington, Nev., and Judge Clark J. Guild of Carson City, Nev. The Blue Metal and Blue Metal Nos. 1, 2, and 3 were located in September 1944 shortly after corundum and andalusite were discovered. Blue Metal No. 4 was taken up in August 1945. The ownership is on a partnership basis, and no company has been formed.

HISTORY AND PAST PRODUCTION

Originally the area included by the Blue Metal group of claims was prospected for gold. A shaft, reported to be 150 feet in depth, was sunk, and a short adit was driven on what is now the Blue Metal No. 3, and many shallow open cuts were dug on the other claims in a search for gold. A small gold ore production from the shaft is reported; there are, however, no records of the quantity or value of the ore produced. Total gross value of copper, gold, and iron ores and gypsum produced in the Buckskin district is $79,284.

The discovery of corundum and andalusite in August 1944 led to relocation of the ground by the present owners in September of that year. Only a very small amount of work was done on the best surface showing, and no corundum-andalusite ore was mined or shipped from the property.

DESCRIPTION OF THE DEPOSIT

Corundum and andalusite, intimately associated, occur as small aggregates sparsely scattered throughout shear zones in highly altered andesite, the country rock. The highly altered condition of the andesite has been caused by an intrusion of granodiorite which is exposed on the north, south, and west of the andesite. Later intrusions by several lamprophyric dikes further altered the andesites to the point where recognition is very difficult. Silicification is fairly widespread in the immediate vicinity of the property,

and those areas subjected to silicifying action stand out as prominent ridges within the country rock.

A few small shear zones widely and irregularly scattered over the property, varying in thickness from 2 to 50 feet, are composed of a sericitic or talcose rock in which the corundum and andalusite occur. The main shear zone, containing the best showing of ore, is approximately 300 feet long by 50 feet wide. It strikes N. 25° to 30° E. and dips steeply to the northwest. In only a relatively small portion of the zone, however, is corundum or andalusite found. The aggregates, the largest of which is only a few square feet in area, are confined to an area approximately 50 by 75 feet within the sericitic or talcose zone (fig. 2).

The better-grade ore is easily distinguishable from the altered andesite and sericitic material by a distinctive dark-blue color imparted to it by the corundum. Few if any well-formed crystals of either the corundum or andalusite were noted. No doubt the grinding and crushing action within the shear zone has obliterated crystal forms.

The deposit is comparatively shallow, which is fairly well proven by the work done by the Bureau. The deepest point below the outcrop in the adit is only 70 feet, and no corundum or andalusite was found either in passing through the shear zone or in the crosscut, which penetrated the zone for 23 feet.

It is possible, however, that both the adit and crosscut penetrated a barren portion of the shear zone, but, judging from the extremely small and irregular occurrence of the corundum and andalusite on the surface, it is doubtful that any sizeable aggregates of these minerals will be found within the shear zone.

SAMPLING AND ANALYSES

During the project, no samples were taken from the surface exposures of corundum and andalusite. Analysis of the sample taken from the pits directly above the adit and sent to the experimental station in Salt Lake City for test work is as follows:

Percent								
Al_2O_3	Fe	CaO	MgO	SiO_2	Na_2O	K_2O	LOI	TiO_2
40.0	0.31	0.8	.05	50.7	0.13	0.23	6.85	0.52

This sample is representative of only that portion of the outcrop in which it is possible to see the bluish color given it by the corundum and andalusite.

Nine samples were taken from the ore zone cut by the adit. The location and analyses are given below:

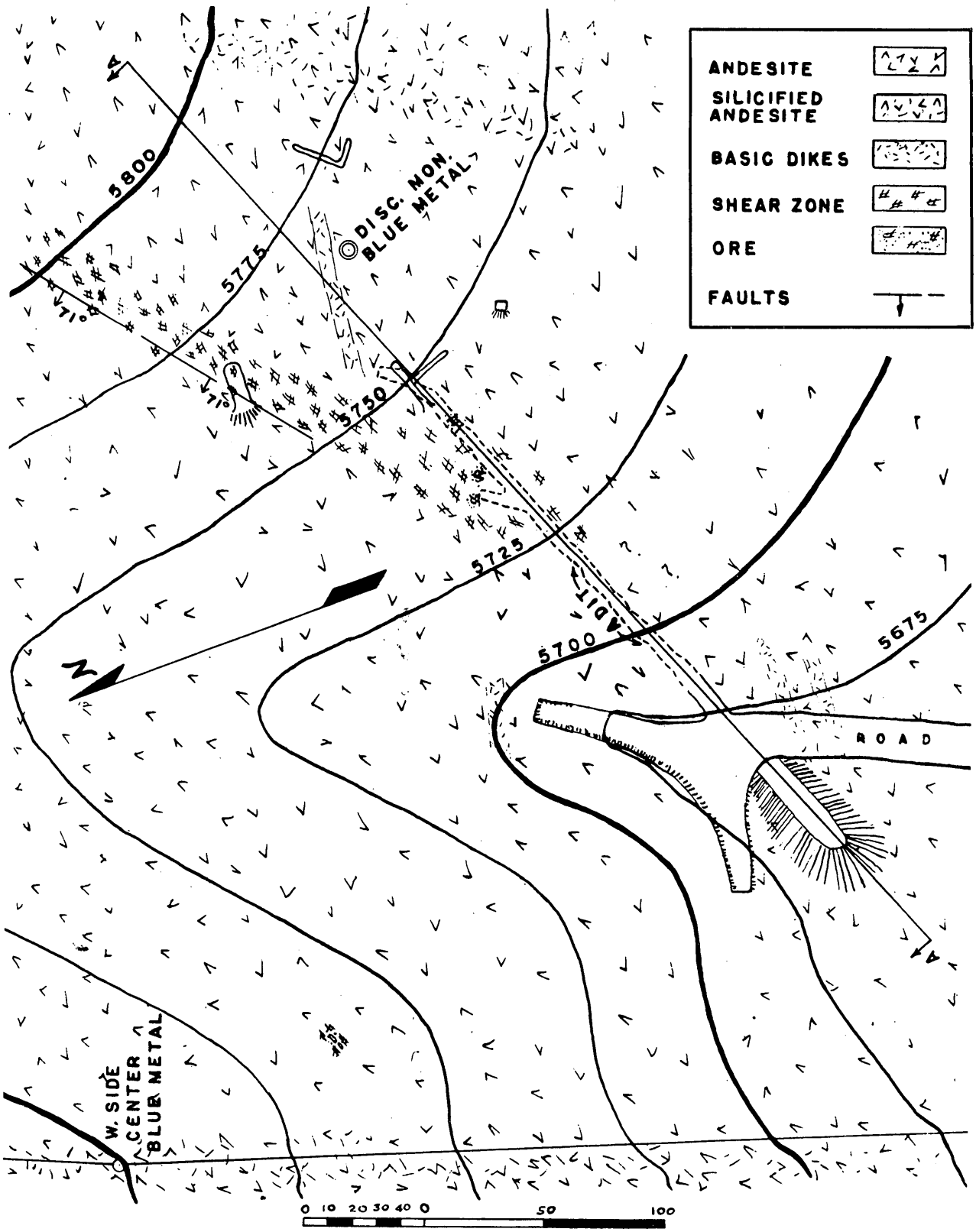


Figure 2. - Geologic and surface map, Blue Metal corundum property.

Sample No.	Type	Location	Percent					Oz/ton	
			Al_2O_3	SiO_2	MgO	Fe_2O_3	LOI	Au	Ag
1	Grab (fines)	0+90 to 0+98	17.2	75.1	0.28	-	-	-	-
2	Grab (coarse)	do.	27.7	63.22	0.22	-	-	-	-
3	Grab (fines)	0+90 to 0+125	22.2	70.48	0.21	-	-	-	-
4	Grab (coarse)	do.	21.0	71.18	0.29	-	-	-	-
5*	Face	TiO_2 - 73.65							
6	Chip, face of drift	0+155						Tr	Tr
7	Chip, left of drift	0+153 to 0+154						Tr	Tr
8	Chip, right of drift	do.						Tr	Tr
9	Channel, right of drift	0+91 to +140 (2" x4")	21.05	69.14	-	0.78	5.11	-	-
Note:									
10	Chip	20+5 in crosscut	21.30	73.32			4.84		

* Sample 5 (a concentrate made from sample 3) was made purely for qualitative purposes, and was assayed for TiO_2 in order to determine the fine, black mineral that was disseminated through some of the sericitic material.

Complete analyses of the samples were not considered necessary, inasmuch as the low alumina content indicated that either there was only a very small amount of corundum and andalusite, or none at all, present in the samples. The silica content is higher than normal for typical andesite, but this can be attributed to the fact that the country rock has been subjected to silicifying action by the granodiorite intrusion. Alumina content is not much higher than that of the andesite and many other igneous rocks, and the amount of alumina present indicates that no economically important concentration of the corundum or andalusite is present in that part of the shear cut by the adit and crosscut.

MINE WORKINGS

Development work on the corundum and andalusite outcrop on the property consisted of a few shallow pits. This work was done on the only outcrops of corundum and andalusite, in what is considered to be the main shear zone, and apparently no effort was made to delimit the ore zone. All of the work was confined to a 50- by 50-foot area and was for sampling purposes only.

Many shallow trenches and open cuts are scattered over the property, and on the Blue Metal No. 3 claim there is a shaft approximately 150 feet in depth, and a short adit. This work was done in the early 1900's in search of gold. No corundum or andalusite is found in the vicinity of the old workings.

WORK BY THE BUREAU OF MINES

Work by the Bureau consists of an adit 200 feet long and a 23-foot crosscut off the adit.

After completion of the adit to a length of 175 feet (station 0+175), work was suspended for almost a month. On September 14 work was resumed, and it was decided to drive the adit another 25 feet and to change the bearing slightly to the north in order to cut through a basic dike that had entered the adit at station 0+165. No change in the character of the rock on the footwall of the dike was noted, and work on the adit was stopped at 0+200.

A crosscut off the adit, bearing N. 26° E., was started at station 0+115 and driven 23 feet along the strike of the sericitic zone. This was approximately the middle of the sericitic zone, and it was thought that the possibility of finding ore was somewhat better than if the zone had been cut by a series of crosscuts. No corundum or andalusite was found.

All work was done under contract, the contractor furnishing all supplies, equipment, and labor. The work was started on June 25, 1945, and ended September 26, 1945.

BENEFICIATION TESTS

Beneficiation tests by the Bureau's experimental station in Salt Lake City were done on a sample of the higher-grade ore taken from the shallow surface pits directly above the adit and 150 feet from the portal. The purpose of the tests was to determine the best method of concentration and the type of concentrate that could be made by the method selected.

The report on the results of the test work is quoted below.

> Test work was conducted on a sample of corundum-andalusite ore from the Blue Metals prospect, Douglas County, Nevada.
>
> Mineralogically, this ore is composed of micaceous alteration products, andalusite, corundum, quartz, and rutile. A microscopic grid grain "count" indicated that there was 7 to 9 percent corundum by weight and 11 to 14 percent andalusite by weight.
>
> Petrographic examination of several thin sections shows that the corundum, andalusite, and rutile occur in small aggregates and also along fracture planes. The aggregates of these three minerals are approximately 48-mesh. Rutile ranges in size from minus 100- to plus 400- (theoretical) mesh and is well-formed in short prismatic crystals. The corundum and andalusite are intimately associated in the aggregates and the grain size of the andalusite ranges from minus 65- to plus 200-mesh. The corundum ranges in size from minus 100- to plus 400- (theoretical) mesh. Both the corundum and andalusite crystals have cryptocrystalline inclusions of quartz and micaceous gangue. The corundum and andalusite are altering to micaceous minerals, and no well-developed crystals of corundum were observed. The physical structure of the fine corundum is such that even if liberated from andalusite it is doubtful that it would meet abrasive specifications.

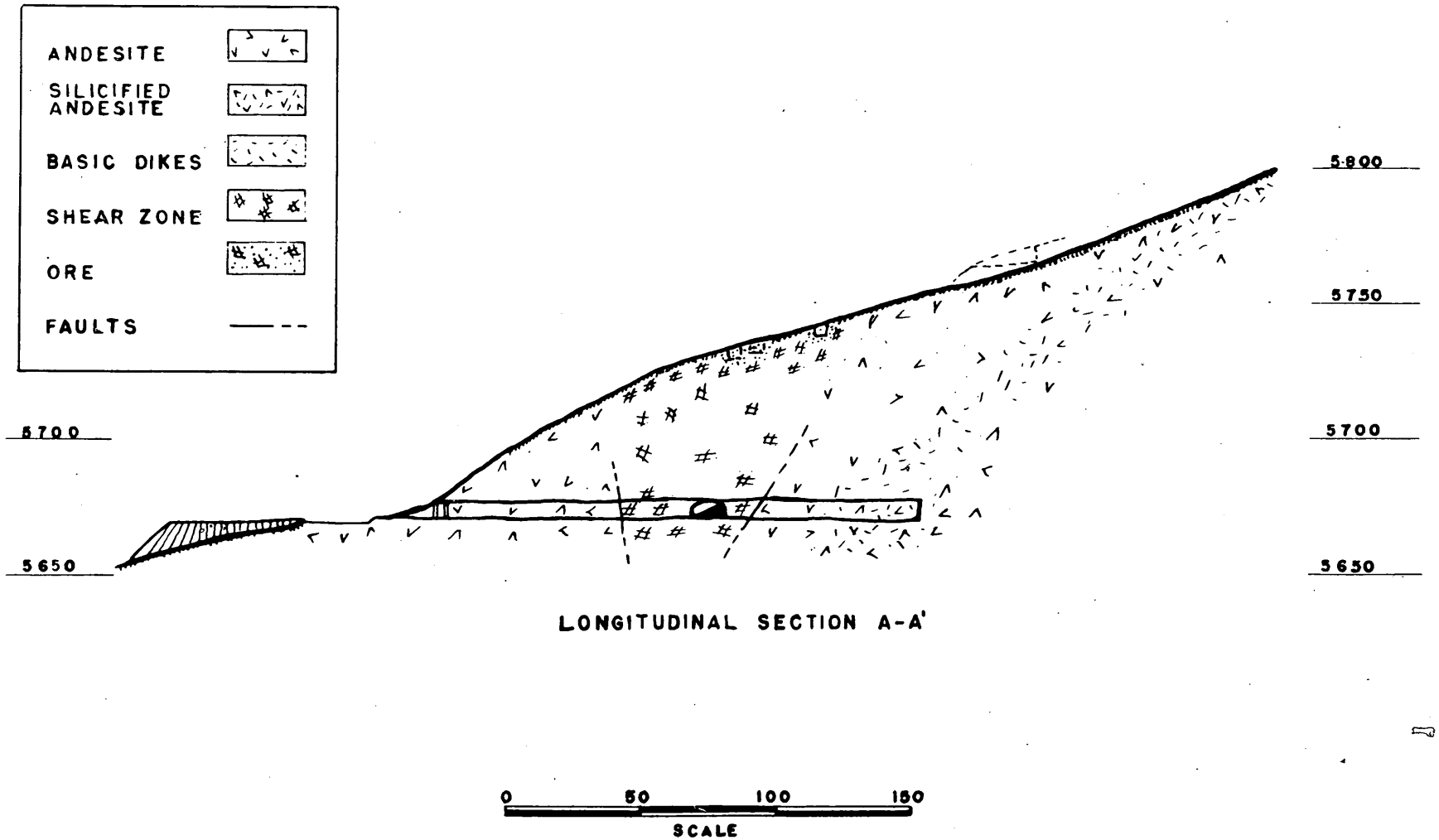


Figure 3. - Longitudinal section A-A', Blue Metal corundum property.

Beneficiation

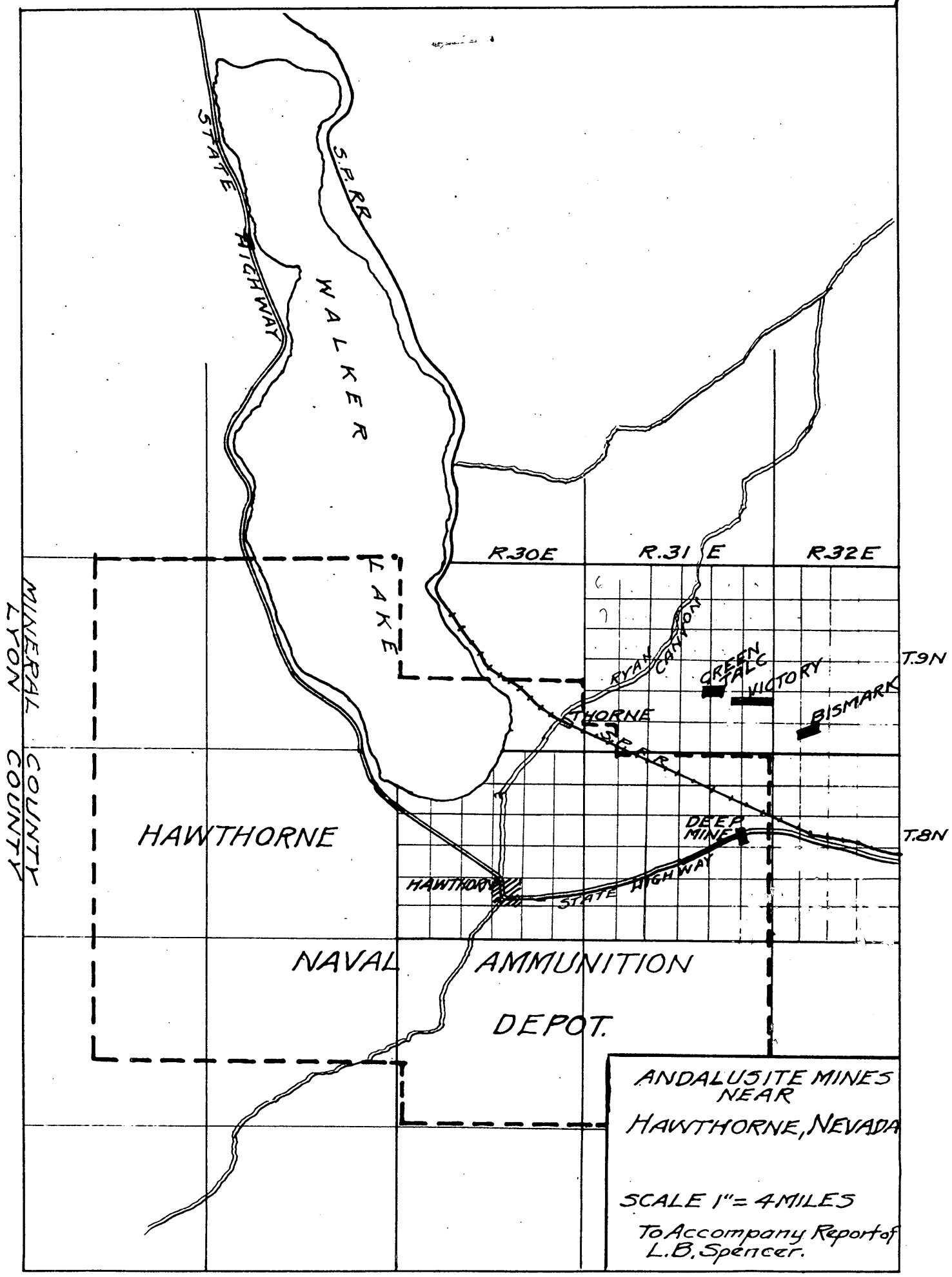
A sample of the ore was roll-crushed to 20-mesh and screened on 35- and 65-mesh. The minus 20-mesh and plus 35-mesh fraction was tabled; tailings were rejected, and the concentrate was reground to minus 35-mesh and screened on 65-mesh. All of the minus 35- plus 65-mesh material was tabled, and tailings were rejected. The concentrates were reground to minus 65-mesh, combined with the remainder of the minus 65-mesh material, deslimed, and tabled. A rutile product, two corundum concentrates, a middling, and a tailing were obtained from the minus 65-mesh material. The rutile product contained only 14.8 percent of the titanium and assayed 16.0 percent TiO_2. Recoveries in the combined corundum concentrate, based on microscopic estimates of 38.2 percent corundum and 44.5 percent andalusite, were 78.4 percent of the corundum and 55.3 percent of the andalusite; the chemical analysis of the combined product was 78.0 percent Al_2O_3, 17.0 percent SiO_2, 1.36 percent TiO_2, and 0.9 percent Fe. An additional 20.5 percent of the corundum and 19.8 percent of the andalusite could be obtained by combining table middlings with the corundum products; however, the estimated grade of the combined products would be lowered to 27.5 percent corundum and 34.4 percent andalusite. This product probably would meet specifications for refractory uses, as it assayed 62 percent Al_2O_3 and 31 percent SiO_2.

These beneficiation tests were run for purpose of liberating and concentrating abrasive quality corundum. Although abrasive corundum was not recoverable, this ore probably could be used for preparing high-alumina refractories. In this case fine grinding would not be necessary, and 20- to 35-mesh comminution would suffice.

Flotation of corundum from ore ground to 100-mesh and deslimed gave neither high recovery nor high-grade products. Only low-grade combined corundum-andalusite concentrates were recovered. The chemical assay of the combined product was 62.2 percent R_2O_3. Numerous reagent combinations were employed, but in no case was a successful separation obtained.

Summarizing the results of test work on the Blue Metals corundum-andalusite ore, relatively fine grinding was necessary in attempting to liberate the mineral constituents. Even at 65-mesh sizes, poor liberation was obtained; both corundum and andalusite were recovered in a combined concentrate, and hence the abrasive uses of the product would be limited. For refractory purposes a combined corundum-andalusite product could be obtained at coarser sizes and still assay 60 percent Al_2O_3.

No high-grade corundum products were obtained by tabling, even at minus 65-mesh sizes. However, 99 percent of the corundum and 75 percent of the andalusite were recovered in a combined product that assayed 62.2 percent Al_2O_3, 31.4 percent SiO_2, and 1.0 percent TiO_2. Recoveries by straight flotation treatment were unsatisfactory.


STATE HIGHWAY
S.P.RR
WALKER
LAKE
R.30E
R.31 E
R.32E
T.9N
T.8N
MINERAL COUNTY
LYON COUNTY
RYAN CANYON
GREEN VALLEY
VICTORY
BISMARK
THORNE
S.P.RR
DEEP MINE
HAWTHORNE
STATE HIGHWAY
HAWTHORNE
NAVAL AMMUNITION DEPOT.
ANDALUSITE MINES NEAR HAWTHORNE, NEVADA
SCALE 1" = 4 MILES
To Accompany Report of L.B. Spencer.

R.I. 3895
August 1946

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

EXPLORATION OF THE BLUE METAL CORUNDUM PROPERTY DOUGLAS COUNTY, NEV.[1]

By E. O. Binyon[2]

CONTENTS

	Page
Introduction	1
Acknowledgments	2
Location and communications	2
Physical features and climate	3
Ownership of property	3
History and past production	3
Description of deposit	3
Sampling and analyses	4
Mine workings	5
Work done by the Bureau	5
Beneficiation tests	6

INTRODUCTION

Corundum and andalusite were discovered in August 1944 on what is now known as the Blue Metal group of claims. The property, comprising five unpatented lode claims, is situated 20 miles northwest of Yerington in the Buckskin Mining District, Douglas County, Nevada. An engineer of the Bureau of Mines examined the property on November 1, 1944, and recommended a small amount of drifting and crosscutting to determine more definitely the extent and character of the ore deposit. The work that had been done by the owners was for sampling purposes only and was confined to a few small pits on the outcrop, and no effort had been made to delimit the ore zone. Samples taken from the best surface showings were sent to the experimental station in Salt Lake City for beneficiation tests. The results of the preliminary test work appeared favorable, and upon the strength of them and the recommendations made by the Bureau, 2.5 miles of access road was approved and completed early in 1945. Exploration was started on June 24 and completed September 26, 1945.

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REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

EXPLORATION OF THE BLUE BELL GROUP, LOCATED DOUGLAS COUNTY, ORE.-1/

By R. D. Stevens2/

CONTENTS

	Page
Introduction	1
Acknowledgments	2
Location and communications	2
Topical features and climate	2
Ownership of property	2
History and past production	2
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INTRODUCTION

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The property is in sec. 14, T. 13 N., R. 23 E., Douglas County, Nev. on the west slope of the Singatze Range, approximately 20 miles northwest of Yerington, Nev., in Lyon County. Yerington is on the Nevada Copper Belt Railroad and is the business and communication center for mining and farming communities in and around Smith and Mason valleys. Telegraph and telephone services are maintained by the Western Union and Bell telephone systems, respectively.

The Buckskin mine, for which the district is named, is 1-1/2 miles southeast of the property. To reach the Blue Metal property from Yerington, it is necessary to go west 1 mile on Highway 95 (alt.) to its junction with the Ludwig-Smith Valley road; continue on this for 17.9 miles; at this point leave the Smith Valley road and take the road on the right; continue to bear right for 2.1 miles on the newly constructed road until the main workings are reached. The roads are typical desert roads maintained in fair condition by the County.

PHYSICAL FEATURES AND CLIMATE

No outstanding surface features are noticeable in the immediate vicinity of the property. The relief is moderate and typical of the foothills of the mountain ranges throughout the State. The altitude at the property is approximately 5,800 feet. The foothills merge with Smith Valley to the south and west and rise gradually to the north and east to form a spur, which is a part of the Singatze Range.

Vegetation consists of desert grass and sagebruch, and no timber suitable for mine or other purposes is found on or near the property. A small quantity of water is available from an abandoned shaft on the Blue Metal No. 3 claim. The condition of the shaft, however, made accurate measurement of the quantity or reliability of flow impossible. The requirements for present operations are small and are met by hauling water from wells in Smith Valley, approximately 3 miles distant.

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The discovery of corundum and andalusite in August 1944 led to relocation of the ground by the present owners in September of that year. Only a very small amount of work was done on the best surface showing, and no corundum-andalusite ore was mined or shipped from the property.

DESCRIPTION OF THE DEPOSIT

Corundum and andalusite, intimately associated, occur as small aggregates sparsely scattered throughout shear zones in highly altered andesite, the country rock. The highly altered condition of the andesite has been caused by an intrusion of grandiorite which is exposed on the north, south, and west of the andesite. Later intrusions by several lamprophyric dikes further altered the andesites to the point where recognition is very difficult. Silicification is fairly widespread in the immediate vicinity of the property, and those areas subjected to silicifying action stand out as prominent ridges within the country rock.

A few small shear zones widely and irregularly scattered over the property, varying in thickness from 2 to 50 feet, are composed of a sericitic or talcose rock in which the corundum and andalusite occur. The main shear zone, containing the best showing of ore, is approximately 300 feet long by 50 feet wide. It strikes N. 25° to 30° E. and dips steeply to the northwest. In only a relatively small portion of the zone, however, is corundum or andalusite found. The aggregates, the largest of which is only a few square feet in area, are confined to an area approximately 50 by 75 feet within the sericitic or talcose zone (fig. 2).

The better-grade ore is easily distinguishable from the altered andesite and sericitic material by a distinctive dark-blue color imparted to it by the corundum. Few if any well-formed crystals of either the corundum or andalusite were noted. No doubt the grinding and crushing action within the shear zone has obliterated crystal forms.

The deposit is comparatively shallow, which is fairly well proven by the work done by the Bureau. The deepest point below the outcrop in the adit is only 70 feet, and no corundum or andalusite was found either in passing through the shear zone or in the cross cut, which penetrated the zone for 23 feet.

It is possible, however, that both the adit and crosscut penetrated a barren portion of the shear zone, but, judging from the extremely small and irregular occurrence of the corundum and andalusite on the surface, it is doubtful that any sizeable aggregates of these minerals will be found within the shear zone.

SAMPLING AND ANALYSES

During the project, no samples were taken from the surface exposures of corundum and andalusite. Analysis of the sample taken from the pits directly above the adit and sent to the experimental station in Salt Lake City for test work is as follows:

Percent								
Al_2O_3	Fe	CaO	MgO	SiO_2	Na_2O	K_2O	LOI	TiO_2
40.0	0.31	0.8	.05	50.7	0.13	0.23	6.85	0.52

This sample is representative of only that portion of the outcrop in which it is possible to see the bluish color given it by the corundum and andalusite.

Nine samples were taken from the ore zone cut by the adit. The location and analyses are given below:

shaftor ocean sats were dug on the other claims in a search for gold. A small gold ore production from the shaft is reported; there are, however, no records of the quantity or value of the ore produced. Total gross value of copper, gold, and iron ores and gypsum produced in the Sonsakin district is $73,254.

The discovery of corundum and andalusite in August 1944 led to relocation of the ground by the present owners in September of that year. Only a very small amount of work was done on the best surface showing, and no corundum-andalusite ore was mined or shipped from the property.

DESCRIPTION OF THE DEPOSIT

Corundum and andalusite, intimately associated, occur as small aggregates sparsely scattered throughout sheer zones in highly altered andesite, the country rock. The highly altered condition of the andesite has been caused by an intrusion of granodiorite which is exposed on the north, south, and west of the andesite. Later intrusions by several lamprophyric dikes further altered the andesites to the point where recognition is very difficult. Silicification is highly pronounced in the immediate vicinity of the lamprophyre, and these areas embedded in silicified cotton stand out as resistant ridges within the country rock.

A few small shear zones widely and irregularly scattered over the property, varying in thickness from 2 to 30 feet, are composed of a mixture of talcose rock in which the corundum and andalusite occur. The main shear zone, containing the best showing of ore, is approximately 270 feet long by 30 feet wide. It strikes N. 25° to 50° E. and dips steeply to the northwest. In only a relatively small portion of the zone, however, is corundum or andalusite found. The aggregates, the largest of which is only a few square feet in area, are confined to an area approximately 60 by 75 feet within the sericite or talcose zone (Fig. 3).

The better-grade ore is easily distinguishable from the altered andesite and sericite material by a distinctive dark-blue color imparted to it by the corundum. Few if any well-formed crystals of either the corundum or andalusite were noted. No doubt the grinding and crushing action along the shear zone has obliterated crystal forms.

The deposit is comparatively shallow, which is fairly well proven by the work done by the Dupont. The deepest point below the surface in this pit is only 70 feet, and no corundum or andalusite was found dipping in vertically through the shear zone or in the cross cut, which penetrated the zone for 20 feet.

It is possible, however, that both the pit and crosscut penetrated a barren portion of the shear zone, but, judging from the extremely erratic and irregular occurrence of the corundum and andalusite on the 7 surfaces, it is doubtful that any sizeable aggregates of these minerals will be found within the shear zone.

SAMPLING AND ANALYSES

During the project, no samples were taken from the surface exposures of corundum and andalusite. Analysis of the sample taken from the pit directly above the pit and cast to the experimental station in Salt Lake City for test work is as follows:

Percent								
Alcoa	Fe	CaO	SiO2	MgO	K2O	LOI	TiO2
50.5	0.21	0.6	.06	50.7	0.18	0.25	0.89	5.46

This sample is representative of only that portion of the pulpout in which it is possible to see the bluish color given it by the corundum-andalusite.

Nine samples were taken from the ore zone out by the pit. The location and analyses are given below:

Sample No.	Type	Location	Percent Al_2O_3	SiO_2	MgO	Fe_2O_3	LOI	Oz/ton Au	Ag
1	Grab-(fines)	0+90 to 0+98	17.2	75.1	0.28	-	-	-	-
2	Grab (coarse)	do.	27.7	63.22	0.22	-	-	-	-
3	Grab (fines)	0+90 to 0+125	22.2	70.48	0.21	-	-	-	-
4	Grab (coarse)	do.	21.0	71.18	0.29	-	-	-	-
5*	Face	TiO_2 - 73.65							
6	Chip, face of drift	0+155						Tr	Tr
7	Chip, left of drift	0+153 to 0+154						Tr	Tr
8	Chip, right of drift	do.						Tr	Tr
9	Channel, right of drift	0+91 to +140 (2" x4")	21.15	69.14	-	0.78	5.11	-	-
Note:									
10	Chip	20+5 in crosscut	21.30	73.32			4.84		

* Sample 5 (a concentrate made from sample 3) was made purely for qualitative purposes, and was assayed for TiO_2 in order to determine the fine, black mineral that was disseminated through some of the sericitic material.

Complete analyses of the samples were not considered necessary, inasmuch as the low alumina content indicated that either there was only a very small amount of corundum and andalusite, or none at all, present in the samples. The silica content is higher than normal for typical andesite, but this can be attributed to the fact that the country rock has been subjected to silicifying action by the granodiroite intrusion. Alumina content is not much higher than that of the andesite and many other igneous rocks, and the amount of alumina present indicates that no economically important concentration of the corundum or andalusite is present in that part of the shear cut by the adit and crosscut.

MINE WORKINGS

Development work on the corundum and andalusite outcrop on the property consisted of a few shallow pits. This work was done on the only outcrops of corundum and andalusite, in what is considered to be the main shear zone, and apparently no effort was made to delimit the ore zone. All of the work was confined to a 50-by 50-foot area and was for sampling purposes only.

Many shallow trenches and open cuts are scattered over the property, and on the Blue Metal No. 3 claim there is a shaft approximately 150 feet in depth, and a short adit. This work was done in the early 1900's in search of gold. No corundum or andalusite is found in the vicinity of the old workings.

WORK BY THE BUREAU OF MINES

Work by the Bureau consists of an adit 200 feet long and a 23-foot crosscut off the adit.

After completion of the adit to a length of 175 feet (station 0+175), work was suspended for almost a month. On September 14 work was resumed, and it was decided to drive the adit another 25 feet and to change the bearing slightly to the north in order to cut through a basic dike that had entered the adit at station 0+165. No change in the character of the rock on the footwall of the dike was noted, and work on the adit was stopped at 0+200.

A crosscut off the adit, bearing N. 26°/E., was started at station 0+115 and driven 23 feet along the strike of the sericitic zone. This was approximately the middle of the sericitic zone, and it was thought that the possibility of finding ore was somewhat better than if the zone had been cut by a series of crosscuts. No corundum or andalusite was found.

All work was done under contract, the contractor furnishing all supplies, equipment, and labor. The work was started on June 25, 1945, and ended September 26, 1945.

Sample No.	Type	Location	Percentage Alumina	Silica	Ferric Oxide	Titania	Lime	Magnesia	Ignition Loss
1	Grab-(fines)	0+00 to 0+38	17.2	76.1	0.05	-	-	-	-
2	Grab (coarse)	do.	27.7	65.22	0.09	-	-	-	-
3	Grab (fines)	0+00 to 0+18	22.2	70.45	0.03	-	-	-	-
4	Grab (coarse)	do.	21.0	73.38	0.09	-	-	-	-
5*	Face	7+09 - 7+.35							
6	Cut, face of drift	0+105						Tr	Tr
7	Cut, left of drift	0+105 to 0+.5m						Tr	Tr
8	Cut, right of drift	do.						Tr	Tr
9	Channel, right of drift	0+21 to 1+00 (ga 4a")	21.15	65.14	-	0.25	0.11	-	-
Note: 10	Cut	2045 in crosscut	21.30	75.25					4.24

* Sample 5 (a concentrate made from sample 5) was made solely for qualitative purposes, and was assayed for TiO2 in order to determine the kind of mineral that was disseminated through some of the metallic material.

Complete analyses of the samples were not considered necessary, inasmuch as the low alumina content indicates that either there was only a very small amount of corundum and emeralite, or none at all, present in the samples. The silica content is higher than normal for typical emeralite, but this can be attributed to the fact that the country rock has been subjected to silicifying action by the pneumatolytic intrusion. Alumina content is not much higher than that of the emeralite and many other igneous rocks, and the amount of alumina present indicates that no economically important concentration of the corundum or emeralite is present in that part of the cleavage by the adit and crosscut.

MINE WORKINGS

Development work on the corundum and emeralite outcrops on the property consisted of a few shallow pits. This work was done on the only outcrops of corundum and emeralite, in what is considered to be the main cleavage zone, and apparently no effort was made to delimit the ore zone. All of the work was confined to a 30-by 30-foot area and was for sampling purposes only.

Many shallow trenches and open cuts are scattered over the property, and on the Blue Metal No. 2 claim there is a shaft approximately 180 feet in depth, and a short adit. This work was done in the early 1900's in search of gold. No corundum or emeralite is found in the vicinity of the old workings.

WORK BY THE BUREAU OF MINES

Work by the Bureau consists of an adit 500 feet long and a 50-foot crosscut off the adit.

After completion of the adit to a length of 175 feet (station 0+75), work was suspended for almost a month. On September 14 work was resumed, and it was decided to drive the adit another 50 feet and to change the bearing slightly to the north in order to cut through a vein that had entered the adit at station 0+105. No change in the character of the rock on the footwall of the vein was noted, and work on the adit was stopped at 0+50.

A crosscut off the adit, bearing N. 65° E., was started at station 0+75 and driven 50 feet along the strike of the emeralite zone. This was approximately the middle of the emeralite zone, and it was thought that the possibility of finding ore was somewhat better than if the zone had been cut by a series of crosscuts. No corundum or emeralite was found.

All work was done under contract, the contractor furnishing all supplies, equipment, and labor. The work was started on June 23, 1948, and ended September 28, 1948.

BENEFICIATION TESTS

Beneficiation tests by the Bureau's experimental station in Salt Lake City were done on a sample of the higher-grade ore taken from the shallow surface pits directly above the adit and 150 feet from the portal. The purpose of the tests was to determine the best method of concentration and the type of concentrate that could be made by the method selected.

The report on the results of the test work is quoted below.

Test work was conducted on a sample of corundum-andalusite ore from the Blue Metals prospect, Douglas County, Nevada.

Mineralogically, this ore is composed of micaceous alteration products, andalusite, corundum, quartz, and rutile. A microscopic grid grain "count" indicated that there was 7 to 9 percent corundum by weight and 11 to 14 percent andalusite by weight.

Petrographic examination of several thin sections shows that the corundum, andalusite, and rutile occur in small aggregates and also along fracture planes. The aggregates of these three minerals are approximately 48-mesh. Rutile ranges in size from minus 100-to plus 400- (theoretical) mesh and is well-formed in short prismatic crystals. The corundum and andalusite are intimately associated in the aggregates and the grain size of the andalusite ranges from minus 65- to plus 200-mesh. The corundum ranges in size from minus 100- to plus 400- (theoretical) mesh. Both the corundum and andalusite crystals have cryptocrystalline inclusions of quartz and micaceous gangue. The corundum and andalusite are altering to micaceous minerals, and no well-developed crystals of corundum were observed. The physical structure of the fine corundum is such that even if liberated from andalusite it is doubtful that it would meet abrasive specifications.

BENEFICIATION

A sample of the ore was roll-crushed to 20-mesh and screened on 35- and 65-mesh. The minus 20-mesh and plus 35-mesh fraction was tabled; tailings were rejected, and the concentrate was reground to minus 35-mesh and screened on 65-mesh. All of the minus 35- plus 65-mesh material was tabled, and tailings were rejected. The concentrates were reground to minus 65-mesh, combined with the remainder of the minus 65-mesh material, deslimed, and tabled. A rutile product, two corundum concentrates, a middling, and a tailing were obtained from the minus 65-mesh material. The rutile product contained only 14.8 percent of the titanium and assayed 16.0 percent TiO_2. Recoveries in the combined corundum concentrate, based on microscopic estimates of 38.2 percent corundum and 44.5 percent andalusite, were 78.4 percent of the corundum and 55.8 percent of the andalusite; the chemical analysis of the combined product was 78.0 percent Al_2O_3, 17.0 percent SiO_2, 1.36 percent TiO_2, and 0.9 percent Fe. An additional 20.5 percent of the corundum and 19.8 percent of the andalusite could be obtained by combining table middlings with the corundum products; however, the estimated grade of the combined products would be lowered to 27.5 percent corundum and 34.4 percent andalusite. This product probably would meet specifications for refractory uses, as it assayed 62 percent Al_2O_3 and 31 percent SiO_2.

These beneficiation tests were run for purpose of liberating and concentrating abrasive quality corundum. Although abrasive corundum was not recoverable, this ore probably could be used for preparing high-alumina refractories. In this case fine grinding would not be necessary, and 20- to 35-mesh comminution would suffice.

Flotation of corundum from ore ground to 100-mesh and deslimed gave neither high recovery nor high-grade products. Only low-grade combined corundum-andalusite concentrates were recovered. The chemical assay of the combined product was 62.2 percent R_2O_3. Numerous reagent combinations were employed, but in no case was a successful separation obtained.

Beneficiation tests by the Dynamic gravimetrical method on the Lake City ores done on a sample of the water-washed ore taken from the ballast surface site directly above the mill and 140 feet from the portal. The purpose of the tests was to determine the best method of concentration and the type of concentrate that could be made by the method selected.

The report on the results of the test work is quoted below.

Test work was conducted on a sample of commercial-quality ore from the Blue Metals prospect, Saguache County, Colorado.

Mineralogically, this ore is composed of microscopic cuttings, aggregate, quartzite, carnotite, carnotite, and matrix. A microscopic test study "count" indicated that there was 1 to 2 percent carnotite by weight and 12 to 14 percent quartzite by weight.

Petrographic examination of several thin sections shows that the carnotite, quartzite, and matrix occur in small aggregates and also alone throughout rocks. The aggregates of these three minerals are approximately 10-mesh. Matrix varies in size from minus 100-to plus 40-. (Thoroughly) mesh and is well-formed in short orthorhombic crystals. The carnotite and quartzite are intimately associated in the aggregates and the crystals of the quartzite range from minus 5-to plus 20-mesh. The carnotite ranges in size from minus 100-to plus 400-(thoroughly) mesh. Both the carnotite and quartzite crystals have crystallographic inclusions of quartz and microscopic carnotite. The carnotite and quartzite are filmed to microscopic crystals and on well-developed crystals of carnotite were observed. The crystal structure of the fine carnotite is such that even in liberated from quartzite it is doubtful that it would meet abrasive specifications.

Experiment

A sample of the ore was well-crushed to 20-mesh and composed on 20-mesh. The minus 20-mesh and plus 35-mesh fraction was tabled. Tailings were rejected, and the concentrates were recovered to minus 35-mesh and screened on 65-mesh. All of the minus 35- plus 65-mesh material was tabled, and tailings were rejected. The concentrates were recovered to minus 65-mesh, combined with the screenings of the minus 65-mesh material, classified, and tabled. A middle product, two composite concentrates, a tailings, and a tailings were obtained from the minus 65-mesh material. The middle product contained only 14.6 percent of the titanium and received 12.0 percent TiO_2. Recovered in the combined carnotite concentrate, based on microscopic estimates of 98.0 percent carnotite and 44.5 percent quartzite, were 75.6 percent of the carnotite and 84.8 percent of the quartzite; the chemical analysis of the combined product was 75.0 percent V_2O_5, 1.0 percent TiO_2, 1.56 percent Fe_2O_3, and 0.0 percent Al_2O_3. In addition, 0.4 percent of the carnotite and 12.6 percent of the quartzite could be rejected by combining table middlings with the carnotite product; however, the total grade of the combined products would be lowered to 24.6 percent carnotite and 54.4 percent quartzite. This product probably would meet specifications for refractory uses, as it contained no appreciable alkali and no arsenic As_2O_3.

These beneficiation tests were run for purpose of liberation and concentration abrasive quality carnotite. Although abrasive carnotite was not recovered, this ore probably could be used for producing high-alumina refractories. In this case fine grinding would not be necessary, and coarse to 65-mesh comminution would suffice.

Flotation of carnotite from ore ground to 100-mesh and tailings gave neither high recovery nor high-grade concentrate. Only low-grade quartz-carnotite-quartzite concentrates were recovered. The chemical assay of the combined product was 89.6 percent V_2O_5. Numerous grinding conditions were employed, but in no case was a successful separation obtained.

Summarizing the results of test work on the Blue Metals corundum-andalusite ore, relatively fine grinding was necessary in attempting to liberate the mineral constituents. Even at 65-mesh sizes, poor liberation was obtained; both corundum and andalusite were recovered in a combined concentrate, and hence the abrasive uses of the product would be limited. For refractory purposes a combined corundum-andalusite product could be obtained at coarser sizes and still assay 60 percent Al_2O_3.

No high-grade corundum products were obtained by tabling, even at minus 65-mesh sizes. However, 99 percent of the corundum and 75 percent of the andalusite were recovered in a combined product that assayed 62.2 percent Al_2O_3, 31.4 percent SiO_2, and 1.0 percent TiO_2. Recoveries by straight flotation treatment were unsatisfactory.

ANALYSIS OF ANDALUSITE-CORUNDUM ORE SAMPLES TAKEN FROM VICINITY OF HAWTHORNE, NEVADA

SAMPLE NO.	LOCATION OF SAMPLING	SAMPLE DESCRIPTION	% ION LOSS	$\%SiO_2$	$\%Al_2O_3$	$\%Fe_2O_3$
GT-1	Green Talc Claim No.1 Sample taken from Open Pit on Southwest corner of claim. Location from SW corner of claim, GT-1 125 N along end line and 160 easterly and parallel to side line.	Gray with green streaks	2.89	40.78	54.30	Trace
GT-2	Green Talc claim No. 1 Sample taken on southern slope of hill approximately 500' easterly from SW corner and 100' N.	Typical ore taken at random	5.30	40.94	50.46	Trace
GT-3	Green Talc Claim No. 1. Sample taken from open cut located 500' easterly, and parallel, from SW corner and 100' N.	Soft light material occurring next to wall rocks-very friable	2.71	66.36	30.32	Slight
GT-4	Same location as GT-1 but taken from right side of open pit.	Wall rock-shale-dark red to black in color	7.93	44.98	26.20	Heavy
GT-14	Sample taken from stock pile of SP. R.R. Station at Thorne	Crushed ore-typical ore-gray-with green streaks	2.82	54.86	42.58	Trace
GT-15	Same location as GT-1 but taken from side of open pit typical overbearing material	Random sample taken for characterization-siliceous appearing	1.27	72.48	24.90	Trace
GT-16	Same location as GT-1	Sample taken from bottom of pit-typical ore	3.40	51.52	42.83	Trace
Bismark 1	Sample taken from Bismark claim 100' Westerly along center line from Disc. monument and 60' N.	Typical ore-blue with gray colors	Sp. Gr.	3.22		
Deep M. No. 1		Random samples-gray with blue spots	Sp. Gr.	3.24		

Analysis performed 8-25-51
by R.B. Holt & C.W. Redeker

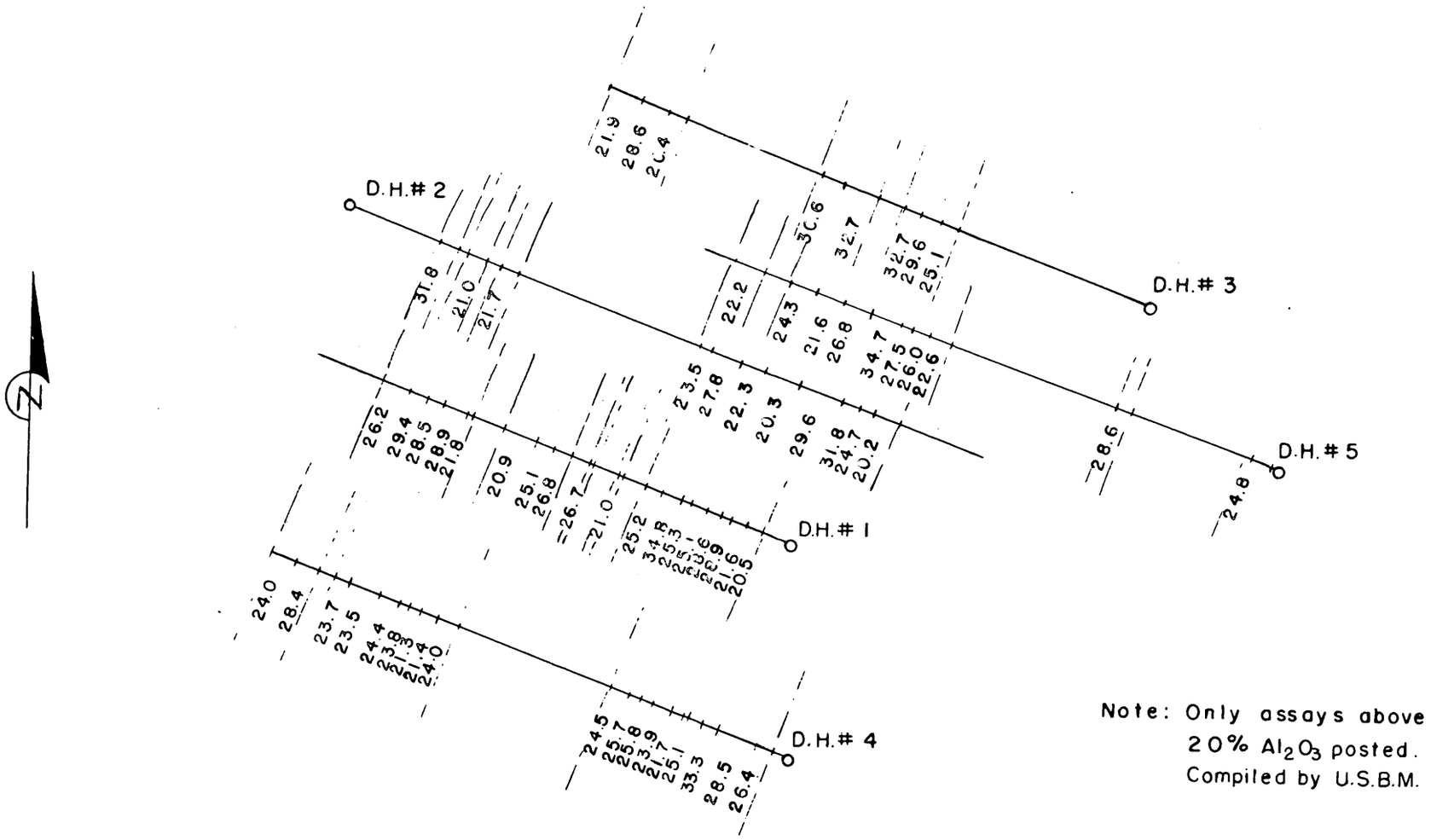

Fig. 2A
Overlay Plan Map, Showing Drill Hole Samples
and Mineralized Segments.
Bismark Deposit, Mineral County, Nev.

Form 6-30
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Knoxville, Tennessee

OFFICIAL BUSINESS

16—47319-2

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300 (GPO)

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MR. C. O. MITTENDORF
Chairman, Operating Committee
Defense Minerals Administration
Dept. of the Interior
Washington 25, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

Project Summary Report

By: Lawrence G. Houk May 5, 1954

1. DMEA Docket No. 2512 - Corundum-Andalusite
Contract No. Idm-E457
Green Talc Mine and Bismark Mine - T.9 N., R.31-32 E.
Mineral County, Nevada

Operator: Coranda Corporation
386 Race Street
San Jose, California

Application $200,000 for 17,000 feet of Ax and Ex drilling. Trenches on 4 groups of claims.

Operator's property rights: Lessee
Lease and Option to Purchase dated January 1, 1952.
Operating Agreement 4/28/52
Assignment of Option 4/9/52
Owner's Consent to Lien dated April 24, 1952.

2. Contract - dated December 5, 1952.

Work authorized on Bismark and Green Talc Group:

2500 feet diamond drill hole (Bx) @ $11.50 per foot	$28,750.00	
250 Class #3 Chemical Analyses @ $25.00 each (The unit here is each analysis).	6,250.00	
50 Pyrometric Cone Equivalent Tests @ $20.00 each (The unit here is each test).	1,000.00	
Total estimated cost of project		$36,000.00
Government participation @ 90%		$32,400.00

Amendments:

No. 1, dated May 13, 1953, provides for drilling seven holes on the Green Talc Mine instead of six. The total footage (1,600 feet) remains the same.

No. 2, dated September 2, 1953, advances the date of completion from September 5 to November 5, 1953, to allow time to complete analytical work and reports.

Work completed:

2500 feet diamond drill hole (Bx) @ $11.50 per foot	$28,750.00	
250 Class #3 Chemical Analyses @ $25.00 each	6,250.00	
50 Pyrometric Cone Equivalent Tests @ $20.00 each	1,000.00	
Total Estimated Cost of Project		$36,000.00
Government participation @ 90%		$32,400.00

In addition to the above the Bureau of Mines, Hydrometallurgical and Ore Dressing Branch, made 235 analyses of Al_2O_3 and SiO_2. Work began January 8, 1953, and was completed June 5, 1953.
Operator's final report received November 3, 1953.
Field Team's final report received in Washington April 19, 1954.

3. Audit - Report of Review in lieu of final audit issued November 18, 1953, (no exceptions).

Accepted cost	$36,000.00
Government participation	$32,400.00

4. Certification of discovery - issued April 23, 1954.

5. Comments:

The results of the work indicates that the ore is too low grade for direct use in refractories, and possibly the silicate and oxide crystals are so interlocked to make simple metallurgical separation difficult.

How conducted - The Operator was indifferent to advice that the sludge should be run where core recovery fell below 90%. The contract diamond drilling was conducted in an efficient manner. Supervision and sample preparation (chemical engineer) was not directed properly, according to the field team.

Operation - The contract drilling by Bit and Tool Company of San Francisco was efficient. Contract field work was completed on time, delay in receiving results of analytical work unavoidable.

Engineering - Holes started at Nx and continued to Bx and went to Ax in emergency. Seven to twelve feet per shift was the average. The core recovery was poor.

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
2		100
3/25	Johnson	110
	Selledge	120
		220

MAR 2 5 1965

Mr. Keith G. Papke
The Standard Slag Company
Post Office Box 4400
Reno, Nevada

Re: DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-E457

Dear Mr. Papke:

This will acknowledge receipt of your letter of March 19, 1965, requesting information concerning the work performed under the subject contract.

Information obtained from the Coranda Corporation may be released to you upon receipt of the written consent of that company, whose last address in our records is 386 Race Street, San Jose, California.

If you are unable to obtain such consent, we are willing to release the requested information upon receipt of evidence that the Coranda Corporation has relinguished all interest in the property and the written authorization from the owner of the property.

A charge of $20.00 will be made for the cost of reproducing and mailing of the information requested.

Sincerely yours,

George Fumich, Jr.

Acting Director

FEJohnson/bih
3/25/65

cc to: Files
Dir. reading file
Mr. F. E. Johnson

43683

MAIN OFFICES
YOUNGSTOWN, OHIO

WESTERN SALES OFFICE
235 MONTGOMERY STREET
SAN FRANCISCO 4, CALIF.

The Standard Slag Company

GENERAL OFFICES - WESTERN DIVISION
POST OFFICE BOX 4400, RENO, NEVADA

File called for

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O. M. E.
RECEIVED
MAR 22 1965

INITIALS	CODE
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March 19, 1965

Director
Office of Mineral Exploration
U. S. Dept. of the Interior
Washington, D. C.

Dear Sir:

We are interested in obtaining a copy of a report of drilling done on the Dover and Green Talc claims in Mineral County, Nevada, approximately in Section 22, T9N, R31E, MDM. This drilling was done by the DMEA and Coranda Corporation; the report is listed as DMEA Docket No. 2512. At the time of the drilling (apparently in the 1950's) the Coranda Corporation had a lease and option on the property; this has since been cancelled.

Mrs. Esther Rea, the owner of the claims, has given us her permission to see this information. We would appreciate your help in locating the data and determining whether copies can be obtained or where the report can be studied.

Yours very truly,

THE STANDARD SLAG COMPANY

Keith G. Papke

Keith G. Papke
Geologist in Charge
of Exploration

KGP/b

cc: R. O. Jones
Mr. R. B. Maurer, Area Director
U. S. Bureau of Mines
450 Golden Gate Avenue
San Francisco, California

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
555 Battery Street
San Francisco 11, California

OFFICIAL FILE COPY
O. M. E.
RECEIVED MAY 31 1963

DATE		
5/31		800
		500
		2.20

May 28, 1963

Memorandum

To: Chief, Division of Field Operations, OME, Washington, D. C.

From: Acting Field Officer, OME, Region II

Subject: DMEA-2512 (Corundum, Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-E 457

Enclosed is a copy of a letter from George Holmes with reference to your letter of March 21, 1963, of the above subject.

Paul V. Fillo

Paul V. Fillo

Enclosure

cc:

Chief, Division of Field Operations, OME, Washington, D. C

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
REGION II

Division
of
Mineral Resources

Reno Field Office
U. S. Bureau of Mines
Reno, Nevada

MAY 1963
BUREAU OF MINES
OFFICE OF
MINERALS EXPLORATION
REGION II

May 24, 1963

Memorandum

To: Paul V. Fillo, Acting Field Officer, OME, Region II, San Francisco

From: G. H. Holmes, Jr., Mining Engineer, Reno Field Office, Region II

Subject: DMEA - 2512 (Corundum-Andalusite)

With reference to the attached memorandum on DMEA-2512, Coranda Corporation, Esther Rea telephoned me several months ago and requested that I allow R. R. Reed, Bootstrap mine, to read the Bureau of Mines unpublished report on the andalusite-corundum deposits in Mineral County, Nevada. She advised me that no work had been done on the property since the Coranda Corporation relinquished its lease. I have traveled by the property several times in recent years and there has been no sign of any activity.

Mrs. Rea is living in Reno but is not listed in the telephone directory. I'll try to get her address for you.

George H. Holmes, Jr.

George H. Holmes, Jr.

Copy to:
W. F. Dietrich

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
	Selbrede	120
3/20	[illegible]	110
3/26	Turnbull	100
		550

March 19, 1963

Memorandum

To: The Files

From: Chief, Division of Minerals

Subject: DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-E457

Inasmuch as the royalty period has expired (December 5, 1962), we should close this docket via only a docket memo instead of the usual closing letter. On June 1, 1962, the Operator returned our Form 63, saying that there had been no production, as far as they knew, but that the property was in the hands of the original owners.

Since then we have sent three successive form 63's to Mrs. Esther Rea, P.O. Box 2266, Reno, Nevada, as of July 25, 1962, September 28, 1962, and January 23, 1963. The last was sent registered mail and a return card was received, signed by her. Nevertheless, she will not fill in and return the 63 form.

There is nothing much else for us to do except to ask Fillo if he knows anything, but he could only say as he did a year ago, "Our files disclose no further examinations or activity of the subject contract."

It is almost impossible to believe that there has been any production from this deposit of off-grade sillimanite (too low grade for direct refractory use), so let's close it without further "flogging of a dead horse."

Griswold

dc: Director's Reading File
WRGriswold/mm

Drilling program
Reserves — Require beneficiation to produce usable product

8623

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
3/21	[illegible]	500
3/21	Talbot	800
	Selfridge	130
3/21	[illegible]	110
3/21	[illegible]	100
		220

MAR 21 1963

Memorandum

To: Acting Field Officer, Region II

From: Chief, Division of Field Operations

Subject: IMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-K457

With reference to this Coranda contract, the royalty repayment period expired December 5, 1962. We would like to close our file but we can get no reply to our Form 63's from Mrs. Esther Rea, P. O. Box 2266, Reno, Nevada. It may be that the good lady is provoked because we refused her request of July 17, 1956, to provide her with a copy of the Government's final report (Henry W. Jones and A. J. Bodenlos) on the project.

We have little thought that there ever was any production from the property but, nevertheless, we dislike closing a docket without a positive word of some sort.

Do you suppose the Bureau people in Reno would interview the lady for you? Or, possibly, sometime when you might be passing near Hawthorne on other business, you might steal a couple of hours to get a quick look at the property.

We would appreciate any sort of positive information you might be able to get for us, without going to any great expense.

George G. Selfridge (gla)

WRGriswold/gla
3-21-63
cc to: Director's Reading File
Review Committee
Docket
Code 500

43683

MMB Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
1/11	Holt	500
	Mirsowski	500
1/11	Talbert	800
	Schuyler	120
1/11	Johnson	110
1/9	Hanks	100
		220

JAN 1 1 1963

Honorable Walter S. Baring
House of Representatives
Washington 25, D. C.

Dear Mr. Baring:

In accordance with your request of January 7, 1963, enclosed are two copies of the following publications:

Kyanite and Related Minerals, by James D. Cooper and Gertrude E. Tucker, preprint from Bureau of Mines Yearbook, 1961

Kyanite and Related Minerals, by James D. Cooper, preprinted from Bureau of Mines Bulletin 585, Mineral Facts and Problems, 1960 edition

Kyanite, A Materials Survey, by F. A. Klimpfelter and James D. Cooper, Bureau of Mines Information Circular 8048, 1961

Corundum and Emery, by Henry F. Chandler, a chapter from Mineral Facts and Problems, Bulletin 585, Bureau of Mines, 1960 edition

Abrasive Materials, by James D. Cooper and Gertrude E. Tucker, a preprint from Bureau of Mines Minerals Yearbook, 1961

Our records indicate that the Defense Minerals Exploration Administration, predecessor to the Office of Minerals Exploration, entered into a contract with the Corunda Corporation for the exploration of corundum-andalusite deposits in the Green Tale and Bismark mines. Estimated cost of the work was $30,000, of which the Government agreed to contribute $12,400.

Our reports covering the work done are confidential, for use within the Government only, especially as to sections dealing with conclusions, recommendations, and ore reserves. However, factual information relating to the project submitted by the operator can

43683

be furnished to persons who present the written authorization of the operator under the contract:

Ceramic Corporation
c/o Mr. J. H. Redda
347 South Bascom Street
San Jose, California

Sincerely yours,

George Fumich, Jr.
Director

(ph)

Enclosures 10

cc: MR (2)
DL
AA
DCCO
James D. Cooper, Bur. of Mines, Room 3427
Director's Reading File
Docket 2512
Code 300
BFHolt/mm

FRS 1442

~~800~~ ~~120~~ ~~110~~ ~~100~~

DRAFT SPHolt/mm 1-10-63

Honorable Walter S. Baring
House of Representatives
Washington 25, D. C.

500

Dear Mr. Baring:

In accordance with your request of January 7, 1963, enclosed are two copies of the following publications:

Kyanite and Related Minerals, by James D. Cooper and Gertrude E. Tucker, preprint from Bureau of Mines Yearbook, 1961

Kyanite and Related Minerals, by James D. Cooper, preprinted from Bureau of Mines Bulletin 585, Mineral Facts and Problems, 1960 edition

Kyanite, A Materials Survey, by T. A. Klinefelter and James D. Cooper, Bureau of Mines Information Circular 8040, 1961

Corundum and Emery, by Henry P. Chandler, a chapter from Minerals Facts and Problems, Bulletin 585, Bureau of Mines, 1960 edition.

Abrasive Materials, by James D. Cooper and Gertrude E. Tucker, a preprint from Bureau of Mines Minerals Yearbook, 1961

Our records indicate that the Defense Minerals Exploration Administrative, predecessor to the Office of Minerals Exploration, entered into a contract with the Coranda Corporation for the exploration of corundum-andalusite deposits in the Green Talc and Bismark mines. Estimated cost of the work was $36,000, of which the Government agreed to contribute $32,400. ~~All of the exploration authorized by the contract was completed at a cost to the Government of $32,400.~~

Our reports covering the work done are confidential, for use within

the Government only, especially as to sections dealing with conclusions, recommendations, and ore reserves. However, ~~much of the~~ relating to the proposal submitted by the prospecting operator or assignee factual information ~~developed during the work~~ can be furnished to persons who present the written authorization of the operator under the contract:

Coranda Corporation
c/o Mr. J. H. Rodda
547 South Bascom Street
San Jose, California

Also enclosed for the use of Mr. Dean Olson, in the event that he should be interested in our current exploration program, are two copies each of the following:

Exploration Assistance, A Program of the U. S. Department of the Interior, Office of Minerals Exploration

Title 30 - Mineral Resources, Chapter III, Office of Minerals Exploration, Part 301 - Regulations for Obtaining Federal Assistance in Financing Exploration for Mineral Reserves, Excluding Organic Fuels, in the United States, its Territories and Possessions.

Sincerely yours,

Director

Enclosures 14

cc: MR (2)
DL
AA
DCCO
Director's Reading File
Code 500 (2)
James D. Cooper, Bureau of Mines, Room 3427
OME ~~Mails and Files~~ Docket 2512

SPHolt/mm

Re: DM&A - 2512

Follow-up of the unanswered 9/26/67 Form 63 is suggested.

Talbot
1/10/63

WALTER S. BARING
AT LARGE, NEVADA

COMMITTEES:
INTERIOR AND INSULAR AFFAIRS
VETERANS' AFFAIRS

GEORGE H. (TIM) SEWARD
ADMINISTRATIVE ASSISTANT

Congress of the United States
House of Representatives
Washington, D. C.

SUBCOMMITTEES:
INTERIOR AND INSULAR AFFAIRS:
PUBLIC LANDS
MINES AND MINING
IRRIGATION AND RECLAMATION
NATIONAL PARKS

VETERANS' AFFAIRS:
INSURANCE, CHAIRMAN
HOSPITALS

January 7, 1963

PRS
JAN - 8 1963 1442

TO:	
MME	
REPLY TO BE PREPARED BY:	MME
FOR SIGNATURE OF:	MME
COPY OF LETTER FURNISHED	
MR DL AA	
ZONA REPLY COPY TO ABOVE	

Mr. George Fumich, Jr.
Director
Office of Minerals Exploration
Department of the Interior
Washington 25, D. C.

Dear Mr. Fumich:

I have recently received a letter from Mr. Dean Olson, 321 West 4th Street, Reno, Nevada, who has expressed an interest in certain properties which were some time ago under lease to Coranda Corporation by Mr. William Rea. At that time a $200,000 DMEA exploratory loan was offered on the andalusite-corundum properties in Hawthorne, Nevada, of which loan approximately $32,000 was utilized.

Mr. Olson has asked me to obtain for him any available information dealing with the marketability, statistical analysis, and reports on andalusite-corundum. He also feels that there would be in all probability substantial documents and reports in the files of DMEA which justified the exploratory loan. The transaction is referred to in DMEA as "DMEA-2512, (Corundum-Andalusite), Coranda Corporation, (GREEN TALC and BISMARK MINES) Mineral County, Nevada, Contract Idm-E 457."

I realize that this may or may not be public information, but in any event, I would appreciate any information that you can furnish me that might be of interest to Mr. Olson with the thought in mind that he has expressed an interest in the properties.

Sincerely,

Walter S. Baring

WALTER S. BARING
Congressman for Nevada

WSB/eg

OFFICIAL FILE COPY O. M. E RECEIVED JAN 8 1963		
DATE	INITIALS	
1/9/63	S.1944	500

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
555 Battery Street
San Francisco 11, California

OFFICIAL FILE COPY
O. M. E.
RECEIVED JUN 22 1962
600
220

June 18, 1962

Memorandum

To: Fiscal Section, Division of Administrative Services, Office of the Secretary, Department of the Interior, Washington, D. C.

From: Acting Field Officer, OME, Region II

Subject: DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-E 457

Enclosed is the original of a Report of Royalty Review covering the subject contract.

This office concurs in the facts as stated in the Report of Royalty Review.

PAUL V. FILLO

Paul V. Fillo

Enclosure

cc:
Chief, Division of Field Operations, OME, Washington, D. C.
Contract Administration & Audit Div., Washington, D. C.

PVFillo:kmb 6-18-62

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
		220

JUN 1 3 1962

Memorandum

To: Acting Field Officer, Region II

From: E. D. Talbert, Acting Chief (Signed) E. D. Talbert
Contract Administration and Audit Division

Subject: DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Great Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-7457

The original and one copy of a Report of Royalty Review covering the subject contract are enclosed. If you concur in the facts stated therein, please make the following distribution:

(a) Original to the Fiscal Section, Division of Administrative Services, Office of the Secretary, Department of the Interior, Washington 25, D. C.; and

(b) One copy for your files.

This Report of Royalty Review is made for record purposes only; therefore, no copy for the Operator is provided.

As evidence of your concurrence, a copy of your memorandum transmitting the original report to the Fiscal Section should be furnished this Division. If for any reason you do not concur, both copies of the report should be returned to this Division with your comments.

Enclosures

EDTalbert/ama 6-13-62

cc:
Docket
Director's Reading File
CA & A Division
Mr. Rothrock

43683

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

555 Battery Street
San Francisco 11, California

OFFICIAL FILE COPY
O. M. E
RECEIVED APR 2 1962
DATE

4/2	4007	800
4/5 4/9	Hoff 5.1.44	500 ✓
March 27, 1962		
		220

Memorandum

To: E. D. Talbert, Acting Chief, Contract Administration and Audit Division, OME, Washington, D. C.

From: Acting Field Officer, OME, Region II

Subject: DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-E457

In pursuant to your request of March 14, 1962, our files disclose no futher examinations or activity of the subject contract.

Paul V. Fillo

Paul V. Fillo

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
3/14	Selbedge	120

MAR 14 1962

Memorandum

To: Acting Field Officer, Region II

From: Acting Chief, Contract Administration & Audit Division (Signed) E. D. Talbert

Subject: DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract Idm-E457

The files of the Washington office pertaining to the subject contract indicate that the last examination of the property was on December 31, 1957. Please advise as to whether the regional files disclose later examinations and, if so, the dates thereof and the findings.

A letter dated July 17, 1956, from Esther Rea, one of the owners of the property, includes the statement that "The Coranda Corporation defaulted under their lease of January 1, 1952, and the above-named four andalusite properties have now reverted to the owners". Do your files disclose any subsequent lease or transfer of the property?

I assume that the property under the contract has remained inactive since completion of the exploration work in October 1953. If your files indicate otherwise, your comments will be appreciated.

EDTalbert/cac
March 14, 1962

cc: Director's reading file
CA&A

43683

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
11/3	[illegible]	100
		225

NOV 3 1959

Barton Mines Corporation
North Creek
New York

[illegible] - 75 / 2

Attention: Mr. James B. Burns
Secretary

Gentlemen:

For the information requested in your letter of October 26, we suggest that you write directly to the Coranda Corporation.

Please excuse us for any delay or inconvenience that this procedure may cause, but we are confident that you recognize the necessity for our policy of withholding individual company data unless the company concerned consents to its release.

Sincerely yours,

Allen S. Dakan, Chief
Division of Administrative
Management

ASDakan:kb - November 3, 1959
Copy to: Director's reading file
Chron.

43683

BARTON MINES CORPORATION

NORTH CREEK, N. Y.

INDUSTRIAL ABRASIVES
BARTON MINES
CRYSTAL GARNET
TRADE MARK
WORLD'S STANDARD
SINCE 1878

OFFICIAL FILE COPY
O. M. E.
RECEIVED OCT 29 1959

DATE	INITIALS	CODE
		100
	ABRASIVE GRAINS AND POWDERS	

October 26, 1959

U. S. Department of the Interior
Office of Minerals Exploration
Washington 25, D. C.

Attn: Mr. Allen S. Dakan, Chief
Division of Administrative Management

Re: Your letter October 20, 1959

Dear Mr. Dakan:

Thank you for the information regarding the exploration of corundum contained in your above letter.

Was any corundum and/or andalucite discovered by the Coranda Corporation as a result of this exploration? If so, we would appreciate the details including resulting production.

Yours very truly

BARTON MINES CORPORATION

James B. Burns

James B. Burns
Secretary

JBB/g

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
10/20		200
		225

OCT 20 1959

Mr. James B. Burns, Secretary
Barton Mines Corporation
North Creek, New York

Dear Mr. Burns:

The Office of Minerals Exploration has had no contracts for exploration for corundum. However, our predecessor agency, the Defense Minerals Exploration Administration, entered into one corundum exploration contract with the Coranda Corporation, 386 Race Street, San Jose, California. The exploration was in Mineral County, Nevada, and the contract provided for total estimated cost of $36,000 with Government participation of $32,400. The contract was executed on December 5, 1952; was terminated a year later, and was certified in April, 1954. The minerals sought were corundum and andalucite.

Sincerely yours,

Allen S. Dakan, Chief
Division of Administrative
Management

ASDakan:kb - October 20, 1959
Copy to: Director's reading file
Chron.

43683

MDM

BARTON MINES CORPORATION

NORTH CREEK, N. Y.

INDUSTRIAL ABRASIVES BARTON MINES CRYSTAL GARNET TRADE MARK WORLD'S STANDARD SINCE 1878

ABRASIVE
GRAINS AND POWDERS

October 13, 1959

U. S. Department of the Interior
Office of the Secretary
Washington 25, D. C.

Gentlemen:

We have your semi-annual report of Office of Minerals Exploration for the period ending June 30, 1959.

We note that Corundum is one of the minerals that qualify for this program and wonder if you could tell us if any contracts have been let for the exploration of Corundum. If so, could you give us the particulars, such as name of contractor and location of deposit.

Yours very truly

BARTON MINES CORPORATION

James B. Burns

James B. Burns
Secretary

JBB/g

OFFICIAL FILE COPY
O. M. E.
RECEIVED OCT 16 1959

DATE	INITIALS	CODE
10/20		200

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
5/21	G	220
5/21	Hook	600

MAY 21 1959

Memorandum

To: Mr. George Mavor, OME Auditor

From: E. D. Talbert, Acting Chief (Signed) E. D. Talbert
Contract Administration and Audit Division

Subject: Docket No. DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Contract No. Idm-E457

In the copies of your Report of Royalty Review of the subject contract, the following words in reason (a):

"the exploration project has been inactive since the completion of the DMEA contract"

have been replaced with:

"there was no production from the property during the period covered by this review."

Distribution of the regional copies is authorized after this revision has been made.

EDTalbert/ama
May 20, 1959

Copy to: Docket
Director's Reading File
CA & A Division

43683

Docket Copy
Surname:
Houk
Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

20 JUL 1956

Mrs. Esther Rea
P. O. Box 2226
Reno, Nevada

Re: Docket No. DMEA-2512
(Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract No. Idm-E457

Dear Mrs. Rea:

Reference is made to your letter of July 17, 1956, requesting a copy of the final report, dated April 8, 1954, by Henry J. Jones, Mining Engineer, and A. J. Bodenlos, Geologist, or permission for your engineers to examine the factual data in the final report in the office of Mr. Spangler Ricker, Executive Officer, DMEA Field Team, Region II, Reno, Nevada.

The Defense Minerals Exploration Administration can not supply you with the final report, inasmuch as the evaluation of the exploration work is for the Government's information, and is not made available to the public. The Coranda Corporation contributed to the cost of the exploration work, and the assay data obtained cannot be released without their written permission. The Coranda Corporation officials can, no doubt, supply you with the desired information.

Sincerely yours,

C. O. Mittendorf

Administrator

LGHouk:gad 7/20/56
Copy to: Admr. R. File
Docket
Field Team, Region II
Mr. Kiilsgaard, 5222
Mr. Chandler, 3520
Mr. Houk

R.G.K.

ESTHER REA
P. O. BOX 2226
RENO, NEVADA

July 17, 1956

RECEIVED
JUL 19 1956

Mr. B. O. Mittendorf
Administrator
Defense Minerals Exploration Administration
U. S. Department of the Interior
Washington 25, D. C.

Dear Mr. Mittendorf: RE: Docket No. DEMA 2512 (Corumdum-Andalusite
GREEN TALC, BISMARK, VICTORY, DEEP MINES
Andalusite Properties, Mineral County, Nevada
Contract No. IDM-E457

I am one of the owners of the above-named properties. We, as owners, wish to have the results of the exploration work done under the above-referred-to loan on the GREEN TALC and BISMARK andalusite properties..

If possible, we should like to have a copy of the Final Report on these properties dated April 8, 1954, by Henry J. Jones, Mining Engineer and A. J. Bodenlos, Geologist. Or, if this is not possible, perhaps you would give permission for our engineers to look over the results of the final report, without the conclusions of your engineers, which report is in the office of Mr. S. Ricker, Executive Officer, DMEA, Region No. 2, Reno, Nevada.

The Coranda Corporation defaulted under their lease of January 1, 1952, and the above-named four andalusite properties have now reverted to the owners. We wish to proceed with further development of these properties and it would be very helpful to have the Government's cooperation. We wish very much to have development and production started on these properties, especially to return the Government loan.

This matter is important to us and it would be appreciated if you will reply as soon as possible in the enclosed airmail self-addressed envelope.

Thanking you,

Sincerely yours,

Esther Rea

Esther Rea

FILE COPY
SURNAME:

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

Houk
Chandler
FE Johnson

DEC - 7 1955

Mr. Howard R. Decker
1075 San Miguel Road
Concord, California

Re: Docket No. DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract No. Idm-E457

Dear Mr. Decker:

Reference is made to your letter of November 21, 1955, requesting an evaluation of the results from the Defense Minerals Exploration Administration's exploration program on the Coranda Corporation's property near Hawthorne, Nevada, and the amount of the Government's lien.

You are correct in your understanding that this Administration cannot recommend a particular property. As to the evaluation of the results of the exploration work, the Government's evaluation is for its own information and is not made available to the public. However, we can advise you of the amount of the Government's lien. The amount of the lien payable from all mineral production is $32,400.00.

It is suggested that you contact the Coranda Corporation for any additional information on the property.

Sincerely yours,

C. O. Mittendorf (64257)

Administrator

LGHouk/FEJohnson/gad:bih
12/5/55

cc to: Docket
Admr. Reading File
Field Team, Region II (2)
Mr. Chandler - R-3520
Mr. Kiilsgaard - R-6222
Mr. Houk
Mr. Johnson
Mr. Mittendorf

R.G.

Docket
Surname:
Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

Mr. Howard R. Decker
1075 San Miguel Road
Concord, California

Re: Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract No. Idm-E457

Dear Mr. Decker:

Reference is made to your letter of November 21, 1955, requesting an evaluation and the amount of the lien resulting from the Defense Minerals Exploration Administration's exploration program on the Coranda Corporation's property near Hawthorne, Nevada.

You are correct that this Administration cannot recommend a particular property nor can we evaluate the results of the exploration work conducted on a participation basis with the Coranda Corporation. The amount of the lien payable from all mineral production from the contract area is $32,400.00.

It is suggested that you contact the Coranda Corporation for any additional information on the property.

Sincerely yours,

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 12/2/55
Copy to: Admr. R. File
Docket
Mr. Chandler, 3520
Mr. Kiilsgaard, 5222
Mr. Houk
Field Team, Region II

GMR-2512

1075 San Miguel Road,
Concord, California,
Nov. 21, 1955.

Brooks E. Gonzalez - Business Community Sp.

Dr. Gonzales,
Defense Minerals Exploration Authority,
Washington, D.C.

Dear Mr. Gonzales: I have a group interested in a corundum property near Hawthorne, Nevada. I understand that you headed the exploration of this property through your department.

While I realize that you cannot recommend and particular property, would it be possible to give us some few facts as to its value from the standpoint of your exploration, and the amount of money due the DMEA as a result of these explorations.

Thanking you for what information you can supply, and for references you can offer on this property, I remain,

Yours very truly,

Howard R. Decker

Howard R. Decker

RECEIVED
NOV 30 1955

Nov 28 3 06 PM '55
BUREAU OF MINES
MAIL ROOM
WASHINGTON D. C.

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

May 11, 1954

Memorandum

To: Nonmetallic Minerals Division
Defense Minerals Exploration Administration

From: Chief, Ceramic and Fertilizer Materials Branch

Subject: Docket No. DMEA-2512 - Corundum Andalusite
Coranda Corporation, Green Talc and Bismark Deposits
Mineral County, Nevada
Contract Idm-E457

It is recommended that a certificate of discovery or development be issued, as a result of mineralized areas disclosed by diamond drilling.

Petrographic analyses are lacking.

Further metallurgical tests are required to determine the amenability of quartzose-type ore to beneficiation. Metallurgical tests on metavolcanic-type ore must be made to determine its amenability to beneficiation.

Without these petrographic and further metallurgical tests it is not possible to estimate ore reserves.

In addition, the ore concentrates must be tested for their use in refractories, on a commercial scale, to determine the p.c.e.; resistance to melting and softening, or deformation, at high temperatures; and the resistance of the refractories to the following destructive influences: abrasion, pressure, chemical attack, and rapid changes in temperature.

W. F. Dietrich

W. F. Dietrich

FILE COPY
SURNAME:

FEJohnson

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

MAY 1 1954

Mr. Irving Gumbel, Acting Director
Materials Division
Emergency Procurement Service
General Services Administration
Washington 25, D. C.

Re: Docket No. DMA-2512
Corundum-Andalusite
Green Talc & Bismark Mines
Mineral County, Nevada
Contract No. Idm-E457

Dear Mr. Gumbel:

I am enclosing one copy of a Certification of Discovery or Development relating to the subject contract.

The exploration contract was signed December 5, 1952, with the Government participating to the extent of 90% of $36,000.00, or $32,400.00.

The project work was started January 8, 1953, and was completed May 20, 1953, after the expenditure of $36,000.00 which is the total accepted cost according to the Report of Review in lieu of a final audit. The Government paid 90% of the total accepted cost, or $32,400.00.

The project consisted of diamond drilling, core analyses, and ceramic testing. A total of 2,500 feet of diamond drilling was completed, 1,600 feet being on the Green Talc Claim, and 900 feet being on the Bismark Claim. The Green Talc property was explored by seven drill holes over an area 410 feet by 420 feet to an average vertical depth of 150 feet in the mineralized formation. The outcrop of the Bismark Group was explored over an area about 180 feet long and 240 feet wide, to a depth of 140 feet below the surface. The deposits explored consist of replacement bodies of alumina-bearing minerals occurring in meta-volcanics in the Excelsior formation of Triassic age.

The DMA concurs with the field team evaluation of the work performed and has certified that a discovery or development has resulted from the work under this contract.

LGHouk/FEJohnson/gad/bih 5/11/54

Sincerely yours,

C. O. Mittendorf

Administrator

cc to: Docket
Admr. Reading File
Region III (2)
Operating Committee
Mr. Hedges Room 4604
Mr. Thayer Room 5216 GSA

Enc. Mr. Chambers - Mr. Houk - Mr. FEJohnson

R.C.B.

DOCKET COPY
Surname:
Houk
Chambers
Curtin
Hartwell
Thayer
Hedges
Johnson

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

Mr. Irving Gumbel, Acting Director
Materials Division
Emergency Procurement Service
General Services Administration
Washington 25, D. C.

Re: Docket No. DMEA-512
Corundum-Andalusite
Green Talc and Bismark
Mines
Mineral County, Nevada
Contract No. Icm-5457

Dear Mr. Gumbel:

I am enclosing one copy of a Certification of Discovery or Development relating to the subject contract.

The exploration contract was signed December 5, 1952, with the Government participating to the extent of 90% of $36,000.00 or $32,400.00.

The project work was started January 2, 1953, and was completed May 2[illegible], 1953, after the expenditure of $36,[illegible] which is the total accepted cost according to the Report of Review in lieu of a final audit. The Government paid 90% of the total accepted cost or $32,400.00.

The project consisted of diamond drilling, core analyses and ceramic testing. 2,500 feet of diamond drilling was completed seven holes totaling 1,6[illegible] feet on the Green Talc Claim, and five holes totaling 9[illegible] feet on the Bismark Claim. Aluminum-minerals replaced meta-volcanics in the Excelsior formation of Triassic age. The Green Talc property was explored over an area of [illegible] feet in length, 420 feet in width and penetrating the mineralized formation to an average vertical depth of 130 feet. The outcrop of the Bismark Group was explored over an area of about 180 feet long, [illegible] feet wide and to a depth of [illegible] feet below the surface.

The DMEA concurs with the field team evaluation of the work performed and has certified that a discovery or development has resulted from the work under this contract.

Sincerely yours,

C. D. Mitteauer

Administrator

Enclosure

LJHouk:gmd 5/5/54

Copy to: Admr. R. File
Docket File
Mr. Johnson
Mr. Chambers
Operating Committee

Field Team, Region III
Mr. Thayer, 5216 GSA Bldg.
Mr. Hedges, 4604
Mr. Houk

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

Department of the Interior
Defense Minerals Administration
RECEIVED
MAY 3 1954

April 30, 1954

Memorandum

To: Mr. Lawrence G. Houk, Director, Non-Metallic Minerals Division, Defense Minerals Exploration Administration

From: Commodity Specialist, Construction and Chemical Materials Branch

Subject: Docket No. DMEA-2512, Coranda Corporation, Mineral County, Nevada

While corundum is mentioned as occurring with other minerals, no estimate of its quality or its percentage of the total is made. Insufficient information is presented to permit evaluation of this property as a domestic source of corundum.

Henry P. Chandler

Henry P. Chandler

Attachment

File Copy
Surname:

Hoch
Chambers
Dubois
Hollund
Harrington
Hedges
Jeffrey
Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

APR 26 1954

Coranda Corporation
386 Race Street
San Jose, California

Re: Docket No. DMEA-2512 - ~~Corundum~~
Andalusite
Green Tale and Bismark Mines
Mineral County, Nevada
Contract No. Idm-R457

Gentlemen:

Transmitted herewith is a Certification of Discovery or Development on Contract No. Idm-R457 on the Green Tale and Bismark Mines, Mineral County, Nevada.

By the terms of the Exploration Project Contract and of the Certification, all production from the property from the date of the Exploration Project Contract, December 5, 1952, is subject to the Government's percentage royalty as set forth in the contract until the sum of $32,400.00 is paid, or until December 5, 1962, whichever occurs first.

Payments should be made to Mr. H. C. Miller, Executive Officer, Defense Minerals Exploration Administration Field Team, Region III, 1012 Flood Building, 870 Market Street, San Francisco 2, California. Checks should be drawn to the Treasurer of the United States. The purchaser should be advised to deduct the royalties from the amount due on each shipment and forward check to the Executive Officer.

Royalty payments to the Government should be accompanied by suitable evidence, such as copies of settlement sheets showing quantity and grade of ore sold, the name of the purchaser, and the price and charges certified to be correct by the purchaser.

You are requested to notify Mr. Miller of any changes in ownership or production rights that may have any effect on the Government's right to its percentage royalty. Also, if production ceases at any time for any extended period, please notify Mr. Miller six-month intervals that no production has been made.

Sincerely yours,

SIGNED

Administrator

Mr. Houk
Docket File
Field Team, Region III
Mr. Thayer, 5216 GSA Bldg.
Operating Committee

File
Johnson
Hedges, 4604
Mr. Chambers

R.C.S.

IN REPLY REFER TO
G-MD-CNM

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

Defense Minerals Administration
RECEIVED
APR 23 1954

Memorandum April 22, 1954

REVIEW OF FIELD TEAM REPORT ON APPLICATION DMEA-2512 (Corundum Andalusite)

To: L. G. Houk, Defense Minerals Exploration Administration
From: D. M. Larrabee, U. S. Geological Survey
Applicant: Coranda Corporation.
Name of property: Green Talc and Bismarck Deposits.
Location of property: Mineral County, Nevada.
Date of field team report: April 8, 1954.
Authorship of field team report: Henry W. Jones and A. J. Bodenlos.
Field team's recommendation:

1. Engineer's report - Certification of discovery or development.
2. Geologist's report - No certification of discovery or development.
3. Field Team (H. C. Miller and Roscoe Smith) - certification.

Comments:

1. Wide divergence of reserves estimates by Engineer and Geologist.

2. Geologist has taken greater account of irregularity of deposit, and adverse effects of mineralogy in recovery. His reserves estimates include a certain amount of recoverability, and are therefore of more use now.

ACTION RECOMMENDED:

To protect the Government's interest in case of future development, a certification be made, and the reserves estimates of the Geologist be accepted.

D M Larrabee

D. M. Larrabee

File Copy
Surname:

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

Houk: X-2971 Room 4637

APR 19 1954

Interior
Defense Minerals Exploration
Administration

14X4401(01) Revolving Fund,
Defense Production Act, Interior (Allocated
Working Fund to the Office of the Sec.)

TELETYPE

To: Mr. H. C. Miller, Executive Officer, DMEA Field Team, Region III, 1012 Flood Building, 870 Market Street, San Francisco, California

Subject: Docket No. DMEA-2512, Contract No. Idm-X457, Coranda Corporation, Mineral County, Nevada.

Teletype recommendations on certification. If affirmative describe broadly or indicate nature of discovery by airmail. Deadline means in operator's hands prior to May 3, 1954.

George C. Selfridge

(246)

George C. Selfridge
Chairman, Operating Committee, DMEA

LGHouk:gad 4/16/54
Copy to: Admr. R. File
Docket File
Operating Committee
Confirmation Copy
Mr. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

R.C.L.

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

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

April 14, 1954

Memorandum

To: George C. Selfridge, Chairman, Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket No. DMEA-2512 - Corundum Andalusite
Coranda Corporation, Green Talc and Bismark Deposits
Mineral County, Nevada
Contract Idm-E457

Final F.T. Report

Attached are (1) four copies of the Field Team's final report on the subject property, entitled "DMEA-2512, Green Talc and Bismark Mine Deposits, Mineral County, Nevada, (Andalusite-Corundum)," by Henry W. Jones, Mining Engineer, U. S. Bureau of Mines, and A. J. Bodenlos, Geologist, U. S. Geological Survey, dated April 8, 1954, (2) four copies of the operator's final report which was submitted to Mr. A. C. Johnson on November 3, 1953, (3) four copies of the operator's supplemental report on ore-dressing work done by the Western Machinery Company, and (4) three copies of a memorandum dated April 9, 1954, from Mr. A. C. Johnson, Chief, Mining Division, Region III, to Mr. H. C. Miller, Executive Officer, DMEA Field Team, Region III.

The results of the exploration done on the Coranda Corporation's property are difficult to evaluate as you will readily note from the report by Jones and Bodenlos. Much additional research is needed to arrive at a definite conclusion. It should be noted also that the engineer and geologist are not in agreement as to the reserves.

As time is getting short in which to determine whether or not to certify this property as to a discovery, no attempt will be made by us to try to get closer agreement as to the reserves that may have been exposed by the drilling program. Furthermore, Mr. Bodenlos has been assigned to work in Mexico and is no longer available to us in San Francisco.

It is Mr. Roscoe Smith's and my opinion from all the evidence at hand that the Administrator should certify to the operator that a discovery or development has resulted from the work under the contract.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachments

Copy to: Roscoe Smith, USGS
A. C. Johnson, Reno
Finance Officer, Region III
George Mavor

April 9, 1954.

Memorandum

To: Mr. H. C. Miller, Executive Officer, DMEA Field Team Region III

From: Chief, Mining Division, Region III

Subject: Docket DMEA-2512 - Corundum Andalusite
Coranda Corporation, Green Talc and Bismark Deposits
Mineral County, Nevada
Contract Idm-E457

Enclosed are six copies of final report on the above mentioned property by Henry W. Jones, Mining Engineer of the Bureau of Mines, and A. J. Bodenlos, Geologist of the Geological Survey.

According to the geologist the Hawthorne deposits of alumina minerals are replacement bodies which occur in metavolcanic rocks of the Excelsior formation of Triassic age. The metavolcanics are largely meta-andesites but include some meta-tuffs. In certain zones, the rocks have been sheared and recrystallized into schists, and these areas seem to provide the principal sites of alumina mineralization. At the Green Talc deposit, there is also a quartzite bed in the sequence. Dikes of diabase or basalt intrude the metavolcanics in places.

Under the exploration project a total of 2500 feet of drilling was completed; 1,600 feet on the Green Talc property and 900 feet on the Bismark claim. Seven holes were drilled on the Green Talc property extending over an area about 410 feet in length, 420 feet in width and penetrating the mineralized formation to an average vertical depth of 150 feet.

Five drill holes were spaced along the outcrop of the Bismark claim extending over an area about 180 feet long, 240 feet wide and cutting the outcrop at a maximum depth of 140 feet below the surface.

Mineralization was noted in all holes and alumina and silica analyses were run on the better sections of cores by the Bureau of Mines Hydrometallurgical and Ore Dressing Branch, Reno, Nevada, and the Pittsburgh Testing Laboratory at San Francisco. Analyses showed an average low alumina and high silica content.

Reviewed by
DMEA OPERATING COMMITTEE
4-21-54
(date)

Sampling results indicate the average sillimanite mineral content of the formations were too low in grade for direct usage in the refractory industries. Further metallurgical and economic factors must be included in the study of the minerals present prior to arriving at a definite conclusion as to the value of the properties. In all likelihood, if the property is brought into production, selective mining will have to be done.

Further ore dressing tests will be necessary on the average material from the deposits to determine if a suitable grade refractory product can be made. If such a product can be obtained from these studies, it might be possible to exploit the deposits at a profit.

Preliminary ore dressing tests were made by the Bureau of Mines on the Hawthorne Andalusite deposit in 1944 and 1945. About 50 tons of ore that analyzed 42.5 percent Al_2O_3 and 54.2 percent SiO_2 but from the work that has been done under the DMEA exploration project, the material that has been indicated will not approximate these analyses. The weighted average of the preliminary material that has been indicated by diamond drilling will average in the neighborhood of about 30 percent Al_2O_3 and about 55 percent SiO_2.

There is a question as to the possibility of this lower grade material being concentrated to a product that would be satisfactory for refractory material. The Bureau of Mines on material that averaged 42.5 percent Al_2O_3 and 54.2 percent SiO_2 were able to make a concentrate that was satisfactory for refractories.

Three flow sheets under this program were used, each varying slightly in grading and sizing procedures and 15 different concentrates were produced which varied in grade from 52.1 to 72.4 percent Al_2O_3 and 44.9 to 25.2 percent SiO_2 - the composite average being 62.3 percent Al_2O_3 and 35.1 percent SiO_2. The overall ratio of concentration was 4.2 to 1.

The operators of the Coranda Corporation have submitted some tests that were done on samples from the Hawthorne Andalusite deposits that are preliminary heavy-liquid and heavy-media separation tests. The material that they submitted for these tests are not representative of the material that was indicated by the diamond drilling. From the present data, it is impossible to evaluate the material for refractories. Results to date are inconclusive until further ore tests have been made.

Mr. Bodenlos in his section of the report under Geology has made some pertinent remarks on the difference of alumina content in the andesite and the quartz, which will have to be taken into con-

sideration for the evaluation of these deposits for refractory material. Under the geologist's recommendations he has concurred with the Mining Division that further tests are necessary to provide a sounder appraisal of cut-off points and reserves. He has also suggested that there are two types of ore that which occurs in fine-grained quartz and that which seems to be a direct replacement of metavolcanics and schist. To date, all tests have been made on quartzose ore, so a metallurgical test on metavolcanic material is warranted.

The second approach would be a detailed petrographic study of cores, cutting thin sections from all types of mineralized rock (silicified volcanics, aluminatized volcanics, ore in fine-grained quartz, sericitized ore, ore high in sericite, etc.), with a view to checking mineral content against chemical analysis, should result in a better appraisal of what constitutes rock amenable to beneficiation.

The operator furnished the Mining Division with five copies of his final report and also five copies of a supplemental report on Preliminary heavy-liquid and heavy-media tests. Four copies of each of these reports were forwarded to your office on April 7. The fifth copy of the final report is with the U. S. Geological Survey at Menlo Park. The fifth copy of the supplemental report is enclosed with the joint report of the Bureau of Mines and Geological Survey.

We are requesting the operator to furnish two additional copies of these reports, as we do not have a copy of either report for the Mining Division files in Reno. If these copies are made available, by the operator, one copy of each report will be forwarded to you.

A. C. Johnson

Encls.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

FINAL REPORT

Idm-E457

DMEA-2512, Green Talc and Bismark Mine Deposits

Mineral County, Nevada

(Andalusite-Corundum)

Henry W. Jones, Mining Engineer
U. S. Bureau of Mines

A. J. Bodenlos, Geologist
U. S. Geological Survey

April 8, 1954

Reviewed by
DMEA OPERATING COMMITTEE
4-21-54
(date)

FINAL REPORT

Docket No.: DMEA-2512 (Andalusite-Corundum)

Name and address of operator: Coranda Corporation
386 Race Street, San Jose, Calif.
P. O. Box 1484, Hawthorne, Nev.

Name and location of property: Green Talc and Bismark Mine Deposits, Mineral County, Nev.

Contract No.: Idm-E457

SUMMARY

The Green Talc and Bismark deposits, located about 10 miles and 12 miles respectively northeast of Hawthorne, Nev., were diamond drilled under DMEA contract No. Idm-E457, between the periods of January 8, 1953 and May 20, 1953. Government participation was 90% of the total project cost of $36,000.00, or $32,400.00.

A total of 2,500 feet of drilling was completed; 1,600 feet on the Green Talc property and 900 feet on the Bismark claim. Seven holes were drilled on the Green Talc property extending over an area about 410 feet in length, 420 feet in width and penetrating the mineralized formation to an average vertical depth of 150 feet (fig. 3).

Five drill holes were spaced along the outcrop of the Bismark claim extending over an area about 180 feet long, 240 feet wide and cutting the outcrop at a maximum depth of 140 feet below the surface (fig. 2).

Mineralization was noted in all holes and alumina and silica analyses were run on the better sections of cores by the Bureau of Mines

Hydrometallurgical and Ore Dressing Branch, Reno, Nevada and the Pittsburgh Testing Laboratory at San Francisco. Analyses showed an average low alumina and high silica content. Fifty pyrometric equivalent cone tests were submitted to Pittsburgh Testing Laboratories by the operator.

CONCLUSIONS

Sampling results indicate the average sillimanite mineral content of the formations were too low in grade for direct usage in the refractory industries. Further metallurgical and economic factors must be included in the study of the minerals present prior to arriving at a definite conclusion as to the value of the properties. In all likelihood, if the property is brought into production, selective mining will have to be done.

ENGINEER'S RECOMMENDATIONS

1. Further ore dressing tests will be necessary on the average material from the deposits to determine if a suitable grade refractory product can be made. If such a product can be obtained from these studies, it might be possible to exploit the deposits at a profit.

2. From present data, it is impossible to evaluate the material for refractories. Results to date are inconclusive until further ore tests have been made.

In the event the material can be up-graded for commercial use, a discovery should be certified, and the Government entitled to royalties from production.

3. Production at present is not economically feasible.

DESCRIPTION OF WORK COMPLETED

The contract with the Coranda Corp. was signed for a DMEA exploration project on December 5, 1952. Work was to be completed within a six month period, or by June 5, 1953. Drilling was started on January 8, 1953 and was completed on May 20, 1953. Work was performed under separate contract with the Diamond Bit and Tool Co. of San Francisco, Calif.

Drill holes 2, 3, and 4 on the Green Talc deposit were located as indicated on figure 3 in the original contract. The extremely difficult drilling experienced in hole 2 necessitated the drill site of hole 1 be moved to a more favorable location. It was transferred to the west and opposite side of a small ridge in an effort to intersect the downward extension of the sillimanite outcrops observed in the open pit. Hole 5 was located on the west side of the ridge and midway between the projection of holes 2 and 3. This was done because holes 1 and 2 indicated the mineralization was swinging to the north rather than to the northeast as previously assumed. Holes 6 and 7 were correspondingly located on the western side of the ridge in an effort to extend the majorzone of mineralization in that direction.

Amendment No. 1 to the contract permitted the drilling of hole 7 to the north as good mineralization was found in hole 6.

Drill holes on the Bismark deposit were located parallel to one

another, about 25 to 40 feet apart and striking N. 70° W. to S. 70° E. Holes 1, 3, 4, and 5 cut the outcrop and the assumed downward extension of the outcrop at right angles (fig. 2). Barren rock was encountered at 80 feet on hole 3, therefore, hole 5 was located to the east to locate a continuation of the mineralized structure. Hole 4 was located to extend the structure below the sand dunes to the south. Results indicated that most of the mineralization, other than the outcrop, was situated on the eastern slope of the hill. A total of 900 feet of drilling was completed on the property.

All holes were started at NX size, then continued at BX size until conditions forced the completion of the hole at AX size. Drill footages averaged 7 to 12 feet per shift.

Diamond drill core was marked and logged at the drill sites; the first three holes by the Bureau of Mines engineer and the remainder by an engineer retained by the corporation. All cores were then split, including the unmineralized portions, and half were shipped to the Bureau of Mines core library at Reno, Nev.; the remainder were made into pulp samples, a part of which were submitted to the Bureau of Mines Hydrometallurgical and Ore Dressing Branch at Reno, Nevada for analyses. A similar pulp sample was sent to the Pittsburgh Testing Laboratory in San Francisco by the operator. A total of 235 alumina and silica analyses were made of the material by the Bureau of Mines, Hydrometal-

lurgical and Ore Dressing Branch (logs and analyses are attached to this report), and 250 complete analyses were made by the Pittsburgh Testing Laboratory. Fifty composite samples were made up of the material by the operator and submitted to the Pittsburgh Testing Laboratory for Pyrometric Equivalent Cone tests. (Complete drill hole logs were included in the interim reports on the property).

DRILL HOLE INFORMATION

Hole No.	Date Start	Date Completed	Length Feet	% Core Recov.	Av. Daily Foot.	Dip	Bear.	Elevation Collar	Elevation Bottom
				Green Talc Deposit					
1	2/24/53	3/18/53	208	55	9.0	-20	S35E	5164	5093
2	1/8/53	2/19/53	286	?	7.5	-25	N45W	5170	5049
3	1/7/53	2/12/53	200	46	6.6	-20	N49W	5169	5101
4	2/19/53	3/18/53	200	59	7.4	-20	N45W	5168	5110
5	2/14/53	3/23/53	250	55	7.1	-30	S45E	5210	5085
*6	3/20/53	3/30/53	243	74.5	24.3	-30	S72E	5222	5097
*7	3/24/53	4/2/53	213	80	23.6	-30	S72E	5242	5136
				Bismark Deposit					
*1	4/13/53	4/29/53	150	85	10.0	-30	N70W	5235	5160
*2	4/13/53	4/25/53	200	84	16.6	-30	S70E	5255	5155
*3	4/29/53	5/9/53	171	59.5	17.1	-30	N70W	5283	5197
*4	5/1/53	5/16/53	200	63.7	14.3	-45	N70W	5207	5066
*5	5/12/53	5/20/53	179	60	22.4	-45	N70W	5273	5147

*Drilled on a two shift basis.

Analyses were made only on the recovered core. The operator was indifferent to the advice of the examining engineer that core and sludge should be analyzed for every run where core recovery was not 90 percent or better. Core recovery was poor.

Estimated Reserves

Difference of reserve estimates between the Bureau of Mines and the Geological Survey is evident. Accordingly, both sets of computations are included along with Bureau of Mines overlay sheets (Nos. 2A and 3A) showing Al_2O_3 assays and indicated blocks.

Green Talc Deposit

Inasmuch as it is difficult to determine which material can be beneficiated to a commercial grade and which is waste, an arbitrary cut-off point of 20% Al_2O_3 was used for determining mineralized reserves, by the Bureau of Mines engineer. The assays were posted on a plan view map of the drill holes and an area of influence was interpreted. It was assumed the area of influence extended 20 feet on all sides of the drill holes for the purpose of measuring indicated mineralization. Inferred mineralization was calculated by assuming the block extended an additional 20 feet to either side and along the plane of the hole. A factor of 11.3 cubic feet per ton was used in the computations.

A total length of 120 feet of mineralization was measured along hole 1 between sections 21-95 feet and from 140-185 feet. Mineralization extended from 117-187 feet and again from 205-286 feet along hole 2 for a total length of 150 feet. Mineralization was measured at hole 3 from 16-33 feet and from 115-175 feet for a total length of 77 feet. Hole 4 mineralization extended from 10-48 feet and from 115-170 feet for a length of 93 feet. Hole 5 contained mineralization from 7-88 feet, 134-144

feet, and 154-210 feet, for a total mineralized segment length of 147 feet. Hole 6 contained mineralization from the surface to 45 feet, from 60-174 feet, for a total length of 159 feet. Mineralized zones in hole 7 extended from 50-75 feet, 95-130 feet, and 145-213 feet for a total length of 128 feet.

Bismark Deposit

Reserves on the Bismark Deposit were determined by the same method as that used on the Green Talc property, except, because of the close proximity of the holes, only indicated reserves were compiled.

Mineralization along drill hole 1 extended from 8-43 feet, 48-52 feet, 57-64 feet, 67-80 feet, and 104-130 feet for a total mineralized length of 75 feet. Drill hole 2 included sections from 32-35 feet, 48-56 feet, and 110-174 feet, for a length of 75 feet. Drill hole 3 contained mineralization from 60-75 feet, 86-102 feet, and 141-171 feet for a length of 51 feet. Mineralization in hole 4 extended from 6-69 feet and from 127-200 feet for a length of 136 feet. Mineralization in hole 5 was measured from 3-11 feet, 45-55 feet, 100-151 feet, and 161-171 feet for a total length of 79 feet.

Total Reserves

Green Talc Deposit

Hole No.	Indicated	Inferred	Total
1	16,991	16,991	
2	21,238	21,238	
3	10,902	10,902	
4	13,168	13,168	
5	20,814	20,814	
6	22,513	22,513	
7	18,123	18,123	
	123,749 tons	123,749 tons	247,498 tons

Bismark Deposit

Hole No.	Indicated	Inferred	Total
1	10,000		
2	10,000		
3	7,221		
4	19,256		
5	11,185		
	57,662 tons		57,662 tons
			305,160 tons

GEOLOGY

The Hawthorne deposits of alumina minerals are replacement bodies which occur in metavolcanic rocks of the Excelsior formation of Triassic age. The metavolcanics are largely meta-andesites but include some meta-tuffs. In certain zones, the rocks have been sheared and recrystallized into schists, and these areas seem to provide the principal sites of alumina mineralization. At the Green Talc deposit, there is also a quartzite bed in the sequence. Dikes of diabase or basalt intrude the metavolcanics in places.

The attitude of the metavolcanics was not established with certainty because most mapping was confined to the vicinity of the deposits. At the Green Talc deposits, the quartzites of possible primary origin seem to have fairly low dips. The schistosity of sheared and recrystallized metavolcanics dips relatively steeply and strikes north to northeast. The country rock is faulted, relatively complexly at the Green Talc deposit.

ORE DEPOSITS

Two types of mineralization formed the deposits. One consists of silicification and actual replacement of metavolcanics or their schistose equivalents by fine-grained quartz, followed by emplacement of alumina-bearing minerals. The other consists of direct replacement of country rock by alumina-bearing minerals, evidently without an intervening quartz stage. The source of mineralizing solutions as yet is unknown, but evidently was from below, either related to large granodioritic batholiths occurring throughout this part of Nevada or to the basic dikes.

Minerals in the deposits include fine-grained quartz, "bull" quartz, andalusite, corundum, diaspore, halloysite, sericite, pyrophyllite, pyrite, hematite, epidote, and several rare minerals present in very small amounts. The iron minerals and epidote evidently are unrelated to the alumina mineralization. The fine-grained quartz, as noted above, occurs either disseminated in the metavolcanics or as massive bodies completely replacing metavolcanics. Andalusite, corundum, and diaspore all are fine grained, and occur in blebs and lenses scattered in either fine-grained quartz or in metavolcanics. Associated with them are halloysite and sericite. The sericite occurs as fine-grained veinlets and as larger masses which are of secondary origin. The halloysite is massive, fine grained material of green color, positively identified only recently by the Bureau of Mines by means of X-ray examination. Pyrophyllite occurs as crystalline rosettes, is green in color, and occupies fractures in primary minerals. In places

it is associated with bull quartz veining earlier minerals.

Paragenesis was not established, but it is thought that fine-grained quartz was introduced into some of the ores, after which the aluminum oxides and corundum were deposited, followed by halloysite and sericite. Diaspore may be an alteration from the oxides, and halloysite possibly was similarly derived, although its massive aspect suggests that it crystallized directly. The coarsely crystalline quartz and pyrophyllite clearly are later than the aluminum oxides, but their relation to sericite is not clear; the sericite could well be the last phase of mineralization.

Numerous factors have a bearing on the distribution of the mineralized rock. In the report on preliminary examination of the area, it was noted that replacement is irregular and without obvious control with respect to lithology or structure. At that time, surface mapping at three deposits produced a two dimensional picture of great irregularity, and subsequent drilling shows that these irregularities also exist in the vertical dimension. This is very common in replacement deposits of the non-metallic minerals and is to be expected. Blocks of potential ore may contain masses of unreplaced volcanic rock, dike rock, or quartzite, or they may contain fault zones with associated hydrated aluminum silicate minerals, for sericite seems to be abundant in fractures and occurs in quantity in the larger faults. Any or all of these break up homogeneous ore blocks. Drilling at the Green Talc deposit verifies the original contention that homogeneous blocks are difficult to find. (See also progress report dated

March 3, 1953.)

GRADE OF MINERALIZED BLOCKS

Considerable difficulty is encountered in trying to establish the grade of ore in the Hawthorne deposits.

Although various attempts have been made by members of DMEA to get certain basic data from the operators which were deemed necessary to appraise these deposits, such information never was compiled, and hence it is difficult to judge just what does constitute ore. For example, for a complete appraisal of the potential of the deposit, one should know the percent of the various different alumina minerals in the ore, their grain size, amenability of the ore to different means of concentration, and the suitability for use as refractory material of the various concentrates that can be made. Information regarding most of these is still too incomplete to permit an unqualified appraisal of the deposits. However, because the DMEA contract stipulated chemical analysis of core samples, about 350 analyses are available to assist in such determinations. These in themselves are not adequate to reveal the character of mineralization for reasons discussed below, but they are of great help. Three problems are involved.

The basic problem is that alumina has been introduced into alumina-bearing rock, with commercially valuable alumina minerals replacing rock containing commercially worthless alumina-bearing minerals. The country rock, completely unmineralized, probably contains between 15

and 18 percent alumina. Although it is not definitely known what the total range is at this deposit, chemical analyses of andesites throughout the United States show they contain from 13 to 18 percent Al_2O_3. Schists range to slightly higher, from about 13 to 19 percent Al_2O_3. Thus, where alumina minerals directly replace metavolcanics and schistose recrystallized metavolcanics, the proportion of recoverable and marketable alumina mineral can not be directly told from alumina analyses. Non-recoverable aluminous material would include feldspars, pyroxenes, amphiboles, and possibly micas, especially iron-bearing biotite. It is not a question of straight addition, because some non-commercial alumina-bearing minerals have been replaced by commercial minerals. It should be noted that it is much easier to determine recoverable alumina content where the country rock was first replaced by fine-grained quartz (Bismark deposit), for in such areas, the non-commercial alumina minerals were removed before alumina oxides were emplaced.

The second problem in determination of useful ore mineral content is introduced by the presence of the sericite and clay minerals, especially halloysite. Sericite may provide a relatively high alumina content in rock, inasmuch as its composition includes, theoretically, 38.5 percent Al_2O_3 and 11.8 percent K_2O. Analyses by the Geological Survey of specimens from various parts of the United States show a range of 30.1 to 35 percent Al_2O_3 and 8.9 to 10.9 percent K_2O. Halloysite from North Carolina analyzed 37.9 to 39.2 percent Al_2O_3. From megascopic inspection, it is known these

minerals are present in cores from the Coranda property. A little sericite may be useful, but in excessive amounts it is deleterious inasmuch as it contains alkali which is not desirable in alumina refractories. The halloysite could be used. Yet in the summary report of the operators, they note that the ore from these deposits will have to be beneficiated, possibly by sink-float units. If such units are used, then both the sericite and halloysite will be lost, because its gravity will be below that of the desired product. In fact, alumina bound with sericite and halloysite will very likely be lost by any simple method of beneficiation.

The third difficulty in appraising the results of chemical analyses is that core recovery is relatively low in many of the holes, or in parts of the holes. Where this condition prevails, it is probable that there has been loss of certain constituents, so that the chemical analysis is not representative. It should be noted that the operators make no statements indicating that any sludge was analyzed to determine the true composition of any one segment.

In an attempt to evaluate the analyses, and to appraise the extent and character of mineralization, the results of analyses were plotted graphically, showing (1) Al_2O_3, (2) iron, titanium, magnesium, and calcium oxides, and (3) sodium and potassium oxides. Abstracts from the visual logging and the percentage of core recovery were also plotted. Two of the graphs--one of the Bismark and one of the Green Talc deposit-- are re-

produced in figure 4. They were selected to illustrate the two types of mineralization, the method of analysis, and the difference from the operators' interpretation that all of Bismark hole 4 and most of Green Talc hole 1 is in ore. To illustrate the use of the graphs, note that sericite contains alumina to potassium in ratio of 3:1. By multiplying potassium content by 3, it may be seen that a great amount of alumina is thus tied to a non-recoverable and high alkali mineral. If this is subtracted from the total alumina content, it is clear that the remaining alumina, and consequently the commercial alumina or aluminum silicate, in much of the drilled ground is not particularly high.

This approach also revealed an interesting relation between the ferromagnesian and alkali oxide content and the extent of silica replacement where fine-grained quartz preceded alumina mineralization. In unmineralized metavolcanics or their schistose equivalents, the ferromagnesian oxides constitute from 4 to 10 percent, and the alkalis from 3 to 5 percent of the rock. As silicification proceeds, the amount of these two groups of oxides drops. This is best illustrated in the Bismark deposit, where ore minerals seem to be deposited for the most part in fine-grained quartz. The alumina ranges in content from as little as 4 percent to as high as 33 percent. Coupled with low ferromagnesian oxides and alkali oxides, such ground should provide good feed for beneficiation units, provided the grain size is large enough.

Where this method of analysis was applied to aluminatized metavolcanics, it did not reveal as clear a picture. One finds combinations where alumina is in the magnitude of the average of country rock, with about the same amounts of ferromagnesian oxides and alkali oxides, which in most places have been visually logged as metavolcanics. Then some rock is in the same brackets of alumina content, but has very high ferromagnesian and low alkali content. This is judged to be basic dike rock, but it has been logged as such in only a few places. In addition, some rock has average or slightly above average alumina, with above average alkali content. This is judged to be sericitized metavolcanic, although in places it is logged as containing ore minerals because of its alumina content. Finally, rock which is logged as a mixture of metavolcanics and mineralized veins has a wide range in the content of the three groups of oxides.

Another approach was followed to try to ascertain the value of the rock. Samples were tested for refractoriness by heating in furnaces to determine pyrometric cone equivalents. As composite samples were used, most of which contained some deleterious material, the results have a wide range. An attempt was made to correlate the P. C. E. against composition, using ratios such as alumina versus alkalies, alumina versus ferromagnesian minerals, alumina versus ferric oxides, and a three-way plot of alumina, iron, and alkali oxides against P. C. E. values.

None showed any systematic curves, although it seems that iron has more effect than any other impurity in lowering P.C.E., but not in linear function. Under any circumstances, the composite P.C.E. values are not encouraging, many of them being no higher than any ordinary fire clay. One fact demonstrated by the composite P.C.E. values is that the rock is not homogeneous.

From these graphs an attempt was made to differentiate unmineralized rock from mineralized rock, and low grade material from high grade material. Subordinate categories of very slightly mineralized rock and of mineralized rock containing unreplaced remnants of country rock were also differentiated. The complete results--illustrated in figure 4 in the left hand column labelled ORE-- are shown in figures 2 and 3 where the grade of ore is plotted on the drill holes.

Judging from the results of this graphic analysis, the replacement masses are irregular in the vertical dimension as well as in the horizontal dimensions. Evidently the operators have not taken this into account, for it appears that they have been too liberal in their definition of ore as shown in graphs of logs included in their summary report. Comparison of logging from the writer's evaluation and that of the operators' shows that much ground which they consider as ore actually consists of only slightly mineralized metavolcanic rock, containing little more alumina than in the unaltered volcanic rock. Much of what the writer shows as mineralized contains high alumina only by virtue of sericitization, and it probably will not yield marketable material by any method of beneficiation. Nonethe-

less, it is apparent that some blocks definitely contain sufficient alumina and aluminum silicates to be ore if the material is amenable to concentration.

Another important--and controversial--point is that it will be difficult to find moderately large blocks which can be mined and beneficiated as a whole. Instead, it appears that selective mining will be necessary to produce satisfactory feed for concentrating units. Despite the contention of the operators that they can mine non-selectively, the fact that they did mix drill core samples in segments from 15 to 70 feet in length, and did derive disappointingly low P.C.E.'s, refutes their arguments that they can mine and beneficiate large blocks.

ORE RESERVES

Mr. A. C. Johnson of the Bureau of Mines wrote E. H. Bailey of the Geological Survey (Jan. 6, 1954) as follows: "It is quite evident that a million tons of alumina-silicate rock has been found, but I am not too sure that it could be classified as ore..." The writer agrees with each statement but would emphasize that the total magnitude of commercial alumina-bearing rock, in the light of the appraisal outlined in the above section, is much less than 1,000,000 tons.

The reserves of alumina-bearing rock, possibly rich enough for mill feed, are calculated on the basis of the writers evaluation of the core; it may be noted that the cut-off point cannot be calculated inasmuch as costs of mining and beneficiating as yet are unknown.

All reserves are classed as Inferred and are summarized in the following table:

Block	Tons 20% Al_2O_3 or more	Tons 10-20% Al_2O_3	Tons Total
Bismark deposit			
Main	10,000	4,000*	14,000
West	4,000		4,000
East	7,000		7,000
	21,000		25,000
Green Talc deposit			
Main	106,000		
Middle	32,000		
East	11,000		
Surface blocks	10,000		
	159,000		159,000
Total inferred reserves			184,000

* Where commercially valuable alumina minerals are in quartzite, as at Bismark, possibly even 10 percent alumina rock may contain as much recoverable material as metavolcanic rock which contains 25-28 percent alumina.

Bismark deposit. -- Because most ore minerals occur in fine-grained quartz, it is relatively easy to appraise reserves at this small deposit. The largest mass is one discovered as the result of drilling, occurring

east of the outcrops of alumina-bearing rock at the surface. The mass is irregular in all dimensions, but roughly consists of a block 110 feet long, about 40 feet in average width, and calculated to be about 25 feet high. It partly underlies worthless silicified metavolcanics and either will require considerable stripping or underground mining. Its volume is 110,000 cubic feet; using the conservative figure of 11.3 cubic feet per ton, as was done by the operators, the block contains about 10,000 tons. If rock containing less than 20 percent Al_2O_3 can be handled, then additional ground may be calculated northward, into the area shown in drill hole #5; this would increase the ore to about 14,000 tons.

Two smaller blocks crop out at the surface, the first being the highly mineralized area on the west side of the main rib of the deposit (fig. 4, hole 1), from which samples were taken and which were highly amenable to concentration and to production of high grade alumina refractories. It is judged that the west block may be as much as 80 feet long and 15 feet wide. It is picked up 60 feet below the surface in drill hole 1 but is barren 23 feet below the surface in drill hole 2. Using an average of 40 feet depth, this block would contain about 4,000 tons. The second (east) block was picked up in the first 37 feet of drill hole 4. Owing to lack of outcrops in the area, it is not known how far it extends laterally from the hole. Assuming its length to be twice its width, its average depth to be 30 feet, it may contain as much as 82,000 cubic feet, or about 7,000 tons of ore.

In total, then, it is estimated that the three blocks contain an inferred tonnage of 21,000 tons, with a possible additional 4,000 tons if lower grade rock in drill hole 5 is included. This is considered as inferred because of insufficient data to consider it measured or indicated.

Green Talc deposit.--As the result of drilling, it seem evident that the south end of the ridge is relatively poor, as was indicated by geology mapped on the surface. Ore in southwest main pit, faulted, intruded by dikes, and containing much halloysite, does not seem to have much continuity in depth or northward, as indicated by holes 1 and 2. Hole 3 indicates little extension in depth of ore seen on the surface. Hole 7, north of the main area, shows very little mineralization. Holes 5 and 6 seem to have uncovered the best ore body in the area, averaging 80 feet in width and possibly as much as 250 feet long. Including low-alumina rock which also is relatively free of deleterious oxides, a block 60 feet in average depth gives a volume of 1,200,000 cubic feet and 106,000 tons of rock.

A smaller block may be indicated by the results of drilling holes 3 and 4. Although outcrops in the area are few and consist only of silicified metavolcanics, at depth a block possibly 120 feet long, averaging 30 feet in width, and with an average depth of 100 feet gives 360,000 cubic feet, or 32,000 tons of possible ore. Another small block extending from the east pit, diagonally north to northwest uphill, cut at shallow depth by

drill hole 4, may be 120 feet long on a dogleg, 30 feet in average width, and 35 feet in depth. This contains 126,000 cubic feet of rock, or possibly 11,000 tons.

Surface blocks which evidently do not go very deep, from south of drill hole 4 southwest toward the main pit may provide another several thousand tons. Totaling the three calculated blocks gives 149,000 tons, which with possibly 10,000 tons on the surface between hole 4 and south of hole 3, gives a figure of 159,000 tons.

If the possible 25,000 tons at Bismark is added to this, the drilling program resulted in blocking out 184,000 tons of ore. This estimate is admittedly conservative. It should be emphasized that mining part of this tonnage will require other than open pit stripping and surface mining.

GEOLOGIST'S RECOMMENDATIONS

Inasmuch as the operators as yet have not fully probed the necessary avenues to determine the true worth of their ore, it is suggested that two additional checks be made which may provide a sounder appraisal of cut-off points and reserves.

As noted by Johnson in his letter to Bailey, further metallurgical testing is needed to determine whether a concentrate of ore minerals can be made. Along this line, it should be reiterated that there are two types of ore, that which occurs in fine-grained quartz and that which seems to be a direct replacement of metavolcanics and schist. To date, all tests

have been made on quartzose ore, so a metallurgical test on metavolcanic ore is warranted.

The second approach is geological. A detailed petrographic study of cores, cutting thin sections from all types of mineralized rock (silicified volcanics, aluminatized volcanics, ore in fine-grained quartz, sericitized ore, ore high in sericite, etc.), with a view to checking mineral content against chemical analysis, should result in a better appraisal of what constitutes rock amenable to beneficiation.

EXPENDITURES

Total approved	$36,000
Total cost of project	$36,000
Gov'ts share of cost	$32,400
Gov'ts share unexpended	None
Value of production and Gov'ts royalty	None

EFFICIENCY OF OPERATIONS

Contract diamond drilling was carried out in an efficient manner, considering the extremely difficult conditions encountered. Competency of the operators, however, was considered inefficient. The field work, handled by a chemical engineer, was not directed properly, due mostly to lack of sufficient engineering practice.

EQUIPMENT PURCHASED FOR THE PROJECT

There was no equipment purchased for the project.

Green Talc Mine
Mineral Co., Nevada

Docket No. DMEA-2512
Contract No. Idm-E457

Diamond Drill Hole #1

Sample No.	Footage	Percent SiO_2	Percent Al_2O_3	Description
1 - 1	21 - 27	41.7	33.5	Mineralized, sericite
2 -1	27 - 34	46.9	31.7	" "
3 - 1	34 - 39	46.3	32.1	" "
4 - 1	39 - 45	54.1	28.0	Meta volcanics & Min.
5 - 1	45 - 55	54.3	29.0	Mineralized, sericite
6 - 1	55 - 65	44.5	34.8	Light, colored Min.
7 - 1	65 - 70	37.8	37.2	" " "
8 - 1	70 - 80	57.4	24.8	Some Min. in meta volc.
9 - 1	80 - 90	58.8	25.7	" " "
10 - 1	90 - 95	54.3	28.7	" " "
16 - 1	140 - 150	41.4	34.5	Al-Si Min. and Sericite
17 - 1	150 - 155	47.3	25.1	Mostly Sericite in M.V.
18 - 1	160 - 170	45.5	29.9	Sericite & Al-Si Min.
19 - 1	170 - 178	35.2	36.6	Al-Si Min. & Kaolin
20 - 1	178 - 185	52.3	24.8	Sericite and Meta volc.
21 - 1	185 - 200	58.9	18.5	Some Min. in M.V.
22 - 1	200 - 208	46.1	17.5	M.V. rock, no min.

Diamond Drill Hole #2

4 - 2	35 - 40	72.4	14.6	Sericite in M.V. schist
5 - 2	40 - 47	62.5	16.1	" " "
12 - 2	88 - 97	51.3	22.0	Sericite in Quartzite
15 - 2	97 - 107	74.1	13.4	Sericite in M.V. schist
17 - 2	117 - 130	37.9	39.0	Al-Si Min. Some Sericite
18 - 2	130 - 135	54.7	29.3	Sericite cementing M.V.
20 - 2	135 - 146	45.4	34.6	Mostly Al-Si Min., Ser.
22 - 2	146 - 156	42.2	28.5	Al-Si Min, & Dike rock.
24 - 2	156 - 164	44.0	32.6	Al-Si Min. & Kaolinite.
25 - 2	164 - 172	56.7	25.6	" " "
26 - 2	172 - 180	49.4	24.1	Kaolinite in Schist
27 - 2	180 - 187	52.0	23.4	Sericite and Schist
29 - 2	187 - 197.5	71.7	16.3	Sericite and clay
30 - 2	197.5 - 205	81.3	10.9	Sericite bands in schist
31 - 2	205 - 213	42.7	35.5	Predom. Sericite
32 - 2	213 - 221	55.5	26.7	Sericite & Al-Si in schist
33 - 2	221 - 230	50.4	27.7	Sericite in M.V.
34 - 2	230 - 237	48.3	28.3	" " "
35 - 2	237 - 245	57.7	25.2	Al-Si, Sericite in M.V.
36 - 2	245 - 250	50.8	29.5	" " "
38 - 2	250 - 257	43.6	32.0	" " "
40 - 2	257 - 264	56.3	26.9	" " "
42 - 2	264 - 270	49.2	29.5	M.V. with some Al-Si Min.
43 - 2	270 - 280	48.8	29.2	M.V. with Sericite
44 - 2	280 - 286	44.5	34.5	Some Min. in M.V.

Diamond Drill Hole #3

Sample No.	Footage	Percent SiO_2	Percent Al_2O_3	Description
1 - 3	1 - 4.5	39.8	33.5	Sericite and Al-Si Mineralization
2 - 3	4.5 - 16	52.6	17.3	Soft Schist, no Mineralization
3 - 3	16 - 25	38.1	21.7	Al-Si Min., some Sericite in M.V.
4 - 3	25 - 33	58.4	22.1	Kaolinite and Sericite in M.V.
5 - 3	33 - 41	67.3	16.1	Quartzite, little Mineralization
12 - 3	97 - 105	75.6	8.0	Quartzite, some Sericite in seams
13 - 3	105 - 115	76.8	9.2	" " " " "
14 - 3	115 - 125	43.9	35.9	Sericite, some Al-Si min.
15 - 3	125 - 138	60.2	24.4	" " " "
16 - 3	138 - 148	47.3	33.7	Black M.V. cemented with Sericite
17 - 3	148 - 150.6	38.3	39.2	Sericite and Al-Si minerals
18 - 3	150.6 - 165	36.2	31.7	Dark M.V. rock, sericized in seams
19 - 3	163 - 175	49.4	23.6	Light porphry schist, little min.

Diamond Drill Hole #4

2 - 4	10 - 20	51.1	21.6	Dense M.V., no mineralization
3 - 4	20 - 30	59.4	30.3	Sericite & Kaolin in light groundmass
4 - 4	30 - 40	64.0	29.0	Min. in darker groundmass
5 - 4	40 - 48	64.7	25.6	Dissem. min. in dark groundmass
7 - 4	52 - 55	65.3	15.3	Talc in Meta Volcanics, Little min.
8 - 4	55 - 60	66.8	15.2	Kaolin in M.V.
9 - 4	60 - 65	72.2	8.8	Broken M.V. Hematite, little Min.
16 - 4	110 - 115	70.2	18.0	Kaolin or Talc in M.V.
17 - 4	115 - 125	61.7	23.7	Sericite in light sandy M.V.
18 - 4	125 - 135	45.0	39.9	Al-Si Min., Sericite inclusions
19 - 4	135 - 145	49.2	37.8	Well Min., Corundum streaks
20 - 4	145 - 150	54.9	31.8	Same only darker groundmass
21 - 4	150 - 160	57.7	21.0	Silicious M.V. Little Min.
22 - 4	160 - 170	58.6	24.0	Light Min. in a M.V. groundmass
23 - 4	170 - 175	70.0	14.8	Meta volcanics, little Min.
24 - 4	175 - 185	65.6	16.7	Light M.V. with dark phenocrysts

Diamond Drill Hole #5

2 - 5	5 - 14	39.6	33.8	Al-Si Min. light groundmass
4 - 5	14 - 20	47.4	48.1	" " , Corundum noted
5 - 5	20 - 30	58.9	34.8	" " " "
5 - 5B	30 - 40	57.7	35.3	Light Buff Groundmass, less Min.
5 - 5E	40 - 49	61.0	32.2	" " " , Some Sericite
6 - 5	49 - 55	52.8	24.3	Light Talc, little Min.
7 - 5	55 - 64	64.4	29.2	Light buff Groundmass, well Min.
9 - 5	64 - 73	70.7	24.8	" " " , some sericite
10 - 5	73 - 83	65.8	24.3	" " " " "
11 - 5	83 - 88	42.9	38.3	Broken, light, well Min., some Sericit
12 - 5	88 - 98	76.4	19.2	Light Buff groundmass, quartzitic
13 - 5	98 - 108	65.2	21.1	Gen Min. structure, some sericite
14 - 5	108 - 117	75.1	19.0	" " " " "

(Contd.) Diamond Drill Hole #5

Sample No.	Footage	Percent SiO_2	Al_2O_3	Description
15 - 5	117 - 124	72.5	14.0	Quartzitic, min. structure
17 - 5	124 - 134	85.9	9.4	" Some Min., Kaolin
18.- 5	134 - 144	70.3	20.1	Min. M.V. , Some Sericite
19 - 5	144 - 154	71.3	17.5	" " " " and Kaolin
21 - 5	154 - 159	53.1	30.8	Dark M.V. with Sericite inclusions
22 - 5	159 - 169	45.7	35.7	" " " " "
23 - 5	169 - 179	38.7	39.1	" " , Considerable Sericite
24 - 5	179 - 189	41.5	29.0	Sandy textured M.V., Some Min.
25 - 5	189 - 200	39.7	27.1	M.V. and some min., Sericite Incl.
28 - 5	200 - 210	53.4	22.1	" " Sericite Incl.
29 - 5	210 - 220	53.4	19.1	M.V. dark groundmass, no min.
30 - 5	225 - 235	49.4	18.0	" " " " "
31 - 5	235 - 240	48.5	20.0	" " " " "
32 - 5	240 - 250	45.8	21.1	" " " " "

Green Talc Mine
Mineral Co., Nevada.

Docket No. DMEA 2512
Contract No.Idm-E457

Diamond Drill Hole #6

Sample No.	Footage	Percent SiO_2	Percent Al_2O_3	Description
1-- 6	0 - 8	47.7	23.0	Sericite in dark groundmass, some Al-Si.
2 - 6	8 - 18	25.1	35.6	Al-Si min., some Kaolin, in dark G.M.
3 - 6	18 - 28	49.0	26.7	Small sericite incl. in dark meta volcamics
4 - 6	28 - 33	8.0	39.6	Sericite amd Al-Si with Qtzite inclusions
4 - 6a	33 - 35	48.3	31,4	Gen. min. zone some meta volcanic incl.
5 - 6	35 - 43	24.5	34.1	Gen. min. structure, broken.
6 - 6	43 - 44.5	33.1	35.1	Kaolinized min. structure.
7 - 6	44.5-54	64.4	18.1	Kaolinized structure, oxidized, little min.
8 - 6	54 - 60	61.0	17.4	Hematite and sericite seams in M.V.
9 - 6	60 - 70	42.6	35.5	Alt. to general Min. structure
10- 6	70 - 80	55.6	32.3	Gen. min. zone, increasing corundum, silicious
11- 6	80 - 91	49.4	26.2	Light meta volcanics, little mineralization
12- 6	91 - 97	33.9	36.9	Sericite in dark colored meta volcanics.
13- 6	97 - 107	52.3	33.8	Light and dark meta volcinics, some min.
14- 6	107- 114	50.1	38.6	Sericite mineralization
15- 6	114- 120	56.7	36.7	Silicious mineralized zone.
16- 6	120- 130	40.2	36.6	Same as above, less broken.
17- 6	130- 136	23.8	36.8	General mineralized structure.
18- 6	136- 146	23.8	34.5	" " "
19- 6	146- 147	41.3	35.5	Dark M.V. groundmass, AlSi min. throughout.
20- 6	147- 154	50.4	40.0	Dark M.V., general min. structure.
21- 6	154- 164	50.3	37.0	Quartzite, streaked with AlSi min. some Fe.
22- 6	164- 174	51.3	30.9	Meta volcanics, some sericite inclusions.
28- 6	227.5-229	44.2	33.2	AlSi min. in lighter meta andesite

Diamond Drill Hole #7

6 - 7	50 - 55	34.0	39.9	Inter banded layers sericite and light M.V.
7 - 7	55 - 62	44.7	31.6	Same as above, some dark M.V
8 - 7	62 - 65	49.7	28.8	Dark altered M.V. blue cast, no min.
9 - 7	65 - 75	48.7	28.4	Silicious M.V., suspected corundum, altered.
13- 7	95 - 105	45.7	32.3	Sericite in light M.V., slightly oxidized.
14- 7	105- 107	58.6	24.9	" " " " " "
15- 7	107- 113	37.8	31.7	" " " " " "
16- 7	113- 120	48.4	30.8	Light M.V., little mineralization.
17- 7	120- 126	51.8	24.0	" " " "
18- 7	126- 130	52.9	28.1	Sericite and AlSi min. in light M.V.
19- 7	130- 135	67.2	16.7	Porus quratzite, grayish in color.
20- 7	135- 145	64.9	17.7	Light M.V., considerable hematite, no min.
21- 7	145- 156	56.7	26.1	Light M.V., some mineralization.
22-7	156- 166	51.1	30.1	Mineralization in light M.V., spotty.
23- 7	166- 175	48.4	26.3	Dark M.V., little mineralization.
24- 7	175- 185	51.3	26.0	Dark M.V., no mineralization
25- 7	185- 190	47.7	27.5	Dark M.V., hematite seams, some min.
26- 7	190- 204	45.2	30.2	Same as above.
27- 7	204- 205	33.8	37.8	Good AlSi mineralization, no sericite.
28- 7	205- 213	50.0	27.3	Meta volcanics, no mineralization.

Bismark Mine
Mineral County, Nevada

Docket No. DMEA-2512
Contract No. Idm-E457

Bismark Drill Hole No. 1

Sample No.	Footage	Percent SiO_2	Percent Al_2O_3	Description
B-4-1	18 - 20	54.4	28.9	Slight mineralization in meta-volcanics
B-5-1	20 - 26	54.6	28.6	Slight mineralization, brecciated, iron stains.
B-6-1	26 - 31	64.4	25.1	Patchy min., schistose, some diaspore, prominent qtz.
B-7-1	31 - 32	66.0	25.3	Meta- volcanics, considerable iron stain, no ore
B-8-1	32 - 38	56.8	34.8	General min. structure, diaspore indications
B-9-1	38 - 43	70.6	25.2	Min. structure, vugs and seams of quartz.
B-10-1	43 - 48	81.6	13.0	Some min. in Quartz structure, glassy
B-11-1	48 - 52	72.2	21.0	Same as above.
B-12-1	52 - 57	81.8	14.2	Slight min. in quartz structure, glassy.
B-13-1	57 - 64	66.1	26.7	Same as above.
B-14-1	64 - 67	88.4	7.1	Quartzy structure, some mineralization.
B-15-1	67 - 74.5	66.4	26.8	Gen. ore structure, diaspore and pyrophyllite.
B-16-1	74.5-80	63.0	25.1	Min. altering to a schistose structure.
B-20-1	104-110	65.3	28.9	Alt. to min. structure, quartz seams throughout.
B-21-1	110-115	62.5	28.5	Same as above.
B-22-1	115-120	63.4	29.4	Same as above.
B-23-1	120-130	53.3	26.2	Quartz, some mineralization, in brecciated schist.

Bismark Drill Hole No. 2

B-3-2	25 - 32	61.8	17.1	Schistose Meta-andesite, white phenocrysts
B-4-2	32 - 35	42.9	31.8	Green sericite, broken, containing iron stain.
B-7-2	48 - 56	60.1	21.7	Mineralization in broken quartzy groundmass.
B-8-2	56 - 65	91.4	4.6	Same as above, some white grained fine material
B-9-2	65 - 75	89.6	6.2	Light sandy material, could be diaspore
B-10-2	75 - 85	84.2	7.5	Light quartzite, some sericite in seams.
B-11-2	85 - 90	92.1	4.8	Light quartzite, increasing mineralization
B-12-2	90 - 96	81.2	11.7	Less mineralized, in light quartzite,
B-13-2	96 -106	87.5	6.3	Light quartzite, some sericite in seams.
B-14-2	106-110	84.5	11.4	Same as above, altering to general ore structure.
B-15-2	110-116	68.0	23.5	General mineralized structure, buff colored
B-16-2	116-125	61.7	27.8	General mineralized structure.
B-17-2	125-135	71.4	22.3	Buff colored ground ma ss, well mineralized
B-18-2	135-145	69.3	20.3	Buff ground mass, diaspore crystals
B-19-2	145-155	72.4	29.6	Same as above.
B-20-2	155-160	59.7	31.8	Same as above.
B-21-2	160-166	65.7	24.7	Min. banded in a meta-andesite , slightly schistose
B-22-2	166-174	73.9	20.2	Decreasing mineralization in schistose rock.
B-23-2	174-181	8315	10.4	Meta andesites, some quartzite zones, sericite
B-24-2	181-191	73.8	14.7	Scattered sericite seams in a meta andesite
B-25-2	191-200	59.0	19.4	Schistose meta volcanics, no mineralization.

Bismark Mine
Mineral County, Nevada

Docket No. DMEA-2512
Contract No. Idm-E457

Bismark Drill Hole No. 3

Sample No.	Footage	Percent SiO_2	Percent Al_2O_3	Description
B-3-3	20 - 23	89.1	5.7	Reddish stained quartzite, no mineralization.
B-4-3	23 - 32	87.8	7.5	Small green areas in a broken quartzite.
B-5-3	32 - 41	68.9	18.9	More prominent min. in light qtzite groundmass.
B-6-3	41 - 50	75.0	12.8	Some min. in a light quartzite.
B-7-3	50 - 60	73.7	15.8	Broken min. structure, quartzitic.
B-8-3	60 -65	61.1	25.1	Broken, reddish, honeycombed str., some min.
B-9-3	65 - 70	55.4	29.6	Schistose Qtzite, occasional green min.
B-10-3	70 - 75	47.7	32.7	Waxey surfaces on shear surfaces, little min.
B-13-3	86 - 95	57.2	32.7	Light schistose str., slight mineralization.
B-14-3	95 - 102	53.5	30.6	Broken, schistose, some mineralization.
B-19-3	141- 151	63.2	20.4	Slight min. ina meta-andosite, highly broken.
B-20-3	151- 161	57.0	28.6	Schistose structure, considerable min.
B-21-3	161- 171	37.5	21.9	Grey, reddish material, soft and sandy, no min.

Bismark Drill Hole No. 4

B-1-4	6 - 16	67.5	26.4	General mineralized structure.
B-2-4	16 - 26	64.8	28.5	Gen. min. structure in a broken meta-volcanic.
B-3-4	26 - 30	51.0	33.3	Min. structure continuing.
B-4-4	30 - 35	67.8	25.7	Some meta volcanics in gen.mineralized zone.
B-5-4	35 - 37	64.2	25.1	Brecciated material, schistose, mineralized.
B-6-4	37 - 43	67.8	21.7	Continued mineralized structure.
B-7-4	43 - 51	51.0	23.9	Dark meta volcanics, no mineralization
B-8-4	51 - 54	53.9	25.8	Some green min. in meta volcanics
B-9-4	54 - 61	53.9	25.7	Some min. in a light ground mass.
B-10-4	61 - 69	57.3	24.5	Broken schistose material, some min.
B-18-4	127-134	53.7	24.0	Light schistose material, some light min.
B-19-4	134-139	46.2	21.4	Broken light groundmass, little mineralization.
B-20-4	139-145	47.5	21.3	Slight min. in a dark ground mass.
B-21-4	145-150	45.1	23.8	Same as above.
B-22-4	150-160	44.3	24.2	Broken meta volcanics, littlt to no mineralization.
B-23-4	160-170	45.8	23.5	Dark meta volcanics, slight mineraliaation.
B-24-4	170-180	44.7	23.7	Slight min. contd, in a meta-volcanic
B-25-4	180-190	40.7	28.5	Broken meta volcanics, some mineralization.
B-26-4	190-200	44.0	24.0	Solid, dark meta volcanics, some min.

Bismark Mine
Mineral County, Nevada

Docket No. DMEA-2512
Contract No. Idm-E457

Bismark Drill Hole No. 5

Sample No.	Footage	Percent SiO_2	Percent Al_2O_3	Description
B-1-5	3 - 11	52.2	24.8	Gen. mineralized structure, light green min.
B-2-5	11 - 16	85.4	8.0	Min. zone cont., appears low in grade, solid
B-3-5	16 - 21	83.6	10.3	Silicious, light ground mass, little min.
B-4-5	21 - 26	85.5	8.2	Schistose, some mineralization
B-5-5	26 - 28.5	90.9	5.5	Highly silicious, general ore structure.
B-6-5	28.5-35	83.1	9.8	General min. zone, slightly darker color.
B-7-5	35 - 45	75.2	16.1	General min. zone, slightly schistose.
B-8-5	45 - 55	58.9	28.6	General ore structure continuing, schistose.
B-9-5	55 - 61	75.7	16.4	Blue green cast to min. structure
B-10-5	61 -71	81.8	12.5	General mineralized section, light colored.
B-11-5	71 - 81	90.7	5.9	General mineralized structure, quartz seams.
B-12-5	81 - 91	73.2	19.5	Low grade min., broken meta volcanics.
B-13-5	91 -100	73.6	15.7	Buff colored meta volcanics, low grade, silicious
B-14-5	100-108	69.2	22.6	Silicious ore structure, better grade.
B-15-5	108-114	71.1	20.0	Same as above, general ore structure.
B-16-5	114-116	58.8	27.5	Meta andesites, little to no mineralization.
B-17-5	116-124	55.9	34.7	Reddish colored ore structure, broken.
B-18-5	124-132	69.2	26.8	Silicious mineralized structure, solid.
B-19-5	132-142	74.2	21.6	Low grade min. silicious, solid.
B-20-5	142-151	66.7	24.3	Darker colored min. structure.
B-21-5	151-161	69.8	19.3	Broken, platey ore structure, low grade.
B-22-5	161-171	76.4	22.2	Same as above.
B-23-5	171-179	63.3	18.8	Schistosed mineralized structure, low grade.

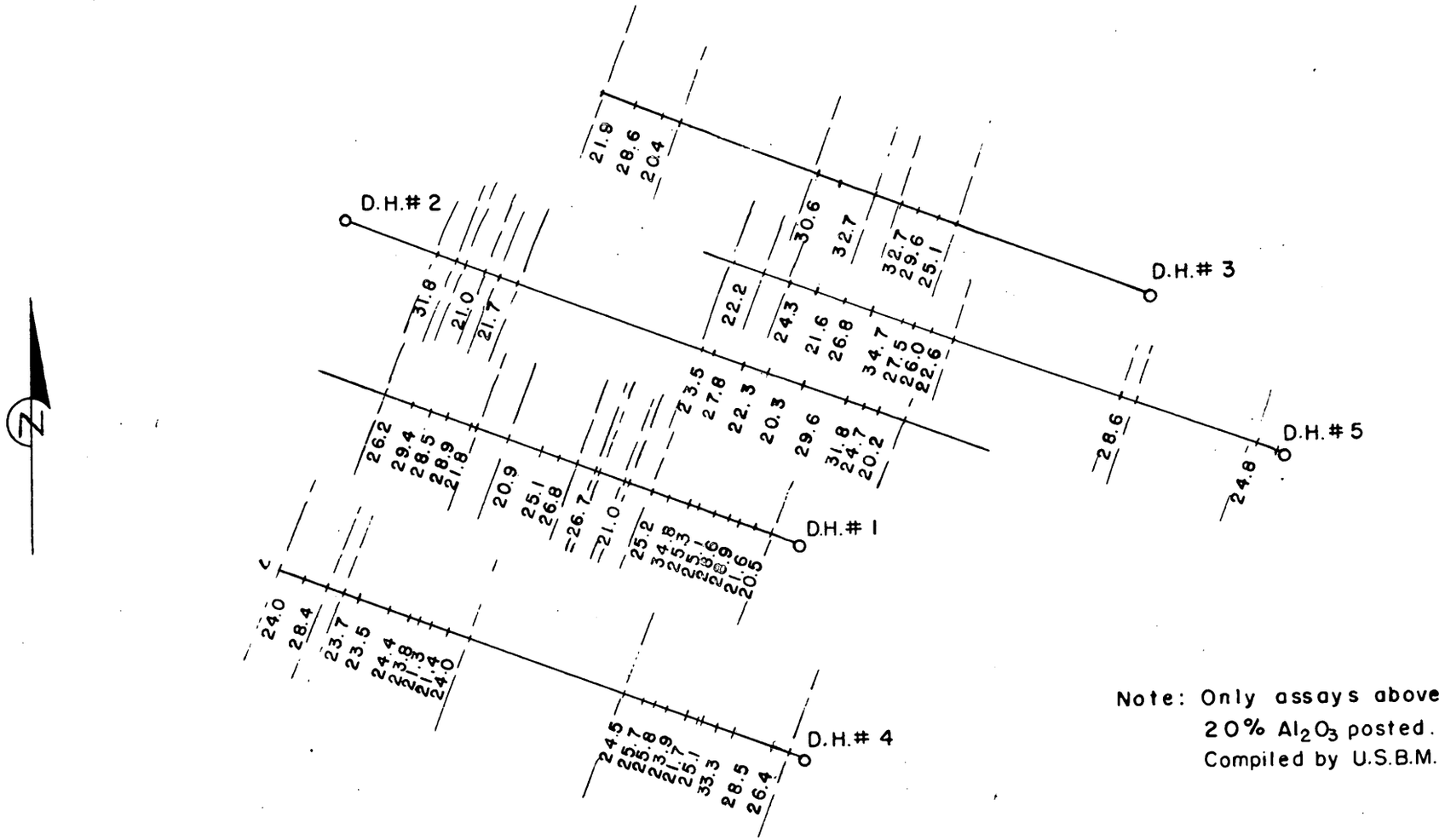

Fig. 2A

Overlay Plan Map, Showing Drill Hole Samples and Mineralized Segments.

Bismark Deposit, Mineral County, Nev.

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

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

March 17, 1954

Memorandum

To: George C. Selfridge, Chairman, Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket No. DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc Mine and Bismark Mine
Mineral County, Nevada
Contract No. Idm-E457

Reference is made to your letter dated March 12, 1954, stating that your office would be pleased to receive the final field team and operator's reports on the Coranda project.

Mr. Bodenlos, Geologist, Geological Survey, completed his part of the report shortly before he left for Mexico. The report is now being reviewed by Roscoe Smith and the illustrations drafted. Mr. Smith informs us that the Survey part of the report will be sent to Reno for inclusion in the joint Bureau of Mines-Geological Survey report early the week of March 22.

The Bureau of Mines engineer has been working on his part so it shouldn't be too long before the report is complete and ready to be sent to you.

According to our files, the Reno office has the operator's final report. Mr. Smith says it is not dated but that it was submitted with a letter dated November 3, 1953. Certification of a discovery must thus be made prior to May 3, 1954. That doesn't give us too much time to get our joint report in to you, so I will make every effort to get it completed within the next few weeks.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Copy to: Roscoe Smith, USGS
A. C. Johnson, Reno

File Copy
Surname:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

MAR 12 1954

Mr. H. C. Miller
Executive Officer, DMEA
Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512 ~~Corundum~~
Andalusite
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract No. Idm-E457

Dear Mr. Miller:

The work outlined in the subject contract appears to have been completed. This office would be pleased to receive the final field team and operator's reports.

The certification of discovery or development, if one is to be made, must be made within six months of the date of receipt of the operator's final report.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (JHB)

Approved:

J. H. Hedges (JHB)
Member, Bureau of Mines

D. M. Larrabee (JHB)
Member, Geological Survey

LGHouk:gad 3/12/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. H. P. Chandler, 3520
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

RCH 3-15-54

FILE COPY
SURNAME:

Robertson

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

600

September 17, 1953

N. S. in R.R.

Memorandum

To: Administrator

From: Nonmetallic Minerals Division

Subject: Docket No. DMEA-2512 - Corundum-Andalusite
Coranda Corporation
Green Talc and Bismark Mines
Mineral County, Nevada
Contract No. Idm-E457

Re: Approval of Amendment No. 2

This Division recommends the amendment as executed.

The amendment only advances the date of completion from September 5 to November 5, 1953, to allow the Operator sufficient time to complete the analytical work and reports.

/s/
J. T. Robertson
Nonmetallic Minerals Division

JTRobertson:gad 9/17/53

Copy to: Admr. R. File
Docket File
Mr. Houk

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

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

September 8, 1953

Memorandum

To: Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc Mine & Bismark Mine, Mineral County, Nevada
Contract Idm-E457
Amendment No. 2

Attached are the original and two copies of Amendment No. 2, dated September 2, 1953, extending the time of completion of subject contract.

A justification sheet is attached to each copy of the amendment.

Proper distribution has been made of the remaining copies.

9-14

S. Ricker for H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachment

Copy to: A. C. Johnson, Reno (With copy of amendment)
Finance Officer, Region III (With copy of amendment)
E. H. Bailey, USGS
George Mavor

RECEIVED
OCT 6 1953
GENERAL COUNSEL
DEFENSE MINERALS
ADMINISTRATION

17

MDL

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

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

September 2, 1953

Mr. J. H. Rodda, President
Coranda Corporation
386 Race Street
San Jose, California

Re: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc Mine & Bismark Mine
Mineral County, Nevada
Contract Idm-E457
Amendment No. 2

Dear Mr. Rodda:

Complying with the request in your letter of August 31, 1953, we have prepared Amendment No. 2 to the subject contract extending the completion date to November 5, 1953.

If you are in accord with the amendment as we have drawn it up, will you kindly sign all of the six copies enclosed, returning the original and four carbon copies to this office, retaining the remaining copy marked "Operator's Copy" for your records.

Sincerely yours,

H. C. MILLER
H. C. Miller
Executive Officer
DMEA Field Team, Region III

Enclosure

Copy to: DMEA, Washington, D. C.
E. H. Bailey, USGS
A. C. Johnson, Reno

FILE COPY
SURNAME:

UNITED STATES 600
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

AUG 27 1953

Mr. H. C. Miller
Executive Officer, DMEA
Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Green Talc Mine and Bismark Mine
Coranda Corporation
Mineral County, Nevada
Contract No. Idm-E457

Houk
Ellis
Selfridge

Dear Mr. Miller:

Reference is made to the subject contract for exploration assistance at the Green Talc Mine and Bismark Mine in Mineral County, Nevada.

You are authorized to grant a two-month extension to the subject contract to allow sufficient time to complete the analytical work and for preparation of the Operator's final report.

Mr. J. H. Rodda requested the extension when he visited our offices on August 24, 1953. He was advised to write you a letter requesting the additional time. The completion date will be changed from September 5, 1953, to November 5, 1953, by the amendment.

Sincerely yours,

Ernest Wm. Ellis
857
ACTING Chairman, Operating Committee

Approved:

M. H. Kline 857
Member, Bureau of Mines

D. M. Larrabee
857
Member, Geological Survey

LGHouk:gad 8/26/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Dietrich, 3526
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

HHR 8-27

case 7-14

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

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

July 10, 1953

Memorandum

To: George C. Selfridge, Chairman, Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation, Green Talc Mine & Bismark Mine
Mineral County, Nevada, Contract Idm-E457

Reference is made to your letter dated June 15, 1953, with which you transmitted six copies of a proposed amendment which would allow the Coranda Corporation to analyze their samples in their own laboratory in place of having the work done by the Pittsburgh Testing Laboratory or other Government approved laboratories.

For a number of reasons, neither Mr. Bailey nor I were in favor of allowing Coranda to do their own work and to pay them for doing it. To satisfy us that their results were correct, we would have to have check samples run and that would mean that we would be paying twice for the analyses of many of the samples. There were other reasons too why we could not approve the proposed amendment, but I will not go into that in this memorandum.

We could never understand why Mr. Rodda, President, Coranda Corporation, objected to having the Pittsburgh Testing Laboratory run the samples. His reasons did not impress us. We thereupon arranged a counter program of analyses which was presented to Mr. Rodda in the form of a letter to him dated July 3, 1953, of which a copy was sent to DMEA. Mr. Rodda rejected that proposal which we had worked out with his Chemist, Mr. Holt.

Mr. Rodda called the other day, having discussed the matter by telephone with Mr. Houk in Washington, informing me that he is now satisfied that Pittsburgh Testing Laboratory can

do the work satisfactory and that he will proceed under the original contract. Mr. Bailey and I are now satisfied.

Accordingly, the six copies of proposed Amendment No. 2 are being returned to you unsigned by the Operator.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachments

Copy to: E. H. Bailey, USGS
A. C. Johnson, Reno

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 8 1953

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

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

July 3, 1953

Mr. J. H. Rodda, President
Coranda Corporation
386 Race Street
San Jose, California

Re: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc Mine & Bismark Mine
Mineral County, Nevada
Contract Idm-4457

Dear Mr. Rodda:

As a result of conversations between Mr. Holt, Mr. Bailey, and myself, I believe I may be able to prepare an amendment to your contract which will be mutually satisfactory. The amendment would delete, in Exhibit "A" of your contract, under "Description of the Work", the paragraph referring to the analysis of 250 samples to be given a Class #3 analysis and allow for the following items:

Analyses for Na, K, Fe, Ti, and ignition loss to be run by the Coranda Corporation on the drill core samples that have been shown by U. S. Bureau of Mines assays to contain 30% Al_2O_3 or more.

50 samples at $10.00 each $500.00

Concentration by heavy liquids of 50 samples on which cone tests are to be run. Separation to consist of screening to -65 and +150 and separation by sodium tetrabromide. Samples to be weighed to ascertain amount of concentration.

50 samples at $2.00 each $100.00

Cone tests on the above concentrates to be run by Pittsburgh Testing Laboratory or other commerical laboratories acceptable to the Executive Officer of DMEA Field Team, Region III.

50 cone tests at $20.00 each $1,000.00

The items totaling $7,250.00 under "Agreed Project Costs" of Exhibit "A" would be deleted from the contract by the amendment and

substituted therefor would be items totaling $1,600.00.

If you are agreeable to such an amendment, I will give consideration to drawing it up; if not I would appreciate hearing further from you regarding your desires.

Sincerely yours,

H. C. MILLER

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Copy to: DMEA, Washington, D. C.
E. H. Bailey, USGS
A. C. Johnson, Reno

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

600

JUN 15 1953

Houk
Chapman
Selfridge
H. Johnson

Mr. H. C. Miller
Executive Officer, DMEA
Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Green Talc Mine and Bismark Mine
Corunda Corporation
Mineral County, Nevada
Contract No. Idm-E457

Dear Mr. Miller:

Reference is made to the subject contract on the proposed amendment to allow the corporation to perform chemical analyses and PCE tests on the core samples obtained in drilling.

You will find transmitted herewith six copies of the proposed amendment, if it meets with your approval, kindly have executed.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee

Approved:

J. H. Hedges

Member, Bureau of Mines

A. R. Kinkel, Jr.

Member, Geological Survey

Enclosures 6

LGHouk:gad 6/12/53

Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Dietrich, 3526
Mr. Larrabee, G-232 GSA Bldg.
Mr. Houk

FILE COPY
SURNAME:

Robertson
Chamberlin

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

600

June 12, 1953

Memorandum

To: Administrator

From: Nonmetallic Minerals Division

Subject: Docket No. DMEA-2512 - Corundum-Andalusite
Coranda Corporation
Green Talc and Bismark Deposits
Mineral County, Nevada
Contract No. Idm-E457

Re: Amendment No. 2

This Division has drafted the attached Amendment No. 2 and recommends approval.

The purpose of the amendment is to permit the Operator to make the chemical analyses and PCE tests called for by the contract at its own laboratory, Hawthorne, Nevada.

The number of Chemical Class #3 analyses is increased from 250 to 300 but the total agreed cost for analyses and PCE tests and also the total cost of the project will remain the same.

As a check and safeguard, duplicate pulps of all samples will be made and one set delivered to the DMEA, Bureau of Mines, Reno, Nevada.

J. T. Robertson
Nonmetallic Minerals Division

Attachment

JTRobertson:gad 6/12/53

Copy to: Admr. R. File
Docket File
Mr. Houk

DEPARTMENT OF THE INTERIOR
Defense Minerals Exploration Administration
JUN 8 1953

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

Office of
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

June 5, 1953

AIR MAIL

Memorandum

To: Defense Minerals Exploration Administration, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation, Green Talc Mine & Bismark Mine
Mineral County, Nevada, Contract Idm-E457

Reference is made to our letter dated May 15, 1953, to Mr. J. H. Rodda, President, Coranda Corporation, concerning the subject contract, ~~which~~ with particular reference to that part of the contract which calls for commercial laboratory analyses of drill hole samples. A carbon copy of that letter went forward to you.

Mr. Rodda and Mr. R. B. Holt, Secretary-Treasurer, Coranda Corporation, called at this office on May 15, 1953, to discuss the matter which concerned us. At that conference, I insisted that as matters now stand I had no alternative but to see that the contract be followed. They brought up many reasons why they were objecting to sending samples to the Pittsburgh Testing Laboratory and apparently were basing their objections upon the results of work done by that laboratory last fall, which they claim was highly inaccurate and proved by them to be unreliable.

I am not well enough versed in the types of analyses under discussion to disprove the statements made to me by Rodda and Holt. I do know, however, that our Reno Laboratory ran duplicates of some of their samples and the results checked Coranda's results very closely.

Messrs. Rodda and Holt were informed by me that I have no authority to amend their contract to allow them to use the funds stipulated in the contract to pay for running the samples in their own laboratory in place of the Pittsburgh Testing Laboratory or other commercial laboratories approved by me. As they were so

insistent that it would be a waste of money to have samples run on the outside, I suggested to them that they write me a letter, giving me their story in detail so that I could take it up with you.

On June 4, 1953, I received a letter from Messrs. Rodda and Holt, dated May 19, 1953, giving information, data, and operating procedure to support their request for an amendment to their contract. Their letter is rather long and has a number of attachments. Time will not permit us to have the letter and attachments copied, if we are to get them to you quickly. Therefore, I am sending you our copy. Time is of essence as Coranda will soon complete all the field work under its contract and what to do about getting the samples run must be settled quickly. May we, therefore, request your immediate help on this problem which is causing us considerable concern.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachment

Copy to: E. H. Bailey, USGS
A. C. Johnson, Reno

Rec'd. June 4/53

CORANDA CORPORATION
386 RACE STREET
CYpress 3-3391
SAN JOSE, CALIFORNIA
May 19, 1953

DMEA-2512
Contract IDm-E457

Mr. H. C. Miller, Executive Officer
DMEA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Dear Mr. Miller,

In reference to our verbal conversation Friday, May 15, 1953, which concerned laboratory chemical analysis and pyrometric cone equivalent tests on andalusite-corundum drill core samples, we mutually agreed that an amendment to our contract IDm-E457 be made and sent to the DMEA office in Washington, D. C., for their approval. This amendment would approve the performance of chemical analysis and P.C.E. tests in our own laboratory and would also allow total costs and charges be made against the specific funds set aside in our contract provided that the total amount did not exceed the funds alloted. It is our conclusion that expedition of the amendment is very necessary to gain reasonably accurate data for determining the quality and to some extent the quantity of ore reserves and other important data. We feel that unless the amendment in question is approved a large amount of work and considerable expense would be essentially wasted.

In support of the amendment we wish to offer the following information, data and operational procedure which we feel will best complete the present exploration program.

Previous to the filing of our original application for exploration work (Docket No. 2512) we conferred with the San Francisco office of the Pittsburg Testing Laboratories and obtained costs for complete chemical analysis and P.C.E. tests on andalusite-corundum samples, which were included in the aforesaid application. Between the time that the above information was obtained and the granting of the exploration loan, a considerable number of samples, resulting from sink-float experiments, were submitted to the Pittsburg Testing Laboratories for Chemical analysis. These sink-float samples were prepared by the Western Machinery Co. of San Francisco from two types of ore which were obtained from the Bismark Deposit by our company. The purpose of the sink-float work was to obtain information concerning the quality and quantity of concentrates that could be expected from each ton of mine run ore.

The results of analysis as performed by Pittsburg Testing Laboratories (see Table I) and first reported September 19, 1952, were considered immediately erroneous as the sink material at 2.95 specific gravity and or the highest grade concentrate from each type ore was reported to have lower alumina content that the feed (see Table II). By making a simple material balance such that the alumina content in the feed should equal the sum of the alumina content in the sink-float fractions, it was found that they did not equal each other but differed by as much as 12% in alumina or 30% error! The above was brought to Pittsburg Testing Laboratories' attention and part of these samples were rerun along with the feed samples and better agreement was reached. However, upon making

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analysis of these same feed samples in our own laboratory using Bureau of Standards samples as a control on our methods, it was found that Pittsburg Testing Laboratories results were still erroneous, (See Table III) as our results showed higher alumina content. Upon checking with Mr. Steele, Chief Chemist for Pittsburg Testing Lab, it was found that they were having considerable difficulty with the analysis with which they were unfamiliar at the start, plus the fact that they were incorrectly fusing the samples for analysis. Upon checking in our own laboratory and spending the necessary time to work out the best method of analysis, adapted from A.S.T.M. and those prescribed by Hillebrand and Lundell, (Bureau of Standards) we found that a combination borax and sodium carbonate flux was absolutely necessary to properly fuse the samples in question. This method is not used by commercial labs unless a charge of at least $40.00 per analysis is made due to the added time and labor elements.

Upon discussing analysis of andalusite-corundum samples with refractory companies, it was found that they strongly encouraged the running of our own analysis and that they would not accept those made by commercial laboratories unless methods employing the above type of flux were used.

Upon conferring with the chief mineralogist of the Boulder City Station, who recently visited our laboratory, and the chief chemist of the Reno Station, it was mutually agreed that unless the above fusions and standard methods were used, the results from commercial laboratories would be of little value.

It is not to be meant or construed that commercial laboratories are not capable of performing the chemical analysis in question: however, they must use the proper methods which are time consuming and would be prohibitive in cost in our particular case. Checking with Abbot Hanks & Co. of San Francisco, a cost of $40.00 per analysis was quoted and verbal checking with Twining Laboratories of Fresno, Calif. resulted in the same costs.

It is also brought to your attention that under the provisions of our contract, no mention was made for the preparation or chemical analysis of concentrates from the core samples for purposes of determining P.C.E. numbers. As you know, the ore from these deposits must be beneficiated so comparable concentrates of the core samples must be made and analyzed before P.C.E. numbers are determined or these data would be of little or no value to us or anyone else. To properly evaluate the core samples we feel it is necessary to analyze at least 350 samples as compared to 250 originally alloted, and of these 350 samples 50 concentrate analysis would be made which would allow the P.C.E. numbers to be of important value instead of a set of meaningless figures.

In light of the fact that our lab is fully and specially equiped and that we are certain of the accuracy of our analytical results, we feel that our lab is best suited to make the analysis in question which includes concentrate preparation and analysis, both of which are not provided for under our present contract. We have duplicate samples and stock such that our results may be checked at any time by any qualified laboratory that the DMEA or Bureau of Mines so designates. On the other hand it would not only be prohibitive to have the above outlined work performed by a commercial lab but the results in all probability would be erroneous as we have previously experienced.

Due to the fact that we have our own laboratory completely and specially equipped and in condition to run chemical analysis and P.C.E. tests on aluminum silicate ores, we would be able to make these tests at slightly lower costs than those given by Pittsburg Testing Laboratories. We feel that from past experience that we would be able to perform 350 analysis and 50 P.C.E. tests for approximately the same amount alloted in our contract.

Under the above method it is expected to gain the necessary information to complete the exploration program satisfactorily and ask that every effort be made to gain approval of the amendment.

Sincerely yours,

CORANDA CORPORATION

R B Holt

By R. B. Holt
Secretary - Treasurer

J. H. Rodda

By J. H. Rodda
President

RBH/bg

Enclosures: 4

cc:

TABLE I

Sample No.	Description	Weight%	Al_2O_3%	SiO_2%
1322	Sink in 2.95	72.0	29.54	64.88
1323	Sink 2.90 Float 2.95	8.1	32.54	63.72
1324	Sink 2.85 Float 2.90	5.7	37.97	56.10
1325	Sink 2.80 Float 2.85	7.1	29.09	64.42
1326	Float 2.80	7.1	[illegible].12	65.12
Totals		100.0		
%Alumina in combined fractions 100 gm basis			30.2	
1327	Feed		42.20	52.84
1328	Sink 2.95	72.4	35.80	53.80
1329	Sink 2.90 Float 2.95	11.8	43.46	49.00
1330	Sink 2.85 Float 2.90	3.9	39.98	54.36
1331	Sink 2.80 Float 2.85	5.0	38.58	54.32
1332	Float 2.80	6.9	30.90	59.58
Totals		100.0		
% Alumina in combined fractions 100 gm basis			37.2	
1333	Feed		43.30	43.10

TABLE II

Sample No.	1527	1333
Silicia S_iO_2	52.84	43.10
Alumina Al_2O_3	42.20	48.30
Iron Oxide Fe_2O_3	0.57	0.66
Titanium Oxide	1.30	1.70
Calcium Oxide	Nil	Nil
Magnesia Mgo	Nil	Nil
Potassium Oxide K_2O	0.20	0.21
Sodium Oxide Na_2O	1.28	0.21
Loss on Ignition	1.96	6.10

Chemical Analysis and Comparison Sheet

COPANDA CORPORATION
386 Race St.
San Jose, Calif.

DMEA 2512
IDME-457

Sample No.	Moisture %	Ign. Loss %	SiO_2 %	Al_2O_3 %	Fe %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %	Sample Description
Bismark S-1	0.60	0.90	42.20	53.60	0.57	1.90	Trace	None	0.20	0.60	Feed samples for H.M.S.
Bismark S-2	0.09	4.40	38.60	55.20	0.76	0.82	None	None	0.33	0.67	Tests
Pittsburg Testing Lab. Results:											
Bismark S-1	—	1.96	52.84	42.20	0.57	1.30	None	None	0.20	1.28	Feed samples for H.M.S.
Bismark S-2		6.10	43.10	48.30	0.66	1.70	None	None	0.21	0.21	Tests
Rerun S-1		No Ch.	46.00	49.05	No.Ch.	No Ch.	No.Ch.	No Ch.	No Ch.	No Ch.	
Rerun S-2		"	41.33	52.20	"	"	"	"	"	"	
Nat'l Bur. Std.#76	As Is	0.20	54.70	37.60	2.22	2.12	0.32	0.42	0.36	1.30	
Same	" "	"	54.22	37.32	2.33	2.30	0.28	0.59	0.34	1.27	
Same	" "	"	55.30	37.26	2.41	2.22	0.33	0.50	0.41	1.35	
Same	" "	"	54.24	37.50	2.30	2.37	0.35	0.56	0.38	1.39	
Listed Av. Bur. Stds.	Analysis by As Is	0.22	54.68	37.67	2.38	2221	0.27	0.58	0.38	1.37	Average analysis from Certificate
Green Talc No. 5 Hole											
1-5	0.32	4.23	47.82	45.60	1.36	Trace	0.24	Trace	1.00	5.70	Diamond Drill Core
3-5	0.39	6.50	50.94	41.22	0.40	"	Trace	"	1.00	3.80	Samples
4-5	0.22	0.79	50.92	46.81	0.14	0.49	0.05	"	0.34	1.35	
5-5	0.12	2.30	58.12	37.52	0.82	0.48	0.05	"	0.33	0.60	
5-5A	0.11	2.66	62.94	35.20	0.30	0.05	Trace	"	0.34	1.60	
5-5B	0.40	1.63	62.14	34.76	0.44	1.05	0.08	None	0.20	1.15	
5-5C	0.51	1.99	56.12	39.20	0.36	0.50	None	None	0.43	1.76	
5-5D	0.09	0.75	64.00	31.00	0.26	0.80	Trace	None	0.35	0.71	
5-5E	0.05	4.69	66.48	21.18	0.51	2.15	"	Trace	0.31	0.74	
5-5F	0.11	2.23	65.34	25.50	0.60	1.52	"	None	0.40	0.28	
8-5	0.00	5.66	43.16	53.10	0.60	0.62	-	-	-	-	
9-5	0.00	8.66	76.54	16.85	0.12	0.55	-	-	-	-	
10-5	0.01	3.27	71.94	15.05	0.16	0.36	-	-	-	-	
11-5	0.09	0.59	53.53	41.12	0.12	0.08	-	-	-	-	

COPANTA CORPORATION
576 F. St.
Hawthorne, Nevada
March 15, 1953

Method - 101 - Analysis of Sillimanite Corundum and Allied Minerals

Note: Method 100 has been revised and is superceded by Method 101.

1. Sample Preparation: Diamond Drill cores from each hole are to be logged, split and one half of each core placed in a duplicate set of boxes (same labeling as those brought from field). The other half of the core is to be skeletonized according to the logs and pieces placed in pint jars and labeled. The remaining core is crushed in a chipmunk crusher to minus 1/2 inch and quartered and pulverized in a Braun Pulverizer. The pulp is then run over a magnet to remove iron which has resulted from wear on pulverizer face plates. The pulp is rolled on rubberized cloth to thoroughly mis the material and placed in quart jars. All samples such as those supplied to the Bureau of Mines, Reno, Nevada, shall be taken from these quart jars.

2. Physical Separation of Sillimanite - Corundum Minerals from Gangue Rock: Place 100 grams of pulp dried at 105°C or portion thereof into a separatory funnel of sufficient size and add acetylene tetrabromide. Make certain that the grains are thoroughly wetted and let stand a few minutes. Stir the material several times and allow to stand at least 10 minutes. Drain the sink material into a Buchner funnel and filter off acetylene tetrabromide. Wash sink material with carbon tetrachloride. The carbon tetrachloride-acetylene tetrabromide mixture is then distilled to recover acetylene tetrabromide. Weigh dried sink material and record as per cent sink at 2.95 specific gravity. To determine per cent sillimanite and corundum minerals present in above sink product, treat the sink in the same manner as above except the heavy liquid shall be methylene iodide or other suitable heavy liquids. To lower the specific gravity of methylene iodide use benzol or other suitable solvents.

3. Moisture Determination: Weigh 5.00 grams of the sample into a weighing bottle and heat to constant weight at a temperature of not under 105°C and not over 110°C. Record the loss in weight as per cent free moisture.

4. Loss on Ignition: Weigh 1.00 gm of the moisture free sample (105°-110°C) into an ignited and weighed porcelain crucible, and heat to constant weight over a blast burner or in an electric muffle at 900 to 1000°C. Record loss in weight as the ignition loss.

5. Silica: (a) Weigh 0.500 gm of the moisture free sample into a platinum dish (free from iron stain). Add 2 gm of Na_2CO_3 and 10-15 grams of borax (anhydrous). Mix well and fuse at a low red heat gradually increasing to full temperature of blast burner. The blast burner should be equipped with refractory rings around the flame issuing from the burner and also around the platinum dish. Refractory rings of suitable size may be cut from 3½ inch clay crucibles. Blast for 15 min. Make certain that an oxidizing flame is used or errors will result and also damage to the platinum dish. The melt at the end of 15 minutes should be clear and transparent and no solid particles should be seen in the liquid. If solid particles are still present continue heating. If the solids fail to dissolve, cool, melt and add more anhydrous borax and reheat until the solids are dissolved. Allow melt to cool slightly and frit the melt by holding the dish with a pair of platinum tipped tongs on its side

in a 400 ml beaker and praying the melt with methyl chloride solution. Note: Use methanal saturated with HCl gas. Remove as much of the melt as possible from the dish and dissolve the remaining portions by heating the dish filled with methyl chloride. Wash the solids in the dish into the beaker and dissolve the solids in the beaker with methyl chloride. Treat the dissolved melt in the beaker several times with methyl chloride by washing down the sides until no white residue is seen remaining on the beaker walls. Note: Complete removal of boron or methyl borate is necessary or erroneous results will occur. Add 15 ml of hydrochloric acid and 50 ml of water and evaporate to approximate dryness. Cool and add 15 ml of HCl and 50 ml of water, boil 1-2 min. and filter on No. 40 Whatman filter paper. Wash 4-5 times with hot diluted HCl (1:4) then 7-8 times with hot H_2O. Reserve paper containing SiO_2 ppt. Transfer the filtrate to the original beaker, evaporate to dryness and bake ½ hr. in oven.. Cool, add 15 ml of HCl and 50 ml of H_2O - bring just to a boil - filter on No. 42 Whatman paper and wash as before. Reserve filtrate for following determination.

(b) Place filter papers containing SiO_2 ppt. in platinum crucible, ignite carefully until paper is burned off, then heat at full heat of blast burner for 10-15 min. Cool with air from blast burner - keep crubible covered. Repeat operation until constant weight is attained. Moisten ppt with H_2O, add HF slowly until crucible is half full then add 5 drops of H_2SO_4 and evaporate to fumes. Cool and add 2-3 ml of HF and 2 drops of H_2SO_4 and evaporate to dryness. Heat crucible to bright redness at fullheat of blast burner for 5 min. Cool and repeat operation until constant weight has been obtained. Loss in weight represents SiO_2 except for small quantity obtained from Alumina pption.

6. Separation of Al_2O_3 and P_2O_5 from Fe_2O_3, TiO_2, CaO and MgO:

(a) Fuse residue from HF evaporation with a little $K_2S_2O_7$ of $Na_2S_2O_7$. Dissolve melt in diluted HCl (1:4) and add to the filtrate from the SiO_2ppt which was reserved. Evaporate filtrate to 75 ml and nearly neutralize with 10% NaOH. Slowly and while swirling a 250 volumetric flask containing 100 ml of 10% NaOH to which has been added one gm of Na_2CO_2 and one gm Na_2CO_3, add filtrate solution. Warm on a water bath for 1 hr. and cool to roomtemperature. Dilute with water to mark. Mix well and let stand for a few minutes. Filter off ppt on a paper which has been previously washed with Na H and dried. Catch the filtrate in a dry beaker. Do not wash ppt. From filtrate take 100 ml aliquot for Al_2O_3 determination.

7. Iron Determination:

(a) Dissolve ppt on filter paper and on volumetric flask in hot dilute HCl (1:4). Adjust volume to 100 ml, add 5 gm of NH4Cl and heat to boiling. Add NH_4OH while stirring slowly until there is a slight excess. Again heat to boiling, filter hot and wash five times with hot NH_4Cl (2%). Place paper containing ppt in original beaker, add 15 ml of HCl, stir to macerate paper and dilute with hot water to 100 ml volume, ppt, with NH_4OH and wash with NH_4Cl. Reserve filtrate from the two precipitations for CaO and MgO determinations. Dissolve ppt in hot dilute HCl (1:4) and cool. Pour into a 100 ml flask, dilute with water to the mark and mix. Draw off exactly 10 ml for TiO_2 determination and 10.0 ml for Fe_2O_3 determination. Add 2 ml of hydroxylamine hydrochloride to the sample solution and then add the required amount of sodium acetate to bring the ph up to 3-6 level.

(b) Fe_2O_3

Take 10 ml aliquot and transfer to 50 ml flask. Determine on a separate sample the amount of Sodium Acetate solution necessary to bring ph to the sample solution and then add the required amount of sodium acetate tobring the ph up to 3-6 level. Add 2 ml of).5 per cent ortho-phenanthrolinesolution, dilute with water to the 50 ml mark, mix and let stand for 5-1 minutes. If pyrophosphate is present letsamples stand for one hour. Determine the transmittance of the solution in a model D.U. Beckman Spectrophotometer or similar instrument at a wave length of 508 per m and a Blue photo tube. Use a slit width of 0.54, sensitivity at midpoint and switch at 0.1. Determine Fe_2O_3 concentration from calibration curve.

TiO_2

Add to the ml portion previously saved 15 ml of H_2SO_4 (6N). If iron is present in appreciable amounts, add dilute phospheric acid from a buret until the yellow color of ferric iron is destroyed. A like amount must be added to standards also. Pour solution into 100 ml flask and add 5.0 ml H_2O_2 and dilute to 100 ml in volumetric flask. Determine transmittancy of solution with aid of blue filter at 425 m. Slit width 1.04, sensitivity midpoint and switch at 0.1 Read TiO_2 concentration from calibration curve.

8. Al_2O_3

(a) Dilute 100 ml aliquot to 250 ml. make acid with HCl (1:1) and add 5 gm NH_4Cl. Heat to boiling, add NH_4OH very slowly while stirring constantly until a slight excess is shown by methyl red indicator. Boil 1-2 min. filter hot and wash five to six times with hot NH_4Cl (2%). Place paper containing ppt in original beaker; add 15 ml HCl and with aid of glass rod macerate the paper. Add boiling water to make up volume to 250 ml. Repeat pption with NH_4OH and filter as before. Wash thoroughly with hot NH_4Cl (2%) using at least 250 ml of wash solution.

(b) Place paper containing ppt in platinum crucible which has been previously weighed with its cover. Carefully burn off the paper. Heat crucibles for 10 minutes or so in a muffle furnace to make certain paper is thoroughly ashed and then remove and place covers on crucibles tightly. Blast at full heat of burner for 10 min. Cool crucibles for a few moments and place in a dessicator. Note: Alumina picks up moisture quickly so crucibles must be transferred to a dessicator as soon as practical. Repeat blasting and weighing to constant weight. Note: Weighing should be done as quickly and accurately as possible to prevent errors from moisture absorption by the hygroscopic alumina. Subtract SiO_2 found in next section from Al_2O_3 value.

(c) Fuse ppt with 5 gm Na_2S_2O or until solids are dissolved and dissolve melt in warm water and about 30 ml of dilute H_2SO_4 (1:1) solution. Evaporate to copius fumes of H_2SO_4 and cool. Take up with water, heat, filter, washwith hot water, ignite in a platinum crucible and weigh. Note: Theacid solution should be pasty on cooling and not solid as solution matter is more easily made. Treat residue with 5 ml of HF and 2-3 drops of H_2SO_4, evaporate to dryness, ignite and weigh. Repeat till constant weight is obtained. Add corrected silica to silica determination.

9. Lime Cao

Evaporate combined filtrates from Fe_2O_3 and TiO_2pption to less than 250 ml volume and cool. Pour solution into a 250 ml volumetric flask and dilute with water to the mark. Determine CaO content on a DU model Beckman Spectrophotometer with flame attachment. Set the wave length at 554 m, switch at 0.1, sensitivity at maximum and slit width of . Read concentration from calibration curve.

10. Magnesia MgO

From the same samples as prepared for CaO, determine MgO content in the same manner as CaO on the flame spectrophotometer. Use a wave length of 383 m, sensitivity - maximum, slith width of and switch at 0.1. Read concentration from calibration curve.

11. Na_2O - K_2O - Alkalies

(a) Weigh 1.00 gm of moisture free (105-110°C) sample, ground to impalpable powder and 1.0 gm of NH_4Cl into an agate mortar and mix well. Add 7-8 gm of $CaCo_3$ and again mix intimately. Place a 1/8 inch layer of $CaCO_3$ in the bottom of the platinum crucible, and then add the mixture, tapping the crucible occasionally to obtain a dense mass. Place a 1/8 inch layer of $CaCO_3$ on the top. Heat the crucible over a low flame until amonnia fumes are no longer fiven off, then increase the heat so that the bottom half of the crucible is a dull red and maintain this temperature for one hour. Cool, fill the crucible, 3/4 full ofwater, and heat until the contents can be shaken out and crushed in an a ate mortar. Transfer by means of a jet of water to a beaker, evaporate to a low volume, decant through a No. 40 Whatman filter paper and wash the material left in the dish by decantation with warm water. Transfer to the paper and wash several times with hot water. Acidify with several ml of HCl and evaporate to a volume of less than 100 ml. Make alkaline with NH_4OH and add a small amount of $(NH_4)CO_3$ crystals to ppt CaO. Heat for a few minutes to complete ppton of CaO and filter. Acidify filtrate with HCl and cool. Transfer to a 100 ml volumetric flask a dilute to mark with water.

(b) Determine Na_2O and K_2O transmittency on the DU Flame Spectrophotometer. For Na_2O use a wave length of 589 m, sensitivity - midpoint, slith width of and switch at 0.1. For K_2O use a wave length of 368 m, sensitivity at midpoint, slit width of and switch at 0.1. Read respective concentrations from calibration curve.

References: (1) A.S.T.M. Committee C-8 , Refractory materials, Manual of A.S.T.M. Standards, Feb. 1952.
(2) Hillebrand and Lundell, Applied Inorganic Analysis - John Wiley & Sons, Publishers

ADAPTION OF STANDARD METHODS OF RESISTANCE TO PYROPROCESS EQUIVALENT OF SILICATE MINERALS

1. (a) Portion of the pulp as previously prepared shall be screened on a No. 70 A.S.T.M. or No. 65 Tyler standard screen. Final size of the screened sample shall be 50 grams. The minus 325 mesh material shall be removed to prevent physical reduction of the ICE number.

2. Preparation of test cones: A sample shall be heated in an oxidizing atmosphere in the temperature range of 1700 to 1800° Fahrenheith (925 to 980°C) for not less than 30 minutes. Dried sample shall be thoroughly mixed after the addition of sufficient dextrine, glue, gum tragacanth, or other alkali-free binder and water, and shall be formed in a metal mold in test cones in the shape of a truncated trigonal pyramid with its base at a small angle to the trigonal axis. The dimensions shall agree with the standard split mold for A.S.T.M. pyrometric test cone.

3. Mounting: The test cones shall be mounted on plaques of refractory material of such a composition as will not affect the fusibility of the cones. They shall be mounted with the base embedded approximately 3 mm. (o.12 in.) in the plaque and the face of one side inclined at an angle of 82 deg. with the horizontal. Thearrangement of the test cones with repsect to the Standard Pyrometric Cones shall be substantially as given in A.S.T.M. Method C-24-46; that is, alternating the test cones with the Standard Pyrometric Cones in so far as is practical. The plaque may be any convenient size and shape and may be biscuited before using, if desired.

4. Heating: (a) The heating shall be carried out in a suitable furnace at a rate to conform to the following requirements:

To reach cone No. 20	45 min.
Time interval to:	
Cone No. 23	20 min.
Cone No. 26	6 min.
Cone No. 27	4 min.
Cone No. 28	4 min.
Cone No. 29	10 min.
Cone No. 30	4 min.
Cone No. 31	12 min.
Cone No. 32	8 min.
Cone No. 32½	9 min.
Cone No. 33	9 min.
Cone No. 34	6 min.
Cone No. 35	10 min.
Cone No. 36	10 min.
Cone No. 37	4 min.
Cone No. 38	6 min.

(b) That type of furnace in which a neutral or oxidizing atmosphere may be maintained is to be preferred. Excessive reducing conditions should be avoided. Care should be taken that the flame does not strike directly against the cone or cone plaque. The furnace should be tested at intervals for the determination of the uniformity of the distribution of the heat.

5. Pyrometric Cone Equivalent: (a) The softening of the cone will be indicated by the top bending over and the tip touching the plaque. The bloating, squatting, or unequal fusion of small constituent particles should always be reported. The Pyrometric Cone Equivalent shall be reported in terms of Standard Pyrometric Cones and shall be that cone which most nearly corresponds in time of softening with the test cone. If the test cone softens later than one Standard Pyrometric Cone but earlier than the next Standard Pyrometric Cone and approximately midway between, the P.C.E. shall be reported thus: Cone No. 31-32.
(b) If the test cone starts bending at an early cone but is not down until a later cone, the fact should be reported.

6. The temperature corresponding to the end points of those Standard Pyrometric Cones that are used in connection with refractories are as follows:

Cone	End Point Deg.Fahr.	Deg. Cent.
No. 15	2615	1435
No. 16	2669	1465
No. 17	2687	1475
No. 18	2714	1490
No. 19	2768	1520
No. 20	2786	1530
No. 23	2876	1580
No. 26	2903	1595
No. 27	2921	1605
No. 28	2939	1615
No. 29	2984	1640
No. 30	3002	1650
No. 31	3056	1680
No. 32	3092	1700
No. 32½	3131	1722 (approx.)
No. 33	3173	1745
No. 34	3200	1760
No. 35	3245	1785
No. 36	3290	1810
No. 37	3308	1820
No. 38	3335	1835

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SURNAME:

Robertson
Houk

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

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May 27, 1953

Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corporation
Green Talc Mine
Mineral County, Nevada
Contract No. Idm-E457

Memorandum

To: Administrator

From: Nonmetallic Minerals Division

Subject: A recommendation of approval of Amendment No. 1.

This Division recommends approval of Amendment No. 1, dated May 13, 1953, as prepared by the Executive Officer, DMEA Field Team, Region III.

The amendment provides for drilling seven holes instead of six holes. However, the total footage, 1,600 feet, remains the same.

There is no change in the approved total project cost.

Jasper T. Robertson
Nonmetallic Minerals Division

JTRobertson:gad 5/27/53

Copy to: Admr. R. File
Docket File
Mr. Houk

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

Office of
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

May 19, 1953

Memorandum

To: Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Contract Idm-E457 - Docket DMEA-2512 (Corundum-Andalusite), Coranda Corporation, Green Talc Mine & Bismark Mine, Mineral County, Nevada
Amendment No. 1

Attached are the original and two copies of Amendment No. 1, dated May 13, 1953, permitting the drilling of Hole #7 under Contract Idm-E457.

A justification sheet is attached to each copy of the amendment.

Proper distribution has been made of the remaining copies.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachments

Copy to: A. C. Johnson, Reno (With copy of amendment)
Finance Officer, Region III (With copy of amendment)
E. H. Bailey, USGS
George Mavor

cal 5/25

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
(RECEIVED)

MAY 19 1953

Office of
DMA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

May 18, 1953

Mr. J. L. Dodds
President, Corundo Corporation
386 Race Street
San Jose, California

Re: Docket DMA-3512 (Corundum-Andalusite)
Corundo Corporation
Green Hole Mine & Bismark Mine
Mineral County, Nevada
Contract Idn-1457

Dear Mr. Dodds:

Your contract for exploring the Green Hole and Bismark Corundum-Andalusite deposits in Mineral County, Nevada, stipulates that approximately 250 samples are to be given a Class 38 analytes and approximately 50 samples are to receive pyrometric equivalent cone tests to be made by the Pittsburgh Testing Laboratory or such other laboratories as I may approve. To date, we have not had the results of a single test and in calling this to your attention, I wish to emphasize that the terms of the contract must be adhered to.

Sincerely yours,

H. C. Miller
Executive Officer
DMA Field Team, Region III

Copy to: DMA, Washington, D. C.
E. H. Bailey, USGS
A. C. Johnson, Reno

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

May 13, 1953

Mr. J. H. Rodda
President, Coranda Corporation
386 Race Street
San Jose, California

Re: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc Mine & Bismark Mine
Mineral County, Nevada
Contract Idm-E457

Dear Mr. Rodda:

In order to allow for the drilling of hole #7 in connection with this project, we have drawn up Amendment No. 1 dated May 13, 1953.

If you are in accord with the amendment as we have drawn it up, will you kindly sign all of the six copies enclosed, returning the original and four carbon copies to this office, retaining the remaining copy marked "Operator's Copy" for your records.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 18 1953

Sincerely yours,

H. C. MILLER

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Enclosure

Copy to: DMEA, Washington, D. C.
E. H. Bailey, USGS
A. C. Johnson, Reno

2512

FILE COPY
SURNAME:

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

BW

600
MAR 16 1953

Hack
Fitzpatrick
Selfridge

Mr. H. C. Miller
Executive Officer, DMEA
Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corporation
Green Tale Mine and Bismark Mine
Mineral County, Nevada
Contract No. Idm-2497

Dear Mr. Miller:

Reference is made to your memorandum of March 4, 1953, and our telephone conversations of March 11th and 12th.

It is our understanding that there will be no necessity to amend the contract. That you as Executive Officer will approve Mr. Spencer as supervising engineer for this project and that you will not approve the request of the Coranda Corporation to run the chemical analysis and DCS tests in their own laboratory.

The field team representative should supervise the core splitting and pulp preparation on each visit. The project engineer would tag, store, and transport the cores to a convenient location until the DMEA Field Team could make an examination and log the cores, and in conjunction with the project supervisor split the cores and make the pulps. At this time the field representative would obtain their half of the cores and their portion of the pulps for check analysis.

It is suggested that you write Mr. Hodda and advise him that any deviation from the contract as written must have your approval in writing. It might be well to indicate to Mr. Hodda that the integrity he establishes in his relations with DMEA will be a factor in consideration of continuing Government assistance.

The contract as written gives you broad control in the supervision of each step of the project; however, we do not wish to unduly tie the hands of the operator in working out his

problems. It is agreed that close supervision by Mr. A. C. Johnson is important and necessary. With regard to the allocation of drilling footage in the contract between the Green Tale and the Bismark claims, you may change the drilling proposed in the contract within your delegated authority without reference to this office.

Sincerely yours,

Guy H. Baillinge (JHB)

Chairman, Operating Committee

Approved:

J. H. Hedges (JHB)

Member, Bureau of Mines

A. R. Kinsel, Jr. (JHB)

Member, Geological Survey

J.H. 3/16/53

LGHouk:gad 3/13/53

Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Houk

Mr. H. C. Miller
Executive Officer, DMEA
Field Team, Region III
1012 Flood Building
370 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corporation
Green Dale Mine and Bismark Mine
Mineral County, Nevada
Contract No. Idm-1457

Dear Mr. Miller:

Reference is made to your memorandum of March 4, 1953, requesting our advice on contract supervision.

Perhaps a solution to the problem of the integrity of the supervising engineer (Mr. Spencer or any acceptable engineer) may be resolved by having the DMEA Field Team supervise the core splitting and pulp preparation on their monthly visits. The project engineer would tag, store, and transport the cores to a convenient location until the DMEA Field Team could make an examination and log the cores, and in conjunction with the project supervisor split the cores and make the pulps. At this time the DMEA Field Team would obtain their half of the cores and their portion of the Coranda pulps for check analysis. The core preparation should be made at least monthly or at the completion of each hole or at convenient intervals, whichever is the most satisfactory to all concerned. An alternative to this would be to ship the cores to Reno for sample preparation.

It is possible that Coranda Corporation may object to our impounding the cores, stating that it would not be possible to keep an accurate check on the alumina content of the cores. It is, therefore, recommended that you suggest to them for this purpose that sludges be used as a check upon the mineral content.

Another possible solution to this problem, and probably the best, would be to assign a Bureau of Mines Engineer to the property during the diamond drilling stage. The salary of the supervising engineer would be deducted from the unit cost, thus reducing the unit cost from $11.50 to $10.00 per foot. You will find enclosed a copy of proposed Amendment No. 1, prepared by our legal staff, for your approval and execution should you decide this is the proper solution.

With regard to the Coranda Corporation setting up their own analytical laboratory, this Administration is of the opinion that if safeguards are taken there will be an ample check on the results. An examination by the Field Team representative of the equipment, method of making the analysis, and the number of checks run by the Coranda Corporation's analytical laboratory will provide valuable information on the applicant's ability.

A careful visual assay of the cores retained by the DMEA Field Team will, no doubt, give a partial check on the accuracy of the Coranda chemists. Erratic or suspicious assays may be checked by sending the corresponding pulps to the Pittsburgh Testing Laboratories or running the assays at the Bureau of Mines in Reno. It is recommended that at least 10% of your samples be run by an independent laboratory for the account of Coranda. A copy of proposed Amendment No. 2 is enclosed for your approval and execution, should you deem this to be advisable. It reduces the amount allowed for analysis and pyrometric cone tests by 10% to allow for the check sampling by an independent laboratory. The difference should be absorbed by the Coranda Corporation as consideration for allowing them to do the chemical analysis in their own laboratories.

It might be well to indicate to Mr. Rodda that his ability to accurately analyze and the integrity he establishes in his relations with the DMEA will be factors in consideration of continuing Government assistance.

The contract as written gives you broad controls in the supervision of each step of the project, yet we do not wish to unduly tie the hands of the operator in working out his problems. An arrangement should be set up that is agreeable to all concerned.

Sincerely yours,

Chairman, Operating Committee

Approved:

Member, Bureau of Mines

Member, Geological Survey

LGHouk:gad 3/12/53
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Houk

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 13 1953

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

March 13, 1953

Mr. J. H. Rodda, President
Corunda Corporation
P. O. Box 1484
Hawthorne, Nevada

Re: Docket DMEA-2512 (Corundum-Andalusite)
Corunda Corporation
Green Tale Mine and Bismark Mine, Mineral County, Nevada
Contract Idm-2457

Dear Mr. Rodda:

Reference is made to my letter to you, dated February 27, in which I mentioned that the cost of erecting your field laboratory cannot be charged to the project account, nor can you charge the contract $25.00 for each chemical analysis and $20.00 for each pyrometric cone equivalent test made by your chemist.

Mr. Bailey and I have been in telephonic communication with the Washington office of the Defense Minerals Exploration Administration and the matter stands as I stated in my February 26 letter. The contract calls for having the analyses made by the Pittsburgh Testing Laboratory, or other such laboratory as may be approved by me, and we will have to abide by the terms of the contract. If the Pittsburgh Testing Laboratory is not qualified in your opinion to make the analyses, we have no objection to your having the work done by the Abbot A. Hanks, Inc. That laboratory, as I learned yesterday, is equipped to run your analyses but is not equipped to make cone tests. It was suggested to me that Twining Laboratories at Fresno, California, can make cone tests.

Your contract with the Government states that the supervisor has to be approved by me. I have investigated Mr. L. B. Spencer's qualifications and I approve of your hiring him to direct your operations under the contract.

Sincerely yours,

H. C. MILLER

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Copy to: DMEA, Washington, D. C.
E. H. Bailey, USGS
A. C. Johnson, Reno

DEPT. OF THE INTERIOR
Minerals Administration
RECEIVED
MAR 20 1953

REPORT OF LONG-DISTANCE CALLS

Location San Francisco, Calif.

Date March 12, 1953

Time 11:30 A.M. _____ P.M.

Person Called: (Name) Lawrence Houk

(Title) DMEA

(Address) Interior Bldg. Washington 25, D. C.

Call Made by: (Name) H. C. Miller

(Title) Regional Director, Region III

Approved by: (Name) H. C. Miller

(Title) Regional Director, Region III

Justification and brief report on subject matter discussed:

Mr. Houk called yesterday from Washington, requesting me to discuss certain matters in connection with DMEA Docket 2512 immediately with A. C. Johnson of Reno, Nevada and E. H. Bailey of the Geological Survey and to report back by phone this morning. As the involved questions needed further discussion with Mr. Houk, Mr. Bailey and me, the call was put through with Mr. Bailey on one of the Regional Office phones and me on another. The urgency of reaching an agreement between the three of us was so great that no other means short of a long-distance call would have been satisfactory.

H C Miller
(Signature of Person Making Call)

Copy for: Director's Reading File, Washington, D. C.
Person Called
Regional Director, Region III
Approving Official

R3-17

March 12, 1953
2:20 P. M.

Mr. H. C. Miller, Region III, calling Mr. L. G. Houk

Re: Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corp.

Mr. Miller: In regard to this call I have Mr. Bailey of the Geological Survey on the line.

Mr. Miller: As far as engineers and geologists are concerned we have none to put there. Johnson in Reno says Spencer would be able to handle the job and He (Johnson) will keep close check on the property. At the present time half of all cores are being sent to Reno and Johnson is planning all details. We would like to know if DMEA is interested in having Rodda make analysis that the Bureau of Mines is going to make anyway. In other words ~~I would~~ why should we be charged for something we are going to make anyway.

Mr. Houk: You would want to approve Coranda doing the assaying?

Mr. Bailey: I think it is unwise for them to run the assay. If the drilling is successful Rodda will apply for a sizeable some for a mill. We should have analysis that we would be absolutely sure of.

Mr. Houk: We would take 100% of all pulps and send 10% to Pittsburgh Testing Laboratories or Bureau of Mines as we are writing you and we would have a safeguard or check on both Rodda and Holt.

Mr. Bailey: Suppose that does not check.

Mr. Houk: Then we would take corresponding length in the cores and make a pulp from that and send to a third laboratory to make an umpire.

Mr. Bailey: If we have them checked by the Bureau of Mines we would have only one analysis.

Mr. Houk: If Mr. Miller does not want Coranda to make a chemical analysis check he Mr. Miller must make the decision. We thought with the safeguards checking 10% of the samples, having a supervising engineer there when the pulps are made so that the Bureau of Mines would get the same pulps they would then to run a good and true assay. I don't think they would try to misrepresent. But if they cant analyse them correctly you should not allow them to do it.

Mr. Miller: Are we going to allow Rodda so much for assaying that he runs himself?

Mr. Houk: We were going to change the contract from $25 to $22.50 to take care of the work done by an outside laboratory. Quite a few of the checks would be run as soon as possible. If you are not going to allow them to do any of the assaying work insist that they send them to the Pittsburgh Testing Laboratories and write to Rodda and advise him that you must approve any deviation of the contract.

Mr. Bailey: Then you will be satisfied for a letter from Mr. Miller to that effect.

Mr. Houk: Is it necessary to satisfy? I understand Mr. Spencer will be approved as project engineer. Are you going to approve or disapprove Coranda assaying?

Mr. Bailey: It seems to me the contract should be followed as set up.

Mr. Miller: I would leave the contract as it is.

Mr. Houk: Write Rodda a letter and tell him this, ~~that you~~ do not allow them to do the assay work, it must be sent to the Pittsburgh Laboratory. And changing of the contract is within your delegation of authority. No amendments to the contract?

Mr. Miller: I will inform him - no change. We will let it ride.

Mr. Houk: All settled then.

4:00 P.M.
March 11, 1953

Mr. L. G. Houk calling Mr. H. C. Miller in San Francisco, California

Mr. Houk: With regard to the Coranda deal (DMMA-2512) we have your memorandum of March 4 and I have prepared a letter. I will read it to you to give you our thoughts on it.

Letter of March 11, 1953

we make a note in the contract that the cores could be shipped to Reno for sample preparation.

We can write you a proposed amendment to reduce the unit cost from 11.50 to $10 per ft. If you have a Bu. Mines engineer stay there until the drilling is accomplished, would only be about a month and a half for his detail to see if there is any collusion there.

Mr. Miller: They might try to put something over on us.

Mr. Houk: What we would like to know is which of the first two solutions on field engineers you prefer. Can you put a Bureau of Mines engineer there?

Mr. Miller: I am pretty sure we can if you think we should have one .

Mr. Houk: We should get an accurate answer.

Mr. Miller: The Geological Survey man - Bodenlos ~~Bodenus~~ could be sent, I think.

Mr. Houk: Is he good?

Mr. Miller: I think so.

Mr. Houk: Find out if Geological Survey have a man available.
Now on establishment of analytical laboratory tests, we can insist upon Pittsburgh Testing Laboratory. Isnt there another laboratory?

Mr. Miller: Abbott Hank Laboratory. We should have some check.

Mr. Houk: We can set up in the amendment that we check 10%. Then we can make an umpire and then decide on their ability to do the work.

Mr. Miller: I think that will keep them in check.

Mr. Houk: On this letter of Bodenalas - it is within your authority to change the diamond drilling any way you want. You can delegate to the field team the authority to change the location and direction of the diamond drilling. ~~and to either mine~~. Can you call me tomorrow and let me know whether or not a Government man can be detailed to the job.

Mr. Miller: Will you send me that letter?

Mr. Houk: Yes. When you call tomorrow (or send a teletype) you are to tell me whether the Bureau can delegate a man and whether you are going to approve Spencer, Page, etc. and whether or not you are going to approve the analytical laboratory.

Mr. Houk: Anything on Taglo - mica in Nevada?

Mr. Miller: I don't know what the status is.

Mr. Houk: Let me know on that too. About Ataro?

Mr. Miller: I have not heard anyting from him.
Here is Taglo. We have not anything except that samples were sent to South Dakota. We are waiting for that.

Mr. Houk: That sample was nonstrategic. You have a letter from us to make a field examination.

Mr. Miller: The examination was made early in February - scheduled for February 2nd. The report is in preparation now. You probably will have it this week.

25/2

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

Office of
Executive Officer
DMEA Field Team
Region III

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 11 1953

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

March 9, 1953

AIR MAIL

Memorandum

To: Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2512 (Corundum-Andalusite), Coranda Corporation, Contract Idm-E457
Mineral County, Nevada

On March 4, I sent you an Air Mail memorandum concerning the subject contract and in it I related some of the major items that concern Mr. Bailey and me regarding the way the project is being conducted.

I now have a "progress report" prepared by Mr. A. J. Bodenlos of the Survey on the Coranda Corporation's exploration of the Green Talc and Bismark mines, four copies of which are attached herewith.

I believe the report is self-explanatory and it along with my memorandum of March 4 will give you the full story as to why Mr. Bailey and I are somewhat concerned.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachment

Copy to: E. H. Bailey, USGS
A. C. Johnson, Reno

Progress Report

Docket No. DMEA 2512 (Corundum-Andalusite)

Name and Address of operator: Coranda Corporation
Mr. J. H. Rodda, President
386 Race Street
San Jose, California

Name and Location of Property: Green Talc Mine and Bismarck Mine
Mineral County, Nevada

Contract No. Idm E457

The offices and deposits of the Coranda Corporation at Hawthorne Nevada, were visited by A. J. Bodenlos, U. S. Geological Survey, and Henry Jones, Bureau of Mines, from February 11 to 13, 1953. The purpose of the visit was to ascertain the progress on the exploration contract and to analyse the status of the project. Detailed conversations with R. A. Holt, Acting Operating Supervisor, as well as study of the core on completed drilling and examination of outcrops, has led to the following report.

Status of Project

Drilling

Of the four recommended holes for drilling on the Green Talc deposit, nos. 2 and 3 were under way during our visit. Hole No. 3 was completed for a length of 200 feet on February 12th, and no. 2 had reached 225 feet out of its contemplated 250-foot length. Two rigs had been used but it was planned to expand to three rigs; the third rig arrived at Hawthorne on February 12th. The rig on no. 3 hole will be move to the location of no. 4, the new rig will be put on no. 5 hole, and when no. 2 hole is completed the rig will be moved to the location of no. 1 hole.

The examining team, after consideration of results to the present, recommended that no. 4 hole be drilled as previously planned. No. 1 hole can be put in either at the planned location or on the opposite side of the slope, in the gully west of the ore-bearing ground, just north of the dump crossing the west gully. In this location its bearing would correspond to about N. 35° W. or S. 35° E; it was swung northward from the original azimuth to bring it slightly farther north on the pptential ore body.

At the same time no. 5 hole was spotted in a small wash on the west side of the ridge, about 20 feet wast of the access road, and at an altitude of 5,208 feet, striking about N. 45° W. and with an inclination of about -30°. The purpose of hole no. 5 is to determine if the possible northwest lobe of the mineralized area extended northward, and its inclination was determined to cut the main mineralized area at a greater depth between holes nos. 2 and 3. An additional result of the hole will be to determine if drilling will result in better core recovery if from the west instead of from the east. If this proves the case, hole no. 1 will be drilled from the west gully rather than from the road southeast of the deposit.

Core recovery to date has not been exceptionally good; Jones estimated that they now are obtaining about 40 percent, an improvement over the 27 percent recovered during the first stages of drilling. The reasons for the low recovery are: 1) major differences in hardness of the rock; not only are parts of the section weathered but materials of great difference in hardness (schist, silicified rock, knots of ore, and sericite) are interbanded or intermixed, making it difficult to core cleanly. 2) presence of low-dipping westward faults and joints are intersected at low angles by the drill. To remedy the situation as much as possible, holes are cemented regularly, casing is used to at least 100 feet down, and sludge is being saved. Under these circumstances, drilling is comparatively slow. The driller stated that each rig was making no more than 10 feet a day.

It was questioned whether the lenses also were dipping westward at low angles but the writer opined that the lenses probably are steep and that from the standpoint of attitude of the ore, it makes little difference whether the block is dripping from the southeast or northwest. Re-examination of surface outcrops of the various Green Talc mineralized lenses and rough correlation of drill core to surface exposures on the south lens confirms the original contention that potential ore bodies have a steep west dip. The only possibly improvement on core recovery resulting in drilling from the west rests on the factor of orientation of faults and joints; the drilling of hole no. 5 should quickly show if this factor has any importance or whether the difference in hardness of the core outweigh the orientation of fractures.

Chemical analysis

At the time of our visit no core or sludge had been analyzed. Inasmuch as some 425 feet of core had been drilled, and since the grade of ore cannot be visually judged, it is imperative that the chemical analyses be started at the earliest possible moment. The results of the first holes must be available to permit adequate interpretation and the proper spotting of future holes.

Logging of core

To date all core has been logged by Henry Jones, Bureau of Mines, The corporation has made no effort to obtain a mining geologist or engineer to handle this chore.

Geology

No geology other than that done by the Geological Survey in July 1952 and that done during this visit has been made at the initiative of the contracting corporation.

Engineering

The only engineering done on the property is the survey of the drill-sites, tied to one of the claim corners, by L. B. Spencer, the engineer who has been working off and on for the corporation since it took leases on the property.

The Corporation office in Hawthorne

The corporation has establised an office and laboratory in Hawthorne, where facilities for chemical analysis, spectrographic analysis, specific gravity determinations, and pyrometric analysis have been set up. In addition, hoods and sinks have been installed.

Chemical work other than drill-core analysis

It was ascertained that since the property was examined by geologists and engineers of Field Team Region III in July 1952, some eight chemical analyses have been run by the Coranda Corporation. Two were made on the Bismark deposit, one on each side of the main rib, and six were made from samples on the Green Talc deposit. Of the latter, four were made on samples from the southwest pit, one from the northeast pit. This is mentioned because of numerous contentions by the corporation that they have adequately sampled their property. Of the above eight analyses, all but the one from the east side of the rib on the Bismark deposit are from areas previously sampled, including the southwest pit of the Green Talc deposit where the Bureau of Mines ran a large bulk sample (WMR 388). As yet there is next to no information on the grade of outcrops.

Allocation of drilling footage

The following footage has been allocated:

Green Talc deposit	No. 1	200 feet	N. 35	W.	-25°
	2	250 feet	N. 45	W.	-20°
	3	200 feet	" "	"	-20°
	4	200 feet	" "	"	-20°
	5	250 feet	" "	"	-30°
Bismark deposit	1	150 feet	N. 70	W.	-30°
	2	150 feet	" "	"	-30°
	3	200 feet	" "	"	-30°

Total allocated by contract to Green Talc:	1,600 feet
Total spotted to date	1,100 feet
Total to be spotted	500 feet

Total allocated by contract to Bismark	900 feet
Total spotted to date	500 feet
Total to be spotted	400 feet

It may be noted that the allocation of drilling to the two deposits is disproportionate because the Green Talc south lens has a surface area of about 80,000 sq. feet and the Bismark of about 12,000 sq. feet. For this reason it is suggested that two hundred feet of drilling be shifted from the Bismark to the Green Talc allocation.

If it proves that enough ore can be blocked out in the drilling of five holes on the south lens of the Green Talc deposit, it is further recommended that the balance of the footage, the 500 feet on the Green Talc and possibly the 200 feet from the Bismarck, be used to explore other lenses on the Green Talc deposit, as outlined in the Field Team report resulting from the investigations last July. A strong contingency should be added, and that is that the operators furnish tangible proof of presence of ore in the vicinity of the other leases in the form of chemical analyses.

Analysis of the Report

The management of the project still is somewhat inexperienced in exploration of mineral deposits. It was found, only by accident, that it was contemplated pulping the cores and storing them in bottles after the fraction for chemical analysis had been selected.

The principal trouble that the project is heading for is that it is and will be out of phase. Drilling is the only activity accomplished to date; study of core and chemical analyses were not started. The management promised the Bureau engineer, for several weeks running now, that analyses would be started "by next week". Under these circumstances, it will be impossible for the Field Team to judge whether the full project is justifiable. There must be insistence that chemical analysis keeps pace with the drilling.

Despite the Field Team recommendation that the contract be written including stipulation that the corporation should engage the services of a competent mining engineer or geologist to study core, log core, determine the sections needing analysis, and correlate the information to arrive at a sound estimate of ore tonnage, the contract arrived without this necessary safeguard. The Coporation does have L. B. Spencer, but as nearly as could be determined, he has not been engaged to handle any of the above tasks.

Another problem involving chemical analysis is that the coporation has contended that the Pittsburgh testing laboratory has been inaccurate on previous work and therefore they have not paid for some past work. The operators subsequently approached the Bureau of Mines Reno office to solicit an agreement to do the analytical work themselves. They are under the impression that the Reno office gave permission for this sort of an arrangement and on this basis equipped a laboratory in Hawthorne.

The operators have been comparatively shrewd in exploiting concessions verbally granted them by one member or another of DMEA. To avoid misunderstanding in the future, it is comparatively important to let the operators know that all major decisions on the project must appear in writing. As yet, I doubt that they have written permission to have R. A. Holt act as the operator's supervisor, and similarly their understanding concerning chemical analyses also is verbal. And from what I gleaned in conversations with Holt, I am not sure that he has been fully advised on accounting requirements and fiscal matters.

Geology

Most time spent on the property was devoted to showing the basic geology to the Bureau engineer. The available core was perfunctorily examined, and the writer assisted Jones in logging 30 feet of new core.

The core is not too illuminating on the presence and grade of ore. First, it is comparatively incomplete and second, ore minerals are inconspicuous where fine-grained and disseminated in silicified rock. It is only through analysis that the alumina content can be determined.

On thing is very obvious, however, and that is that solid blocks of ground which can be mined without selection are apt to be few and far between. Veins and masses of sericite and unreplaced remnants of schist are common in potential ore bodies. The deposit evidently will produce material that must be beneficiated.

The major problem in logging core is identifying the type of quartz. It was mentioned in the Field Team report that quartzite of apparent sedimentary origin seems to overlie the mineralized ground in places and seems to be broken by faults. In addition, much mineralized ground was silicified by solutions which evidently carried the alumina minerals. In cores it is comparatively difficult to distinguish the two types, and on the proper identification rests the question on the magnitude and complexity of faulting in the area. Undoubtedly chemical analyses will help solve the problem because the primary quartzites, as far as is known, were not secondarily mineralized.

The log of the core from hole no. 2 does not show too clear a picture because of the numerous bodies of quartz which may be either of primary or secondary origin. Restudy of the core probably is in order after the analyses are made. The logging of the core from hole no. 3 shows two ore bodies, one on the flank of the ridge in the vicinity of the northeast pit, and the other a downward continuation of the outcrops found just east of the ridge crest. Apparently the mass of unreplaced schist between the two continues downward and also appears to be widening downward.

A. J. Bodenlos, Geologist
March 3, 1953

2512

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

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

Air Mail

March 4, 1953

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 5 1953

Memorandum

To: Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2512 (Corundum-Andalusite), Coranda Corporation, Mineral County, Nevada, Contract Idm-E457

Kindly refer to your copy of my letter to Mr. J. H. Rodda, President, Coranda Corporation, dated February 26, 1953. Note that I called Mr. Rodda's attention to that part of his contract which specifies where the analyses of core samples and core tests are to be made. That was done because Mr. Bailey and I had heard that Mr. Rodda was setting up his own laboratory and was figuring to use the $7,250.00 allowed by the contract for analyses and core testing to pay for the laboratory and the work to be done in it.

As there was some question about the qualifications of Mr. L. B. Spencer to direct the operations, I also reminded Mr. Rodda that his contract states that his supervisor has to be approved by me.

There is considerable background to the reason why I am attempting to hold Mr. Rodda to the terms of the contract. Although we recommended that the surface of the property be sampled, to do that was not stipulated in the contract and few samples have been taken. That in itself is not too serious, as we can go back any time and take surface samples. However, we feel that we cannot be too exacting when it comes to samples taken underground by drilling. Mr. Rodda is a shrewd operator and we have reasons to believe that he is planning to ask for a production loan of considerable size just as soon as drilling is completed. At that time we will, no doubt, be asked to evaluate the results of the exploratory work, and to have to do that on the basis of results reported to us by the operator's own laboratory - results which we will always view with

suspicion - will bring up inevitable complications. There is also great doubt in Mr. Bailey's and my mind that either Mr. Holt or Mr. Rodda are qualified to make the necessary tests.

I now have a letter, dated February 27, 1953, from Mr. Rodda referring to our conversation of February 20. A copy of the letter is attached. It is plain from the letter that Mr. Rodda plans to run all samples and thus have absolute control over the results that he puts out. He promises, however, to furnish us with pulps of all samples tested.

Mr. Rodda did not furnish me with the requested qualifications of Mr. Spencer, but cites them in a letter to Mr. A. C. Johnson, dated February 25. A copy of that letter also is enclosed.

Mr. Johnson is of the opinion that Mr. Spencer is qualified to direct the operations and is under the impression that A. J. Bodenlos of the Survey concurs. Mr. Bodenlos has spent considerable time at the property since drilling operations started, and in personal conversation with him, Mr. Bailey gained the impression that Mr. Spencer is not the man for the job. It is Mr. Bodenlos' suggestion that Ben Page of Stanford University or someone equally qualified in the non-metallics field should be in charge of the operations rather than Mr. Spencer whose qualifications as an engineer and geologist on an andalusite program are subject to question.

It should be evident from what I have stated that Mr. Bailey and I are somewhat concerned about the subject program and in addition to wanting to inform you of our thoughts on the matter, I am writing this memorandum to request you to give it some consideration and let us know what you think we should do.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachments

Copy to: E. H. Bailey, USGS
A. C. Johnson, Reno, Nevada

C
O
P
Y

CORANDA CORPORATION
386 RACE STREET
CYpress 3-3391
SAN JOSE, CALIFORNIA
Feb. 27, 1953

Mr. H. C. Miller, Executive Officer
DMEA Field Team, Region III
1012 Flood Bldg.
San Francisco, California

Dear Mr. Miller:

In Re Contract IDME 457 DM EA 2512

Confirming our discussion in your office Feb. 20, 1953, and with reference to Mr. A. C. Johnson's letter of Feb. 17, 1953, whereby he called attention to a clause under the terms of our contract which states: "approximately 250 samples are to be given class #3 analyses, and approximately 50 samples are to receive pyrometric equivalent cone tests. Analyses and cone tests are to be made by Pittsburg Testing Laboratory, or such other laboratory as may be approved by the DMEA Field Team, Executive Officer Region III".

In our discussion with Mr. A. C. Johnson, who has stated that he has been more or less in agreement that in all likelihood these samples could be analyzed in our laboratory, but has advised that we get your approval.

I have persuaded our company at a cost of several thousand dollars to install a complete laboratory at Hawthorne, Nevada. Our laboratory is now complete and fully equipped to make complete analyses and pyrometric equivalent cone tests on sillimanite minerals.

Our equipment includes, a P.C.E. high temperature furnace, a electric muffle furnace, a drying oven, a battery of high temperature blast burners, a large hood, and a Beckmand Model Du Flame Spectrophotometer and other general laboratory equipment.

We plan to make in excess of 250 class #3 analyses and 50 pyrometric equivalent cone tests. Using Bureau of Standards and A.S.T. methods throughout and standard samples we shall have a constant check on the accuracy on our determinations. Pulps from each sample tested will be made available to the Mining Division for check analyses.

R. B. Holt and myself are experienced chemists and qualified to perform these analyses and tests.

After exploration application was made, we feel it is necessary to run our own analyses and tests as commercial laboratory analyses have been proven unsatisfactory due to inaccurate results and extremely slow reporting.

M.C. Miller

Feb. 27, 1953

We have run heavy liquid tests on our ore and sink-float fractions were tested by the Pittsburgh Testing Laboratory. The results of which gave a higher percentage of Alumina for the feed than the combined sink and float products. Analyses of Feed Sample No. 1327 was given as 42.2 % Alumina and a weighted calculated average of the combined sink-float products of the same sample was found to be 30.3% Alumina or an error of approximately 40%.

Upon checking with Refractory Companys, we were advised to set up our own Testing Facilities as they also have found that commercial testing analyses of sillimanite minerals have been unsatisfactory, and they have offered their cooperation on any problem that may arise.

Therefore we are asking permission to make the analyses and tests in our own laboratory and that the funds alloted in the contract be made available to our company on the same unit basis.

Sincerely yours

CORANDA CORPORATION
by J. H. Rodda, President

cc: A. C. Johnson
San Jose Office
file

C
O
P
Y

CORANDA CORPORATION
386 RACE STREET
CYpress 3-3391
SAN JOSE, CALIFORNIA

DMEA * 2512 ----- Contract IDM-E 457

February 25, 1953.

Mr. A.C. Johnson, Chief, Mining Division
U.S.Bureau of Mines
P.O.Box 1551
Reno, Nevada.

Dear Mr. Johnson:

In reply to your letter of February 17, 1953, and under the provisions of our contract IDM-E 457, we are to ask for approval of our project supervisor. We would like permission to continue to employ Mr. L.B. Spencer, as he is familiar with the type of ore found in these deposits, having worked for Champion Spark Plug Co, on their deposit at White Mountain. He is a registered engineer, holding State of Nevada License No. 62 as Civil and Mining Engineer and Land Surveror, and has had many years experience in this area. Mr. Spencer made the orginal survey of the claims for us and has been in our employ on a monthly basis since January 1,1953.

We are forwarding a letter to Mr.H.C. Miller, Executive Officer, DMEA field team, Region III, asking permission to analyze the samples and cores in our own laboratory, which is now fully equipt and ready to make such analyses.

The cores are being split, half being saved for storage in the Reno Core library, the other half being ground and the pulp split for analysis. Part of the pulp in each sample being carefully labeled and stored for the Mining Division, for check analyses.

Our Engineer Mr. Spencer and Bob Holt will log the cores as requested, and not as heretofor, where the logging was done jointly by Mr. Holt and Mr. Jones.

Sincerely yours
/s/ J. H. Rodda
President , Coranda Corporation

CC
Mr.H.C.Miller
San Jose office
File

Office of
Executive Officer
DMEA Field Team
Region III

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 3 1953

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

February 26, 1953

Mr. J. M. Redda, President
Coranda Corporation
P. O. Box 1434
Hawthorne, Nevada

Re: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation, Green Talc Mine
and Bismark Mine, Mineral County,
Nevada, Contract Idm-2457

Dear Mr. Redda:

Mr. A. G. Johnson has sent me a carbon copy of a letter he wrote to you on February 17. Upon receipt of that letter I again reviewed your contract and there are several matters which I think should be brought to your attention.

From our discussion in this office the other day, you told me that you were setting up a field laboratory so that samples can be analyzed by your own chemists. Of course, we can have no objection to your spending your own money to set up such a laboratory. The cost, however, cannot be charged to the contract, nor can you charge the contract $25.00 for each chemical analyses and $20.00 for each pyrometric cone equivalent test made by your chemist.

The contract is specific in that the analyses and cone tests are to be made by the Pittsburgh Testing Laboratory, or such other laboratory as may be approved by me. I doubt very much if I could approve of a test being made in your own laboratory by men employed by you. In any event, the matter will have to be taken up with our Washington office before a decision can be rendered.

I note also that the cores resulting from drilling operations should be tagged and boxed at the drill sites and the boxed cores shipped to the Bureau of Mines at Reno where the Bureau in consultation with your project supervisor will prepare the samples for chemical determination and for cone tests.

The contract stipulates also that your supervisors must be approved by me. No request for such approval has been made to date. I suggest, therefore, that you furnish me with the names of your supervisors and a statement of their experience in the work they are

doing. A carbon copy of such information should be sent to Mr. A. C. Johnson at Reno.

Mr. Johnson has pointed out other items that need to be followed in his February 17 letter.

Your immediate cooperation will be appreciated.

Sincerely yours,

N. C. MILLER

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Copy to: DMEA, Interior Building, Washington
E. H. Bailey, USGS
A. C. Johnson, Reno

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
DEC 16 1952

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Bldg.
870 Market St.
San Francisco 2, Calif.

December 12, 1952

Memorandum

To: Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Contract Idm-E457 - Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation
Green Talc Mine and Bismark Mine, Mineral County, Nevada

Reference is made to Mr. G. C. Selfridge's letter of December 5, transmitting to this office the original and five copies of subject contract.

The contract has been executed on the part of the Operator and one copy retained by him. Proper distribution has been made of the Field Team's and Finance Officer's copies, and the original and two remaining copies are returned herewith.

S. Ricker, for
H. C. Miller
Executive Officer, DMEA Field Team
Region III

Attachment

Copy to: A. C. Johnson, Reno (With copy of contract)
Finance Officer, Region III (With copy of contract)
E. H. Bailey, USGS
George Mavor

cae
12-16

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

DEC 5 1952

Robertson
Houk
Holland
Lafferty
Selfridge
H. Johnson

Mr. M. C. Miller
Executive Officer, DMEA
Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Green Talc Mine and Bismark Mine
Coranda Corporation
Mineral County, Nevada

Dear Mr. Miller:

Please find herewith the original and five copies of a contract covering the subject exploration project which have been signed by this office for the Government with register number and effective date as shown.

If the contract meets with your approval, present it to the operator for his approval and signature. If any provisions are unsatisfactory to the operator, return all copies to this office along with suggested changes for consideration. You will note that the project work and estimated project costs have been modified from that first recommended by the field team.

As now set up the project work is concentrated on the Green Talc Group and the Bismark Group along the lines discussed on the telephone by Mr. Lawrence G. Houk and Mr. H. C. Johnson of the Reno office and in general follows the suggestions contained in his letter dated November 4, 1952, to Mr. Houk. The estimated project cost is now $36,000 compared to $50,613, the figure first recommended by the examination report. Please advise the operator that this is a firm contract and that he is obliged to complete the project work at the unit rates of costs per foot and unit rate per sample specified.

After signing of the contract, one copy is to be given to the operator, one copy retained for your files, one copy for the Regional Finance Officer, and the remaining copies, including the original, are to be returned to this office as soon as possible.

Sincerely yours,

S. C. Selfridge (HB)
Chairman, Operating Committee

Approved:
J. R. Robertson (HB)
Member, Bureau of Mines

A. R. Kinkel, Jr. (HB)
Member, Geological Survey

JTRobertson:gad 12/2/52
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Chandler, 3520
Mr. Norton, G-232 GSA Bldg.
Mr. Houk

Enclosures 6

12-5-52

FILE COPY
SURNAME:

Robertson
Hook
Selfridge

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

December 1, 1952

Memorandum

To: Chairman, Operating Committee

From: Nonmetallic Minerals Division

Subject: Docket No. DMEA-2512 (Corundum-Andalusite)
Corunda Corporation
Green Talc Mine and Bismark Mine
Gillis Range, Mineral County, Nevada

Re: Recommendation of approval of Exploration Project Contract in the sum of $36,000.00.

The Corunda Corporation, a Nevada corporation, holds an operating agreement, dated April 28, 1952, giving it the right to operate and extract ore from four separate mines or groups of unpatented mining claims. The mines are separated, one from the other, by distances of one to four miles (see maps). Numerous outcrops of alumina-silica rocks, containing the minerals corundum and andalusite, are found on the properties.

The company applied for exploration assistance to explore and test several of the outcrops at an estimated cost of $200,000. The Operating Committee is referred to the application, a bound volume of information, photos, and maps, accompanying this memorandum. The applicant's large project was considered too extensive and was modified to the one here recommended - a diamond drilling and sampling project to cost $36,000.00 instead of $200,000.00 as first proposed.

After field examinations of the properties by the DMEA Field Team, Region III, had been made, and after examination of the various factors by the commodity specialists, a modified project was decided upon. It would confine the work mostly to diamond drilling and sampling to be done on only two of the four mines, namely, the Green Talc Mine and the Bismark Mine.

Diamond drilling would total 2,500 feet of holes; 1,600 feet to explore one of the Green Talc Mine outcrops, an area of approximately 200 feet X 400 feet; 900 feet of holes to explore part of the Bismark Mine outcrop, an area approximately 50 feet X 150 feet. These two outcrop areas are judged to be the most promising

11/4/52 Letter from A. C. Johnson to L. G. Houk in which was submitted a modified exploration project.

12/1/52 J. T. Robertson's memorandum to Operating Committee submitting an exploration project contract for approval.

The work to be performed under the contract is diamond drilling and sampling; 1,600 feet of D. D. holes are to test a corundum-andalusite outcrop on the Green Talc Mine and 900 feet of D. D. holes are to test a similarly mineralized outcrop on the Bismark Mine. Total estimated cost $36,000. Government's participation 90%.

12/3/52 Exploration Project Contract approved by Operating Committee.

12-5-52 Contract executed.

Jasper T. Robertson
Nonmetallic Minerals Division

JTRobertson:gad 12/1/52

Copy to: Admr. R. File
Docket File
Mr. Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
P. O. BOX 1551
RENO, NEVADA

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
NOV 6 1952

November 4, 1952

Mr. Lawrence G. Houk, Chief
Nonmetallic Minerals Division, DMEA
Bureau of Mines
So. Interior Bldg.
Washington 25, D.C.

Dear Mr. Houk:

In compliance with your telephone conversation of Oct. 29, the report on the Coranda Corp.'s application for a DMEA loan, has been reviewed. The proposals in this report by George H. Holmes of the Bureau of Mines and A. J. Bodenlos and H. L. Sobel, geologists of the U. S. Geological Survey, is a sane approach for the exploration of the Green Talc, the Bismark, and the Deep Mines deposits near Hawthorne, Nev.

According to the telephone conversation, you were more or less inclined to concentrate the exploratory work on one deposit, namely the Bismark. It was also my understanding that the drilling program was to be concentrated over an area of from 15,000 to 20,000 square feet.

The biggest deposit in the area is the Green Talc and if work were to be done on only one deposit, it is recommended that this deposit be selected for the work. However, I believe the work should be done on the Green Talc and the Bismark. The Bismark has the higher grade quartz alumina rock but in all liklihood, it will not prove up the tonnage that can possibly be found in the Green Talc deposit. If a concentration of work is to be done on only one deposit, the following recommendations are made for the Green Talc deposit:

Drill: 2 250 foot holes - 25° - on 100 foot centers
2 200 " " - 20°
900 feet

2 deeper holes @ 350 feet = 700 feet
Total drilling = 1,600 feet

Estimate - 4 months to complete work.

CORANDA CORPORATION
386 RACE STREET
CYpress 3-3391
SAN JOSE, CALIFORNIA

Mr. Robertson

Oct. 25, 1952

Mr. Lawrence G. Houk, Chief
Nonmetallic Minerals Division
Defense Minerals Exploration Administration

Re: No DMEA-2512

Dear Mr. Houk,

In answer to your letter of Oct. 6, 1952, I am enclosing five copies of Drilling costs as submitted by Palmer and Decker.

Sincerely yours

J. H. Rodda

J. H. Rodda, President of
Coranda Corporation.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 28 1952

L. G. PALMER

A. P. DECKER

Palmer and Decker

DIAMOND DRILLING CONTRACTORS

163 W. LINE ST. PHONE 832

BISHOP, CALIFORNIA

October 20 1952

Mr. J. H. Rodda,
President,
Coranda Corp.,
386 Race Street,
San Jose, California.

Dear Mr. Rodda:

This letter will confirm our conversation of yesterday at Hawthorne, Nevada, regarding the proposed diamond drilling on your Andalusite Claims near Hawthorne.

We are submitting a bid to do at least 3000 feet of drilling on the Claims at the following prices;

BX Core	$ 7.50 per foot
AX Core	6.35 per foot.

We will supply all drilling equipment, material, labor, water, and other drilling supplies and operate two machines, weather permitting, until completed.

In accord with our conversation in regards the drill sites and access roads, you are to be responsible for any bull-dozer work that may be required.

Yours truly,

Palmer & Decker

Albert P. Decker

Albert P. Decker

APD 1

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 17 1952

October 16, 1952

Memorandum

To: Nonmetallic Minerals Division
Defense Minerals Exploration Administration

From: Acting Chief, Ceramic and Fertilizer Materials Branch

Subject: DMEA-2512, Coranda Corporation (Hawthorne-andalusite-corundum deposits) Mineral County, Nevada

I am in general concurrence with the field team report on subject proposal and believe that the proposed drill project is justified. In addition to the potentiality of improving the supply of corundum, there is a definite need in the western states for the supply of high alumina refractories for the metallurigal, clays and ceramic industry. The project shows promise of developing substantial resources of andalusite or a mixture of andalusite and corundum to be used as a refractory material. Even though it does not prove practicable to produce a special concentrate product for abrasive uses, the corundum content of a concentrated material will materially improve the alumina content of the concentrate.

The mechanics, sampling and the location and pointing of drill holes should be left to the discretion of the DMEA field team. Arrangements should be made for the evaluation of the samples by competent personnel experienced in beneficiation, petrography and ceramics.

Brooke L. Gunsallus

Brooke L. Gunsallus

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

October 15, 1952

Memorandum

To: Lawrence G. Houk, Chief, Nonmetallic Minerals Division, DMEA

From: Henry P. Chandler, Commodity Specialist, Construction and Chemical Materials Branch

Subject: Corundum production at the Coranda Mine

The following observations on corundum are submitted in response to your request for comment on further exploration of the Coranda Mine.

Corundum is on the list of strategic materials for the National Stockpile, and as currently all corundum for domestic uses is imported, mostly from South Africa, a source of that material in the United States is much desired.

The fact that the Coranda Mine may be a possible source of corundum makes it of considerable interest.

In order to qualify for stockpile purchase, the corundum offered must meet certain specifications which are given in National Stockpile Specification P-18.

The results given in War Minerals Report 388 seem to indicate that the material tested might prove more valuable for high-alumina refractories than for abrasive corundum. Only one sample out of the sixteen tested can be considered a good abrasive grade of corundum.

However, a domestic source of corundum would tend to alleviate a stockpiling problem. It probably would be worth-while investigating this matter further, to determine whether or not the abrasive corundum contents of this deposit, in conjunction with its other mineral values, are sufficient to warrant further exploration.

Henry P. Chandler

Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

for Mr

OCT 6 1952

Mr. Robert B. Holt
Coranda Corporation
386 Race Street
San Jose, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corporation Mining Claims
Mineral County, Nevada

Dear Mr. Holt:

Receipt is acknowledged of your letter of September 25, 1952, transmitting to this office information on the rental of laboratory space and purchase of crushing equipment. This information will be used together with your application in processing the proposed exploration project.

I note you have not supplied us with the estimated costs of drilling by the local contractor there in Hawthorne. When this information has been received, your application will be processed.

Sincerely yours,

S.H.
10-6-52

Signed

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 10/3/52

Copy to: Adm. R. File
Field Team, Region III
Docket File
Mr. Dietrich, 3526
Mr. Chandler, 3520
Mr. Norton, G-232 GSA Bldg.
Mr. Houk

CORANDA CORPORATION
386 RACE STREET
CYpress 3-3391
SAN JOSE, CALIFORNIA

Spet. 25, 1952

mr Robertson

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
SEP 29 1952

DMEA-2512

Mr. Lawrence G. Houk
Defense Minerals Exploration
Administration, Room 4637
Interior Building
Washington 25, D. C.

Dear Mr. Houk,

Referring to my letter, dated Sept. 11, 1952, other sources of laboratory crushers for rental in the proximity of Hawthorne, Nevada, have been checked; however, nothing has been found available.

It appears that the best solution to the problem would be to buy a suitable crusher which would be resold upon completion of the exploration program. The Western Machinery Co. of San Francisco quoted a 3"x6" jaw crusher at $256.00 F.O.B. San Francisco and a delivery time of six weeks. As an alternate they suggested the purchase of a second hand crusher similar in size as described above at a cost of approximately $225.00 and a delivery time of one to two weeks. An electric motor to power the crusher may be rented for $10.00 per month and space for operation of this equipment could be rented for approximately $20.00 per month.

Sincerely yours,

CORANDA CORPORATION

R B Holt

by Robert B. Holt
Executive Engineer

RBH/dj

cc: File
J. H. Rodda

CORANDA CORPORATION
386 RACE STREET
CYpress 3-3391
SAN JOSE, CALIFORNIA

Sept. 11, 1952

mr Robertson.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
SEP 18 1952

DMEA 251

Mr. Lawrence G. Houk
Defense Minerals Exploration
Administration, Room 4637
Interior Building
Washington 25, D. C.

Dear Mr. Houk,

Pursuant to your request in connection with the Coranda Corporation Exploration Application (DMEA 2512) I have checked into the availability and rental of laboratory crushing and grinding equipment. As previously mentioned during our conference, Sept. 11, at the Bureau of Mines office, Reno, Nevada, it was felt that above named equipment was available at Hawthorne, Nevada; however, upon contacting the owner I find that this equipment has already been taken up and will not be obtainable for use.

Other sources of laboratory crushers are being checked and as soon as this information is attained it will be forwarded on to you.

Sincerely yours,

CORANDA CORPORATION

Robert B Holt

by Robert B. Holt
Executive Engineer

RBH/dj

cc; File
J. H. Rodda

IN REPLY REFER TO:
G-MD-CNM

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

Defense Minerals Exploration Administration
SEP 11 1952

September 10, 1952

Memorandum

To: Lawrence G. Houk, Defense Minerals Exploration Administration

From: Gilbert H. Espenshade, U. S. Geological Survey

Subject: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation Mining Claims
Mineral County, Nevada

I have reviewed the examination report by the Field Team (dated Aug. 21, 1952), the transmittal letter of Aug. 29, and the other attached documents. The deposits show promise of having a high alumina content, as indicated by the Bureau of Mines' 1945 sample of about 50 tons, containing 42.5% Al_2O_3 and 54.2% SiO_2, and one deposit at least (the Green Talc) seems large enough to be minable.

The sampling and drilling program that the Field Team proposed is logical and well planned, but before approving this program, I think that it should be determined whether the andalusite-corundum concentrates that would be produced from this material would approach or meet the specifications for strategic kyanite. If the quality of the product should be of distinctly inferior grade, then the proposed exploration project would presumably not qualify.

Mr. Gunsallus of the Bureau of Mines tells me that he also favors determining the quality of the material at this point, and has suggested to Mr. Rodda, president of Coranda Corporation, that he submit a sample of several hundred pounds to the Bureau's Electrotechnical Lab at Norris, Tennessee for testing. It is possible that the Bureau of Mines may still have some of the concentrates produced in their 1945 milling tests of this ore (discussed in WMR-388, "Preliminary pilot-plant concentration of andalusite-corundum ore from the vicinity of Hawthorne, Nev.," attached to the docket). About 11 tons of concentrates was produced from about 50 tons of ore, and evidently about 10 tons of these concentrates was shipped to Gladding, McBean and Co. near San Francisco for testing. Gladding, McBean's report on results of their tests was perfunctory and uninformative. If the Bureau still has some of these concentrates, they may also be useful for firing tests at this time.

MEMO

It occurs to me that material of this type might contain topaz, though probably not in amounts large enough to create a problem in the disposal of fluorine during calcining. This possibility should be kept in mind in future tests or analytical work.

Gilbert H. Espenshade

Gilbert H. Espenshade

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

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Bldg.
870 Market St.
San Francisco 2, Calif.

August 29, 1952

Memorandum

To: Operating Committee, DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA-2512 (Corundum-Andalusite)
Coranda Corporation Mining Claims
Mineral County, Nevada

Reference is to Mr. Frank E. Johnson's letter, dated May 26, 1952, on the subject docket.

Attached are the original and three copies of report entitled "DMEA-2512, Corundum-Andalusite, Mineral County, Nevada, Coranda Corporation," by George H. Holmes, Mining Engineer, and A. J. Bodenlos and H. L. Sobel, Geologists, dated August 21, 1952.

We agree with the report that if the project has merit, dependent upon the critical status of andalusite and corundum, the project should be in two stages:

1. Surface trenching, sampling, and analysis.

2. Diamond drilling.

The first stage would not require more than one month's field work. One engineer, two samplers or miners, and the rental of compressor (including operator) are the major items that should be needed. The report recommends that approximately 55 samples be taken during this first stage from the various outcrop and proposed trenches.

The second stage would depend entirely on results of first stage. In the second stage, it is questionable in our minds if two engineers would be required. We also question the need of a transit. For the work a Brunston should be sufficient and any engineer should have one. Two diamond drill samplers do not appear to be necessary on such a job. Truck maintenance and contingencies items could probably be halved. The amount required for analyses and core tests is probably too high, at least until more data are obtained from samples

ON SITE EXAM. RPT.

from the first stage.

The docket file, as well as the three memoranda referred to in the first paragraph of your letter of May 26, is returned herewith.

S. Ricker, Acting for
H. C. Miller, Executive Officer
DMEA Field Team, Region III

Attachments

Copy to: E. H. Bailey

UNITED STATES
DEPARTMENT OF THE INTERIOR
OSCAR L. CHAPMAN, SECRETARY

DEFENSE MINERALS ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

DMEA-2512, Corundum-Andalusite

Mineral County, Nev.

Coranda Corporation

George H. Holmes, Jr., Mining Engineer
U. S. Bureau of Mines

A. J. Bodenlos, Geologist
H. L. Sobel, Geologist
U. S. Geological Survey

August 21, 1952

CORUNDUM-ANDALUSITE
CORANDA CORPORATION MINING CLAIMS
Mineral County, Nevada

Docket No. DMEA-2512 (corundum-andalusite)

Name and address of applicant: Coranda Corporation,
J. H. Rodda, president,
386 Race Street,
San Jose, Calif.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The Coranda Corporation proposes to explore by surface sampling and diamond drilling three andalusite deposits near Hawthorne, Nev. A two-stage program is suggested by the DMEA Field Team: Stage I to comprise taking a minimum of 55 bulk samples by drilling and blasting from approved locations on the Green Talc, Bismark, and Deep Mines deposits; Stage II will be contingent on the results of surface sampling and will consist of 3,000 feet of diamond drilling on the three deposits. The overall estimated cost of the project is $50,613. The Field Team concludes that:

1. No reserve estimates are possible because the deposits have not been sampled. Any contract with the applicants should stipulate that drilling cannot be started prior to receipt of chemical analysis of surface samples. Analyses of samples should be Class 3 as outlined by Pittsburg Testing Laboratory (see docket). The more complete analysis for surface samples is suggested to determine the nature and quantity of deleterious elements as well as the quantity of alumina.

2. Blocks of potential ore may contain masses of unreplaced country rock, dike rock, and quartzite, as well as zones of sheared

hydrated aluminum silicate minerals which may carry deleterious alkalies. All may be present in sufficient quantities to require selective mining if larger mineralized areas, such as the Green Talc, are developed.

3. At least at the Green Talc deposit faulting is complex and may interrupt the continuity of potential ore.

4. Detailed mapping indicates that potential ore blocks may be comparatively small.

5. It is entirely possible that sufficient reserves for at least a small operation could be proved in the suggested DMEA program. It is also possible that substantial reserves may be present in the Green Talc area if the north, west, and east lenses are of higher grade than was judged in field examination.

6. The suggested exploration program is practical and economical.

The Field Team recommends:

1. Approval of the suggested exploration project.

2. Provision in the contract to permit shifting of diamond drill footage after drilling the minimum of two holes on the Deep Mines, three holes on the Bismark, and three holes on the south lens of the Green Talc. Present data does not permit outlining a hard and fast drilling program; most footage can be allocated after surface sampling is completed.

3. Analyses of the surface and diamond drill samples be done by the Pittsburg Testing Laboratory; with check analyses by the Bureau of Mines.

4. Provision in the contract to hire a competent mining engineer

or geologist, acceptable to the Field Team, to supervise the exploratory work.

TIME SPENT ON PROPERTY

Geologic mapping was done on the applicants' properties by Alfred Bodenlos and Harvey Sobel, U.S.G.S. geologists from July 11 to 17, 1952. An examination of the properties was made by G. H. Holmes, Jr., mining engineer, U. S. Bureau of Mines, on July 15 and 16, accompanied by J. H. Rodda and R. B. Holt, president and secretary-treasurer of the Coranda Corporation.

NAME AND LOCATION OF PROPERTY

The applicants' original proposal requested exploration on four separate groups of claims known as the Green Talc, Bismark, Deep Mines, and Victory. Request for work on the Victory group has been withdrawn.

The Green Talc group of claims is in secs. 22, 23, 26, and 27, T. 9 N., R. 31 E., M.D.B.&M., about 11 miles by road northeast of Hawthorne, Mineral County, Nev.

The Bismark group of claims is in secs. 31 and 32, T. 9 N., R. 32 E., M.D.B.&M., about 14 miles northeast of Hawthorne, Nev.

The Deep Mines group of claims is in secs. 13, 14, 23, and 24, T. 8 N., R. 31 E., M.D.B.&M., about 8 miles by road northeast of Hawthorne.

CONDITION AND SEASONAL ACCESSIBILITY OF ROAD TO PROPERTY

The road to the Green Talc group extends 6 miles over paved highway to Thorne, then about 5 miles over a steep, rough, ungraded dirt road to the property. Grading would improve the dirt road and permit access to the claims at all seasons of the year.

The Bismark claims are reached by 8 miles of U. S. Highway 95 and about 6 miles of ungraded, dirt road. This latter section is rough, sandy, and with steep grades near the property. Four-wheel drive vehicles must be used on this road during all seasons.

The Deep Mines group is the most readily accessible, being reached by travelling U.S. Highway 95 for about 7.5 miles and 1/4 mile of dirt road. This latter section is passable to all types of vehicles but could be improved by grading. The property is accessible during the entire year.

COMPETENCY OF APPLICANT AND OPERATING PERSONNEL

J. H. Rodda and R. B. Holt describe their qualifications and experience under Question 6b, Form MF-100. Neither one is qualified to supervise the exploration work so supervision of the proposed exploration, will be by a mining engineer or geologist acceptable to the Bureau of Mines and the U.S.G.S. Analytical work will be supervised by R. B. Holt who appears well qualified.

The financial statement of officers and directors of the company is given under Question 8, Form MF-100.

APPLICANTS' PROPERTY RIGHTS

This section is included in the original application.

DESCRIPTION OF PROPERTY

Descriptions of the property with sampling and results of metallurgical tests, are adequately described in the following Bureau of Mines reports:

"Hawthorne Andalusite Deposits, Mineral County, Nevada" by Glenn L. Thompson, mining engineer, Jan. 1945.

"Preliminary Pilot-Plant Concentration of Andalusite-Corundum Ore from the Vicinity of Hawthorne, Nevada", WMR-388, May 1945.

No further work has been done on the Bismark or Deep Mines and there are no mine workings or buildings on these properties. During 1949, the Technical Porcelain Co., El Cerrito, Calif., mined about 3,000 tons of ore from the Green Talc property. Ore bins and a compressor house were constructed and are still standing although in need of rehabilitation and repair. Mine workings at the Green Talc consist of one open pit (fig. 3). There is no mine machinery at any of the properties.

GEOLOGY

The geology of the deposits as reported in War Minerals Report 388 (Bureau of Mines, 1945) and by Phoenix and Bailey (U.S.G.S., 1944) is correct with regard to major details. The deposits are bodies of fine-grained quartz and in places green hydrous aluminum silicates which carry recoverable andalusite, corundum, diaspore, and possibly other anhydrous aluminum silicate minerals. These bodies replaced metamorphosed volcanic rocks, chiefly andesite and tuff, and also their sheared schistose equivalents. The recoverable minerals occur as fine-grained gobs, irregular masses, and lenses scattered throughout the matrices. Coarse-grained quartz and rosettes of pyrophyllite occupy fractures formed after the andalusite and associated minerals were deposited. The Field Team was not able to establish any control of location or concentration of recoverable minerals within mineralized blocks.

During field examination, July 11 to 17, 1952, Bodenlos and Sobel of the Survey mapped the Bismark and Deep Mines deposits and the south lens of the Green Talc deposit by plane-table and alidade, on a scale of 40 feet to the inch. Copies of the maps are attached. George Holmes of the Mining Division also examined the area. Holt and Rodda of the Coranda Corporation were present in the field during this examination.

Deep Mines deposit

The Deep Mines deposit consists of two areas of quartz-alumina rock in metavolcanic andesite and tuff. One area, at the crest of the hill (fig. 1), is 80 feet long and at most 40 feet wide; it is surrounded by silicified metavolcanics. The other area is on the south slope of the hill, and is exposed only in trenches and pits. The trench shows two bands of quartz-alumina rock, one 60 feet wide and the other 20 feet wide, separated by metavolcanic rock. One pit on the southwest shoulder of the hill and two on the southeast shoulder of the hill contain small patches of quartz-alumina rock. Possibly a block as much as 140 feet wide and 110 feet long may exist under the alluvial and detrital cover, but at least one band of unreplaced country rock is to be expected in this area.

We recommend that three samples be collected from outcrops in the block at the crest of the hill, three from the trench, and one each from the three pits. If the grade of this material is sufficiently high, two drill holes should be cut, each oriented north, 200 feet long, and inclined -20°. The lower should be located in the trench at 4,570 feet altitude and the upper in the same trench at 4,630 feet

in altitude. The remaining 300 feet of drilling suggested for this deposit can be located after the results of initial drilling are evaluated.

Bismark deposit

The Bismark deposit consists of two areas of mineralized ground. The larger, shown on the deposit map (fig. 2), is a crescent-shaped mass of quartz-alumina rock measuring 140 by 180 feet, which replaces metavolcanic rock and schist. Ribs of unreplaced metavolcanic rock remain in the mass of quartz-alumina rock on the east side of the southwest extension of the mass. The southwest extension, about 140 feet long and 40 feet wide, seems to contain high percentages of aluminum silicate minerals, and actually is the best-looking material seen on any of the deposits. The eastern part of the crescent is thought to be low in alumina content or barren. The smaller mineralized area is at the crest of the hill about 100 feet beyond the northeast corner of the mapped area. It is a band of hydrous aluminum silicate rock, green in color, containing some andalusite and in part is quartz-alumina rock. The band is traceable for only 50 feet and is no more than 10 feet wide; it is considered to be too small to warrant its being drilled.

The Field Team recommends that four samples be collected from the southwest extension of the crescent, three from the eastern part of the crescent, and three from outcrops southeast of the main mass of quartz-alumina rock. Should mineable rock be present, the southwest rib should be drilled with three 150-foot holes, oriented west-northwest

and inclined -30°. Two should be drilled from the east, at altitudes of 5,235 and 5,280 feet, and one should be drilled from the west, at an altitude of about 5,255 feet. The remaining 250 feet may be spotted after the core of the first three holes is examined.

Green Talc deposit

A comparatively large zone of metavolcanics and schistose sheared rock is altered and replaced at the Green Talc deposit, extending from the Dover deposit at least 2,000 feet west of the old mill on the Green Talc property, through the Green Talc area, and at least 1/2 mile up an open valley north of the northeast corner of the Green Talc 3 claim. On the Green Talc and Alto claims the zone is as much as 1,000 feet wide; within it mineralized lenses, separated by unreplaced blocks of country rock, trend from north-northeast to northeast. Quartzite in the south end of the mineralized area is thought to be a stratigraphic unit overlying meta-andesite; within the south lens (fig. 3) it seems to immediately overlie mineralized ground.

Only the south lens of the deposit was mapped during the Field Team examination. Outcrops, pits, and trenches indicate an irregular deposit about 400 feet long and as much as 230 feet wide, in which occur unreplaced remnants of metavolcanics, several small diabase dikes, and wide zones of hydrous aluminum silicate minerals (which, according to W.M.R. 388, seem to contain deleterious alkalies). Faults with unknown displacements further interrupt the continuity of quartz-alumina rock; in the main pit on this lens are three fault systems, two striking east and dipping north, of the thrust and reverse type, and one striking north and dipping steeply, apparently with normal movement.

Although considerable mineable material may be present, it may be difficult to find sizable blocks suitable for open-pit non-selective mining. Ore may extend under the masses of quartzite but the presence of such capping rock would necessitate either stripping or underground operations to recover any material so located.

Other potential mineral bodies lie in the main ridge north of the south lens as well as in the ridges flanking it to both the east and the west. On the southeast side of the main ridge is a potentially large area starting about 200 feet north of the northeast corner of the plane-table map; it may be as much as 400 feet long and several hundred feet wide. Its eastern margin is in the eastern ridge. Several mineralized zones also occur on the west side of the main ridge, starting about 200 feet north of the northwest corner of the plane-table map. The western lenses strike about N.25°E. and cross the ridge obliquely. Sporadic mineralization continues as far north as a tributary stream cutting behind the ridge in a northwesterly direction; beyond, in a broad open valley pits expose only sheared hydrous aluminum silicates. In the west ridge is a northeast-striking lens of quartz-alumina rock, best exposed on the ridge crest. The mass is several hundred feet long but contains blocks of unreplaced country rock; it extends beyond the claim lines of the Coranda Corporation.

The Field Team recommends that at least 20 samples be collected from the exposures on the south deposit of the main ridge and that at least four samples be collected from each of the areas described in the paragraph above. If these indicate possibilities of minable rock, 1,600 feet of drilling is proposed as follows:

South lens - 3 holes should be drilled from the road skirting the south margin of the deposit, all oriented northwest. The southwest hole, cutting under the main pit, should be 250 feet long and inclined -25°. The middle hole should be 250 feet long and inclined -20°. The northeast hole, cutting under the northeast pit, should be 200 feet long and inclined -20°.

North lenses, main ridge - 2 holes, one from the west and one from the east, should be drilled from the valleys flanking the ridge, about 400 feet north of the north margin of the plane-table map. Each hole should be 200 feet long, oriented west-northwest, and inclined -20°.

East ridge - the eastern margin of the northeast mineralized zone should be explored by a drill-hole cut from the valley floor, located about 300 feet north of the northeast corner of the plane-table map. It should be 200 feet long, oriented east-southeast, and inclined -20°.

West ridge - one hole, 200 feet long, oriented west-northwest, and inclined -20°, should be drilled from the hillslope about 250 feet northwest of the west dump of the plane-table map.

Should surface sampling indicate that any of the areas be poorly mineralized, the footage of diamond drilling may be shifted to the south lens of the main ridge.

Victory deposits

The Victory deposits, not visited by the Field Team, lie east of the Green Talc area. Owing to their present inaccessibility and the reported heavy detrital cover, it is not advisable to consider exploring them at present. The applicants orally concurred with the conclusion.

PAST OPERATIONS

With the exception of bulk samples taken by the Bureau of Mines and the Gladding-McBean Co., the only significant production occurred during 1949 when about 3,000 tons were mined from the Green Talc deposit by the Technical Porcelain Co., El Cerrito, Calif. There has been no production from the Bismark or Deep Mines properties.

AVAILABILITY OF MANPOWER, SUPPLIES, UTILITIES

The proposed exploration project comprises sampling and diamond drilling; both will be done under contract. A minimum of manpower will be required and will consist, in addition to a supervisor and assistant, of core drill samplers. These men can be obtained locally.

Company operations requiring miners, millmen and other skilled help would necessitate recruitment from outside the district. The local labor supply is limited due to the requirements of the Naval Amunition Depot at Babbit, that employs about 2500 workers.

Mine and mill equipment and supplies would also have to be obtained outside the district, as there is not sufficient mining in this area to justify establishment of equipment dealers. Reno is the nearest source of supplies.

Electric transmission lines pass within 6 miles of the properties, and would be available for mill use. Mine equipment could be gasoline or Diesel powered.

No water is available near the deposits but could be obtained from wells sunk near the valley.

STATEMENT OF APPLICANTS' PROPOSAL

The applicants' original proposal included extensive diamond drilling on the four groups of claims together with hand- and bull-dozer-trenching, test pitting, shaft sinking and crosscutting. Comprehensive sample analyses was also proposed. Total cost of the exploration was estimated to be $200,000.

Work was based on an old Bureau of Mines topographic and geologic map of the Green Talc group, and the company geologists' maps of the Bismark and Deep Mines claims. No detailed geologic map had been made on which to base the exploration program and but very little sampling had been done by the company.

Geologic mapping of the Green Talc, Bismark and Deep Mines properties by U.S.G.S. geologists essentially changed the picture relative to the occurrence of the andalusite-corundum ore bodies. Based on this work, it indicated the applicants' proposal to be over-ambitious and that a much smaller program would be adequate; yet would serve to efficiently explore the principal deposits on the Green Talc, Bismark, and Deep Mines claims.

The revised program proposed by the U.S.G.S., Bureau of Mines and discussed fully with the applicants, designates a modified diamond drilling and surface sampling project on the three properties, along with complete analyses of bulk and core samples. Estimated cost of this work is $50,613.00. This program, which closely approximates the original Bureau of Mines proposed project made in 1943, should adequately explore known ore bodies.

The difference in the cost estimates of the U.S.G.S, and Bureau of Mines of $35,000 and $50,613, respectively is due principally to the inclusion of the following items which are considered necessary to the operation of the project; and which were added subsequent to the U.S.G.S. - Bureau of Mines conference on the proposed project:

Item b	2 core drill samplers	$ 3,600
c	Balance and transit	800
g	Class III analyses instead of Class II	2,800
	Cone tests	1,300
	Payroll tax increase	396
	Truck maintenance	1,800
h	Contingencies	4,601
		$15,297

OPERATORS PROPERTY RIGHTS

Described in applicants' proposal.

EXPLORATION PROJECT

(a) Project can start within 30 days after approval of contract.

(b) Six months will be required to complete the project.

DESCRIPTION OF PROJECT

The project will comprise two-stage exploration on the Green Talc, Bismark, and Deep Mines deposits consisting of surface sampling and diamond drilling. Stage I will comprise taking bulk samples by drilling and blasting from tests pits and trenches whose location will be designated by the Bureau of Mines or U.S.G.S. A minimum of 55 samples will be cut from the three deposits. Preliminary surface sampling and sample analyses is recommended as only one chemical analysis from the entire area is available (see Bureau of Mines WMR-388, 1945). Diamond drilling under these circumstances would essentially be blind because there is absolutely no way of determining the distribution or size of

potential ore bodies with present information. All estimates of reserves made in the past have been based solely on volumetric computations, with no supporting data on grade.

Stage II will comprise diamond drilling.

The proposed diamond drill holes are shown on figures 1, 2, and 3, and will total 3,000 feet. Approximately 1,600 feet will be drilled on the Green Talc deposit, 700 feet on the Bismark, and 700 feet on the Deep Mines property. Holes will be started BX size and will be reduced to AX size when a solid formation is reached. The larger core will make for higher recovery and give larger samples for analyses.

ALLOWABLE COSTS OF PROJECT

a. Independent contracts.

Diamond drilling:

BX size	500 feet @ $7.75/ft.	=	$ 3,875.00
AX size	2500 feet @ $6.50/ft.	=	16,250.00
	Total cost	=	$20,125.00*

*Costs based upon prices submitted by contractor and include all labor, equipment, supplies, and hauling water to drillsites.

b. Labor and supervision.

1 Mining engineer @ $600/month	6 months		$ 3,600.00
1 Ass't engineer @ $500/month	6 months		3,000.00
2 Diamond drill samplers @ $15/da.	120 days		3,600.00
Total cost		=	$10,200.00

c. Operating materials and supplies.

100 large sample sacks @ $1.00/sack	$ 100.00
300 small sample sacks @ $0.50/sack	150.00
150 cardboard core boxes @ $0.70/box	105.00
1 core splitter	100.00
1 specific gravity balance	300.00
1 transit and accessories	500.00
Small tools, ie. shovels, picks, etc.	100.00
Freight and handling of supplies	600.00
Total cost	$1,955.00

d. Operating equipment.

1. To be purchased - None.

2. To be rented - 1 portable air compressor with jackhamer, hoses, drill steel, and to include operator and all operating supplies. To be used for drilling cuts for surface samples.

80 hours @ $8.00/hr. $640.00

3. Owned and furnished by operator. - One Reconnaissance, 4-wheel drive truck. Value $1,200.
Rental = $1,200 x 1/60 = $20 x 6 months 120.00

$760.00

e. Initial rehabilitation and repairs.

None

f. New buildings, improvements, etc.

None

g. Miscellaneous.

Analytical work*

350 Class #3 analyses @ $25.00 each $8,750.00
65 Cone tests @ $20.00 each 1,300.00

*Based on quotations from Pittsburgh Testing Laboratory, contained in application.

In regards to the high cost of the analytical work and the need for Class 3 analyses, the applicant states: "It has been our decision to have all surface sampling and drilling cores analyzed completely for reasons of recent information gained from refractory companies and analytical personnel. It was pointed out that impurity contents of samples should be known as completely as possible as the same have a direct bearing on the refractoriness of high alumina refractories. Also, this information would be of real value for determining plant specifications, if and when mill construction is contemplated."

Payroll taxes, compensation, insurance, estimated at 11% of $10,200.00	$ 1,122.00
Truck maintenance and repairs, 6 months @ $300/month	1,800.00
Total cost	$12,972.00

h. Contingencies.

Estimated at 10% of project cost . . . . . $ 4,601.00

i. Total cost of project $50,613.00

Government participation 90%
Government share of cost $45,551.70
Operators share of cost . . . . $ 5,061.30

OTHER DATA

Attached hereto is a copy of the applicants "Supplement to Coranda Corporation Exploration Application" which contains a general discussion of refractories, markets and uses, economic evaluation, and a proposed flowsheet. Various U. S. Bureau of Mines metallurgical reports are included, as well as a copy of WMR-388, "Preliminary Pilot-Plant Concentration of Andalusite-Corundum Ore from the Vicinity of Hawthorne, Nevada" and R.I.-3895, "Exploration of the Blue Metal Corundum Property, Douglas County, Nev.".

Also attached is a copy of R. R. Lloyd's letter of June 27, 1952 to H. C. Miller which contains abstracts of correspondence pertinent to the subject docket.

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

Office of
Executive Officer
DMEA Field Team
Region III

1012 Flood Building
870 Market Street
San Francisco 2, Calif.

August 8, 1952

Memorandum

To: DMEA, Interior Building, Washington 25, D. C.

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA 2512 (Corundum-Andalusite), Coranda Corp., Mineral County, Nevada

On July 31, Mr. Houk requested that I find out what disposition was made of the concentrates made at Boulder City from the corundum-andalusite ores near Hawthorne, Nevada. Information, thereupon, was sought from our Boulder City and mineral stations. A copy of a memorandum, dated August 1, from Mr. A. C. Johnson and a copy of a memorandum, dated August 6, from Mr. R. R. Lloyd are attached, which give all the information I have been able to collect to date.

H. C. Miller
Executive Officer
DMEA Field Team, Region III

Attachments

Copy to E. H. Bailey, USGS
R. R. Lloyd, Boulder City
A. C. Johnson, Reno

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

C
O
P
Y

P O BOX 1551

Reno, Nevada

August 1, 1952

Memorandum

To: H. C. Miller, Regional Director, Region III

From: Chief, Mining Division, Region III

Subject: Docket DMEA-2512,(Corundum-Andalusite), Coranda Corp., Mineral County, Nevada

Under date of October 18, 1945, I requested information from Mr. C. W. Davis, relative to concentrates that were made from andalusite at Hawthorne, Nev. Under date of August 13, 1945, the following information was sent to me by Mr. Davis. The memorandum on the concentrates had been prepared by Vernon E. Homme to Mr. C. W. Davis and a copy of this memorandum was forwarded by Mr. Davis to me:

"Please be advised that the following andalusite concentrates are stored in the mill building:

Concentrate Number	Weight, pounds
1	55
2	46
3	150
4	61
5	53
6	19
7	193
8	119
9	285
10	66
11	102
12	438
13	278
14	14
15	58
High Grade (Corundum)	17
Total	1,954

"Analysis and description of these concentrates is given in the report on this project." (W.M.R. No. 388, p. 19).

Under date of October 26, 1945, Mr. C. W. Davis shipped to Mr. C. H. Shoemaker, Johns-Manville Corporation, 30 pounds of these concentrates, so there still should be at Boulder City, Nevada 1,924 pounds of concentrates from the Hawthorne Andalusite deposits.

Ten tons of these concentrates were shipped to Gladding McBean & Co. for testing pruposes.

/s/ A. C. Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
P. O. DRAWER "B"
BOULDER CITY, NEVADA

August 6, 1952

Air Mail

Memorandum

To: Mr. H. C. Miller, Regional Director, Region III, San Francisco, California

From: R. R. Lloyd, Chief, Electrometallurgical Branch, Boulder City, Nevada

Subject: Docket DMEA 2512, (Corundum-Andalusite), Corunda Corp., Mineral County, Nevada

In reply to your memorandum of July 31 to Mr. A. C. Johnson, copy to us, our records show that in September 1944 eight tons of corundum-andalusite concentrates were shipped to Gladding, McBean, and Company at Pittsburgh, California and the balance, a little over two tons, shipped to the Salt Lake City station of the Bureau. Later correspondence shows that representative samples of the different concentrates were sent to N. F. Yancey at Seattle. Later, in February 1945 an additional 200-pound composite was sent to him for cone fusion tests.

It is not likely that Gladding, McBean, and Company will have any of the concentrates left, as they used most of the material sent to them for mixing with various clays and making tests from the mixtures. Mr. Yancey, however, may still have some portion of the samples sent to him.

On receipt of your memorandum we immediately teletyped Salt Lake City to determine if they had any of the concentrates left there. We just received an air-mail reply to this teletype, copy of which is enclosed, showing that they have about 260 pounds of concentrates and 85 pounds of the head sample left at that station. Mr. Schack also has given the opinion that the andalusite and corundum are so intimately mixed in this ore that they can not be liberated and separated effectively. We concur in his statements, however, we believe it is only fair to add that other portions of the ore body may have a much different occurrence of the corundum.

R. R. Lloyd, Chief
Electrometallurgical Branch
Metallurgical Division
Region III

Enclosure

COPY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

1600 EAST FIRST SOUTH STREET
SALT LAKE CITY 1, UTAH
August 5, 1952

Air Mail

Memorandum

To: R. R. Lloyd, Boulder City, Nevada

From: C. H. Schack, for J. Bruce Clemmer

Subject: Hawthorne Andalusite Samples

As requested in your teletype of August 5, we made an inventory of andalusite-corundum concentrates shipped from the Boulder City operations in September 1944. The following products are available.

Sample	Weight, pounds	Assay, percent Al_2O_3	SiO_2	P.C.E.
Heads	85	42.7	54.2	34
Conc. 1	5	62.6	34.2	37+
2	5	60.4	37.4	37+
3	200	60.3	36.0	38
12	50	51.7	44.9	35+

Your teletype infers the Washington office is primarily interested in corundum. It is pertinent to mention that although the Hawthorne ore contains about 15 percent corundum, this mineral is finely crystalline and so intimately associated with the andalusite and other minerals it cannot be liberated and concentrated effectively. Both the Boulder City work and previous work at Salt Lake indicated only a very small amount of impure concentrate assaying about 90 percent Al_2O_3 could be made.

C. H. Schack, Acting for
J. Bruce Clemmer

C O P Y

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
P. O. Drawer "B"
Boulder City, Nevada

June 27, 1952

COPY
Memorandum

To: Mr. H. C. Miller, Executive Officer, DMEA Field Team, Region III, San Francisco

From: Chief, Electrometallurgical Branch, Boulder City, Nevada

Subject: Docket No. DMEA-2512, Corundum-Andalusite, Corunda Corporation Mining Claims, Mineral County, Nevada

We have gone through ours and the Salt Lake City files, and the following is an abstract of what seems to be the most pertinent information for your purposes on the above subject. If you desire copies of any or all of these letters, we will be glad to have them made.

November 13, 1943; memo for R. S. Zimmerley from R. S. Dean. "Corundum occurs with the andalusite on one of the properties." Suggests that andalusite would be a substitute for India kyanite.

December 1, 1943; to S.R. Zimmerley from Glenn L. Thompson. "...ores at Hawthorne may contain more than one million tons, to a depth of 100 feet." States that "...Gladding, McBean and Co....may be able to use 40,000 tons of the concentrate annually."

November 7, 1944; to S. R. Zimmerley from Gladding, McBean and Co. States that their tests check the results of the Bureau's Seattle laboratory (reported in W.M. Report 388).

December 1, 1944; to S. R. Zimmerley from Gladding, McBean and Co. (G. J. Middleton, Ceramist). Indicates that Company is interested in the andalusite concentrates, on the basis of their own tests made on Boulder City concentrates at their Pittsburg plant.

December 22, 1944; to C. J. Middleton, Gladding, McBean and Co., Lincoln, California, from S. R. Zimmerley. Preliminary report on sink-float tests then being made at the Salt Lake City laboratory.

cc: H. A. Doerner

December 22, 1944, to Dr. R. S. Dean, Assistant Director, from S. R. Zimmerley. Reviews the project with suggestions for an exploratory project. "Although Mr. Allen's original War Minerals report recommended $18,000 for drilling, we felt that the immediate need would be for some preliminary work to get some idea of the extent of the deposit...this letter is a request for $3,000 for this preliminary work." Nothing could be found in the files to indicate that this money was authorized or that the work was done--Mining files probably took over.

January 4, 1945; to S. R. Zimmerley from Gladding, McBean and Co., C. W. Planje, vice president. Indicates that the andalusite concentrates "would be of great importance in the formulation of high-alumina refractories." States that the fineness of the concentrates is a drawback. This consideration was evidently what induced the Salt Lake City laboratory to attempt to make a coarse product by sink-float concentration.

January 24, 1945. Memo to S. R. Zimmerley from H. G. Poole. A report on the coarse gravity tests (sink-float), which showed that these methods would do about as well as the Boulder City fine concentration.

February 10, 1945. To C. W. Planje of Gladding, McBean and Co. from S. R. Zimmerley. Transmits the sink-float tests data. Calls attention to the fact that the "samples do not necessarily represent the grade or kind of material typical of the entire deposit." Also requests "more specific information concerning the results of your tests on the andalusite, together with the need for and importance of the andalusite."

Febnuary 19, 1945. To S. R. Zimmerley from Gladding, McBean and Co. Replying to above, Mr. Planje believes "it is advisable to delay my letter giving you complete data regarding the results of our tests, as well as full information as to the use to which this material would be put."

On March 12, 1945, Mr. G. J. Middleton, now assistant Superintendent for Gladding, McBean at Lincoln, California, was "interested in obtaining samples of coarse concentrate for testing at our Pittsburg (California) plant. To this letter, Mr. Zimmerley replied substantially as in his February 10 letter to Mr. Planje, and added that, "Since these tests (sink-float) have been in the nature of a small-scale laboratory investigation, we are

not able to furnish you with the quantity of concentrate shipped from Boulder City. However, we are sending nearly 7 pounds of mixed coarse and fine concentrate." Later, another 11 pounds of sink-float concentrate was shipped.

May 16, 1945; to S. R. Zimmerley from Gladding, McBean and Co. (G. J. Middleton, Supt.). "We regret to advise you that we have been unable to reach an agreement with the owners of the andalusite properties at Hawthorne, Nevada. ...the owners ...demands... are so unreasonable that we cannot consider meeting them."

On May 26, 1945, Mr. Zimmerley wrote Mr. Middleton, reminding him that, "it was agreed when we furnished the 10 tons of material for testing in your plant, that we were to be informed of the results of the tests on the andalusite concentrates. Now that your Company has terminated their interest in this material we would appreciate having the results of the test work."

June 4, 1945; to S. R. Zimmerley from Gladding, McBean and Co., G. J. Middleton. Gives briefly the results obtained. "The andalusite concentrates were considered primarily as a material with a high Al_2O_3 content to be used substantially as diaspore is used by mid-western refractory manufacturers. ... Another potential use for this material was as an addition to cone 33 clays to raise the cone fusion to cone 34. As you know cone 34 clays are quite scarce while cone 33 clays are fairly abundant," The letter also stated "the Navy Bureau of Ships has changed its specifications for refractories in combat and merchant marine vessels from class A to class B." This last presumably meant that the demand for higher-alumina refractories from the Navy no longer existed. "The concentrates in high percentage with a clay bond produced a brick which was a potential class A 60 percent Al_2O_3 refractory. We also found that a fairly small addition of Andalusite concentrates to a clay refractory made it more suitable for use as a rotary lime kiln block. The slagging action was reduced, undoubtedly as a result of the increased Al_2O_3 content.

This letter, which did not crowd one page, single-spaced, was the last word in the files on the subject. Their report was far from exhaustive and contained little detail. Nowhere in their correspondence have Gladding, McBean and Co. given any ideas as to the value of the concentrates.

It might be possible to contact either Mr. Middleton or Mr. Planje at the Pittsburgh or Lincoln plants of Gladding, McBean and Co., which are near SanFrancisco, and obtain a more concrete and recent evaluation of the concentrates.

Using other comparative methods of evaluation: If the corundum-andalusite concentrates were substitutive for kyanite, we find that in 1949 12,113 tons of kyanite were produced in Virginia and South Carolina having a value of $33 per ton at the mine, and an equal amount was imported, having a value of about $27 per ton. Recent quotations (E. and M. J.) on domestic kyanite range from $29 to $32 per ton, while the imported material is quoted at $62 to $66 per ton. This material contains from 55 to 59 percent Al_2O_3.

Over 203,000 tons of bauxite was used for refractory purposes in 1949. Alabama and Arkansas dried bauxite at 56 to 59 percent Al_2O_3 is quoted at $8.00 to $8.50 per ton, while an abrasive grade at 80 to 84 percent Al_2O_3 is quoted at $17 per ton in Arkansas. The last material would be required in comparatively small amounts for raising the Al_2O_3 grade of a clay.

High alumina refractories are often made with diasporic clay, a famous product of Missouri, some of which runs as high as 80 percent Al_2O_3. We could find no quotations on this material, however, you should be able to get a price in San Francisco, as it is commonly stocked by most ceramic supply houses. In fact, you should be able to obtain Pacific Coast prices for all of these competitive materials in San Francisco, in which case the freight differential between their origin points and Hawthorne could be computed, and this should give a reasonably accurate value for the Hawthorne material. It required from 3.6 to 4.2 tons of the ore, as sampled, to make one ton of the concentrates.

We hope this information will be helpful, and if we can be of any further service, please do not hesitate to contact us.

(Signed)

R. R. Lloyd, Chief
Electrometallurgical Branch
Metallurgical Division
Region III

COPY

FILE COPY
SURNAME:

Robertson
Houk

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C. 600

MAY 26 1952

Mr. H. C. Miller
Executive Officer
DMEA Field Team, Region III
1012 Flood Building
870 Market Street
San Francisco 2, California

Subject: Docket No. DMEA-2512
Corundum-Andalusite
Coranda Corporation Mining Claims
Mineral County, Nevada

Dear Mr. Miller:

Enclosed please find for your information copies of three memoranda pertaining to the above referred exploration application, one is by J. J. Norton, Geological Survey, and the other two by W. F. Dietrich and H. P. Chandler, Bureau of Mines. The memoranda indicate that a Field Team review should be made.

Your files and an examination will no doubt bring out necessary information with respect to the orebodies but the information with respect to the processing of the ore may require some inquiries from other sources, particularly from concerns who may have in former years made some large scale or tonnage-size tests.

We should also have some information as to the overall extent of corundum-andalusite outcrops in the district and know if the Company has the major deposits blanketed by its claims.

You are requested to carefully review this application and, if deemed advisable, to examine and sample the surface exposure sufficiently to determine the best areas for exploration in part, or in whole.

Sincerely yours,

(signed) FRANK E. JOHNSON (JHB)

Chairman, Operating Committee
Defense Minerals Exploration
Administration

Enclosures - 3

Approved:
W. H. Hedges (JHB)
Member, Bureau of Mines

A. M. Lemmon (KL)
Member, Geological Survey

JT Robertson:mp 5/23/52
cc: Operating Committee (2)
Docket File
Adm. Reading File
Mr. Dietrich, 3526
Mr. Chandler, 3520
Mr. Norton, G-232, GSA Bldg.
Mr. Houk

FILE COPY
SURNAME:

Robertson
Houk
Hedges
Lemmon
Kilgore

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

600 MAY 26 1952

Mr. J. H. Rodda, President
Coranda Corporation
386 Race Street
San Jose, California

Subject: Docket No. DMEA-2312
Corundum-Andalusite Deposits
Mineral County, Nevada

Dear Mr. Rodda:

Your application is being referred to Mr. H. C. Miller, Executive Officer, DMEA Field Team, Region III, 1012 Flood Building, 870 Market Street, San Francisco 2, California, for further information.

Sincerely yours,

5/26

C. O. Mittendorf (for)

Acting Administrator
Defense Minerals Exploration
Administration

JTRobertson:mp 5/23/52
cc: Docket File
Field Team, Region III (2)
Adm. Reading File
Mr. Dietrich, 3526
Mr. Chandler, 3520
Mr. Norton, G-232, GSA Bldg.
Mr. Houk

FILE COPY
SURNAME:

Robertson
Hawk per gad
Lemmon

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

600

May 22, 1952

Memorandum

To: Chairman, Operating Committee

From: Chief, Nonmetallic Minerals Division

Subject: Docket No. DMA-2512 - Corundum-Andalusite
Recommendation to refer exploration application to Field Team, Region III, for review and examination.

The project concerns the exploration of some corundum-andalusite deposits located in the Gillis Range, about 10 miles northeast of Hawthorne, Mineral County, Nevada.

There are 4 separate groups of unpatented mining locations, all situated within one-half mile to five miles from one another.

Mine	Under lease	Indicated on Maps
Victory Group	5 Claims	6 Claims
Green Talc Group	7 "	7 "
Bismark Group	2 "	3 "
Deep Mines Group	2 "	2 "
	16 "	18 "

Each group has partly exposed outcrops of corundum-andalusite ore of varying kind, widths and quality. A mineral analysis of some of the ore reported in tests described in War Minerals Report, No. 388 is as follows:

	Weight Percentages
Andalusite	20% - 35%
Corundum	15% - 20%
Mica	20% - 30%
Quartz	20% - 30%
Titanite	1% - 2%
Miscellaneous	5% - 10%

The outcrop showings indicate large potential tonnages of material containing corundum and andalusite, but the commercial aspect and justification for large scale development have as yet not been determined.

A thorough investigation of all the factors and aspects involved must be made before a firm appraisal of the potentialities of the property can be made.

A field referral is recommended and attached is the letter to Field Term Executive Officer making such request.

Lawrence A. Houk, Chief
Nonmetallic Minerals Division

JTRobertson:mp
cc: F. W. Johnson
Adm. Reading File
Docket File
Mr. Chandler, 3520
Mr. Horton, C-232, GSA Bldg.
Mr. Houk
Mr. Robertson
Mr. Deitrich, 3526

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

May 22, 1952

Memorandum

To: Mr. Lawrence G. Houk, Chief, Nonmetallic Minerals Division
Defense Minerals Exploration Administration

From: Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

Subject: Report on the Coranda Corporation

I have read the report on the subject company and while the material in this report is very well presented, more information on this occurrence of corundum seems desirable.

As a domestic supply of corundum for abrasive purposes is important, it is felt that every probable source of this material should be investigated. However, the amount requested for the exploration of the Coranda property seems hardly justified in view of the meager information on the actual occurrence of corundum presented.

I recommend that a field-team report be made on this property.

Sincerely yours,

Henry P. Chandler

Henry P. Chandler, Commodity Specialist
Construction and Chemical Materials Branch

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
Received
MAY 23 1952

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

May 21, 1952

Memorandum

To: Nonmetallic Minerals Division
Defense Minerals Exploration Administration

From: W. F. Dietrich, Chief
Ceramic and Fertilizer Materials Branch

Subject: DMEA-2512, Coranda Corporation
San Jose, California

Applicant's claims cover one of the most promising areas in the Western United States for the development of a major source of high-alumina materials for the manfacture of superduty refractories. The West Coast's severe shortage of high-alumina materials in the face of an expanding industrial economy should ensure an active market not only for strategic grades of andalusite and corundum but also for marginal products to augment the alumina content of ceramic bodies based on materials lower in alumina.

A field team investigation is recommended. It is suggested that applicant's exploration program may be over-ambitious. It would seem desirable to focus attention on proving the existence of an orebody of adequate proportions to justify a sound development, mining, and milling operation, together with industry evaluation of the products that may be derived from the ore. It is believed that adequate reserves can be proved or the feasibility of the entire project disproved, with the judicious expenditure of not more than $100,000 instead of $200,000 as proposed. Furthermore, it is advised that consideration be given to a two-stage program, continuance into the second stage being contingent upon review of the outcome of the first stage.

W. F. Dietrich

W. F. Dietrich

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 21 1952

IN REPLY REFER TO:

G-MD-JJN

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

MAY 15 1952

Memorandum

REVIEW OF APPLICATION DMEA-2512 (Andalusite and corundum)

To: Lawrence G. Houk, Non-Metallics Minerals Division, DMEA
From: J. J. Norton, U. S. Geological Survey
Applicant: Coranda Corporation.
Name of property: Green Talc, Victory, Bismark, and Deep groups of claims, Mineral County, Nevada.
Location of property: 10 miles northeast of Hawthorne, Mineral County, Nevada.
Applicant's estimate of cost of project: $200,000.
Summary of applicant's proposal:
17,000 feet of Ax and Ex diamond drilling and a few bulldozer trenches.
Sources of information on applicant's property:

1. Thompson, G. L., Hawthorne andalusite deposits, Mineral County, Nevada: Unpublished U. S. Bureau of Mines report, circa February 1944.

2. Phoenix, D. A., and Bailey, E. H., Report on the Hawthorne andalusite deposits: U. S. Geol. Survey unpublished report, April 1944.

3. Baroch, C. T., et al., Preliminary pilot-plant concentration of andalusite-corundum ore from the vicinity of Hawthorne, Nev.: U. S. Bur. Mines War Minerals Rept. 388, May 1945.

4. Cameron, E. N., Sampling of andalusite deposits near Thorne, Mineral County, Nevada: U. S. Geological Survey unpublished memorandum, December 1949.

Comments:

Applicant's extravagant proposal does not seem to be justified by available information. The deposits to be explored contain aluminous rock that the applicant hopes can be mined and milled to produce a usable refractory material. The principal refractory mineral is andalusite. The deposits also contain corundum, but the applicant apparently intends to sell it as a part of his refractory concentrate, rather than separate it for use as an abrasive. The available reports on these

deposits contain no evidence that corundum for abrasive use can be recovered.

The report by Baroch, et al. describes mill tests in which concentrates were made that might be marketable. Further tests were planned to determine the value of the concentrates in high alumina refractories, but I do not know what results were obtained or even whether these tests were ever completed.

The available reports indicate that data on grade and reserves are greatly deficient, and that surface sampling is necessary. The Bureau of Mines collected a sample for mill tests, but did not determine grade of the deposit. Cameron collected chip samples, but he considered his sampling very inadequate. I am attempting to find out what work was done on Cameron's samples, and any information that I obtain will be transmitted to you. The applicant states that the property was mined in 1949 by the Technical Porcelain Company of El Cerrito, California. It is possible that some data acquired during this operation can be obtained by the field team. A small amount of trenching and channel sampling has been recommended at least twice, but I can find no record that the work was ever done. If it has not been done, now would appear to be a good time to do it. Probably a geologic map would be a useful adjunct to the sampling program.

The field team has copies of all reports in our files. An author of one of the reports, Edgar Bailey, is a member of the field team.

The information available to me seems to indicate that the field team will want to negotiate a contract for a very modest program of surface exploration. Probably the field team can make a suitable contract on the basis of information already obtained, thus eliminating the need for a visit to the property.

RECOMMENDATION:

Refer to field team.

J. J. Norton

J. J. Norton

EXPLORATION

Subject: DMEA-2512
Re: Exploration Loan
Green Talc, Bismark, Deep Mines
and Victory Groups
May 6, 1952

Mr. J. H. Rodda, President
Coranda Corporation
386 Race Street
San Jose, California

My dear Mr. Rodda:

This will acknowledge receipt of your application dated April 29, 1952 for a loan under the Defense Production Act of 1950.

Your application was assigned Docket Number DMEA-2512 and referred to the Non-Metallics Division.

Kindly refer to DMEA-2512 in any future correspondence relating to your application.

Sincerely yours,

ROBERT E. ADAMS
Robert Adams
Administrative Officer

7862

DMEA 2572

April 25, 1952

The Cerrado Corporation
386 Race Street
San Jose, California

Attention: Mr. J. H. Rodda

Gentlemen:

We have inspected the property you contemplate drilling near Hawthorne, Nevada and we are willing to contract 30,000 foot of hole at the price of $6.50 per foot. This is to be AX Hole of 1 1/8" Core with the privelege of reducing to EX Hole of 7/8" Core in the event that we hit gravel zones on the larger holes.

This price is to include all labor, material, equipment, and the hauling of water from Hawthorne to drill site--also all diamonds, bits and reamers.

We estimate that we can do this work in approximately 90 days. This will necessitate using four to six diamond drills 2 shifts per day for 7 days per week. We have equipment available and can start the drilling as soon as you are ready.

Very truly yours,

PRECISION DIAMOND BIT AND TOOL CO. INC.

Fred W. Rolland

Fred W. Rolland

FWR:bb

COPY

Corundum - alluvial & bedrock

U.M.R 388 Reserves Green Tree mountain
800 x 200 surface ground 100 feet in depth
+ to be of milling grade, 1,300,000 tons
of inferred material is indicated

Bismark 50 x 150 surface outcrop.
Assuming 100' depth 62,500 tons of
mill grade material.

Pale pink crystals on 50 tons of ore analyzed 42.5%
Al_2O_3 57.2% SiO_2 - 15 different concentrates from
varies from 52.1% - 72.4% - Composite average
62.3% Al_2O_3

A selected corundum concentrate containing 91.5%
Al_2O_3 was made 182 pounds - 65 mesh

11 tons of concentrates

The ratio of oxides of the aluminum to silicates
is not known.

Mostly impossible on fines

A Conf. Mineralogical analysis of heads of SG 2.95
indicate in sample #1 - 30-35% andalusite to
15 - 20% Corundum and in sample #2 20% andalusite
and 20% corundum. Other heads indicate the
corundum andalusite ratio to be 1:1.6 and 1:2

30% or over Al_2O_3

Hole #1 Gran Dale Mine

	SiO_2	Al_2O_3
25 ft	45.2	32.4
15 ft.	42.3	35.6
10 ft.	41.4	34.5
8 ft.	35.2	36.6
58 ft.	42.4	34.2

Hole #2

13 ft.	37.9	39.0
11 ft.	45.4	34.6
8 ft	44.0	32.6
6 ft	42.7	35.5
7 ft	43.6	32.0
6 ft	44.5	34.5
51 ft	42.6	35.0

Hole #3

3.5 ft	39.8	33.5
10.0 ft	43.9	35.9
27.5 ft	39.0	33.1
41.0 ft	40.3	33.8

Hole #4

10 ft	59.4	30.3
25 ft	48.7	37.4
35 ft	51.7	35.4

Hole #5

25 ft	48.7	37.8
5 ft	42.9	38.3
25 ft	44.3	36.1
ft	46.17	37.1

Al_2O_3 35%

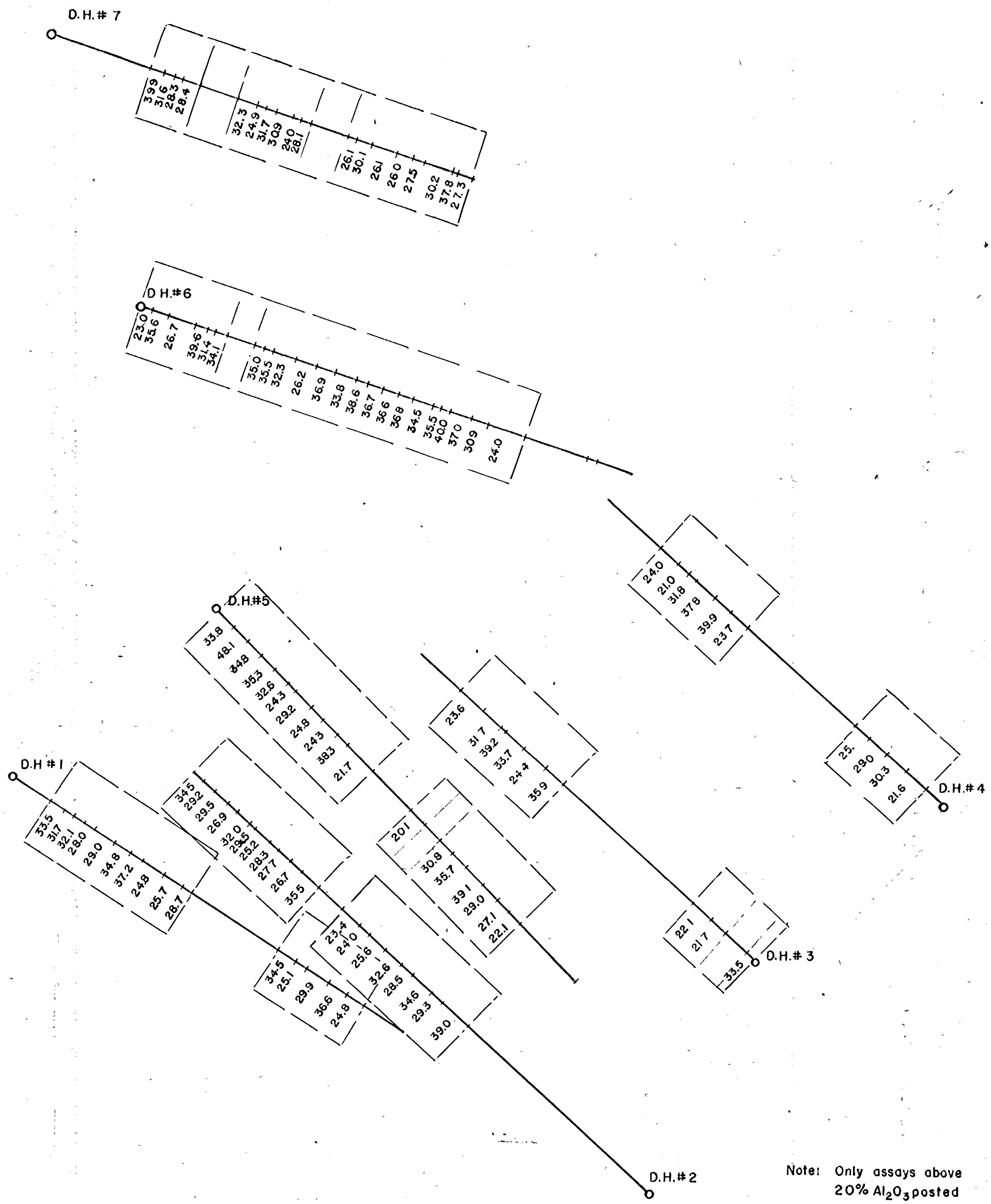
~~33.8~~ ~~[illegible]~~

Hole 1 depth 208
" 2 " 286
" 3 " 175
" 4 " 185
" 5 " 250
1104
240
1344 ft = 21.7% of hole

	Al_2O_3 %
Hole #1	34.2
Hole #2	35.0
Hole #3	33.8
Hole #4	36.4
Hole #5	37.1
Aver.	35.1

	Al_2O_3 %
Hole #1	42.4
Hole #2	42.6
Hole #3	40.3
Hole #4	51.7
Hole #5	46.7
Aver.	44.3

Hole #1	58 ft
Hole #2	51 ft
Hole #3	41 ft
Hole #4	35 ft
Hole #5	55 ft
	240 ft



Note: Only assays above 20% Al_2O_3 posted

Compiled by U.S.B.M.

Fig. 3A
Overlay Plan Map, Showing Drill Hole Samples and Indicated Mineralized Blocks.
Green Talc Mine, Mineral County, Nev.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DMEA-2512

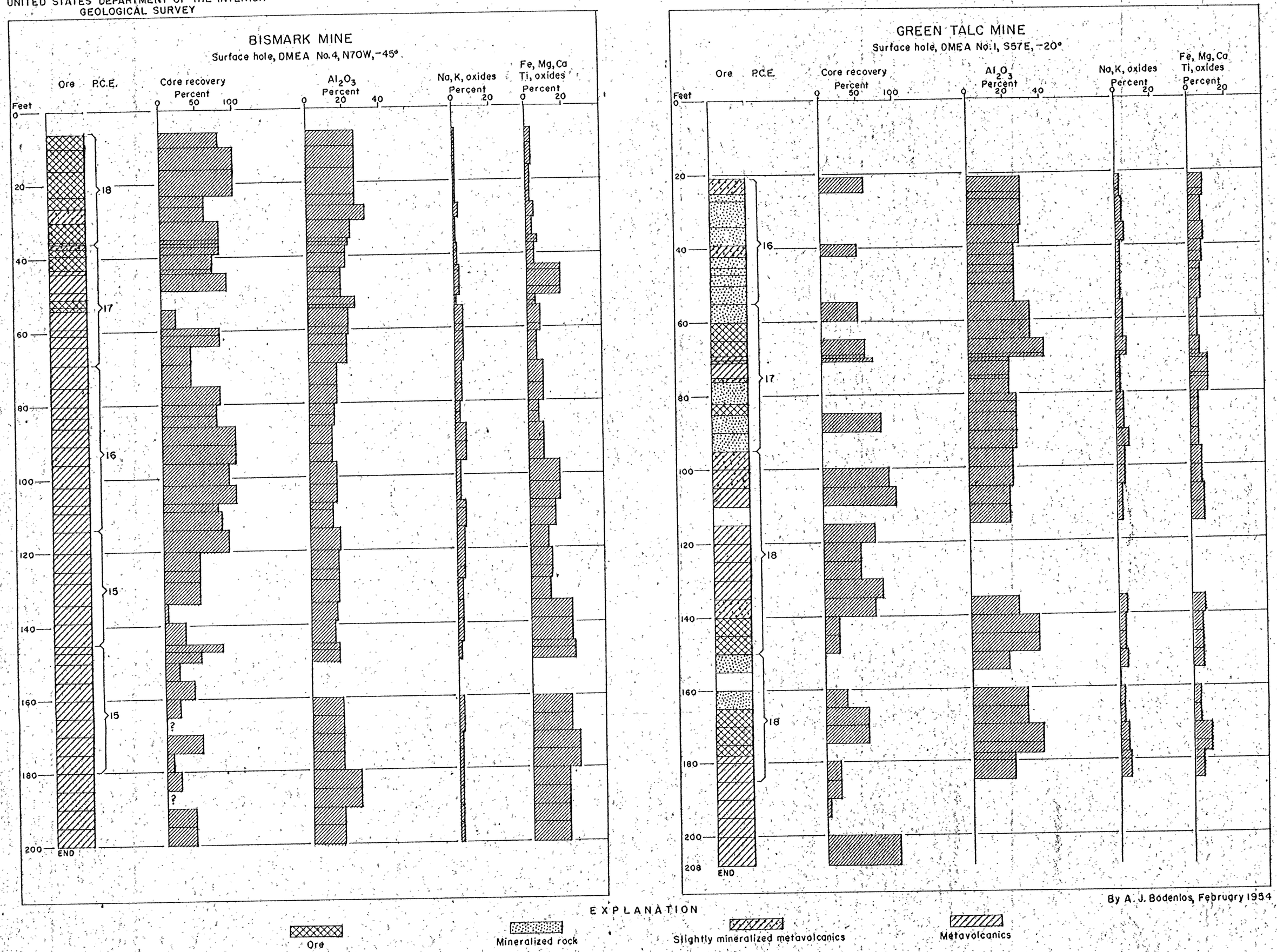


Figure 4.

GRAPHIC ANALYSIS OF DIAMOND DRILL HOLE SAMPLES
CORUNDUM-ANDALUSITE PROSPECT, HAWTHORNE, MINERAL COUNTY, NEVADA

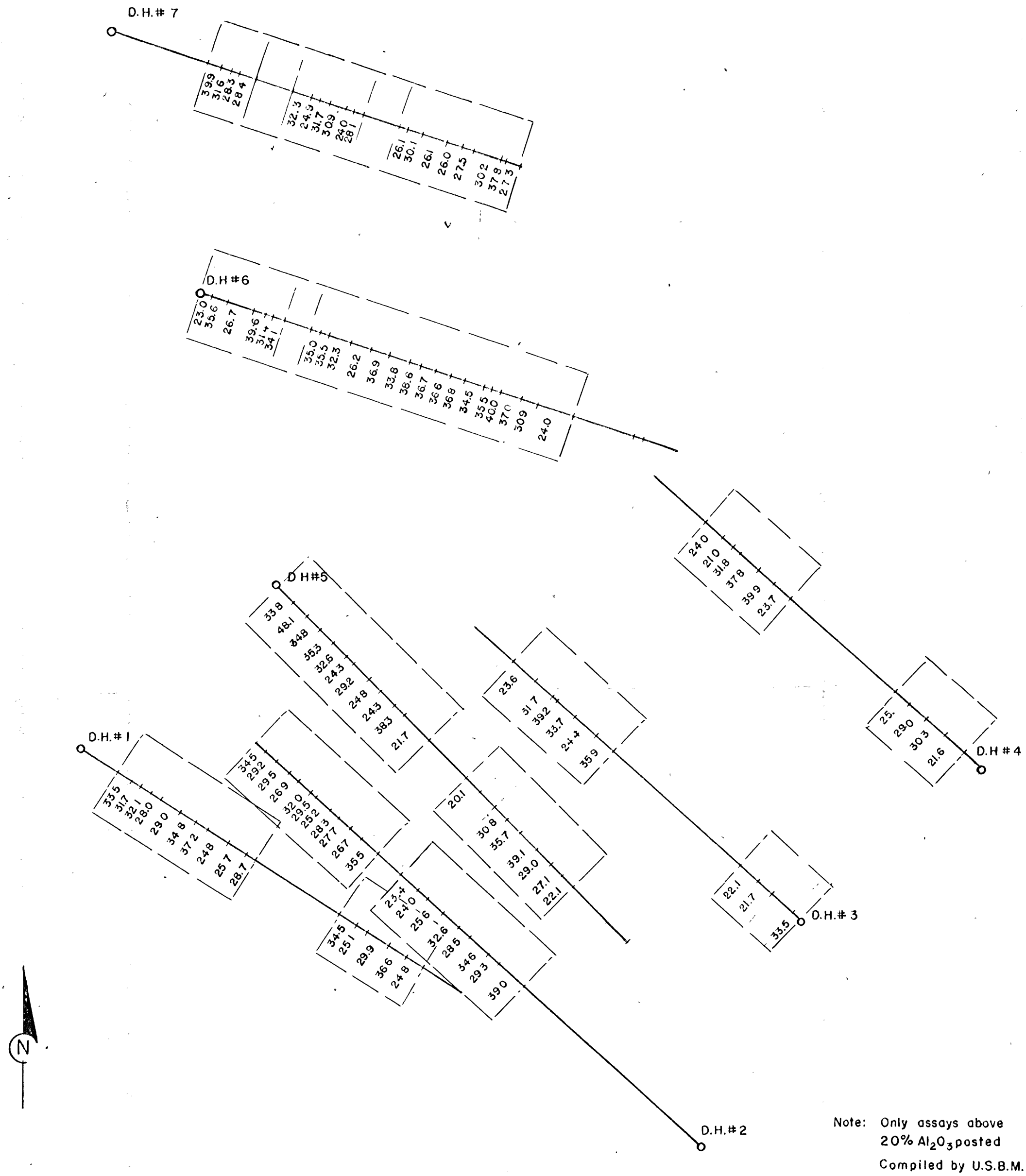
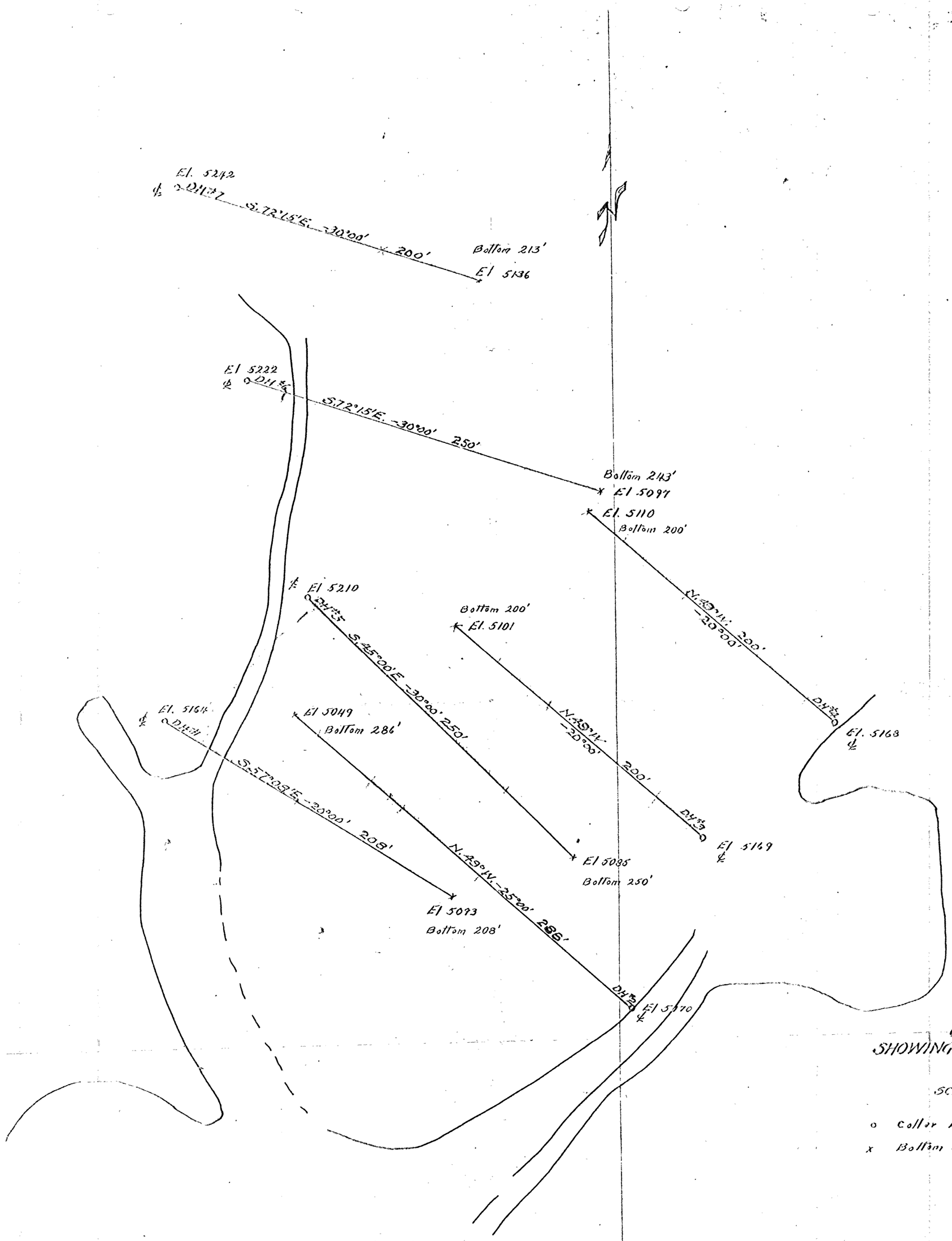


Fig. 3A
Overlay Plan Map, Showing Drill Hole Samples and Indicated Mineralized Blocks.
Green Talc Mine, Mineral County, Nev.



GREEN TALC MINE
SHOWING D.D. HOLES LOCATIONS

SUR. BY L.B.S.

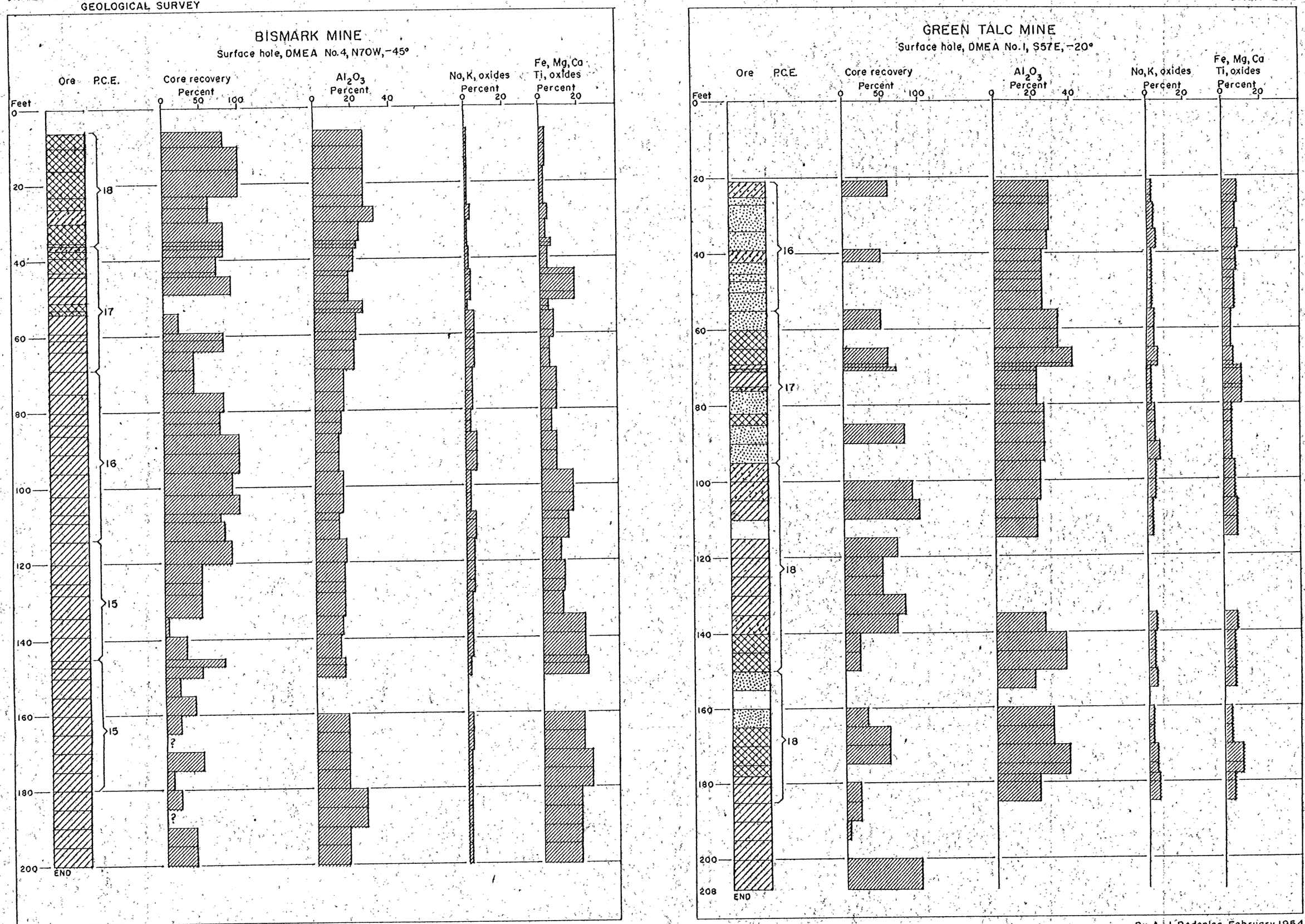
SCALE 1" = 40'

o Collar Elevation

x Bottom Elevation

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DMEA-2512



EXPLANATION

Ore

Mineralized rock

Slightly mineralized metavolcanics

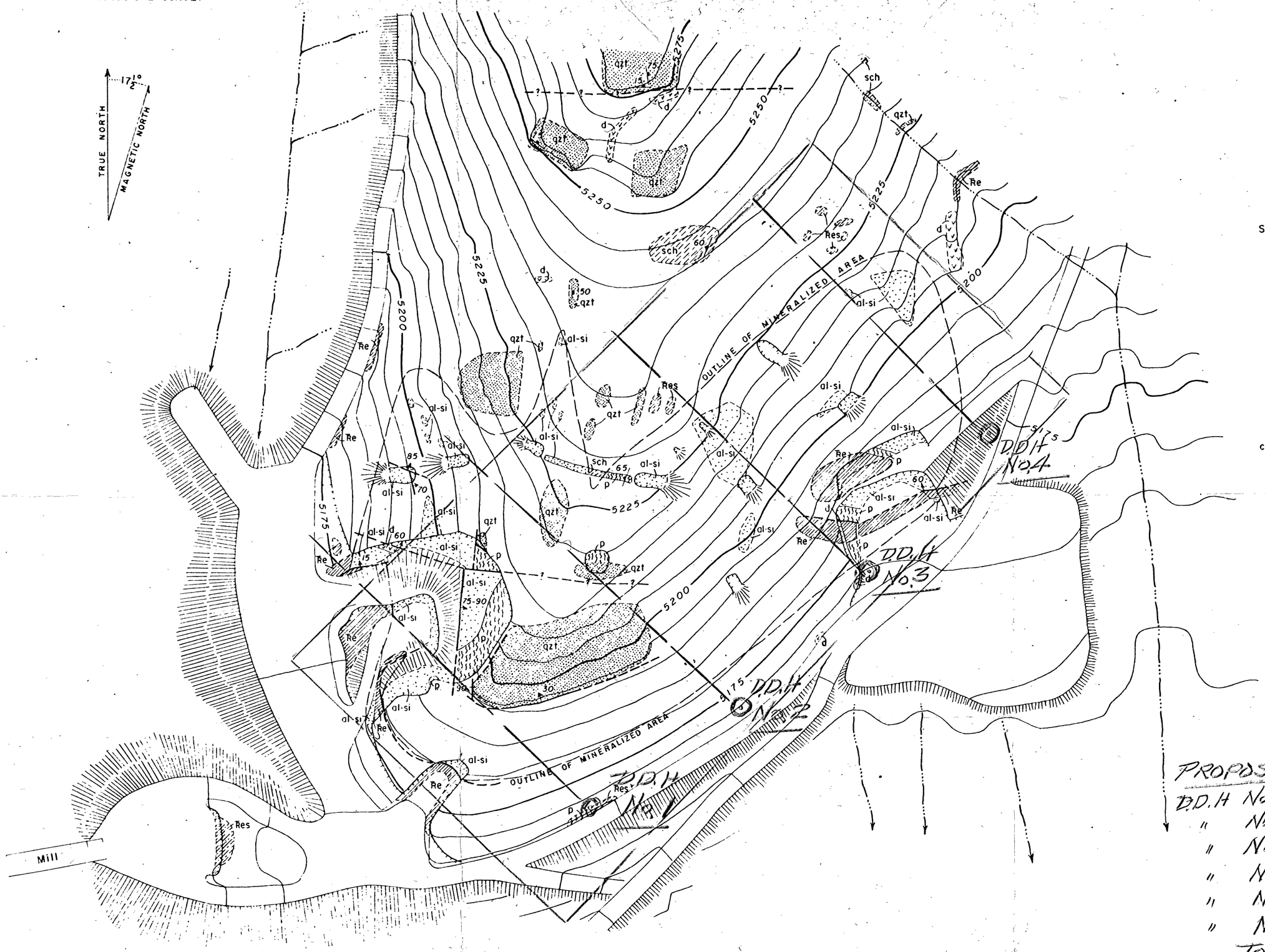
Metavolcanics

Figure 4.

GRAPHIC ANALYSIS OF DIAMOND DRILL HOLE SAMPLES
CORUNDUM-ANDALUSITE PROSPECT, HAWTHORNE, MINERAL COUNTY, NEVADA

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DMEA-2512



EXPLANATION

- Cover
- qzt — Quartzite
- Re — Metavolcanic rocks, principally meta-andesite
- Res — Silicified metavolcanic rocks
- sch — Schist
- d — Diabase(?)
- p — Green micas, possibly containing pyrophyllite
- al-si — Fine-grained quartz, in part containing aluminum silicate minerals and corundum
- Contact (Dashed where approximately located)
- 60 — Fault, showing dip (Dashed where inferred)
- 90 — Vertical fault
- ? — Probable fault
- 60 — Strike and dip of foliation
- 50 — Strike and dip of joints
- Trench or open cut
- Dump

PROPOSED HOLES

D.D.H	No.1	250'	-25°
"	No.2	250'	-25°
"	No.3	200'	-20°
"	No.4	200'	-20°
"	No.5	350'	?
"	No.6.	350'	?
Total		1600 ft	

Topography by H L Sobel, July 1952

Geology by A. J. Bodenlos, July 1952

Figure 3

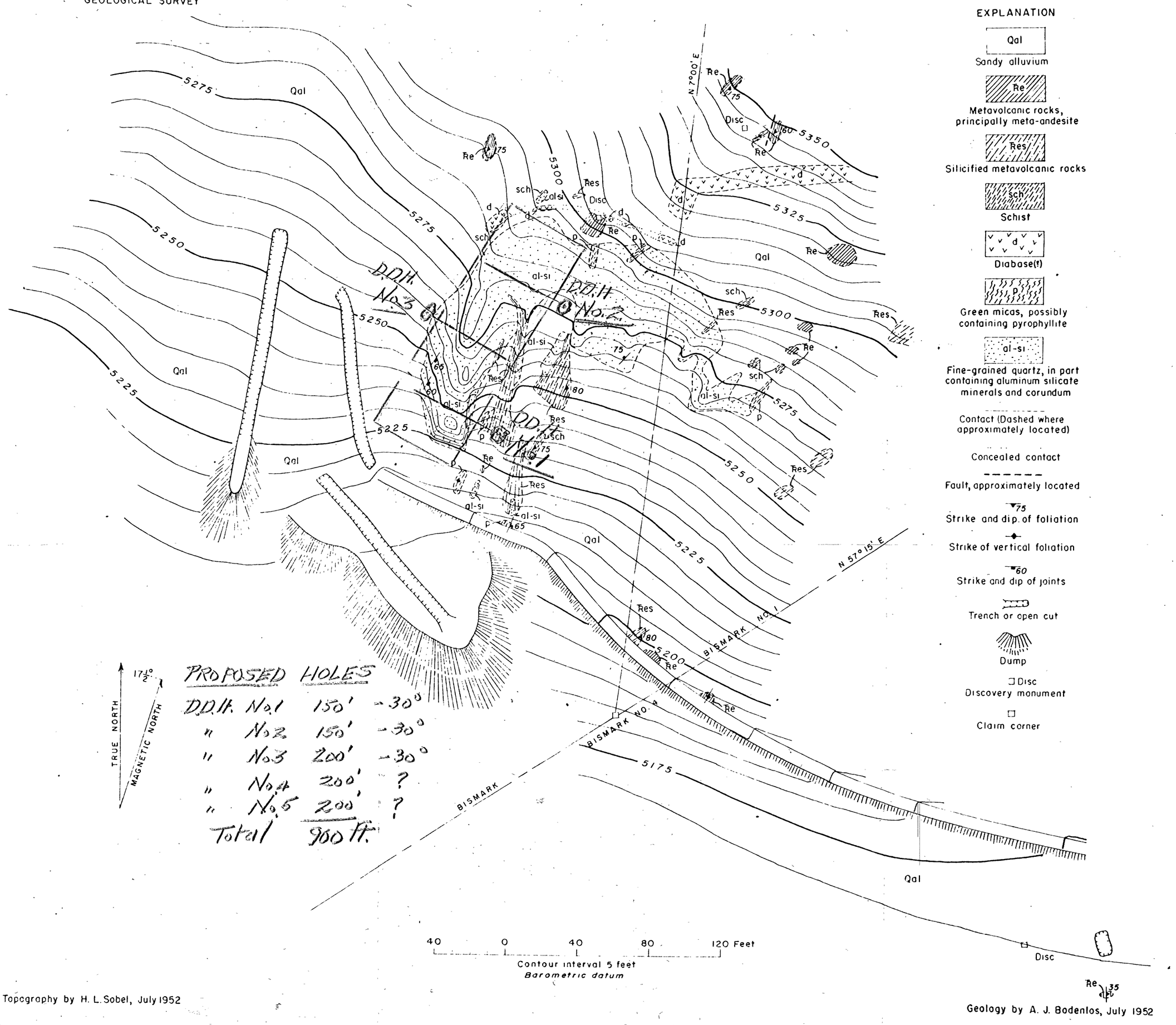
SOUTH LENS OF THE GREEN TALC DEPOSIT, HAWTHORNE, MINERAL COUNTY, NEVADA

40 0 40 80 120 Feet

Contour interval 5 feet
Barometric datum

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DMEA-2512



Topography by H. L. Sobel, July 1952

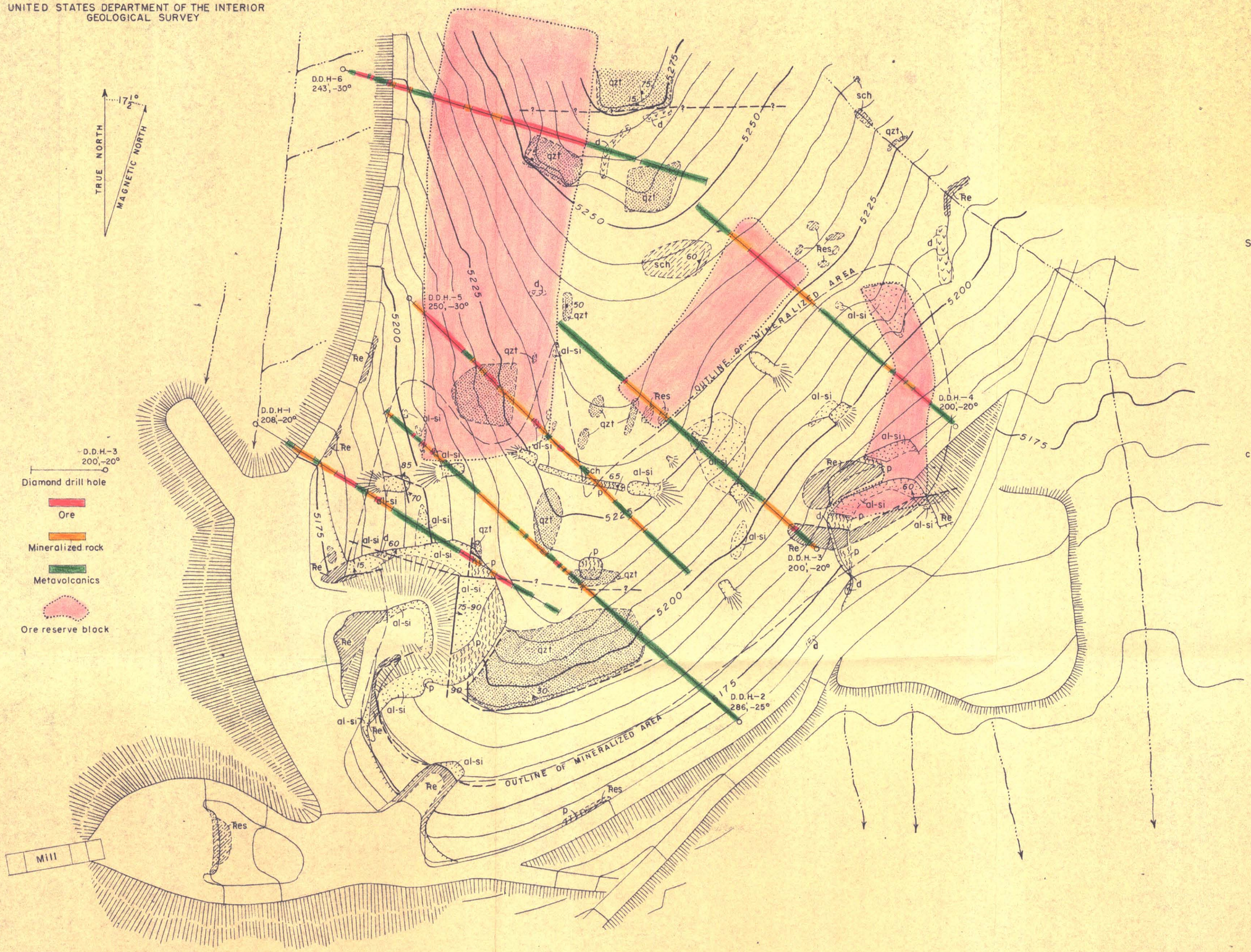
Geology by A. J. Bodenlos, July 1952

Figure 2

BISMARK ANALUSITE DEPOSIT, HAWTHORNE, MINERAL COUNTY, NEVADA

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DMEA-2512



EXPLANATION

- Cover
- qzt — Quartzite
- Re — Metavolcanic rocks, principally meta-andesite
- Res — Silicified metavolcanic rocks
- sch — Schist
- d — Diabase(?)
- p — Green micas, possibly containing pyrophyllite
- al-si — Fine-grained quartz, in part containing aluminum silicate minerals and corundum
- Contact (Dashed where approximately located)
- 60 — Fault, showing dip (Dashed where inferred)
- 90 — Vertical fault
- ? — Probable fault
- 60 — Strike and dip of foliation
- 50 — Strike and dip of joints
- Trench or open cut
- Dump

Topography by H. L. Sobel, July 1952

Geology by A. J. Bodenlos, July 1952

Figure 3

SOUTH LENS OF THE GREEN TALC DEPOSIT, HAWTHORNE, MINERAL COUNTY, NEVADA

40 0 40 80 120 Feet

Contour interval 5 feet
Barometric datum

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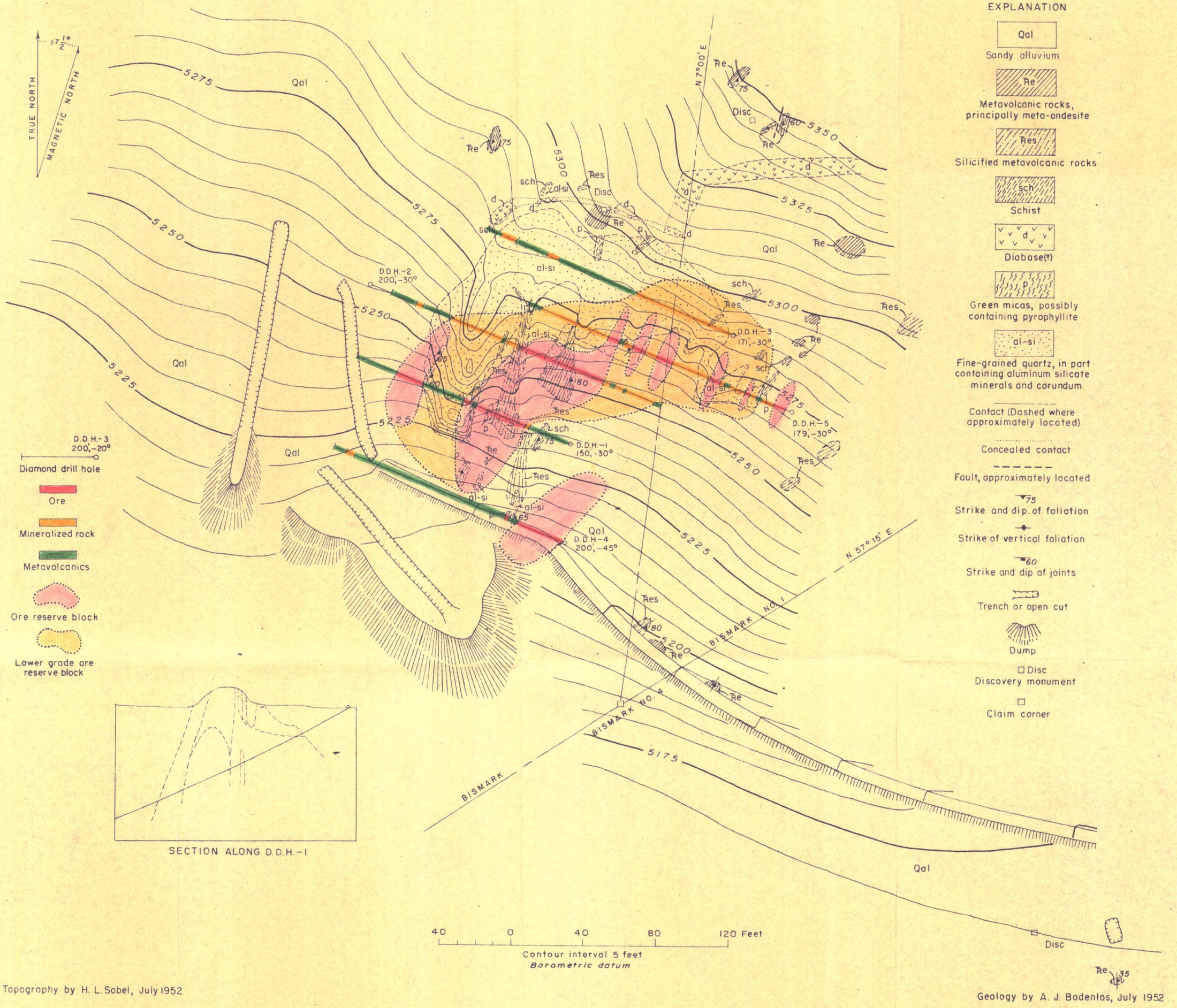

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Figure 2

BISMARK ANDALUSITE DEPOSIT, HAWTHORNE, MINERAL COUNTY, NEVADA

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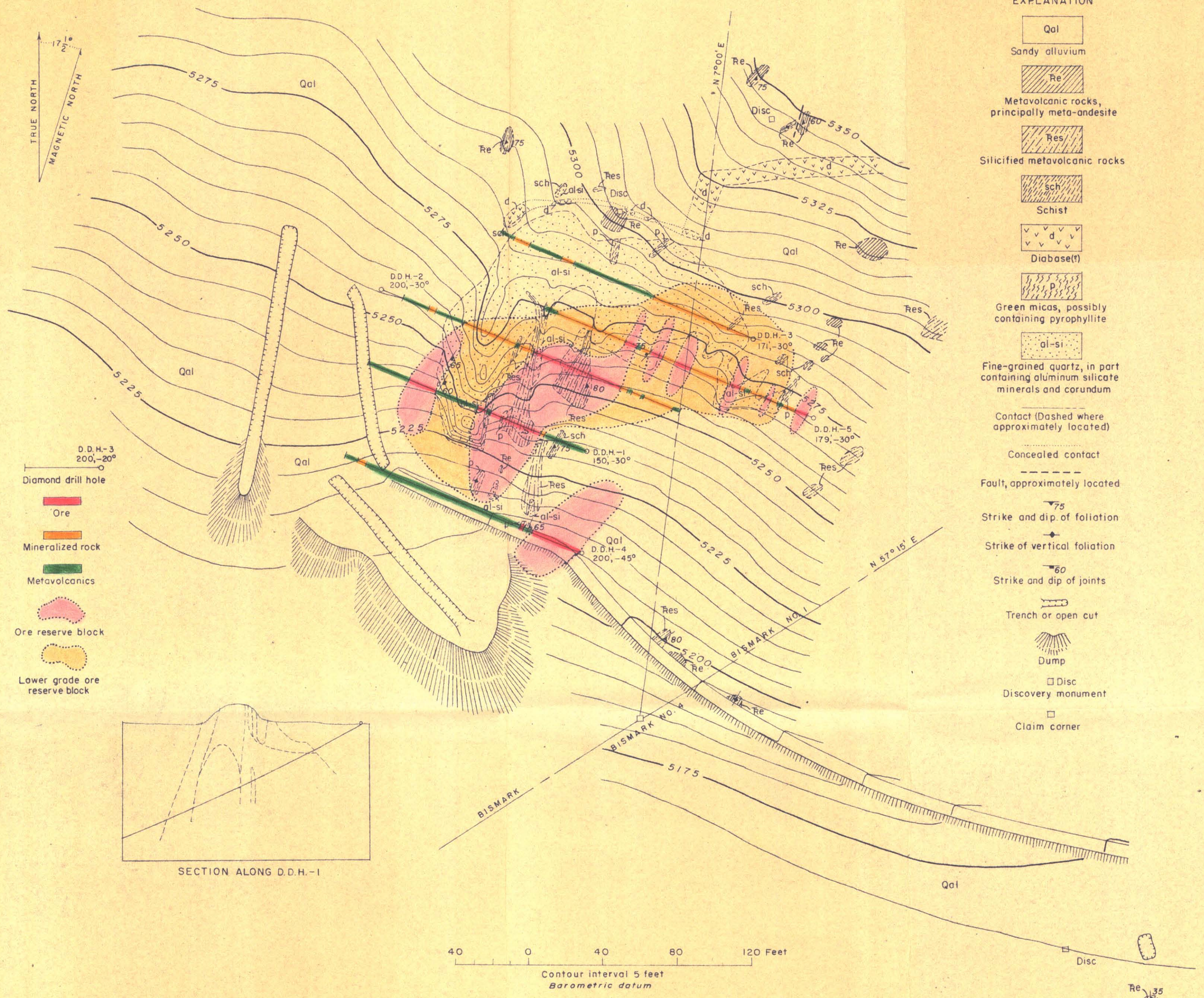

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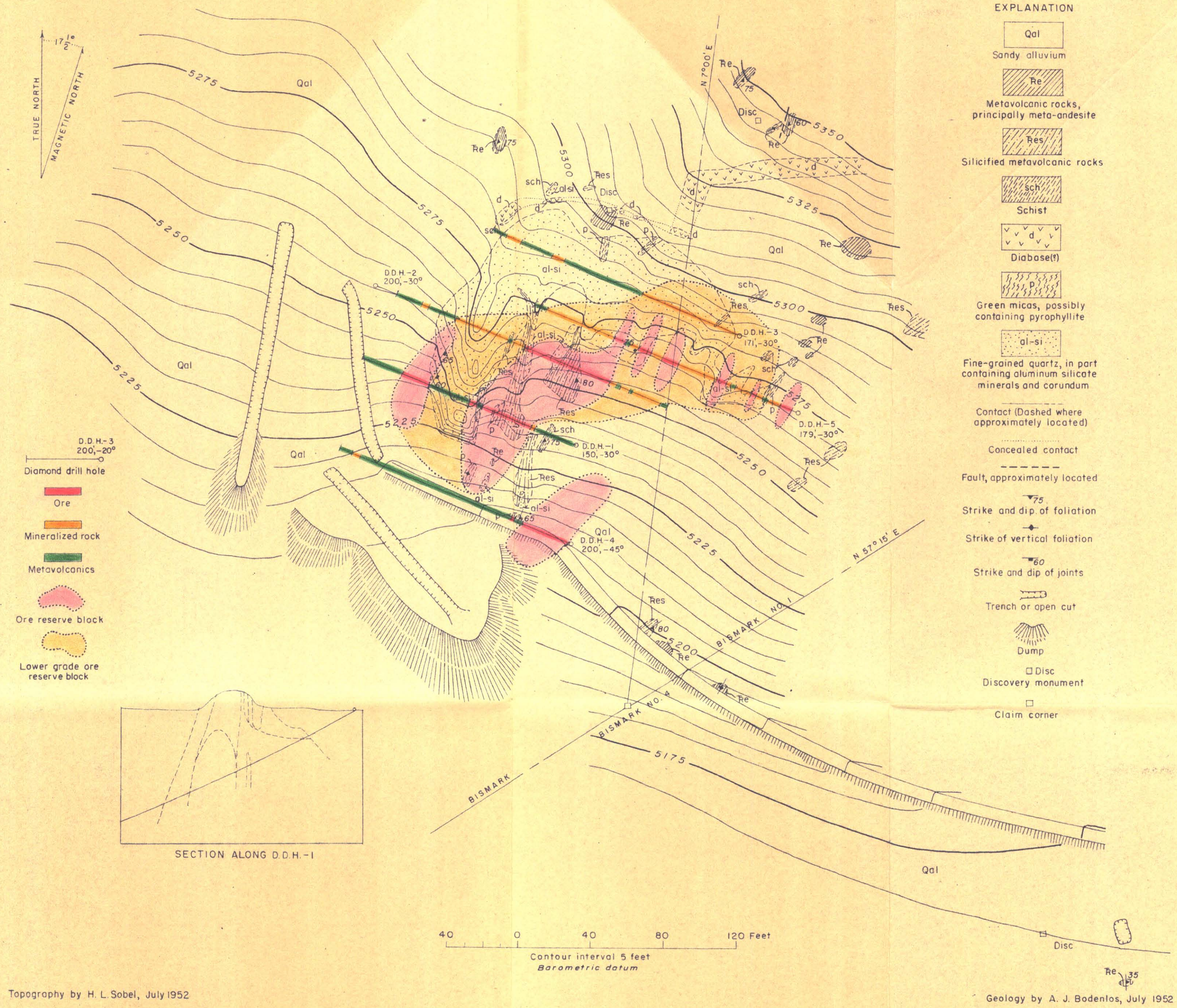

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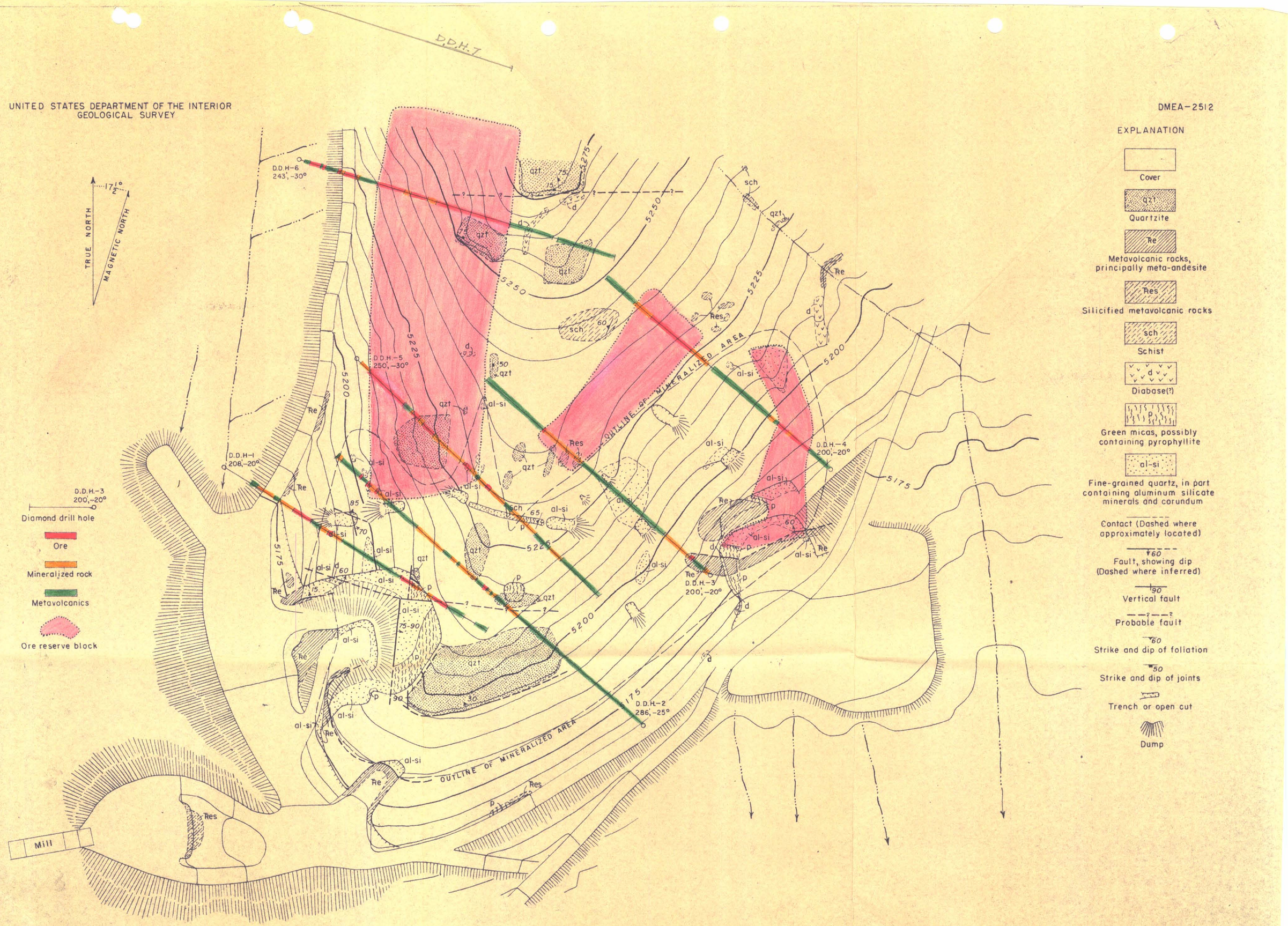

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