DMEA Form 9
Rev. 6/57

UNITED STATES
DEPARTMENT OF THE INTERIOR
Defense Minerals Exploration Administration

OFFICIAL DOCKET FILE Idm-E NO._____ DMEA NO. 4831

Application
- [x] Denied
- [ ] Withdrawn

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

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

Folder No. 1:

Left Side

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

Right Side

- [ ] Project summary (final)
- [ ] 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
- [ ] Final Field Team Report (Tab)
- [ ] Operator's Final Report (Tab)
- [ ] Interim Field Team Reports
- [ ] Operator's monthly reports and all attachments
- [ ] On-site Exam Report (Tab)
- [ ] Settlement Sheets
- [ ] Drill Logs

Additional Folders:

Left Side

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

Right Side

- [ ] Field Team Semi-Annual Report for Certified Project
- [ ] Field Team Interim Reports
- [ ] 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

MF-205
(Combines and supercedes MF-201 and MF-203)
June 1956

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator_____
Docket No. DMEA-_____
Contract No. Idm-E_____
Contract Date_____

CONSENT TO LIEN
and
SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of Ferry, State of Washington, described as follows: 2/

Valley, Valley No. 2, and Valley No. 3. U. S. Mineral Survey No. 560

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

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

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)

None

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

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

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: _____ (State "None" or "See Annex No.____")

Dated this 15th day of August, 1957.

Everett Houghland	[Seal]	Republic, Wash.	[Address]
Hazel A. Houghland	[Seal]	Republic, Wash.	[Address]
J. H. Houghland	[Seal]	Republic, Wash.	[Address]
Juanita M. Houghland	[Seal]	Republic Wash	[Address]
	[Seal]		[Address]
	[Seal]		[Address]

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

_____

[Corporate Seal]

MF-205
(Combines and supercedes MF-201 and MF-203)
June 1956

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator_____
Docket No. DMEA-_____
Contract No. Idm-E_____
Contract Date_____

CONSENT TO LIEN
and
SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of Ferry, State of Washington, described as follows: 2/

Valley, Valley No. 2, and Valley No. 3. U. S. Mineral Survey No. 500

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

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

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)

None

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

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

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: _____ (State "None" or "See Annex No.____")

Dated this 15th day of August, 1957.

Everett Hougland	[Seal]	Republic, Wash.	[Address]
Irene A. Hougland	[Seal]	Republic, Wash.	[Address]
N G Hougland	[Seal]	Republic, Wash.	[Address]
Juanita M. Hougland	[Seal]	Republic, Wash	[Address]
	[Seal]		[Address]
	[Seal]		[Address]

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

_____

[Corporate Seal]

MF-205
(Combines and supercedes MF-201 and MF-203)
June 1956

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator_____
Docket No. DMEA-_____
Contract No. Idm-E_____
Contract Date_____

CONSENT TO LIEN
and
SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of Ferry, State of Washington, described as follows: 2/

Valley, Valley No. 2, and Valley No. 3. U. S. Mineral Survey No. 560

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

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

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)

None

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

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

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: _____ (State "None" or "See Annex No.____")

Dated this 15th day of August, 1957.

Everett Houghland	[Seal]	Republic, Wash.	[Address]
Irene A. Houghland	[Seal]	Republic, Wash.	[Address]
Alf Houghland	[Seal]	Republic, Wash	[Address]
Juanita M. Houghland	[Seal]	Republic, Wash	[Address]
	[Seal]		[Address]
	[Seal]		[Address]

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

_____

[Corporate Seal]

Form MF–103
Revised Feb. 1957

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Budget Bureau No. 42–R1035.3
Approval expires June 30, 1958

APPLICATION FOR AID IN AN EXPLORATION PROJECT

PURSUANT TO DMEA ORDER I, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

NAME OF APPLICANT (Full legal name and mailing address as it should appear on contract if one is executed)

Thomas Consolidated Mines,
640 Peyton Building
Spokane 1, Washington

RECEIVED
SEP 6 1957
U. S. G. S.
SPOKANE, WASH.

APPLICANT NOT TO USE THIS BLOCK

Docket Number: DMEA-4831
Date Received: 9-16-57
Government Participation %:
Region: I
Division Code: 600

BUSINESS ORGANIZATION (Check one)

- Individual [ ]
- Corporation [X]
- Partnership [ ]
- Other (Specify) [ ]

State in which firm is organized:

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

Name	Address	Title
David E. Watson	640 Peyton Bldg.	President
B. L. Bozzi	640 Peyton Bldg.	Secretary

Mineral(s) for which you wish to explore: Selenium - gold

Estimated Cost of Project: $ 161,000.00

LOCATION OF PROPERTY

Name	County	State
Valley Mine	Ferry	Wash.

GENERAL INSTRUCTIONS

Before filling out this application, please read DMEA Order–I, Amended, "Government Aid in Defense Exploration Projects." To assure prompt action, your application must provide all applicable material and information specified on the back of this application form. Avoid unnecessary correspondence and delays by submitting complete and accurate information. *Please submit four copies of this application and all accompanying papers* except as otherwise noted. Place your name and address on each sheet. Each item of information, maps, and reports required as a part of this application is described on the back of this form. Identify each attached statement by the item number to which it applies. If an item does not apply to your application, show the item number on your statement and after it write "not applicable." Maps or sketches should be used to supplement narrative descriptions of the property location and boundaries in item 1, existing mine workings and geology in item 2, and the proposed exploration project in item 4. When this information is not too complex, all of it may be shown on one map or sketch. All documents and other attachments submitted as a part of this application, except those in item 2(g) which you mark to be returned, become the property of the Government and will not be returned to the applicant. Send true copies, *not originals*, of leases, contracts, and other documents which are an essential part of your business records. *File this application with the Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest DMEA Field Office.*

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

SEP 6 1957
Dated

BY *(Signature)*

President
Title

A wilfully false statement or certification to any Department or Agency of the United States Government is a criminal offense. U. S. Code, Title 18, Sec. 1001.

INFORMATION REQUIRED WITH THIS APPLICATION

1. *Applicant's Property Rights:*

(a) State the legal description (section, township, and range; metes and bounds; patent number of claims) of the land upon which you wish to explore and all land adjacent to the proposed project area which you own or control. Describe any part of the project land or workings which should not be subject to Government lien for royalty payments. If the land consists of unpatented claims, state the book and page number for each recorded location notice, including amended locations, and the place where recorded (courthouse, recorder's office, county, and state).

(b) State all the names by which you know the property.

(c) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise. If you are not the owner, submit with this application one exact copy of the lease, contract, or other document (with address of owner) under which you control the property.

(d) Describe all liens, mortgages, or other encumbrances on the property.

2. *Physical Description:*

(a) Describe in detail and illustrate with maps or sketches all mining or exploration operations which you know have been or are being conducted upon the lands, including existing mine workings. Describe all production facilities.

(b) State your interest, if any, in operations stated in 2*(a)*.

(c) State, as far as you know, the past and current production, supporting your statement with copies of settlement sheets, mine records, or published data if available.

(d) Describe known ore reserves on the property giving quantities and grades and sampling methods used, supporting your statement with copies of assay certificates and assay maps if available.

(e) Describe by narrative and maps or sketches the geologic features of the property, including ore minerals, geologic formations if known, and type of deposit (vein, bedded, etc.).

(f) State your reasons for expecting to find ore, and if you have sampled the area you propose to explore, show where the samples were taken, describe sampling methods used, and provide copies of assay certificates.

(g) Send with your application at least *two* copies of all geologic or engineering reports, assay maps, or technologic information which you may have, indicating on each whether you require its return to you.

3. *Accessibility of Project:*

(a) To aid DMEA representatives who may be required to examine the property, state the name and address of the person who will meet the DMEA representative; give directions for reaching the property; and describe accessibility of the property including the mine workings.

(b) Name the shipping and supply points and places where employees reside and state the distances between them and the property.

4. *The Exploration Project:*

(a) Describe fully the proposed exploration project giving individual footages and sizes of openings *for each item of work.* Use narrative, maps, plans, and longitudinal and cross sections as necessary. Show the location of the proposed work as related to geologic features such as veins, ore-bearing beds, contacts of rock formations, etc. Show also the relation of the proposed work to any existing mine workings and to *property boundaries* or to the closest identifiable corner.

(b) If an access road to the project must be built, show the location on the property map and state the length, type, and construction methods proposed.

(c) In the event that an exploration contract with DMEA is executed, how soon will the work start and how many months will be required to complete it? State your anticipated average daily or monthly rate of progress for each type of work.

5. *Experience:*

State your operating experience and background with relation to your ability to carry out this exploration project, and also that of the person or persons who will supervise the operations.

6. *Estimate of Costs:*

Furnish detailed estimates of the costs *for each item of the work proposed in 4(a)* under the headings listed below with a total for each heading and the estimated total cost of the project. Costs for any work to be performed by an independent contractor should be shown separately under category *(a)* below. Costs for any work that is not to be performed by an independent contractor should be given in detail under categories *(b)* through *(g)*.

(a) Independent contracts. State the cost of any proposed independent contract for the performance of all or any part of the work, expressed in units of work, such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved. Cost estimates should be supported by bids from three contractors if possible. *(Note* – If none of the work is to be contracted, write "none" after this item.)

(b) Personal services. For necessary supervision, engineering and geological services, and labor, include an itemized schedule of numbers, classes, rates of wages, salaries or fees, and periods of employment. State whether these technicians and employees are available.

(c) Operating materials and supplies. List items of material and supplies with their cost. Include under this heading power, water, and fuel, and units of equipment and tools costing less than $50 each.

(d) Operating equipment. List items of operating equipment to be used giving specifications and indicating how each item is to be acquired – i.e., rented, purchased, or provided by the applicant. If it is rented or purchased, state the estimated rental or purchase price. If it is to be furnished by the applicant, give its present fair market value.

(e) Initial rehabilitation and repairs. Describe the type and the cost of necessary *initial* rehabilitation or repair of existing buildings, fixtures, installations (exclusive of mine workings), and movable operating equipment now owned by the applicant, which will be used on the exploration project.

(f) New buildings, fixtures, installations. Describe each building, fixed improvement, and installation to be purchased, constructed, or installed for the exploration project stating specifications and cost including labor, materials and supervision.

(g) Miscellaneous. For the operating equipment listed in 6*(d)*, describe the type and estimate the cost of repairs and maintenance expected during project operations. Do not repeat initial repairs listed in 6*(e)*. Show also the costs of analytical work, accounting, workmen's compensation and employees' liability insurance, payroll taxes, and other required costs that do not fall within the previous categories.

Note. – No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. *(a)* State whether you are prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation stated in Sec. 7 of DMEA Order–I, Amended.

(b) Explain to what extent you propose to furnish your share of the costs by providing money, by use of equipment owned by you, or otherwise.

* * * * *

INT.-DUP. SEC., WASH., D.C. 15539

Item 1.

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

D.M.E.A. APPLICATION

1. Applicant's Property Rights:

(a) "The Valley Mine is located in Sec. 6 T. 37 N., R. 33 E. and approximately ten miles North East of Republic, Wash. The property consists of 3 claims, Patent No. 560, and named the Valley, Valley No. 2 and Valley No. 3. The Valley and Valley No. 2 claims are fractions, hence the total acreage of the property is approximately 43 acres." Everett Hougland's report.

(b) "State all names by which you know the property."

Valley Mine - Gold Valley Mine.

(c) "State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise. If you are not the owner, submit with this application one exact copy of the lease, contract, or other document (with address of owner) under which you control the property."

The Company is a Lessee, with Option to Purchase. See attached statements labled: Exhibit 1-c. (contract and lease).

(d) "Describe all liens, mortgages, or other encumbrances on the property."

None.

THIS AGR[redacted]T MADE IN DUPLICATE THIS[redacted] DAY OF JUNE=1957

BETWEEN: Everett Hougland and Irene A. Hougland, Husband and Wife
I. G. Hougland and Juanita M. Hougland, Husband and Wife
Republic, Washington (hereinafter called the "Lessors")
OF THE FIRST PART

AND: David E. Watson
640 Peyton Building
Spokane 1, Washington (hereinafter called the "Lessee")
OF THE SECOND PART

WITNESSETH that for and in consideration for the sum of One Dollar ($1.00) of lawful money now paid by the Lessee to the Lessors (receipt whereof is hereby by the Lessors acknowledged) and of the mutual covenants, agreements, terms, conditions and stipulations hereinafter contained on the part of the respective parties hereto to be made, done observed and performed hereunder, the Parties hereto have mutually agreed as follows:

1. The Lessors hereby give and grant unto the Lessee the sole and exclusive option to purchase, subject to the terms and conditions hereinafter set forth, the Claims consisting of all minerals, precious and base on the surface, in, or under those pieces of land situate in Ferry County, Washington, and more particularly known and described as:

Valley	Valley No. 3
Valley No. 2	U. S. Mineral Survey No. 560

respectively known as the Valley Mine together with all appurtenances thereto belonging or in anywise appertaining free and clear of and from all encumbrances of every kind and nature whatsoever but subject nevertheless to the reservations, limitations, provisos, and conditions expressed in the original grant thereof. The above claims are located in the West half of Section 6, Township 37N, Range 33E.

Exhibit 1-c

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

Also: Ore loading ramp at Torboy, Washington, located on Great Northern Railway Company property and leased from the railway company by Permit No. 35719.

2. The full purchase price of the said Mineral Claims shall be the sum of $60,000 payable to the Lessors in lawful money as follows:

$ 600	1 May 1959
$ 600	1 May 1960
$5000	1 May 1961
$5000	Each May 1, thereafter until full purchase price

is paid. Provided that the Lessee shall be entitled at any time and from time to time during the currency of the Agreement to pay the whole or any part of the balance of purchase price. At the end of five (5) years, dating from May 1, 1957, Lessee agrees to have completed at least five hundred (500) feet of drifting on the vein, or its equivalent in cost, of raising, diamond or long hole drilling, or other exploratory work satisfactory to the Lessors. The Lessee will, when actually working the property:

(A) Timber said mine at all points where proper in accordance with good mining practice.

(B) Keep said leased property in good repair and condition where used.

(C) Keep at all times the drifts, shafts, tunnels and other workings where and when used, clear of loose rocks and rubbish unless prevented by extraordinary mining casualty.

(D) Allow the Lessors, its representatives, successors or assigns to enter upon and into all parts of said mine and leased premises for the purpose of inspection, and to allow them to inspect the records concerning the same, such inspections to be made during such time as it shall cause the least interference with the workings of said property.

(E) In all of its operations on said property under the terms of this lease, the Lessee will use the utmost care in preventing forest fires and will render whatever assistance they may be able to render in the extinguishing of any forest fire, and if a forest fire should develop on said property or approach said property or any part thereof, shall make his crew available to assist in extinguishing such fire and to join others in the work of extinguishing such fire or fires and in assisting and preventing any threatening forest fire from reaching any of said property. Any fire prevention assistance by Lessee shall be deemed done under the direction of the State or Federal Forest Service and compensation shall be requested by Lessee from such agency.

3. The Lessee will deposit annually on or before April 1, unto a "Special Account" - Everett Hougland - at the State Bank of Republic the cost of the following. The Lessor will pay from asaid special account and furnish receipts to Lessee the following:

(1) Annual real and personal property taxes levied against Valley Mine and fire patrol tax.

(2) Insure Lessor and/or Lessee for fire loss buildings and personal property in place 1 May 1957. In the event of fire loss, the Lessors will return buildings and personal property to good state of repair at request of Lessee.

(3) Annual rental on Great Northern Railway Company, Permit No. 35719, being an ore loading ramp at Torboy, Washington.

4. The Lessee, his engineers, agents, servants and invitees shall, during the currency of this agreement, have the sole and exclusive right and liberty to occupy the said Mineral Claims, and to operate the same and to carry out in a workmanlike manner all such examinations, developments and operations as may be deemed advisable and

for such purposes to place upon the said Mineral Claims, machinery, materials, and supplies and to remove them all at will, except track and metal underground pipe. But this shall not be construed to mean that Lessee may not move track and pipe furnished by Lessee from place to place underground.

5. The Lessee covenants that he will during the currency of this agreement pay all overhead operating and carrying charges upon or in respect of the said mineral claims including wages, materials, and supplies and all other expenses in connection with the operation and development of the said Mineral Claims.

6. The Lessee shall be at liberty to treat, remove and ship ore, concentrates, and other materials from the said Mineral Claims paying to the Lessors:

Gross Value of the Ore	Percentage of Net Returns
From $ 0 to and including $20 ore per ton	7%
From $20 to and including $30 ore per ton	10%
Over $31 ore per ton	15%

The Lessee shall instruct any smelter receiving ore, concentrates or other materials from him or on his behalf to pay the said royalty returns direct to the Lessors at the State Bank of Republic, Republic, Washington and to deduct the amount thereof from the amount of the smelter's indebtedness to the Lesseee. All payments other than to "Special Account" - Everett Hougland - made to the Lessors pursuant to this agreement shall be credited pro tanto on account of the payments of the purchase price of the said mineral claims as provided under Paragraph 2 hereof. The term "net return" shall mean the amount paid for such ore by the mill, smelter, or other purchaser thereof after deduction only for transportation paid to common carrier and any mill, smelter, treatment and mint charges and penalties.

The Lessee, at all times during the term of this lease, shall take out and pay the premiums upon general and public liability insurance policy or policies of $100,000 for one person and $100,000 for one accident. The Lessee agrees to indemnify and hold harmless the Lessor against any and all claims for damage by reason of injuries to peson or loss of life sustained from any cause whatsoever by anyone in or about or in connection with the property or the property adjacent thereto. Should the Lessee fail to affect or maintain insurance as provided in this agreement, the Lessor may, but shall not be required to, take out insurance or additional insurance; and the Lessor shall be entitled to receive reimbursement from the Lessee.

7. The Lessee covenants that during the currency of this agreement he will comply with and observe all the requirements and provisions of the Laws of the United States and State of Washington in respect of or affecting the operation of mines and Mineral Claims and the employment of workment therein.

8. The Lessee shall be at liberty at any time to abandon this agreeement providing notice is given in writing thirty (30) days in advance, and such abandonment may be evidenced by either the failure of the Lessee to make any of the payments or work requirements hereinbefore set forth, or by the default of the Lessee to comply with any of the provisions hereof within the time limited as set out in Paragraph 9 hereof, and upon such abandonment all monies paid on account of the purchase price of the said Mineral Claims as provided hereunder shall be retained by the Lessors as liquidated and ascertained damages for the non-fullfillment of this agreement to purchase the said Mineral Claims, and the said Mineral Claims shall thereupon vest in the Lessors free and clear of all liens, claims, charges or other encumbrances of, by

or through the Lessee or any other person or persons, Providing nevertheless that the Lessee shall be at liberty within a period of sixty days from the date of abandonment to remove all dismantleable buildings, mining equipment, materials and supplies placed by him upon the said Mineral Claims, except rail and metal pipe in place underground. By "dismantleable buildings" the contracting parties mean the so-called portable steel buildings and the various types of prefabricated or sectionalized buildings regardless of material. It is not the intent of the Lessee in the event of abandonment to tear down structures whose salvage value is nominal.

9. In the event that default shall be made by the Lessee in any of the covenants, terms, provisions, and stipulations of this agreement (other than as to the provisions for payment of monies required under Paragraph 2 hereof) and if such default shall not have been remedied for sixty days after notice in writing stating specifically the nature of grounds of such default shall have been given by the Lessors to the Lessee, then at the expiration of such sixty day period, the Lessee shall be deemed to have abandoned this agreement; Provided that in the event that the Lessee shall at any time be prevented by strikes, lockouts, fires, riots, explosions, weather conditions, acts of God or by any other cause or causes beyond the control of the Lessee from performing to the true intent and meaning any of the covenants and provisions herein contained (other than as to the payment of monies as provided under Paragraph 2 hereof) then in such case the Lessor shall not be entitled to exercise any remedies herein contained in respect of default or breaches or non-performance so occasioned and this agreement shall be deemed to be suspended during such interruption, and its terms shall be extended for a period equal to that of the interruption aforesaid.

9A. Any time the agreement is surrendered or terminated for any reason whatever Lessee agrees to furnish Lessor a legal release in writing.

10. It is understood that the Lessee shall be entitled to assign this option to the Thomas Consolidated Mines, Inc., an Idaho corporation, within one year. In the event of such assignment, upon this corporation adopting this agreement and agreeing to be bound by the terms hereof, the Lessee shall be discharged from any further liability in respect thereof. No other assignment may be made without the written consent of the Lessor.

11. Upon receiving payment in full of the full amount of the purchase price payable hereunder, the Lessors hereby covenants, promise and agree to convey and assure or cause to be conveyed and assured to the Lessee by a good and sufficient conveyance consisting of a warranty deed in fee simple all those Mineral Claims hereinbefore set forth together with the appurtenances thereto belonging or appertaining freed and discharged of all liens, claims, and encumbrances of every kind and nature whatsoever, but nevertheless to the reservations, limitations , provisos, and conditions expressed in the original grant thereof, and save and except any liens, claims, and charges which may arise from and after the date of this agreement by reason of or through the development and operating of the said Mineral Claims by the Lessee.

12. Any notice permitted or required to be given under the terms of this agreement shall be deemed to have been well and sufficiently given if mailed uner prepaid registered cover addressed as follows:

Everett Hougland Republic, Washington	David E. Watson 640 Peyton Bldg. Spokane 1, Wash.

or such other addresses as the respective parties hereto may hereafter designate in writing, and such notice shall have been deemed to have been received by the part to whom the same is directed 48 hours following the time of posting.

13. The Lessees agree to reservations by the Lessors until purchase price is paid in full as follows: All surface rights to the premises except those necessary for mining or exploration purposes are reserved by the Lessors. This includes both grazing and standing timber and the Lessee expressly agrees to remove no standing timber except that necessary to clear ground for exploration, mine openings, and surface facilities. A dwelling house located toward the south end of the property is reserved by the Lessors unless given ninety (90) days notice by the Lessee together with a separate agreement to rent this house at the rate of ten ($10) dollars per month. Any payments made as house rental shall not apply on payments in lieu of royalty. All equipment now at the mine is reserved by the Lessors and may be loaned, rented, or sold to the Lessee under a separate contract.

14. The Lessor agrees to execute a consent to lien and subordination agreement at Lessee's request for purposes of a Defense Minerals Exploration Project Contract. A copy of such consent to lien and subordination agreement is made a part of this lease and option and is lettered, exhibit "A".

15. This agreement and all covenants and everything herein contained shall enure to the benefit of and shall be binding upon the parties hereto and their respective heirs, executors, administrators, and assigns.

IN WITNESS WHEREOF the Parties hereto have hereunto set their hands and seals the day and year first above mentioned.

TO HAVE AND TO HOLD, the lands, mining claims, mining properties, water rights, tenements, hereditaments and other interest or title hereby conveyed unto said Grantee, his successors and assigns, forever,

IN WITNESS WHEREOF, said Grantors herein have executed this indenture as of the day and year first above written.

ATTEST:

_____

Alvin E. Kelly, Notary (signed)

3rd June, 1957

BY ____(signed)_____

Everett Hougland

____(signed)_____

Irene A. Hougland

____(signed)_____

I. G. Hougland

____(signed)_____

Juanita M. Hougland

____(signed)_____

David E. Watson

MF-205
(Combines and supercedes MF-201 and MF-203)
June 1956

For Government's Use Only
EXPLORATION PROJECT CONTRACT
Operator_____
Docket No. DMEA-_____
Contract No. Idm-E_____
Contract Date_____

Exhibit "A"

CONSENT TO LIEN
and
SUBORDINATION AGREEMENT 1/

To the United States of America:

Referring to that certain land in the County of _____, State of _____, described as follows: 2/

_____

_____

_____

_____,

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

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

2. Grants to the Government a lien upon all of the undersigned's right, title, and interest in the land and upon any production of minerals therefrom, to secure the payment to the Government of a percentage royalty on production as may be provided for by the Contract;

3. Subordinates the undersigned's right, title, claim, or interest in or against the land and in any production therefrom to the rights of the Government under the contract with respect to royalty on production and liens to secure same;

4. Represents and undertakes that there is no claim, lien, or encumbrance upon the undersigned's right, title, claim, or interest in or against the land other than the following: (If "none" insert the word "none." Do not leave lines blank.)

_____

_____

_____

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

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

5. Undertakes and agrees (a) neither to commit any act nor assert any claim in conflict with the provisions of this Agreement; and (b) to give advance notice of the Government's rights under this Agreement to any subsequent transferee, mortgagee, encumbrancer, or lessee of any of the undersigned's right, title, claim, or interest in or against the land, or any production therefrom furnishing the Government with two copies of such notice; and

6. Consents to all amendments (including an agreement of termination) and assignments of the contract without notice thereof, and undertakes and agrees that this Agreement shall extend and apply thereto.

7. Added provision: _____ (State "None" or "See Annex No.____")

Dated this _____ day of _____, 195__.

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

_____ [Seal] _____ [Address]

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

_____

[Corporate Seal]

STATE OF WASHINGTON,)
: ss.
County of Ferry)

I, Alvin E. Kelly, Notary Public in and for the State of Washington residing at Republic do hereby certify that on this 3rd day of June, 1957, personally appeared before me Everett Hougland, Irene A. Hougland, I. G. Hougland, and Juanita M. Hougland to me known to be the individuals described in and who executed the within instrument and acknowledged that they signed and sealed the same as their free and voluntary act and deed for the uses and purposes herein mentioned.

GIVEN UNDER MY HAND AND OFFICIAL SEAL, this 3rd day of June, 1957.

(signed)

Alvin E. Kelly

Notary Public in and for the State of Washington, residing at Republic, in said County.

State of WASHINGTON,)
: ss.
County of Ferry)

I, Alvin E. Kelly, Notary Public in and for the State of Washington residing at Republic do hereby certify that on this 3rd day of June, 1957 personally appeared before me David E. Watson to me known to be the individual described in and who executed the within instrument and acknowledged that he signed and sealed the same as his voluntary act and deed for the uses and purposes herein mentioned.

GIVEN UNDER MY HAND AND SEAL this 3rd day of June, 1957.

(signed)

Alvin E. Kelly

Notary Public in and for the State of Washington, residing at Republic in said County.

LEASE

THIS INDENTURE, dated the 3rd day of June, 1957, by and between Everett Hougland and Irene A. Hougland, Husband and Wife; and I. G. Hougland and Juanita M. Hougland, Husband and Wife (all residents of the State of Washington), Parties of the First Part, jointly and severally, hereinafter called "Lessors", and David E. Watson Party of the Second Part, hereinafter called "Lessee,".

WITNESSETH:

That for the term and upon the terms and conditions set forth in that certain written lease agreement bearing date 3rd June, 1957, from Lessors to Lessee, all of which terms and conditions are hereby made a part hereof, as fully and completely as if herein speciifically set out in full, Lessors have leased, demised and let, and do hereby lease, demise and let, unto Lessee, the following described real property, situate lying and being in the County Ferry, State of Washington, more particularly described as follows, to-wit:

PATENTED LODE MINING CLAIMS:	U. S. Patent Survey No.
Valley	560
Valley No. 2	
Valley No. 3	

The above claims are located in the West half of Section 6, Township 37N, Range 33E.

Together with any and all right, title and interest of said Lessors in and to any and all veins, lodes or mineral deposits extending from, into or contained in said mining claims and mining properties, and, also, all rights-of-way, easements, water, water rights, tenements, hereditaments, privileges, appurtenances and appropriations of every kind and nature belonging to Lessors and located at or in the vicinity of said mining claims and properties or in any wise appertaining to said mining claims and properties, or any of them,

Exhibit 1-c

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

excepting from this indenture and specifically reserving unto said Lessors, their transferees and assigns, all timber located on said mining claims and properties hereinbefore described. Lessors may remove any timber thereon during the life of this lease; provided further, however, that in no event shall such logging operations and timber harvesting by Lessors, their transferees and assigns, materially interfere with, retard or hinder the Lessee's operations hereunder. The Lessors give and grant the Lessee whatever rights they may possess to remove timber on the unpatented mining claims for the purpose of building a road, clearing of ground for mining facilities and carrying on mining operations hereunder.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the day and year first above written.

LESSORS:

Attest:

(signed)
Alvin E. Kelly, Notary

(signed)
Everett Hougland

(signed)
Irene A. Hougland

(signed)
I. G. Hougland

(signed)
Juanita M. Hougland

LESSEE:

Attest:

(signed)
Alvin E. Kelly, Notary

(signed)
David E. Watson

State of WASHINGTON=)
: ss.
County of Ferry)

I, Alvin E. Kelly, Notary Public in and for the State of Washington residing at Republic do hereby certify that on this 3rd day of June, 1957, personally appeared before me Everett Hougland, Irene A. Hougland, I. G. Hougland, and Juanita M. Hougland to me known to be the individuals described in and who executed the within instrument and acknowledged that they signed and sealed the same as their free and voluntary act and deed for the uses and purposes herein metnioned.

GIVEN UNDER MY HAND AND OFFICIAL SEAL this 3rd day of June, 1957.

(signed)

Alvin E. Kelly

Notary Public in and for the State of Washington, residing at Republic in said County.

State of WASHINGTON,)
: ss.
County of Ferry)

I, Alvin E. Kelly, Notary Public in and for the State of Washington residing at Republic do hereby certify that on this 3rd day of June, 1957 personally appeared before me David E. Watsonto me known to be the individual described in and who executed the within instrument and acknowledged that he signed and sealed the same as his free and voluntary act and deed for the uses and purposes herein mentioned.

GIVEN UNDER MY HAND AND SEAL this 3rd day of June, 1957.

(signed)

Alvin E. Kelly

Notary Public in and for the State of Washington, residing at Republic in said County.

For value received, we, David E. Watson and Marjorie B. Watson, husband and wife, transfer unto the Thomas Consolidated Mines, an Idaho corporation, the lease dated June 3, 1957 from Everett Hougland and Irene A. Hougland - husband and wife, and I. G. Hougland and Juanita M. Hougland - husband and wife of Republic, Washington, of the mineral claims situated in Ferry County, Washington known and described as:

Valley

Valley No. 2

Valley No. 3

U. S. Mineral Survey No. 560

located in the west half of Section 6, Township 37N, Range 33E WM.

Said lease was recorded in the office of the auditor of Ferry County, the 4th day of June, 1957 in Book 2 of Leases, page 432, as Document Number 124703, State of Washington.

Dated this 5th day of Sept., 1957.

David E. Watson

Marjrie B. Watson

STATE OF WASHINGTON,)
: ss.
County of Ferry)

On this day personally appeared before me David E. Watson and Marjorie B. Watson, husband and wife, to me known to be the individuals described in and who executed the within and foregoing instruments, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 5th day of Sept., 1957.

(Signed) C. Tod Oien
Notary Public in and for the State of Washington, residing at

THOMAS CONSOLIDATED MINES, INC.
640 [illegible] BLDG
SPOKANE 1, WASHINGTON

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

D.M.E.A. APPLICATION

2. Physical Description:

(a) "Describe in detail and illustrate with maps or sketches all mining or exploration operations which you know have been or are being conducted upon the lands, including existing mine workings. Describe all production facilities."

See Exhibit 2-a. (Map in pocket)

The Valley Mine has a number of buildings:

(1) Combination compressor and hoist house.
(2) A blacksmith shop.
(3) A building used for using laboratory crushing equipment and assay equipment.
(4) A change room.
(5) An 80-Ton ore bin.
(6) Concrete powder magazine.

These buildings are all in need of minor repair but would be serviceable after such repair is made.

A railroad loading ramp at Torboy, Wash. on Great Northern Railway Property. Permit No. 35719.

An electric power line has been constructed to the mine. Power is furnished by Ferry County Public Utilities District.

(b) "State your interest, if any, in operations stated in 2(a)."

Lessee and Optionee to Purchase.

(c) "State, as far as you know, the past and current production, supporting your statement with copies of settlement sheets, mine records, or published data if available."

Everett Hougland's report - "To date 354 railroad cars of ore have been shipped from the property or a total of 20,248.7 dry tons. This tonnage contained 6059.072 oz. of gold and 21,202.00 oz. of silver or .2992 ozs. of gold and 1.05 ozs. of silver per ton. The total gross smelter value was $201,887.78 and the net smelter returns were $124,837.77. Figuring gold at $33.166 per oz. and silver at $0.8505 per oz. an average of $10.82 per ton is indicated." See accompanying Exhibit 2-c.

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

2. Physical Description (con'td.)

(d) "Escribe known ore reserves on the property giving quantities and grades and sampling methods used, supporting your statement with copies of assay certificates and assay maps if available."

See Exhibit 2-a (map in pocket). Grey area represents stope areas,; red area, ore reserves.

Everett Hougland's report - "Ore Reserves: This 20,000 tons was practicall all taken from between the 200 level South and the surface. There is remaining in that area an estimated 2,500 tons of commercial ore. No stoping has been done on the 100 level North but from the samples from a 40 foot shaft, from the surface down and in the level itself, an estimated 500 tons is available. Between the 200 and 300 levels three lenses have been projected with an estimated 16,500 tons of commercial ore. Another 5,000 tons is estimated below the 300 level. This tonnage is conservatively calculated at $8.00 per ton and actual mining may show increased value."

(e) "Describe by narrative and maps or sketches the geologic features of the property, including ore minerals, geologic formations if known, and type of deposit (vein, bedded, etc.)."

See Exhibit 2-a (map in pocket).

Everett Hougland's report - "Geology: The country rock is all andesite with an Eastward dip. In all but one instance the andesite is relatively unaltered and somewhat porphyritic in texture and contains considerable pyrite. TGhe vein is composed largely of intergrown quartz and calcite. It trends approximately North 15 East and dips about 30° S.E. Underground it has been opened for a length of 1200 feet. The width of the vein varies from a seam in the rock to 15 feet wide. It all carries some values but a large portion, as in the case in most other veins of this type, is uneconomic. The commercial ore appears to be confined to roughly equi dimentional lenses. The largest one mined to date contained about 18,000 tons. The values occur as gold and silver the ratio being approximately 1 oz. of gold to 3 oz. of silver. It is impossible to detect these values visually, in most instances, therefore constant assaying is a ncessity. From this it has been found that the best values usually occur close to the foot wall and as the hanging wall is approached an assay line must be used. The vein material contains quartz, calcite, about 2% iron in the form of magnetite and gold and silver.

2. Physical Description (con'td.) (e) con'td.

"The foot wall of the vein has numerous rolls so that it flattens out and steepens rather regularly. Where this flattening occurs the vein becomes wider and it is from these wider portions the bulk of the commercial ore has been mined.

"There appears to be little post mineral faulting of the vein so that it is easily followed. It is strong and fairly continuous from the surface to the 400 level and in most cases has shown little sign of pinching out at the end of the various working faces."

(f) "State your reasons for expecting to find ore, and if you have sampled the area you propose to explore, show where the samples were taken, describe sampling methods used, and provide copies of assay certificates."

Selenium has been recognized in the ores of the Republic Camp for more than 40 years. "There are no deposits known in the United States which are altogether like those at Republic. Their striking feature is the great amount of selenium in the ore, along with appreciable amounts of tellurium." (Excerpt from Washington Geological Survey Bulletin No. 1, page 43, "Geology and Ore Deposits of Republic Mining District," by Joseph B. Umpleby.)

Selenium has been identified in the Valley Mine (Exhibit 2-g-2). The Valley Mine has produced ores from the grass roots (Exhibit 2-a and Exhibit 2-c). Unfortunately the Tacoma Smelter has no record of the selenium content of ores shipped from the Valley. Although the Valley vein has been opened for a strike length of approximately 1100 feet, the full strike length of the structure is not know. The south end of the vein which as been the most productive is also the widest. The full average widths on the south end are not known because the bulk of the work was done on the foot wall and in all instances the hanging wall has not been crosscut. However, stoping widths in excess of 18 feet were obtained. This end is open, although in the upper levels it is terminated by glacial till. So far as is known, no vein in the Republic Camp has been bottomed. The deepest workings are believed to be in the Knob Hill, currently operating.

The facts that the Valley vein has been productive from the surface, that it operated profitably until closed by loss of priorities for men and materials in World War II, that at the time of its closing it had an ore reserve; that no known

2. Physical Description (con'td.) (f) con'td.

geologic feature would indicate a termination of the ore zone both laterally and vertically, strongly suggest the probability of discovering more ore both in depth and laterally. A history of the Republic Camp and the work of Jonte indicate that this ore will have as a component part, a selenium content.

(g) "Send with your application at least two copies of all geologic or engineering reports, assay maps, or technologic information which you may have, indicateing on each whether you require its return to you."

See Accompanying Exhibits:

Exhibit 2-g-1: Report on Valley Mine by Everett Hougland.

Exhibit 2-g-2: Extract from Master's Thesis in Chemistry - "The Relationship of Selenium and Gold in Ores from the Republic District." By J. Haworth Jonte.

Exhibit 2-g-3: Excerpt from Bulletin No. #2 - State of Washington - "Gold in Washington."

Exhibit 2-g-4: Selenium & Tellurium - beginning page 253 - "Rarer Metals," by Dement and Dake.

Exhibit 2-g-5: Selenium - Bulletin 556 - Bureua of Mines, page 777.

Exhibit 2-g-6: Excerpt from Long Range Minerals Program.

Exhibit 2-g-7: Selenium - Buyers and Sellers - Metal Statistics 1957.

Available, but not a part of this application: Geology and Ore Deposits of Republic Mining District - Bulletin No. 1 - Washington Geological Survey. The Ore Deposits of Northeastern Washington by Howland Bancroft - U.S.G.S. Bulletin No. 550.

Exhibit 2-c

VALLEY MINE

ORE SHIPMENT RECORD

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold oz.	Silver oz.	Smelter Value per Ton
6/21/39	1	75,197	.22	.71	$ 263.19	141.41	8.272	.27	$ 7.00
6/31/39	2	111,957	.19	.70	284.98	123.94	8.957	.39	5.09
7/12/39	3	97,458	.20	.68	310.08	166.57	9.746	.33	6.36
8/3/39	4	119,287	.28	.80	544.05	327.35	16.700	.48	9.12
8/11/39	5	114,762	.35	1.03	660.16	431.35	20.083	.59	11.50
8/19/39	6	124,080	.28	.87	568.93	348.44	17.371	.54	9.17
8/28/39	7	116,727	.30	.89	573.32	350.88	17.509	.52	9.82
8/31/39	8	115,939	.37	.90	698.67	475.91	21.449	.52	12.05
9/14/39	9	106.753	.40	1.07	700.51	460.38	21.351	.57	13.12
9/22/39	10	120.191	.55	1.36	1,088.35	806.02	33.053	.82	18.11
9/26/39	11	107,103	.44	1.06	770.88	533.91	23.563	.57	14.40
9/27/39	12	105,059	.62	1.34	1,067.27	800.57	32.568	.70	20.32
10/5/39	13	110,503	.43	1.26	785.56	520.09	23.758	.70	14.22
10/11/39	14	109,691	.51	1.24	98 .90	665.50	27.971	.68	16.75
10/18/39	15	120,479	.56	1.28	1,106.49	922.33	33.824	.77	18.37
Totals		827,594			$10,341.34	$6,974.55	316.075		
3/12/40	1	126,055	.16	.68	328.61	84.11	10.084	.43	5.21
3/12/40	2	126,768	.17	.72	352.71	95.24	10.775	.46	5.56
3/18/40	3	105,185	.12	.48	200.79	00.00	6.311	.25	3.85
3/28/40	4	116,958	.17	.63	321.94	62.14	9.941	.37	5.51
3/27/40	5	115,259	.15	.63	279.96	35.29	8.644	.36	4.86
3/27/40	6	90,618	.17	.67	250.02	59.61	7.703	.30	5.52
4/1/40	7	105,573	.15	.53	253.33	29.05	7.918	.28	4.80
4/8/40	8	105,783	.11	.44	185.11	00.00	5.818	.22	3.50
4/8/40	9	110,330	.17	.64	303.32	70.25	0.378	.35	5.68
4/1/40	1	97,880	.16	.70	272.90	107.96	7.337	.32	5.95
4/23/40	2	136,060	.395	1.60	966.46	570.69	26.066	1.06	14.65

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value per ton
4/23/40	3	114,880	.337	1.30	693.43	371.58	18.738	.72	12.47
4/25/40	4	120,320	.46	1.90	972.45	608.85	26.207	1.08	17.07
4/28/40	5	122,560	.232	.90	438.19	204.71	11.828	.52	8.59
4/28/40	6	104,215	.227	.90	407.32	223.66	13.723	47	8.41
5/2/40	7	114,355	.24	.90	507.32	223.66	13.723	.51	8.87
5/6/40	8	88,940	.487	1.90	801.79	438.65	21.657	.84	18.03
5/6/40	9	115,596	.49	1.90	1,048.28	575.92	28.321	1.10	18.14
5/9/40	10	109,596	.455	2.10	929.54	501.61	24.933	1.15	16.96
5/17/40	11	104,324	.591	2.50	1,145.04	699.10	30.828	1.30	21.95
5/20/40	12	122,666	.667	2.60	1,515.07	960.57	40.909	1.59	24.70
Totals		1,121,811			$12,264.50	$5,916.77	340.582		
3/26/41	1	114,480	.44	1.70	851.47	590.18	25.175	1.00	14.87
3/31/41	2	106,445	.45	1,80	809.33	568.09	23.950	.94	15.21
4/2/41	3	109.754	1.51	1.90	944.12	690.13	27.987	1.03	17.20
4/3/41	4	118,170	.48	1.68	951.08	664.54	28.361	.99	15.75
4/3/41	5	109,331	.36	1.29	657.22	442.11	19.680	.71	12.02
4/9/41	6	112,798	.28	1.03	523.64	302.27	15.792	.58	9.28
4/9/41	7	110,805	.35	1.19	643.80	411.99	19.391	.66	11.62
4/11/41	8	111,140	.39	1.39	724.14	489.73	21.672	.77	13.03
4/15/41	9	107,866	.27	.88	477.43	275.19	14.562	.47	8.95
4/15/41	10	115,755	.25	.75	470.24	244.31	14.469	.43	8.12
4/18/41	11	113,787	.12	.52	218.62	57.42	6.827	.30	3.84
4/23/40	12	116,284.	.20	.64	375.61	201.99	11.628	.37	6.46
4/23/41	13	120,453	.19	.61	369.02	195.91	11.443	.37	6.13
4/26/41	14	118,708	.19	.89	563.90	335.71	17.213	.53	9.50
4/30/41	15	121,122	.33	1.14	663.39	430.86	19.985	.69	10.95
4/30/41	16	120,022	.40	1.22	794.10	562.64	24.004	.73	13.23
5/5/41	17	118,919	.38	1.14	745.75	514.78	22,595	.68	12.54
5/5/41	17	118,919	.38	1.14	745.75	514.78	22,595	.68	12.54
5/5/41	18	118,796	.41	1.34	810.14	579.53	24.353	.80	13.64
5/8/41	19	119,101	.38	1.12	746.11	515.59	22.629	.67	12.53
5/9/41	20	118,227	.40	1.17	779.84	552.04	23.645	.69	13.19

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value per Ton
5/12/41	21	118,783	.32	.91	621.62	392.34	19.005	.54	10.63
5/12/41	22	120,164	.40	1.10	789.69	559.32	24.021	.66	13.15
5/14/41	23	121,853	.38	1.14	764.16	531.63	23.152	.69	12.54
5/14/41	24	121,985	.51	1.39	1,028.53	743.11	31.106	.85	16.86
5/19/41	25	120,117	.57	1.69	1,139.32	854.45	34.233	1.01	18.97
5/19/41	26	119,316	.56	1.59	1,108.84	825.81	33.408	.95	18.59
5/20/41	27	111,415	.49	1.46	905.93	657.64	27.297	.81	16.26
5/23/41	28	118,193	.52	1.50	1,019.39	738.95	30.730	.89	17.25
5/24/41	29	120,309	.49	1.45	978.09	715.06	29.476	.87	16.26
5/26/41	30	118,321	.50	1.50	982.81	720.67	29.580	.89	16.61
5/28/41	31	119,889	.57	1.98	1,149.97	869.35	34.168	1.19	19.18
6/2/41	32	117,409	.62	1.72	1,208.88	932.35	36.397	1.01	20.59
6/2/41	33	112,386	.62	1.68	1,155.10	865.90	34.840	.94	20.56
6/3/41	34	113,068	.57	1.74	1,074.70	800.41	32.224	.98	19.01
6/5/41	35	115,540	.63	1.87	1,213.76	942.32	36.395	1.08	21.01
6/7/41	36	114,905	.58	1.54	1,101.86	827.41	33.322	.88	19.17
6/7/41	37	115,292	.48	1.48	919.92	661.97	27.670	.85	15.96
6/9/41	38	115,838	.62	1.98	1,203.27	930.82	35.910	1.15	20.78
6/12/41	39	116,225	.31	1.20	602.14	360.71	18.015	.70	10.36
6/11/41	40	112,691	.33	1.08	614.91	396.66	18.594	.61	10.91
6/16/41	41	120,415	.23	.78	452.61	244.70	13.848	.47	7.52
6/14/41	42	120,571	.27	.88	534.21	309.01	16.277	.53	8.86
6/16/41	43	118,860	.30	.92	584.92	344.38	17,829	.55	9.84
6/16/41	44	119,381	.26	.83	507.91	291.91	15.520	.50	8.51
6/18/41	45	119,711	.30	1.16	598.87	363.27	17.957	.59	10.01
6/18/41	46	117,951	.41	1.33	803.94	572.49	24.180	.78	13.63
6/21/41	47	117,380	.40	1.25	778.00	550.84	23.476	.73	13.25
6/23/41	48	113.940	.43	1.37	814.72	560.51	24.497	.78	14.30
6/30/41	49	116,588	.27	.86	515.59	305.54	15.739	.50	8.84
6/28/41	50	116.989	.27	.85	517.34	307.48	15.974	.50	8.84
6/30/41	51	118,639	.30	.97	585.98	356.59	17.796	.58	9.88
6/30/41	52	119,657	.36	1.14	72 .11	483.12	21.538	.68	11.90
7/5/41	53	116.684	.34	1.05	653.71	428.53	19.836	.61	11.20
7/5/41	54	117,290	.40	1.21	776.01	550.46	23.458	.71	13.23
7/7/41	55	118.509	.41	1.21	896.61	571.97	24.294	.72	13.55
7/7/41	56	125,355	.41	1.29	852.93	577.98	25.698	.81	13.60

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold O.z	Silver Oz.	Smelter Value per Ton
7/7/41	.57	121,118	.41	1.25	822.46	554.41	24.829	.76	13.58
7/9/41	58	121,488	.42	1.38	849.85	581.47	25.512	.84	13.99
7/14/41	59	118,560	.54	1.52	1,060.85	778.55	32.001	.90	17.89
7/14/41	60	123,889	.41	1.27	841.95	567.77	25.397	.79	13.59
7/16/41	61	123,834	.51	1.74	1,059.08	770.22	31.578	1.08	17.11
7/21/41	62	121,765	.52	1.79	1,063.07	779.61	31.659	1.09	17.00
7/21/41	63	120,304	.52	1.81	1,050.98	769.05	31.279	109	17.47
7/22/41	64	122,530	.54	1.85	1,110.50	825.55	33.083	1.13	18.12
7/23/41	65	118.996	.49	1.68	977.02	715.43	29.154	1.00	16.42
7/23/41	66	121,132	.39	1.32	786.85	555.91	23.621	.80	12.99
7/26/41	67	120,581	.40	1.36	804.01	541.15	24.116	.82	13.34
7/26/41	68	121,200	.28	.94	558.93	343.40	16.968	.57	9.22
7/29/41	69	119,703	.24	1.00	478.20	270.14	14.364	.50	.7.99
7/30/41	70	121,894	.20	.76	399.11	217.19	12.189	.46	6.55
8/2/41	71	122,364	.23	.81	461.41	257.62	14.072	.50	7.54
8/5/41	72	126,950	.20	.72	413.80	226.50	12.695	.46	6.52
8/6/41	73	118.533	.14	.53	264.69	98.42	8.297	.31	4.47
8/6/41	74	116,521	.13	.54	242.39	77.91	7.575	.31	4.16
8/9/41	75	120,779	.19	.65	371.42	198.18	11.474	.39	6.15
8/9/41	76	118,958	.30	.88	583.28	356.01	17.844	.52	9.80
8/13/41	77	121,009	.29	1.02	580.85	348.09	17.546	.62	9.60
8/13/41	78	119,206	.37	1.15	729.19	500.69	22.053	.69	12.23
8/12/41	79	115,575	.37	1.23	709.93	487.24	21.381	.71	12.29
8/18/41	80	122,418	.25	.85	501.69	281.50	15.302	.52	8.20
8/20/41	81	124,389	.20	.75	407.04	220.45	12.439	.47	6.55
8/21/41	82	119,421	.27	.89	529.19	316.34	16.122	.53	8.86
8/21/41	83	125,394	.23	.80	472.22	264.64	14.420	.50	7.53
8/29/41	84	117,976	.19	1.10	381.99	204.24	11.207	65	6.48
8/26/41	85	121,722	.30	1.14	608.45	374.62	18.258	.69	10.00
8/25/41	86	122,934	.32	1.01	647.69	407.29	19.669	.62	10.54
8/25/41	87	126,236	.33	1.08	688.13	433.19	20.829	.68	10.90
8/26/41	88	123,236	.20	.71	401.29	214.29	12.324	.44	6.51
8/26/41	89	123,451	.15	.63	300.24	123.65	9.259	.39	4.86
8/30/41	90	115,990	.37	1.11	707.15	481.63	21.449	.64	12.20

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
9/3/41	91	128,608	.32	1.04	679.41	417.21	20.577	.67	10.57
9/3/41	92	126,364	.21	.79	434.85	236.31	13.268	.50	6.88
9/3/41	93	124,291	.41	1.36	848.83	596.16	25.480	.85	13.66
9/3/41	94	125,769	.28	1.00	582.83	345.21	17.608	.63	9.27
9/3/41	95	128,982	.26	.99	556.10	319.16	16.768	.64	8.62
9/8/41	96	126,719	.34	1.18	715.76	466.57	21.542	.75	11.30
9/8/41	97	121,737	.30	1.08	606.42	363.33	18.261	.66	9.96
9/9/41	98	125,425	.16	.54	321.37	145.81	10.034	.34	5.12
9/10/41	99	125,198	.20	1.02	600.91	355.40	18.154	.64	9.60
9/16/41	100	123,173	.36	1.35	742.53	504.78	22.183	.83	12.05
9/17/41	101	123,310	.36	1.35	742.53	504.78	22.183	.83	12.05
9/20/41	102	124,022	.29	1.05	627.63	369.79	19.502	.66	9.62
9/20/41	103	113,800	.29	1.05	516.13	314.94	15.582	.59	9.62
9/22/41	104	119,183	.29	1.07	573.86	341.93	17.282	.64	9.63
9/21/41	105	117,521	.25	.94	(	(	(	(	8.26
9/29/41	107	119,266	.25	.94	1,934.74	1,089.58	58.523	2.20	8.26
9/29/41	108	114,322	.25	.94	(	(	(	(	8.26
10/1/41	109	122,617	.24	.86	479.87	269.36	14.594	.52	7.89
10/4/41	110	116,032	.25	.94	(	(	(	(	8.26
10/4/41	111	119,201	.25	.94	1,453.20	821.69	43.965	1.65	8.26
10/4/41	112	116,484	.25	.94	(	(	(	(	8.26
10/4/41	113	117,955	.25	.83	483.22	270.33	14.744	.49	8.19
10/6/41	114	117,781	.29	.98	563.84	335.00	17.078	.58	9.57
10/13/41	115	116,413	.23	.82	889136	490.65	27.109	.97	7.55
10/13/41	116	119,320	.23	.82	(	(	(	(	7.55
10/15/41	117	123,293	.30	.95	608.19	365.30	18.494	.59	9.87
10/20/41	118	118,033	.32	1.11	1,244.12	785.81	37.527	1.30	10.61
10/20/41	119	116,450	.32	1.11	(	(	(	(	10.61
10/21/41	120	118,641	.34	1.19	670.67	442.48	20.169	.71	11.29
10/22/41	121	115,188	.33	1.13	1,215.65	786.12	36.654	1.26	10.94
10/22/41	122	106,955	.33	1.13	(	(	(	(	10.94
10/25/41	123	119,540	.23	.79	886.88	492.86	27.120	.93	7.52
10/25/41	124	116,283	.23	.79	(	(	(	(	7.52

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
10/27/41	125	119,183	.14	.56	267.57	99.36	8.343	.33	4.49
10/29/41	126	117,773	.27	.92	1,056.30	631.04	32.090	1.09	8.89
10/29/41	127	119,929	.27	.92	(	(	(	(	8.89
11/1/41	128	115,186	.30	1.03	1,173.69	711.34	35.491	1.22	9.92
11/1/41	129	122,421	.30	1.03	(	(	(	(	9.92
11/4/41	130	115,495	.27	.91	513.03	306.37	15.592	.53	8.88
11/5/41	131	121,083	.30	1.02	1,211.91	741.37	36.670	1.25	9.91
11/5/41	132	123,385	.30	1.02	(	(	(	(	9.91
11/10/41	133	122,924	.29	.83	1,137.89	676.24	34.876	1.00	9.46
11/10/41	134	117,602	.29	.83	(	(	(	(	9.46
11/11/41	135	116,221	.36	.96	684.67	558.48	20.920	.56	11.78
11/12/41	136	126,026	.23	.72	470.30	251.09	14.493	.45	7.46
11/17/41	137	122,189	.27	.85	(	(	(	(	8.41
11/17/41	139	122,211	.27	.85	1,514.11	955.22	49.311	1.55	8.41
11/17/41	138	120,866	.27	.85	(	(	(	(	8.41
11/19/41	140	122,784	.28	1.00	568.12	347.57	17.190	.61	9.25
11/22/41	141	122,170	.32	1.07	(	(	(	(	9.58
11/22/41	142	118,701	.32	1.07	1,906.59	1,212.73	57.683	1.93	9.58
11/22/41	143	119,367	.32	1.07	(	(	(	(	9.58
11/27/41	144	112,164	.37	1.03	681.38	464.93	20.750	.58	12.15
12/1/41	145	120,867	.29	1.22	1,135.90	682.30	33.837	1.42	9.73
12/1/41	146	112,495	.29	1.22	(	(	(	(	9.73
12/3/41	147	119,315	.28	1.06	554.77	338.44	16.704	.63	9.30
12/4/41	148	120,536	.29	1.31	590.70	357.14	17.478	.79	9.80
12/6/41	149	115,812	.28	1.21	1,120.98	660.10	33.368	1.44	9.41
12/6/41	150	122,534	.28	1.21	(	(	(	(	9.41
12/9/41	151	117,955	.28	1.03	548.18	336.44	16.519	.61	9.29
12/10/41	152	116,983	.33	.95	633.19	406.51q	10.302	.56	10.83
12/13/41	153	117,692	.36	1.29	1,380.46	934.47	41.368	1.48	12.01
12/13/41	154	112,131	.36	1.29	(	(	(	(	12.01
12/16/41	155	118.177	.29	1.32	579.11	348.84	17.136	.78	9.80
12/17/41	156	113,936	.27	1.22	59 .03	313.01	15.381	.70	9.11
12/22/41	157	118,356	.29	1.20	1,141.68	680.76	340.63	1.41	9.72
12/22/41	158	116,562	.29	1.20	(	(	(	(	9.72
12/23/41	159	120,246	.38	1.38	(	(	(	(	9.72

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
12/23/41	160	116,482	.38	1.38					12.71
12/26/41	161	110,621	.44	1.48	812.46	564.03	24.337	.82	14.69
12/29/41	162	118,666	.45	1.44	888.34	626.79	26.700	.85	14.97
12/31/41	163	115,862	.43	1.44	1,676.12	1,157.89	50.239	1.68	14.35
12/31/41	164	117,806	.43	1.44	(	(	(	(	14.35
1/5/42	165	116,973	.42	1.46	1,656.29	1,136.21	49.549	1.72	14.04
1/5/42	166	118,973	.42	1.46	(	(	(	(	14.04
1/6/42	167	122,998	.41	1.59	849.58	578.41	25.215	.98	13.81
1/7/42	168	117,353	.34	1.32	668.64	442.05	10.950	.77	11.40
1/12/42	169	116,505	.33	1.77	1,346.76	885.71	38.999	2.09	11.40
1/12/42	170	119,751	.33	1.77	(	(	(	(	11.40
1/14/42	171	109,539	.24	.94	910.85	509.91	27.496	1.08	7.95
1/14/42	172	119,593	.24	.94	(	(	(	(	7.95
1/17/42	173	112,265	.40	1.54	755.34	537.10	22.453	.86	13.42
1/19/42	174	111,446	.31	1.04	1,153.96	716.11	34.915	1.17	10.25
1/19/42	175	113,812	.31	1.04	(	(	(	(	10.25
1/22/42	176	97 ,507	.39	1.15	627.56	437.21	19.014	.56	12.87
1/26/42	177	117,914	.30	. 92	1,172.21	709.68	35.733	1.10	9.84
1/26/42	178	120,308	.30	.92	(	(	(	(	9.84
1/30/42	179	111,019	.33	1,08	605.42	389.09	18.318	.50	10.90
2/2/42	180	116,624	.39	1.92	782.19	555.96	22.742	1.12	13.41
2/3/42	181	113,209	.36	1.32	681.55	458.92	20.378	.75	12.04
2/6/42	182	97,731	.29	1.21	475.59	283.20	14.171	.59	9.73
2/9/42	183	123,290	.35	1.26	1,414.92	944.91	42.429	1.53	11.67
2/9/42 q	184	119,160	.35	1.26	(	(	(	(	11.67
2/11/42	185	112,141	.35	1.34	657.59	439.86	19.625	.75	11.73
2/14/42	186	115,620	.29	1.42	570;84	346.63	16.765	.82	9.87
2/19/42	187	113,171	.37	1.35	(	(	(	(	12.37
2/19/42	188	102,374	.37	1.35	1,987.62	1,364.57	59.430	2.17	12.37
2/19/42	189	105,697	.37	1.35	(	(	(	(	12.37
2/21/42	190	123,078	.23	1.18	519.16	299.05	15.385	.73	8.44
2/26/42	191	121,576	.32	1.20	649.27	412.67	19.452	.73	10.68
2/25/42	192	114,672	.36	1.06	679.33	450.53	20.641	.61	11.85
3/2/42	193	108,956	.34	1.01	1,282.64	837.23	39.004	116	11.18
3/2/42	194	120,477	.34	1.01	(	(	(	(	11.18
3/5/42	195	109,734	.33	1.19	602.91	387.93	18.106	.65	10.99

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
3/4/42	196	109,420	.62	2.07	1,139.96	880.01	33.920	1.13	20.84
3/10/42	197	113,460	.50	1.52	943.44	689.82	28.365	.86	16.63
3/11/42	198	115,709	.36	1.17	690.22	465.18	20.828	.68	11.93
3/25/42	199	111,646	.27	.97	497.90	287.17	15.072	.54	8.92
3/30/42	200	112,564	.22	.71	(	(	(	(	7.15
3/30/42	201	112,380	.22	.71	804.22	423.68q	24.744	.80	7.15
3/30/42	202	108,201	.20	.71	352.03	178.03	10.820	.38	6.50
4/1/42	203	118,701	.19	.65	365.16	183.50	11.277	.39	6.15
4/6/42	204	120,890	.22	.71	842.76	443.72	25.933	.84	7.15
4/6/42	205	114,865	.22	.71	(	(	(	(	7.15
4/8/42	206	117,785	.15	.57	565.14	212.39	17,585	.67	5.94
4/8/42	207	116,678	.15	.57	(	(	(	(	5.94
4/11/42	208	113,992	.18	.68	334.18	161.98	10.259	.39	5.86
4/13/42	209	112,974	.20	.76	370.02	189.06	11.297	.43	6.55
4/15/42	210	115,604	.19	.69	357.18	179.29	10.982	.40	6 .18
4/18 /42	211	106,175	.18	.63	308.28	147.26	9.556	.33	5.81
4/20/42	212	122,132	.16	.61	315.12	130.23	9.771	.37	5.13
4/22/42	213	109,369	.17	.64	301.42	136.10	9.296	.35	5.51
4/27/42	214	116,106	.28	.94	535.54	318.15	16.255	.55	8.85
4/30/42	215	119,492	.24	.57	459.04	246.42	14.339	.34	7.68
5/8/42	216	117,862	.19	.61	361.19	181.33	11.197	.36	6.13
5/5/42	217	122,811	.18	.93	367.88	185.44	10.963	.57	6.04
5/9/42	218	123,054	.18	.70	360.84	178.84	11.075	.43	5.90
5/11/42	219	127,678q	.18	.68	393.67	188.79	12.129	.43	6.17
5/12/42	220	120,851	.27	.97	539.57	313.88	16.315	.59	8.93
5/16/42	221	119,708	.24	.90	948.02	511.18	28.731	1.08	7.92
5/16/42	222	119,719	.24	.90	(94	(	(	(	7.92
5/18/42	223	126,096	.20	.84	810.10	376.49	24.618	1.00	658
5/18/42	224	120,084	.20	1.84	(	(	(	(	6.58
5/23/42	225	121,454	.19	.96	763.37	384.97	22.772	1.15	6.37
5/23/42	226	118,248	.19	.96	(	(	(	(	6.37
5/25/42	227	115,655	.22	.85	418.89	208.23	12.722	.49	7.24
5/28/42	228	112,904	.24	.92	448.00	235.17	13.548	.52	7.94
6/1/42	229	120,183	.36	1.27	720.78	469127	21.633	.76	11.99
6/3/42	230	120,722	.36	1.39	(	(	(	(	12.08
6/3/42	231	112,947	.36	1.39	2,102.49	1,372.53	62.641	2.42	12.08

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
6/3/42	232	114,334	.36	1.39	(	(	(	(	12.08
6/8/42	233	115,760	.19	.79	742.95	342.30	22.766	.85	6.19
6/8/42	234	124,199	.19	.79	(	(	(	(	(6.19
6/11/42	235	119,363	.22	.64	423.40	297.58	13.130	.38	7.09
6/13/42	236	123,832	.18	.55	356.72	149.01	11.145	.34	5.78
6/16/42	237	119,595	.22	.78	847.46	396.40	25.093	.92	7.20
6/16/42	238	115,884	.22	.78	(	(	(	(	7.20
6/19/42	239	116.924	.25	.83	479.12	233.23	14.615	.49	8.20
6/22/42	240	118,803	.21	.94	415.24	211.80	12.472	.56	6.99
6/24/42	241	122,858	.22	.75	865.38	420.71	26.533	.90	7.18
6/24/42	242	118,349	.22	.75	(	(	(	(	7.18
6/29/42	243	120.935	.18	.66	353.35	130.59	10.884	.40	5.85
7/1/42	244	114,302	.17	.55	310.54	120.51	9.716	.31	5.43
7/13/42	245	115,197	.22	.79	(	(	(	(	7.20
7/13/42	246	111,015	.22	.79	1,219.11	569.30	37.229	1.34	7.20
7/13/42	247	112,234	.22	.79	(	(	(	(	7.20
7/20/42	248	93,054	.19	.66	286.91	124.10	8.840	.31	6.17
7/22/42	249	90,070	.18	.84	268,50	114,41	8.106	.38	5.74
7/28/42	250	89,394	.19	.65	275.13	120.02	8.492	.29	6.16
8/3/42	251	91,822	.15	.57	221.24	78.91	6.887	.26	4.80
8/8/42	252	97,245	.18	.62	282.70	117,72	8.752	.30	5.82
8/20/42	253	94,761	.28	1.05	440.47	251.98	13.267	.50	9.30
9/1/42	253	94,761	.28	1.05	440.47	251.98	13.267	.50	9.30
9/1/42	254	101,272	.20	.67	328.57	137.31	10.127	.34	6.49
9/8/42	255	102,685	.23	.22	437.87	201.47	11,801	1.14	8.53
9/15/42	256	110,863	.20	.78	380.97	165.57	11.641	.43	6.89
10/1/42	257	111,381	.27	1.66	523.59	299.56	15.036	.92	9.40
10/13/42	258	104,729	.28	1.96	487.68	278.07	14.622	.56	9.31
11/19/42	259	104.232	.17	.77	291.79	133.41	8.860	.40	5.59
11/24/42	260	103.530	.15	.84	259.07	100.50	7.765	.43	5.00
11/27/42	261	100,623	.18	.74	296.60	142.45	9.056	.37	5.89
12/2/42	262	101,479	.27	1.11	457.78	263.59	13.700	.56	9.01
12/3/42	263	103,815	.20	.81	341.59	170.09	10.381	.42	6.58
12/10/42	264	97,523	.32	1.18	520.48	315.10	15.605	.58	10.67
12/15/42	265	99,365	.27	.92	441.62	249.21	13.414	.46	8.89

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
12/21/42	266	97,678	.30	1.08	984.70	573.35	29.662	1.07	9.96
12/21/42	267	100,072	.30	1.08	(	(	(	(	9.96
12/26/42	268	98,751	.39	1.38	1,278.74	849.03	38.283	1.35	13.03
12/26/42	269	97,570	.39	1.38	(	(	(	(	13.03
1/4/43	270	98,196	.32	1.11	1,046.57	633.75	31.562	1.09	10.93
1/6'/43	271	99,067	.32	1.11	(	(	(	(	10.93
1/15/43	273	100,203	.28	.99	463.09	267.27	14.028	.50	9.26
1/6/43	272	108.928	.25	.94	450.16	240.28	13.616	.51	8.27
1/21/43	274	107,268	.32	.98	524.43	342.97	17,163	.53	10.52
1/25/43	275	99,683	.33	1.00	540.98	332.48	16,448	.50	10.85
2/9/43	276	99,474	.33	1.05	541.28	332.57	16.413	.52	10.63
2/11/43	277	90.439	.37	1.18	553.51	362.44	16,831	.53	12.24
2/18/43	278	103,235	.33	1.06	562.44	347.52	17.034	.55	10.90
2/22/43	279	97,761	.37	1.36	605.10	402.26	18.086	.55	12.38
3/1/43	280	106.079	168	2.19	1,210.39	811.43	36.067	1.16	22.82
3/4/43	281	104,221	.54	2.00	950.41	686.69	28.140	1.04	18.24
3/8/43	282	107,701	.42	1.73	766.21	510.66	22.617	.93	14.23
3/16/43	283	105,970	.35	1.44	625.35	395.02	18.545	.76	11.80
3/15/43	284	108.172	.35	1.45	638.31	417.04	18.930	.68	11.80
3/18/43	285	112,033	.29	1.20	544.40	303.12	16.245	.67	9.72
3/22/43	286	110,150	.38	1.52	705.41	474.12	20.928	.84	12.81
3/27/43	287	111,338	.28	1.29	527.00	299.76	15.587	.72	9.47
4/2/43	288	110,073	.27	1.26	501.75	289.02	148.60	.69	9.44
4/8/43	289	108,597	.29	1.17	527.15	303.11	15.747	.64	9.71
4/9/43	290	106.932	.26	1.02	462.05	257.55	13.901	.55	8.66
4/13/43	291	109,153	.25	.95	451.77	235.51	13.644	.52	8.28
TOTALS		16,805.05 Tons			$ 173,841.78	$109,475.46			
Dump Ore									
12/6/43	1	110,796	.09	.32	(	(	(	(	3.71
12/10/43	2	101,162	.11	.34	391.68	262.77	17.531	.51	3.71
12/14/43	3	107,420	.13	.29	(	(	(	(	3.71

Date	R.R. Car No.	Dry Weight	Gold Assay	Silver Assay	Gross Value	Net Smelter Returns	Gold Oz.	Silver Oz.	Smelter Value Per Ton
6/6/44	4	108,820	.11	.28					3.48
6/6/44	5	116,691	.09	.46					3.48
6/8/44	6	103,233	.09	.46	1,173.11	536.26	34.274	1.23	3.48
6/12/44	7	111,489	.10	.34					3.48
6/14/44	8	119,784	.10	.34					3.48
6/14/44	9	113,806	.12	.31					3.48
6/14/44	10	123,551	.11	.26					3.48
6/17/44	11	115,534	.11	.30	1,155.16	556.04	33.754	1.29	3.31
6/17/44	12	121,746	.11	.30					3.31
6/21/44	13	116,367	.07	.39					3.31
6/21/44	14	114,297	.07	.39					3.31
6/22/44	15	106,108	.11	.46					3.31
6/22/44	16	111,728	.099	.29	1,244.81	489.68	27.655	1.60	3.17
6/26/44	17	103.735	.08	.38					3.17
6/26/44	18	101,337	.08	.38					3.17
6/28/44	19	94,878	.08	.72					3.17
6/28/44	20	100,708	.08	.72					3.17
7/3/44	21	110,017	.12	.64					3.17
7/3/44	22	114,878	.14	.40	1,475.40	612.24	43.886	1.18	4.37
7/6/44	23	112,365	.14	.40					4.37
7/6/44	24	109,693	.14	.40					4.37
7/10/44	25	115,837q	.12	.30					4.37
7/10/44	26	110,773	.12	.30					4.37
7/10/44	27	111,721	.12	.31					4.37
Totals					$5,440,16	$2,456.94			
Tonage Total		20,248,685			$201,887.78	$124,823.77			

5/23/50	1	104,237	.18	.98	354.34	149.50	9.381	.51	6.80
6/12/50	2	105,561	.20	1.15	402.30	177.35	10.556	.61	7.52
6/26/50	3-4	226,672	.18	.99	772.00	321.78	20.400	1.12	6.81
7/19/50	5	98,970	.16	1.02	304.91	118.48	7.918	.50	6.xxx 6.16
7/24/50	6	95,595	.14	.91	258.84	81.92	6.692	.43	
8/1/50	7	92,932	.10	.77	184.74	32.37	4.647	.36	

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Exhibit 2-g-1

GENERAL REPORT ON THE VALLEY MINE, REPUBLIC, WASHINGTON.

LOCATION

The Valley Mine is located in Sec. 6 T. 37 N., R. 33 E. and approximately ten miles North East of Republic, Wash. The property consists of 3 claims, Patent No. 560, and named the Valley, Valley No. 2 and Valley No. 3. The Valley and Valley No. 2 claims are fractions, hence the total acreage of the property is approximately 43 acres.

TOPOGRAPHY

These claims lie in a rolling country. Trout creek flows across the South edge of Valley No. 3 and water has to be pumped continually from the mine. There is little commercial timber on the property but a small saw mill is located close by where ample timber is assured. A ballasted road leads from the mine to an oiled County road about one eighth of a mile distance. Five miles down this oiled County road is located the Valley's loading ramp at Tarboy Siding on the Great Northern.

HISTORY

The Valley claims were probably staked about 1897 and work was begun immediately. There are no past records of this initial work but enough was done for patent and apparently the property was closed down about 1903. From there on it was held by various individuals and companies until about 1928 when it was let go

back to the County for taxes. In 1938 the claims were purchased by I. G. and Everett Hougland at a County tax sales.

In 1939 the work of reopening the property was begun. It was found there was an incline shaft 89 feet in depth on the incline, a short drift to the North and a longer one to the South done by the original locators, and at the advanced price for gold, some low grade ore was opened up in the South drift. A small outfit was installed and a few buildings errected. By November 1st 15 cars of ore had been shipped which averaged about $12.00. At that time the property was optioned and a development program begun which lasted approximately fifteen months. This consisted of sinking the shaft to the 400 level and running about 1600 feet of drifts and two raises. In March 1941 the property was returned to I. G. and Everett Hougland and they immediately began operation. These operations lasted until April 1943 at which time, due to priority difficulties and lack of man power the mine was closed down and has remained that way since.

GEOLOGY

The country rock is all andesite with an Eastward dip. In all but one instance the andesite is relatively unaltered and somewhat porphyritic in texture and contains considerable pyrite. The vein is composed largely of intergrown quartz and calcite. It trends approximately North 15 East and dips about 30° S.E. Underground it has been opened for a length of 1200 feet. The width of the vein

varies from a seam in the rock to 15 feet wide. It all carries some values but a large portion, as in the case in most other veins of this type, is uneconomic. The commercial ore appears to be confined to roughly equi dimentional lenses. The largest one mined to date contained about 18,000 tons. The values occur as gold and silver the ratio being approximately 1 oz. of gold to 3 oz. of silver. It is impossible to detect these values visually, in most instances, therefore constant assaying is a necessity. From this it has been found that the best values usually occur close to the foot wall and as the hanging wall is approached an assay line must be used. The vein material contains quartz, calcite, about 2% iron in the form of magnetite and gold and silver.

The foot wall of the vein has numerous rolls so that it flattens out and steepens rather regularly. Where this flattening occurs the vein becomes wider and it is from these wider portions the bulk of the commercial ore has been mined.

There appears to be little post mineral faulting of the vein so that it is easily followed. It is strong and fairly continuous from the surface to the 400 level and in most cases has shown little sign of pinching out at the end of the various working faces.

PRODUCTION

To date 354 railroad cars of ore have been shipped from the property or a total of 20,248.7 dry tons. This tonnage contained 6059.072 oz. of gold and 21,202.00 ozs. of silver or .2992 ozs. of gold and 1.05 ozs. of silver per ton. The total gross smelter value was $201,887.78 and the net smelter returns were $124,837.77. Figuring gold at $33.166 per oz. and silver at $0.8505 per oz. an average of $10.82 per ton is indicated.

ORE RESERVES

This 20,000 tons was practically all taken from between the 200 lvel South and the surface. There is remaining in that area an estimated 2500 tons of commercial ore. No stoping has been done on the 100 level North but from the samples from a 40 foot shaft, from the surface down and in the level itself, an estimated 500 tons is available. Between the 200 and 300 levels three lenses have been projected with an estimated 16,500 tons of commercial ore. Another 5000 tons is estimated below the 300 level. This tonnage is conservatively calculated at $8.00 per ton and actual mining may show increased value.

MINE BUILDINGS AND EQUIPMENT

The mine is equipped with an 80 ton ore bin into which a 3/4 ton skip dumps directly, a mine office, an assay office, a blacksmith shop containing steel sharpener and oil and coal forges, a compressor house, a dry house, a 10 ton powder house, a watchmans house and several odd storage buildings. A gasoline hoist is in-

stalled and 2 compressors with a maximum capacity of 500 c.f. per minute. These compressors were run by diesels but electric power is now available for installation, hence the mine could be electrified. The major portion of all other mining equipment necessary for production is stored at the mine.

STATE OF REPAIR

Since closing the mine down the water has raised to just below the 100 level. However, the drifts and stopes were left clean with the exception of the pipe and track which was left installed. Three sets in the shaft near the collar have rotted out and caved and the air raise from the 200 to the surface, South of the shaft, has sloughed some.

To begin production it would be necessary to catch up the portal of the shaft, gather up the mining machinery and install power for the compressors. Then production could begin immediately from the 100 while any excess air could be used to pump the 200. Similarly, mining could be carried on on the 200 while the 300 and even the 400 was being pumped. Thus it would be very simple to get into production again.

CONCLUSION

I believe this to be a property with considerable future. With between twenty to twenty five thousand tons of ore blocked, with a minimum of initial expense in getting started and no end in sight of vein extensions there is no limit on future possibilities.

A combination of mining and exploration should develop lenses as fast or faster than they are mined and from past experience it is reasonable to expect considerable tonnages of relatively high grade ore.

Everett Hougland

Exhibit 2-g-2

EXTRACTS FROM MASTER'S THESIS

IN CHEMISTRY AT WASHINGTON STATE COLLEGE,

by J. Haworth Jonte

1942

The Relationship of Selenium and Gold

In Ores From The Republic District

The good ore is characterized by the dark banding in the calcite-quartz body. Three types of quartz were observed in the unaltered vein fillings. The first is vitreous quartz which has a tendency to exhibit crystal faces and show a development towards interlocking aggregates from the vein walls. Ordinary milky quartz occupies a large part of the vein filling and is interbanded with chalcedony.

As mentioned above the most distinctive feature of the ore is the banding roughly parallel to the vein walls. The ore minerals occur as black thread-like concentric bands that follow the general banding of the veins. These bands are supposed (2) to be made up of tetrahedrite, chalcopyrite, and carry free gold in an extremely finely divided state. Figure II is a rough sketch of the banding in the ore. Ernest N. Patty in his report (3) on the metal mines of Washington says, "Gold selenide is also believed to be present, and the question of its occurrence is a much mooted problem." There is little or no tellurium occuring along with the selenium; and thus the region should be considered as one to be more closely studied; and the following are two analyses of the ore one made ;by S. G. Dewsnap (1) of Seattle in 1901 and the other made by Chase Palmer (2) of the United States Geological Survey laboratory in 1916.

TABLE I

Partial analysis of selected Republic Highgrade by S. G. Dewsnap

Silica	47.62%
Alumina	9.73
Iron	4.94
Copper	9.74
Sulfur	8.23
Selenium	5.26
Magnesia	Trace
Arsenic	Trace
Gold	2.81
Silver	7.34
Ca, Ti, and earths	.14
Tellurium 0.4 to 2.12 in different samples of the same pulp	

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TABLE II

Analysis of a gold-selenium ore found in the Republic Mine

	% in ore	Metallic minerals recalculated to 100%
Cu	15.72	22.90
Ag	14.01	20.41
Fe	3.75	5.46
Zn	1.12	1.63
S	15.40	22.43
Sb	12.06	17.57
As	1.80	2.26
Au	2.99	4.36
Se	1.80	2.62
Gangue (Calc.)	31.35	

Palmer concluded from these results that a "normal" gold selenide (Au_2Se_3) could exist. The procedure Palmer (2) used should be described, as it described a method to determine the free gold in the sample. From A. Terreils (2) work on natural sulfides, tellurides and selenides it is apparent that sodium sulfide solution does not attack the tellurides of gold and lead; and also that the selenides of gold and lead react very slowly with soldium sulfide solution. In this way, by dissolving the free gold in sodium sulfide solution, the gold which is undissolved should be that gold which is in the combined form. The amount of gold and selenium was found to be;

TABLE III

	Percent	Atomic Ratio
Gold	1.75	2 (0.008875)
Selenium	1.12	3 (0.01418)

This seems to indicate that the "normal" gold selenide is present. However on careful microscopic examination no visible mineral could be found which would account for a compound such as gold selenide.

Evere since the beginning of mining activities in the Republic District there has been difficulty in recovering the gold from the ore. At the start a large custom mill was built but was closed down in the spring of 1901. It was not until the railroads came that operation was again started. By means of shipping the ore to the smelter, district has been able to keep on producing. The treatment of the ore has in every case been the important factor. It was found out early in the history of the district that roasting of the ore helped along with fine grinding in the recovery of the gold. It is possible that roasting frees the gold from the sulfur or selenium that is present.

The treatment was then changed from amalgamation to cyanidation or amalgamation followed by cyanidation. In this manner it was reported that a 90 percent recovery of the desired values was obtained. At the present time the Knob Hill Mining Company is running a mill at Republic using a cyaniding process. Corwin L. Cooper (4) states, "Selenium is noted in the gasses during the semlting." This statement was in referrence to the smelting of the gold precipitated from the cyanide solution.

It has not been possible to determine, from the past of present processes for smelting these ores, the form of occurence of the selenium by which the ore is characterized. The purpose of this investigation has been to study the relationship of selenium to gold in the several components of the ore in an effort to determine definitely the presence of absence of a compound of gold and selenium.

EXPERIMENTAL WORK

In order to secure a group of representative samples for this investigation a trip was made to Republic in May 1941 on which the author visited several mines and claims andcollected the necessary samples with which to work. With the exception of a sample of rich ore which Mr. E. Hougland, owner of the Valley Mine, brought to Pullman in December 1941 the samples collected in May were used, Following is a list of samples giving the name of the mine or claim and the approximate gold value.

No. 1	Valley Mine	1.0 oz/ton
No. 2	Valley Mine Dec. '41	6.92 oz/ton
No. 3	Lone Pine	0.4 oz/ton
No. 4	Mountain Lion	- - - - - -

IDENTIFICATION OF MINERAL SUBSTANCES (Mineralogical)

The first step taken was to identify the different minerals that compose the ore. On examining the sample with the unaided eye it was obvious that the mass of the ore is composed of quartz and calcite. The black bands which run throughout the ore are usually somewhat parallel to each other and are composed of material too finely divided to make identification possible. Examination of thin sections show that the ore is composed of quartz and calcite with the metallic minerals associated with the quartz. The quartz is cryptocrystalline and the calcite seems to have been the first of the two minerals to be deposited. In some of the high grade ore the calcite seems to be in the form of laths and in other places the calcite is in the form of coarse crystals. Figure III shows tabular crystals of calcite around which the quartz has been deposited and figure IV shows the relative positions of the quartz, calcite, and metallic minerals.

The samples of ore collected in Eureka Gulch, Lone Pine and Mountain Lion, differ from the ones gathered at the Valley Mine. They are of the same general type as the Valley Mine samples with the exception that the samples were taken nearer the surface and contained considerably more iron, and much less calcite.

IDENTIFICATION OF MINERAL SUBSTANCES (Qualitative chemical)

Due to the peculiar occurence of the values in the dark banded portion of the ore it seemed that the separation of the ore into two or more parts, each composed of some of the various minerals, would help in isolation of the source of the selenium. A hand separation was therefore made followed by a magnetic separation.

The sample of ore that was known to be the richest in gold was chosen as the sample to use in the separation. After the ore had been but through the crusher and before being ground in the ball mill, a brownish earth-like mineral was picked out by hand. This mineral looked somewhat like decomposed pyrite. This mineral showed only a slight tendance to be magnetic which may have been due to included minerals; however, on being ground in an agate mortar only a very small amount, not enough to be weighed, of a magnetic minerwal was recovered.

Mr. E. Hougland, owner of the Valley Mine, reported in the fall of 1941 that if the ore was panned there remained a residue of a black-gray metallic looking mineral which was magnetic. This provided another method of getting a mineral separated from the ore. After the ore had been ground in the ball mill a horse-shoe magnet was used to extract the magnetic mineral from the ore. In this manner about 1.5 to 2.0 grams of this mineral was obtained from about ten pounds of ore.

In the previously described manner the sample was separated into three parts.

1. Non-magnetic ferrous mineral
2. Magnetic ferrous mineral
3. The remaineder of the ore which was composed mainly of quartz and calcite.

IDENTIFICATION OF ORE COMPONENTS

I

The identification of these portions that were thus separated seemed to be the next logical step. A qualitative analysis run on the non-magnetic ferrous mineral gave the following results:

1. Large amount of ferric iron
2. Trace of aluminum
3. Presence of gold is indicated
4. Presence of selenium is indicated

II

The magnetic mineral which might possibly be a magnetite is a peculiar checmical combination of elements. On making the analysis for selenium and following the procedure to be outlined later

several thing[illegible]e place which might help [illegible]ntify this mineral.

1. When HBr-Br_2 mixture is added the mineral effervesces and probably carbon dioxide from adhering calcite, is given off. The mineral does not go completely into solution. The bromine is reduced rapidly and the solution becomes colorless unless a great excess of bromine is added.

2. The residue in the distilling flask after the selenium has been removed is filtered and the undissolved material saved. No selenium is present. The filtrate containsa great quantity of iron which when precipitated with ammonium hydroxide gives a black to a faint green colored precipitate.

3. The ammonium hydroxide filtrate when evaporated to a small volume and made basic with ammonium hydroxide gave the blue color of the copper amino complex. No gold is present.

4. A qualitattive analysis was run on the sample in the following manner. The mineral was dissolved in aqua regia and the insoluble material filtered off and weighed. The residue was a gray-white material which was probably composed mainly of silicates. The filtrate was then treated in the usual manner for qualitative analyses. The presence of the following in the mineral was confirmed.

TABLE IV

Cu	Trace
Cr	Trace
Fe	Composes most of the mineral
As	greater than Cu and Cr, much less than Fe

III

The remainder of the ore can be classified only as the quartz-calcite portion. This is evident as when HB_r-Br_2 mixture is added in the analysis for selenium the mixture effervesces easily giving off carbon dioxide.

SUMMARY

Therefore six different samples were obtained with which to work.

1. Valley Mine ore--
   A white quartz-calcite ore containing black bands of metallic minerals. A small amount of iron minerals are present. Magnetic mineral is also present.

2. Valley Mine ore--
   A white quartz-caclite ore containing black bands of metallic minerals. This ore also contained the least magnetic and the most non-magnetic mineral.

3. Lone Pine ore--
   A yellow-brown ore practically all quartz. There were some

bla[illegible]nds noticed but they were n[illegible] very sharply defined. There was a large quantity of iron present.

4. Mountain Lion ore--
A yellow-brown ore with some spots being almost cream collored. The ore was mostly quartz with very faint black banding. There was a large amount of iron present.

The following two samples were separated from ore sample number 2 and were treated in the same manner as the general ore samples.

5. Non-magnetic mineral--
This mineral was separated from Number 2 and wasdescribed under section I, identification of ore components.

6. Magnetic mineral--
This mineral was separated from number 2 and was described under section II, identification of ore components.

ANALYSES

SELENIUM

Because of the desirability of using small samples of ore, gravitmetric and volumetric methods of analysis for selenium were eliminated in favor of a colorimetric dtermination. There were several methods available all of which are dependent on the general reaction:

$$2e + SeO_4^{--} + 2SO_2 \text{ ---------- } \underline{Se} + 2SO_4$$

This reaction is speeded up by the addition of Hydroxylamine (NH_2OH) usually added in the form of the hydrochloride ($NH_2OH \cdot HCl$). This compound acts as a special precipitating agent for selenium and prevents tellurium from precipitating and interferring. . . .

RESULTS

TABLE V

	mg. of Selenium per gm. of Ore			
	I	II	III	Average
No. 1	0.026	0.028	0.027	0.027
No. 2	0.061	0.059	0.062	0.0608
No. 3	0.0	0.0	0.0	0.0
No. 4	0.0	0.0	0.0	0.0
No. 5	0.04	---	---	0.04
No. 6	0.0	0.0	0.0	0.0

Gold

Gold was also determine colorimetrically because the amount of gold in the small samples could hardly be determined in any other manner. Purpose of Cassius, the color of colloidal gold, has been known since the time of the alchemist. The manner in which this may be obtained is very simple and many modifications are known. . . . .

RESULTS

TABLE VII

MG. OF GOLD PER GRAM OF ORE

	I	II	III	Average
No. 1	0.190	0.195	0.204	0.195
No. 2	0.256	0.252	0.251	0.253
No. 3	0.0	0.0	0.0	0.0
No. 4	0.0	0.0	0.0	0.0
No. 5	0.170	----	----	0.170
No. 6	0.0	0.0	0.0	0.0

ANALYSIS OF FREE GOLD

The determination of free gold present in the ore was made to try and establish a definite raio of the gold to selenium....

Table VIII shows the results of the gree gold analysis.

TABLE VIII

Sample	mg/gm free gold
No. 1	0.0
No. 2	0.0

Following the above method which is described by Palmer (2) it was not possible to obtain any evidence of free gold in these samples.

SUMMARY

From the preceeding results it is seen that both the gold and the selenium are foun in only two samples of the ore collected.
Number 1. From the Valley Mine.
No. 2. From the Valley Mine.

There is no gold or selenium in the other samples or in the magnetic portion separated from Number 2. From these relationships there are several associations established which are given in the following tables.

TABLE IX

Ore sample	Relative amount of mineral in the ore	Amount of Gold mg/gm
CARBONATE		
No. 1	Large amount	0.195
No. 2	Small amount	0.253
No. 3	none	0.0
No. 4	none	0.0

Ore sample	Relative amount of mineral in the ore	Amount of Gold mg/gm
QUARTZ		
No. 1	small amount	0.195
No. 2	larger amount	0.253
No. 3	greatest amount	0.0
No. 4	greatest amount	0.0
NON-MAGNETIC IRON MINERAL		
No. 1	very small	0.195
No. 2	most	0.253
No. 3	none	0.0
No. 4	none	0.0
MAGNETIC IRON MINERAL		
No. 1	small	0.195
No. 2	smallest	0.253
No. 3	most	0.0
No. 4	most	0.0

TABLE X

Ore Sample	Relative amount of mineral in the ore	Amount of Selenium mg/gm
CARBONATE		
No. 1	large amount	0.027
No. 2	small amount	0.0608
No. 3	none	0.0
No. 4	none	0.0
QUARTZ		
No. 1	small amount	0.027
No. 2	larger amount	0.0608
No. 3	greatest	0.0
No. 4	greatest	0.0
NON-MAGNETIC MINERAL		
No. 1	very small	0.027
No. 2	larger amount	0.0608
No. 3	none	0.0
No. 4	none	0.0
MAGNETIC MINERAL		
No. 1	small	0.027
No. 2	smallest	0.0608
No. 3	most	0.0
No. 4	most	0.0

From these relationships it seems that the selenium and the gold are both associated with the following portions of the ore:

1. Directly with the Quartz
2. Carbonate
3. Directly with the Non-magnetic mineral

The relationship of the gold to the selenium is not constant. This may be attributed to the presence of free gold in certain samples of the ore and might also be the result of a mixture of aurous and auric selenides. Table XI shows the relationship of gold to selenium in the various samples.

TABLE XI

Sample	mg/gm Gold	mg/gm Selenium
No. 1	0.195	0.027
No. 2	0.253	0.0608
No. 3	0.0	0.0
No. 4	0.0	0.0
No. 5	0.17	0.04
No. 6	0.0	0.0

CONCLUSION

It has been shown that the gold and the selenium are always found together; also that they are directly associated with the quartz in the presence of calcite.

A mineral which contained gold and selenium was separated from the ore. The mineral was an iron mineral and was free from quartz and calcite.

From the relationship of the gold to selenium in this mineral and the general ore sample as shown in table XI the atomic ratios were found to be:

TABLE XII

Sample	Atomic Ratio	
No. 1	Gold	0.445 (3.07)
	Selenium	0.145 (1.0)
No. 2	Gold	0.410 (1.68)
	Selenium	0.240 (1.0)
No. 5	Gold	0.411 (1.7)
	Selenium	0.240 (1.0)

There is probably free gold present in number one as an atomic ratio of three to one is impossible. Number five is the ratio as found in the non-magnetic iron mineral that was separated from number two and the ratio is the same as for the whole ore sample.

Therefore the compound present is most probably Aurous selenide and not Auric selenide as previously reported by Bancroft and Lindgren. This is the more probably compound that would be formed as the metals similar to gold, such as copper and iron, when deposited in such a manner, are nearly always in the lower state of valence. Also in a solution in which there is a possibility of free gold being deposited, one would expect to find the aurous instead of the auric form present.

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Exhibit 2-g-3

EXCERPT FROM BULLETIN NO. 42

"GOLD IN WASHINGTON"

Page 61

Valley (Gold Valley, Lame Foot) (200)

Loc: Sec. 6, (37-33#). Access: 5 mi. from Republic by road. Prop: 3 patented claims: Valley, Valley No. 1, Valley No. 2. Owner: I. G. and Everett Hougland, Republic, Wash. (1939-----). Ore: Gold, silver, selenium. Ore min: aurous selenide, pyrite, tetrahedrite. Gangue: Quartz, calcite. Deposit: Vein est. to av. 7 ft. wide and 1,200 ft. in length in andesite. Dev: 400-ft. incline and other workings on 3 levels total 2,500 ft. Assays: Typical assay shows 0.28 oz. Au, 1.0 oz. Ag. Analysis shows 0.0027% to 0.0061% Se. Prod: 1,994 tons prior to 1941, 5,800 tons 1942, 1,302 tons 1943, 1950. Ref: 28, pp. 77-81 76. 97, 1940, pg. 477; 1941, p. 473. 108, 7/39, p. 22; 2/42 pp. 13-16. 158.

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

Exhibit 2-g-4

Exhibit "2.(g) (4)"

Page 253 of "Rarer Metals"

By DeMent and Dake
Chemical Publishing Company

THOMAS CONSOLIDATED MINES, INC.
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SPOKANE 1, WASHINGTON

SELENIUM AND TELLURIUM

TABLE 28

Selenium Minerals

Mineral	Composition
Berzelianite	CU_2Se
Clausthalite	PbSe
Guanajuatite	Bi_3Te (S,Se)
Joseite	Bi_3Te (S,Se)
Naumannite	(Ag_2Pb) Se
Platynite	$PbS.Bi_2Se_2$

PHYSICAL PROPERTIES

Selenium resmebles sulfur in many of its physical properties forming several allotropes. The specific gravity varies according to the form, ranging between 4.3 and 4.8. The ordinary allotrppe is a grayish solid with a semi-metallic luster, which is best seen on a freshly fractured surface. This stable form is crystalline and has a specific gravity of 4.47. It is insoluble in water and in carbon disulfide. It turns black when heated. A closely related allotrope is red and has similar characteristics. Orange allotropes are also known to be crystalline.

Amorphous selenium is a dark red to black powder which softens at 60° C and has specific gravity of 4.3. It is insoluble in water but dissolves in benzene and carbon disulfide. A gray "metallic"

allotrope, different from the first allotrope described, is lustrous and obtainable in metal-like granules or sticks. It has a specific gravity of 4.8 and is insoluble in water, alcohol, and carbon disulfide but dissolves in ether. A dark red powder, known as the colloidal form, is red and fluoresces in water. On aging, allotropic modification occurs.

Selenium has an atomic weight of 78.96. It has six natural stable isotopes which, arranged in order of abundance, have the following mass numbers: 80, 78, 76, 82, 77, and 74. Artificial isotopes of selenium have been prepared bynuclear reactions.

Selenium melts at 217° C and boils at 690° C, giving off dark red vapors. In a high vacuum it boils at about 310° C. It can be sublimed in a vacuum and obtained in pure form. The element of commerce is usually in lump or rod form. On subliming selenium in air, yellowish vapors have been observed particularly at high temperature.

Sulfur, selenium, and tellurium are members of the oxygensulfur family. They are all bivalent, but also exhibit higher valence states, e.g., tellurium has valences of two, four, and six. Their physical properties are shown in table 29. The specific gravities, melting points, boiling points, allotropicity, etc., all increase with increasing atomic weight.

Exhibit 2-g-5

"SELENIUM"

By
John D. Sargent

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

The element selenium might be described as paradoxical, being either a metal or a nonmetal, a conductor or nonconductor, amorphous or crystalline, colorant or decolorant, and a hydrogenator, or dehydrogenator. Selenium is one of the few strategic materials that remain in short supply.

Summary

Selenium was discovered in 1817 by the Swdish Chemist Berzelius while studying flue dust from the lead chambers of the sulfuric acid works at Gripsholm, Sweden.

The ordinary stable form of selenium is a crystalline, grayish solid with semimetallic luster. It melts at 220.2° C., boils at 684° C., and has a specific gravity of 4.47. Selenium is chemically related to sulfur, with which it is commonly associated in nature. It is found native, like sulfur, and also in the selenides of copper, silver, lead, mercury, bismuth, and thallium. About 25 minerals contain selenium in varying percentages, but none of the species is considered a commercial source.

The most important commercial source of selenium at present is the anode mud or slime produced in the electrolytic refining of blister copper. The selenium content of blister-copper anodes handled by domestic refineries ranges from 0.01 to 0.07 percent; the slimes usually contain 4 to 25 percent selenium.

Commercial uses for selenium began to develop on a substantial scale between World Wars I and II in the glass, ceramic, chemical, pigment, and rubber industries and later in the stainless steel industry. Selenium rectifiers for converting alternating to direct current were used industrially for many years but only on a small scale compared with the period after 1947, when the miniature-type selenium rectifier for electronic circuits was developed. These diminutive rectifiers are often employed in voltage multiplier circuits, for radio and television sets, designed to eliminate heavy and bulky transformers and rectifier tubes. Military uses of selenium rectifiers cover a wide range.

Selenium is used in the glass industry as a decolorizer and in the stainless steel industry as an additive to improve machinability and control the quality of castings. A diversified group of chemical uses, including pigments and rubber accelerators, now consumes more selenium than both the glass and steel industries combined.

Demand existed for larger quantities of selenium than were available and this shortage was expected to continue until at least 1958. Little further increase in the production of selenium from copper was expected, and developement of low-grade selenium deposits appeared possible.

Background

Geographic Distribution

Central and South America

The only selenium recovered from Central and South America thus far has been as a byproduct of the electrolytic refining of South American copper in the United States and Europe.

Africa

Northern Rhodesia produced almost 30,000 pounds of selenium in 1952. Selenium contained in Belgian Congo copper is recovered at Oolen, Belgium, and reported as Belgian production.

Australia

Austrailian output of selenium is about 4,000 pounds a year from slimes produced at electrolytic copper refineries that contain only 1 or 2 percent selenium.

Asia

Selenium is recovered at Several Japanese copper refineries and sulfuric acid plants. Japan produces about 50,000 pounds of selenium annually.

Europe

Sweden is usually the largest European producer of selenium; during 1951 the Swdish output was 90,000 pounds.

The Outokumpy Oy. in Finland produces a small quantity of selenium.

Belgium is a significant selenium producer but obtains most of its selenium-bearing materials from Africa.

West Germany produced over 16,000 pounds of selenium in 1951.

In southeastern Ugoslavia the Bor Copper Mining Corp. recovers about 1,000 pounds of selenium per year at its electrolytic refinery.

North America

Mexico is a major selenium producer, but most of its selenium is recovered and refined in the United States and is included in the United States production statistics.

Blister copper from the Cananea Consolidated Copper Co. at Cananea, Mexico, formerly refined in the United States, is now refined at an electrolytic copper refinery near Mexico City, and the anode muds are sent to a silver recovery plant at Monterey, Mexico, for extraction of the contained metals.

Selenium is produced in Canada by the International Nickel Co. at Copper Cliff, Ontario, and by Canadian Copper Refiners, Ltd., Montreal East, Quebec. Canadian selenium production and value in recent years are as follows: 382,603 pounds valued at C$1,239,633 in 1951; 242,030 pounds valued at C-$786,599 in 1952; 262,346 pounds valued at C$1,101,854 in 1953; and 368,800 pounds valued at C$1,844,000 in 1954.

The United States is the world's leading producer of selenium.

GEOLOGY

The selenium contents of igneous rocks in about 0.09 p.p.m.* Cores of marine sediments from the Continental shelf average 1 to 2 p.p.m. selenium, whereas deep-sea cores assay much lower. Selenium assays of the Continental Shelf deposits correspond closely with the selenium content of the sedimentary rock strata or Western United States and the soils derived from them.

A large area of North America--from Canada to Mexico and from the Mississippi to the Rocky Mountains -- is underlain by seleniferous rocks and soils.

Soils derived from seleniferous rocks usually contain 2 or 3 p.p.m. selenium. Annual rainfall in the seleniferous area is not enough to leach even the more soluble compounds of selenium from the soil. Soils containing only 1 or 2 p.p.m. selenium commonly sustain plants with a selenium content of 50 to 10,000 p.p.m. and in one instance a record 14,920 p.p.m. Some plants are indicative of seleniferous soils.

Aside from the selenium minerals themselves, magmatic sulfide deposits represent the greatest known concentration of selenium in the earth's crust. Average selenium content of magmatic sulfides is about 0.02 percent.

METALLURGY

Blister copper averages about 0.05 percent selenium. About 25 percent of the selenium content of copper ores has been lost before the blister copper stage is reached. Blister copper is converted to refined copper by electrolysis. Anode muds or slimes contain 2 to 25 percent selenium averaging about 8 or 9 percent. The recovery of selenium from anode slime is different at each individual plant.

Several selenium-recovery processes that have been used are:

* p.p.m. = parts per million.

Oxidizing roast, sulfating roast, boiling with dilute H_2SO_4 and niter, aeration in dilute H_2SO_4, pyrometallurgical methods, and miscellaneous methods.

The sulfate-roast process was used by the Canadian Copper Refiners, Ltd., Montreal East, Quebec.

The American Smelting & Refining Co. utilized the soda-smelt process for many years at Baltimore.

Kennecott Copper Co. fused selenium slimes with sodium bisulfate after first leaching out copper with acid.

The Perth Amboy, N. J., plant of the International Smelting & Refining Co. converted aerated slimes to alkaline slags. The selenium content of these slags was dissolved with sulfuric acid and combined with the water from leaching the flue dusts. Elemental selenium was then precipitated with sulfur dioxide.

At the Copper Cliff, Ontario, refinery of the International Nickel Co. the slimes was first fluxed with sand and fluorspar. The resulting matte was refined to dor'e, and the soda niter slags were leached with water. Selenium was recovered from this leach water by precipitation as "coke" selenium.

In some plants slimes and fume products from other metal-refining operations are added to the byproducts-recovery processes along with selenium scrap and spent slenium catalysts. In addition, many fractions are recycled and reporcessed, the net result being a rather complicated operation. Since these raw materials are seldom assayed, the source of any given batch of selenium is unknown.

Slime-treatment processes are designed primarily to recover the precious metals. Selenium and tellurium recovery has secondary importance. Frequent changes are made in slime-treatment processes to increase recovery rates, lower costs, and accommodate changes of raw materials.

The selenium end product of all of these processes is commercial-grade selenium (97.2 to 99.94 percent pure), usually in coke form. This coke selenium is pulverized and sold as commercial-grade selenium or further refined to high-purity selenium (99.99 + percent). Ferroselenium is produced as a byproduct of high purity selenium production. Ferroselenium can be used directly in producing stainless steel.

In 1953 selenium-production facilities were sufficeint for much larger operations had an increased supply of slimes become available.

RESERVES

Known reserves of minable copper at present economic and technologic levels are reported to be 25 million tons.

If all of the 25 million tons of copper reserves was mined and electrolytically refined, 18,750,000 pounds of selenium would be obtained if the present recovery rate of three-fourths pound of selenium per ton of electrolytically refined copper were maintained.

A continuation of present trends toward mining lower grade deposits on a larger scale will increase the total minable reserves.

Several additional selenium occurrences are possible economic sources of selenium. The seleniferous volcanic tuffs at Lysite, Wyoming, are estimated to contain 15 million pounds of selenium. Tremendous tonnages of selenium arecontained in the rock strata and soils of Western United States, and research is in porgress directed toward economic recovery from the richer portions of the selenium-bearing deposits. Magmatic sulfide deposits, other than copper, also contain large quantities of selenium. Pyrite-mining operations may produce byproduct selenium. Lead ores frequently have a high selenium content.

USES

Before World War I, selenium was regarded as the abominatioon of the smelterman and was mostly discarded. Even with present strong demand, selenium is regarded of minor importance compared with precious-metal byproducts. During the World War I, when manganeses was in short supply, selenium first came into use as a substitute to decolorize glass by neutralizing the greenish tinge imparted by iron impurities. Because selenium has certain inherent advantages over manganese in decolorizing glass, its use continued after manganese again became available.

The glass industry continued to be the major consumer of selenium until after World War II, when the selenium-rectifier industry became the principal consumer. Selenium rectifiers have been known since 1884 but were not used extensively until about 1930, when German and American investigators improved the device. Selenium dry-plate rectifiers change alternating to direct current and are extensively used in electroplating, welding, battery chargers, magnet coils, arc lamps, and in the operation of direct-current motors. Additional military uses of selenium rectifiers include aircraft controls, degaussing equipment, dynamotor power, guided missiles, ground starters for aircraft, magnetic amplifiers, radar equipment, relay and solenoid power, sonar equipment, telephones, teletypes and voltage regulators. The largest increase in rectifier

use occurred in 1947, when miniature rectifiers suitable for radio and television circuits were developed. These diminutive rectifiers, used in voltage multiplier circuites of rado and television sets, can deliver 200 to 500 volts d.c. from a 117-volt a.c. source, eliminating a heavy and bulky transformer and rectifier tube and saving more than ½ pound of copper and 7½ pounds of steel per television set.

Selenium has photoelectric conductivity, as well as rectification properties. Selenium photoelectirc cells are used in photographic exposure meters, electric eyes, colorimeters, and pyrometers.

As previously noted, selenium is added to glass to alter the greenish tinge of iron impurities to a neutral gray. From 0.03 to 0.3 pound of metallic selenium sodium selenite, barium selenite, or sodium selenate, per ton of glass is required, the exact amount being determined by the iron content to be neutralized. Excess selenium causes a pink tinge, which is desirable for milk bottles and a few other food containers. From 10 to 50 pounds of selenium per ton of glass yields a desirable ruby-red glass, which is used in tableware, taillight-signal lenses, light filters, infrared equipment, lantern globes, and traffic lights.

Selenium is important in the rubber industry. Added mostly as selenium diethyl dithiocarbamate, selenium acts as an accelerator and vulcanizing agent and, in addition, promotes resistance to heat, oxidation, and abrasion and increases the resilience of rubber.

Selenium as cadmium sulfoselenide is used as a pigment to produce orange, red, and maroon colors in paint, soap, rubber, ceramics, paper, printing inks, plastics, dyes, leather, and other products.

Selenium and its compounds are utilized in industrial and research chemistry. Selenium dioxide oxidizes organic compounds, producing reactions not obtainable by any other known method. Catalysts containing selenium can be either hydrogenating or dehydrogenating agents. Selenium is a hydrogenation and cracking catalyst in crude-oil and coal distillation. Soaps, waxes, edible fats, and plastics are produced by fat hardening with a selenium catalyst. The Kjeldahl method of nitrogen determination utilizes a selenium catalyst. It imparts exceptional antioxidant properties to printing ink, paints, mineral oils, transformer oils, and vegetable oils. The nondrying property of linseed, oiticica, and tung oils is due to contained selenium. Selenium also retards gelation in tung oil. The antioxidant and anti-galling properties of selenium compounds find application in lubricating oils and in extreme pressure lubricants. Selenium is the catalyst that synthesizes cortisone, used to treat arthritis, and isonicotinic acid, used

to treat tuberculosis, Selenium compounds are contained in insecticides, fungicides, parasiticides, bactericides, and herbicides, and in dandruff, dermatitis, and deodorant pharamaceuticals. Photographic photosensitizers and toning baths contain selenium compounds such as sodium selenosulfate. Blasting caps, mercury-vapor detectors, flotation reagents, fireproofing agents, insect repellants, phosphorescents, and luminescents can be made from selenium compounds.

Care must be exercised in such widespread usage, inasmuch as selenium and most of its compounds are toxic or corrosive. Selenium oxychloride is so corrosive that it has been referred to as the universal solvent. The oxychloride is used in phenolic resin solvent, rubber-resin solvent, glue solvent, and paint and varnish removers and has been used to activate charcoal for gas absorption.

Selenium improves the machinability of stainless steel. Forging steels contain 0.18 to 0.22 percent selenium and the full machining grade 0.30 to 0.35 percent. In cast steel 0.01 to 0.05 percent selenium assures a finegrained, bubblefree casting. Small quantities of selenium improve the machinability and tensile strength of copper and copper-rich alloys without appreciably lowering ductility or conductivity.

Serography, a dry photographic process, employs selenium-coated metal disks from which the photographic image is transferred by static electricity.

Radioactive slenium has been utilized in radiography.

Rectifier manufacturers consumed 497,041 pounds of selenium in 1953, which was 45 percent of the toal consumption. Two-thirds of the rectifiers manufactured in 1953 were power rectifiers, and one-third rectifiers for radio and television sets. One-third of all the selenium produced in 1953 was consumed by the chemical industry, 15 percent by the glass industry, and 6 percent by the steel industry.

GOVERNMENT WARTIME CONTROLS

Selenium was available in adequate quantities to meet all requirements during World War II.

Shortages of selenium developed just before the Korean War.

The National Production Authority placed both imported and domestically produced selenium under complete allocation in February 1952, explaining that the action was necessary if essential defense requirements were to be met. Allocation was terminated in early 1953, but the shortage continues.

In another national emergency, Government controls would probably have to be reimposed on selenium.

SUBSTITUTES

The National Bureau of Standards and several private companies have been investigating substitutes for selenium in rectifiers. For large fixed power application, germanium rectifiers can substitute for selenium rectifiers where water cooling is feasible. In the high-temperature ranges oxideized plates of titanium appears to be promising substitutes for selenium rectifier plates. Many other semiconductors are being studied as possible substitutes for selenium in rectifiers. Of these, silicon seems the most likely to be commercially available in the near future.

Glass manufacturers have already reduced the quanitities of selenium required per unit of glass, and further reduction of selenium consumption is possible by using manganese, arsenic, and rare earths in addition to selenium for decolorization. Ruby-red glass can be obtained by additions of gold or copper, but the resultant glass is somewhat inferior to selenium ruby-red glass.

Tellurium imparts desirable qualities to steel and copper equal to or better than selenium, but the garlicky halitosis developed by those handling the tellurium ingredients has thus far prevented much substitution. Sulfur can also substitute for selenium in steel, but the resultant product is less satisfactory than those containing selenium.

Sulfur and tellurium can also be substituted for selenium to a limited extent in the rubber and chemical industries.

DOMESTIC PRODUCTION, CONSUMPTION, AND FOREIGN TRADE

The American Smelting & Refining Co. (Baltimore, Md.), United States Metals Refining Co. (Carteret, N. J.), International Smelting & Refining Co. (Perth Amboy, N. J.), and Kennecott Copper Corp. (Garfield, Utah) are the principal selenium producers in the United States. In addition, several companies, including Kawecki Chemical Co., Boyertown, Pa. and Vickers Electric Division, Vickers, Inc., St. Louis, Mo., recover selenium from the scrap of rectifier manufacturers and spent catalysts andalso upgrade commercial-grade selenium and high-purity selenium. In 1953 the Kawecki Chemical Co. initiated selenium recovery from sulfuric acid-production byproducts.

Domestic production of selenium for the 5 years 1947-1951 averaged 514,988 pounds annually. In 1952 primary selenium production was 687,384 pounds, and 66,881 pounds of secondary selenium was recovered. A primary selenium production of 923,887 pounds and secondary production of 97,948 pounds were attained in 1953. Preliminary data indicates a primary selenium production of 705,000 pounds and a secondary production of 125,000 pounds in 1954. An appreciable increase is expected in 1955.

Apparent domestic consumption (producers' domestic shipments plus imports to consumers) of selenium has ranged during the 5 years about 600,000 to over 1,000,000 pounds, averaging 848,460 pounds annually. Producers' domestic shipments in the period averaged 536,215 pounds and imports to consumers 312,245 pounds. The trend since this period has been toward greater domestic shipments and smaller consumer imports. Apparent domestic consumption of selenium was 802,033 pounds in 1952, 1,125,501 pounds in 1953, and about 1,025,000 pounds in 1954. Demand for selenium and selenium compounds in the 1951-52 period exceeded 1,500,000 pounds and was steadily increasing , with no hope of fulfillment in the near future.

Exports of selenium by producers were at a low level during the 1947-51 period, averaging 27,321 pounds annually. Exports since this period have been at an even lower level and under strick Government control.

Imports of selenium for the 5 years 1947-1951 averaged 315,568 pounds a year. A record 529, 175 pounds of selenium was imported in 1947, largely from Canada. Selenium imports totaled 123,135 pounds in 1952, 99,865 pounds in 1953, and 194,692 pounds in 1954.

PRICES

The price of commercial -grade selenium has risen gradually from $1.75 per pound in 1947 to $6.00 a pound in 1955. Further increases are possible. Selenium prices in foreign markets are 2 or 3 times higher than those in the domestic and Canadian markets.

RESEARCH

Aside from the previously mentioned search for substitutes for selenium most research is directed toward increasing the supply of selenium. Selenium producers have completed research on increasing the selenium-recovery rates, and most of the resultant improvements have been incorporated into existing selenium-recovery processes. Many companies have analyzed their byproducts and wastes for selenium content. Very few were high enough in selenium content to warrant extraction.

The Bureau of Mines Salt Lake City Experiment Station has been investigating the selenium content of ores, rock strata and industrial byproducts for several years. This station has also experimentally recovered selenium from some of the richer and more promising sources such as the Lysite, Wyo., volcanic tuffs and the vanadiferous black shales of southeastern Idaho and southwestern Wyoming. Effective July 1, 1954, the General Services Administration provided financial support for continuing this research program.

Preliminary reports from the investigation of the commercial feasibility of extracting selenium from selenium concentrating vegetation are encouraging.

OUTLOOK

Present indications are that selenium production will be expanded slightly in 1955-57. Normal industrial demand for selenium is likely to increase more rapidly than selenium-production capabilities, in spite of the widespread trend to design away from the use of selenium and the increased uses of selenium substitutes. The selenium shortage can be expected to continue for at least 2 or 3 more years. During 1957-1959 an increased selenium production should be possible as a result of the several research programs now in progress. An annual world production of 3 or 4 million pounds of selenium should be feasible as a result of large-scale mining of low-grade deposits and from the farming of seleniferous vegetation.

PROBLEMS

The most important selenium problem at present is the inadequate supply of available selenium. The quantity of selenium produced in governed not so much by the demand for selenium as by the demand for copper. Large quantities of selenium are available from other sources, but these contain only 1 pound or less of selenium per ton of ore. Large-scale operations would be necessary to recovery such small percentages of selenium economically.Before industry can be expected to expend several million dollars in such large-scale production facilities, it must be convinced that such an undertaking is feasible and reasonably assured of returning a profit: additional technical and economic studies will be needed. Designing away from selenium and the increasing use of selenium substitutes tends to discourage any new large-scale production of selenium.

An attempt to farm seleniferous vegetation would be an entirely new type of mining never before attempted and attended by a host of pioneering problems.

The world wide scope of the selenium shortage plus the large price differential between North American selenium and world-market selenium prices combine to cause several import andexport problems.

The quantity of selenium that would be consumed if more were available is not known. A survey to evaluate this demand is needed.

Exhibit 2-g-6

EXCERPT FROM
LONG-RANGE MINERALS PROGRAM

Hearing Before the Committee on Interior and Insular Affairs United States Senate. Eighty-Fifth Congress

June 4, 1957

Page 118a

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

Selenium

Commodity Summary Data Sheet 1 *1

Basic Data

1. Industry: Leading 5 firms supply 98% of production; Next 2 firms supply 2% of production; Consumption by 220 firms centered in N.E. U.S.

2. Salient Statistics - U. S.:

Production:	1948	1949	1952	1953	1954	1955	1956(est.)
Primary	561	469	687	924	713	699	1,000
Secondary	N.A.#2	N.A.	67	98	127	152	150
Imports	267	172	123	100	195	192	235
Exports	N.A.#2	N.A.#2	N.A.#2	24 *3	24 *3	24 *3	24 *3
Industrial Consumption *4	838	490	802	1,128	1,021	1,051	1,140
Price, Commercial Grade	$2.00	$2.00	$3.00	$4.25	$5.00	$9.00	$15.50
Stocks	271	334	124	123	94	76	150
Employment: Primary and secondary refinery and smelter	130	180	200	300	250	275	

3. Import Sources: Canada 78%, Mexico 20%, Others 2%.

4. Domestic Reserves: Indicated, 19 million lbs., as a byproduct of 25 million tons of copper-ore reserves.

5. Tarrif:

1930 Rate	Effective Rate	Ad Valoren Equiv.
Free	Free	Free

6. Depletion Allowance: 15%, domestic and foreign.

*1 Quantities in thousands of pounds.
*2 N.A.: Not available.
*3 Allowed by Govt. allocation
*4 Producers domestic shipments plus imports.

2. Technological:

Broadening the resource Base.

3. International:

a. The imports of selenium from any one nation to the United States are not large enough to have any influence upon their economy.

b. There are no special international problems concerning selenium.

Programs:

1. Bureau of Mines:

	1954	1955	1956	1957
Expenditures:	$10,000	None	None	$5,000

Objectives: Discover new sources and improve methods for recovery of selenium for seleniferous uranium ores.

Results: Numerous mines and prospects were sampled for selenium value, but practically no reserves of economically workable material were found.

2. Other Government Agencies:

	1954	1955	1956	1957
Expenditures:	None	$66,667	$33,333	$95,000

These funds were spent on cooperative projects with the Bureau of Mines and Geological Survey.

Objectives: Discover new sources, improve analysis procedure, and do laboratory research to develop better and cheaper methods for recovering high-grade selenium from those ores representing a potential reserve.

Results: Mines and Prospects were investigated in N.D., S.D., Ariz., N.M., Calif., Nev., and five widely separated sections of the Phosporia formation in Idaho, Utah, and Wyo. Analytical procedures were developed and workable recovery proecdures were worked out.

3. Industry: Some research has been conducted by Battelle Institute and the U. of Wyoming on seleniferous plants as collectors of selenium, but commercial results have not been announced. Other work is being done on the recovery of Se from copper ores by the bigger smelting companies. Good results are apparent in the increasing production from these sources. Such programs probably have not aggregated over $50,000 per year.

Bureau of Mines - Division of Minerals
January 1957

7. Purchase Legislation:
   P.L. 206, 83rd Cong. None
   P. L. 733, 84th Cong. None

8. Defense Production Act:
   A.T.A.'s granted $75,000, Program open procurement and other contracts
   signed and purchase programs $288,000
   Contracts presently under consideration None
   Advance laons and other financial aid None
   DMEA approved contracts, Govt. share None
   Current ratio of Govt. participation None

9. Stockpile:
   Minimum - Not completed *
   Long Term - Not completed *
   Supplemental - Not authorized *

* Stockpile inventory not reported as filled. Stockpile inventories, stock in other Government accounts, and materials on order may fill objective.

10. World mine production and reserves:

	Mine Production	Reserves
World Total	not applicable	large
United States	byproduct of copper refining	19 million pounds

Selenium

Commodity Summary Data Sheet 2

Problems:

1. Domestic - Economic:

   a. Price changes have resulted in substitutions for selenium, but this has not affected production in any way, because selenium is a byproduct of copper refining. No data are available to calculate substitution elasticity.

   b. No reduction would result in the absence of special Government action.

   c. Price of commercial grade selenium ranged from $2 per pound in 1948 to $15.50 per pound in 1956. High purity selenium metal averaged $3 to $5 more than a commercial grade selenium.

   d. This byproduct commodity is tied economically to copper, principally, and to a much lesser extent to lead.

Exhibit 2-g-7

METAL STATISTICS 1957
Buyers' Guide
Page 794

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

Selenium

The American Metal Co., Ltd., N. Y. C.
American Smelting & Refining Co., N. Y. C.
Anaconda Sales Co., N. Y. C.
Bache & Co., N. Y. C.
Belmont Smelt. & Refining Wks., Inc., Brooklyn
Cerro De Pasco Corp., N. Y. C.
Derby & Company, Ltd., London
Gromo Trading Corp., N. Y. C.
Iritox Chemical Co., New York, N. Y.
Kennecott Sales Corp. N. Y. C.
Kolon Trading Co., Inc., N. Y. C.
Lentex Metal & Chemical Corp. N. Y. C.
Mitsubishi Metal Mining Co., Ltd., Tokyo
Mitsubishi Shoji Kaisha, Ltd., Tokyo
The Ore & Chemical Corp., N. Y. C.
Phelps Dodge Corp., N. Y. C.
Philipp Brothers, Inc., N. Y. C
Philipp & Lion, London
Sadoshima Metal Co., Ltd., Osaka, Japan
Emil A. Schroth, Inc., Newark
United Refining & Smelting Co., Chicago
W. Wiedmann & Co., Antwerp, Belgium
Wolverine Metal Company, Detroit, Mich.
Max Zuckerman, Baltimore

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

THOMAS CONSOLIDATED M... INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

D.M.E.A. APPLICATION

3. Accessibility of Project:

(a) "State name and address of person who will meet DMEA representative."

David E. Watson, or representative
640 Peyton Building
Spokane 1, Washington

Telephone No. RIverside 7-0708.

"Give directions for reaching the property; and describe accessibility of property including the mine workings."

The property is approximately 10 miles Northeast of Republic, Washington; the mining claims are crossed by an oiled county highway, and the main workings are approximately 900 feet north of this county highway.

(b) "Name the shipping and supply points and places where employees reside and state the distances between them and the property."

Previous shipments from the property have been made from a railway loading ramp at Torboy, Washington on the Great Northern Railroad, approximately 5 miles down the oiled county road that crosses the mining claims. The Company does not propose to furnish facilities for employees at this time since it is believed adequate facilities for living and trading exist in and around Republic, Washington.

THOMAS CONSOLIDATED MINES, INC.
640 SEXTON BUILDING
SPOKANE 1, WASHINGTON

4. The Exploration Project:

(a) "Describe full the proposed exploration project giving individual footages and sizes of openings for each item of work. Use narrative, maps, plans, and longitudinal and cross sections as necessary. Show the locations of the proposed work as related to geologic features such as veins, ore-bearing beds, contacts of rock formations, etc. Show also the relation of the proposed work to any existing mine workings and to propoprty boundaries or to the closest corner."

Reference is made to the map in pocket (Exhibit 2-a) with this application. The proposed work under this project has been outlined in dotted lines.

The collar of the shaft is caved, but not seriously so. As a guess 50 feet of shaft plus shaft collar would have to be repaired. The shaft is a two compartment incline. The precise dimensions are unobtainable because of the cave but it would appear to be approximately 4 x 7 feet. Everett Hougland who operated the property reports very little timber was used underground because the rock stood well and that not much caving of the underground works need be anticipated, but it is reasonable to assume some. The rehabilitation phase of the contract contemplates the repair of the shaft and the cleaning of mine levels.

The proposed shaft deepening would be at the size of the existing entry. Drifts and cross cuts are planned to be 6 x 7½ feet in the clear.

(b) "If an access road to the project must be built, show the location on the property map and state the length, type and construction methods proposed."

No access road necessary.

(c) "In the event that an exploration contract with DMEA is executed, how soon will the work start and how many months will be required to complete it? State your anticipated average daily or monthly rate of progress for each type of work."

In the event an exploration contract is entered into with the D.M.E.A., work would be commenced on the project no later than next Spring. A definite date of commencing is impossible to give because it is not known how long this application will be considered before a determination is made. Our present plan would be to carry forward the work on a one-shift basis.

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

D.M.E.A. APPLICATION

5. **Experience:**

"State your operating experience and background with relation to your ability to carry out this exploration project, and also that of the person or persons who will supervise the operations."

The Company has financed its exploration by assessments on shareholders. Following its organization in 1946, two exploration projects have been undertaken.

(1) Thomas Group - Placer Center District - Shoshone County, Wallace, Idaho.

Recapitulation of Work:

Two compartment vertical shaft	560 feet
Drifts, Cross cuts and raises	3,160 linear feet
Diamond Drilling	2,557 linear feet
Surface trenching by bulldozer	3,740 linear feet

(2) War Horse Mine - Fort Steele Mining Division - near Kimberly, British Columbia, Canada.

Recapitulation of Work:

Underground

Drifts and Crosscuts	4,800 linear feet
Diamond Drilling	2,343 feet
Tunnel length	3,885 feet

Surface

Road Construction	Five Miles Plus

RECAPITULATION

Two Compartment Vertical Shaft	560 feet
Drifts, Cross Cuts, and Raises	7,960 linear feet
Diamond Drilling	4,900 linear feet
Surface Trenching by Bulldozer	3,740 linear feet
Road Construction	Five Miles Plus.

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

D.M.E.A. APPLICATION

6. Estimate of Costs:

Description of the Work - The exploration project contemplates the following work in the Valley Mine.

A. Rehabilitating appproximately 50 lineal feet of the present shaft and mine levels by cleaning up tunnel and removing debris and retimbering where necessary.

B. Deepening the present inclined shaft (section 4 x 7 feet in the clear) 200 lineal feet.
C. Excavating a station and pocket at a proposed No. 600 level.
D. Drifting (a) (section 6 x 7½ feet in the clear) in the vein 1200 lineal feet on the No. 600 level, and (b) (section 6 x 7½ feet in the clear) 600 lineal feet in the vein on the No. 400 level, and (c) (section 6 x 7½ feet) 200 feet on the 100 level.

E. Crosscutting (section 6 x 7½ feet in the clear) from the proposed station on the No. 600 level to intersect the vein.

F. 600 lineal feet of raises for prospecting between levels.

Estimated Cost -

6.(a) Independent Contracts. None.

6.(b) Labor, Supervision, Consultants: Applicant asks waiver of schedule. Actual necessary costs to be allowed but no more than $815.00 per month for supervision. Consultants as required at cost.

6.(c) Operating Mat'ls. and Supplies: (Applicant asks waiver of schedule. Actual costs allowable.)
6.(d) Operating Equipment.

To be rented - See Below.
To be purchased - As required.
To be furnished by operator - the applicant, will furnish or rent, or acquire by purchase contract all operating equipment for the work at an arbitrary allowance of $450.00 per month, beginning with the beginning of work.

6.(e) Rehabilitation and Repairs: Minor other than underground.

6.(f) New Buildings, Improvements: None

6.(g) Miscellaneous: Actual necessary costs.

CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

SUMMARY

A.	Rehabilitate approximately 50 lineal feet of shaft and mine drifts and cross cuts.	$ 4,000.00
B.	Sink 200 lineal feet of inclined shaft. @ $105.00/ft.	21,000.00
C.	Station and pocket.	5,000.00
D.	2,000 lineal feet of drifting and crosscutting @ $55.00/lin. ft. (This estimate is for a timbered drift close lagged in the back. If timbering is unnecessary the estimated cost is $47.50/lin. ft. and the total cost will thus be corresponding less but the higher estimate is here indicated to cover all eventalities.)	110,000.00
E.	600 feet raises from 600 to 400 and 400 to 300 levels @ $35.00.	21,000.00
	Total Estimated Costs	$161,000.00
	Government Participation @ 75%	$120,750.00

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

D.M.E.A. APPLICATION

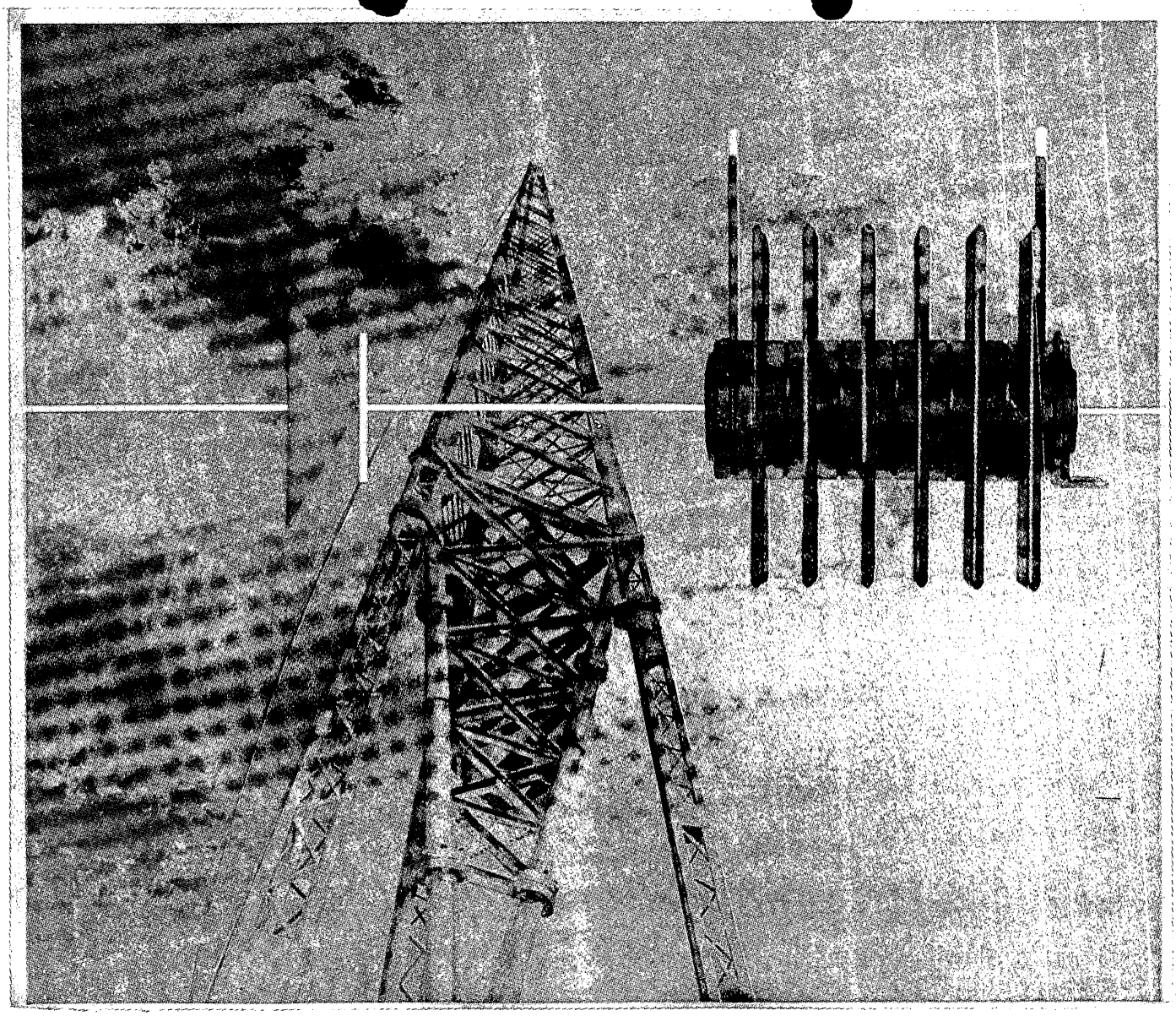
7. (a) "State whether you are prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation stated in Sec. 7 of DMEA Order - 1, Amended."

The Company plans on carrying its proportionate share of the contemplated program by assessments on its shareholders and/or by such other financing as may be available to it.

(b) "Explain to what extent you propose to furnish your share of the costs by providing money, by use of equipment owned by you, or otherwise."

The application is predicated on the Company furnishing all the necessary equipment to conduct the program, whether it has it now, rents it, or acquires it by purchase contract. As a depreciation rate for the use of this equipment an allowance of $450 per month is asked.

Item 7.



SELENIUM: ONE WAY STREET FOR ELECTRONS

A selenium rectifier is a compact, efficient device used to convert alternating current into direct current. It serves as a "one way street for electrons" in many everyday electronic devices . . . in everything from television to radar.

But besides its applications in electronics, selenium has many other rare characteristics: When exposed to light it generates an electric current, and so is used in light meters and photoelectric cells. Combined with cadmium, it imparts color to red automobile tail lights, to crimson paint, to red textile dye. Conversely, it is a highly efficient decolorizer in glass where maximum transparency is essential. It is used in the manufacture of cortisone. It imparts certain desirable characteristics to stainless steel.

ASARCO's metallurgists have succeeded in increasing the supply of selenium to the point where demands for this versatile element can now be met immediately, including those for high-purity selenium—99.99 percent pure—which is required for electronic uses.

The present balance between supply and demand for this useful element is due largely to improved recovery processes, developed and perfected by ASARCO. Nobody mines selenium. It is available as a by-product of copper refining and exists only in some ores, and then only in trace amounts . . . not more than one part in 300,000 or 400,000.

ASARCO works with more non-ferrous metals and elements than any other company. Selenium, indium, tellurium and most of the other rare metals and elements; and copper, lead, zinc, silver and other long-known basic raw materials are all constant subjects for ASARCO Research. We will be pleased to help you find ways and means of using these metals and elements more efficiently and economically.

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway, New York 5, N. Y.

ASARCO

Exhibit 2-a

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING
SPOKANE 1, WASHINGTON

DMEA Form 7
(12-56)

10/22 Anderson 600

OFFICIAL FILE COPY

Date	Surname	Code
10/22	Houk	600
10/22	Selfridge	120
"	Johnson	110
"	Mittendorf	100
10/23	gb	220
		225

600

Mr. David E. Watson
President, Thomas Consolidated Mines
640 Peyton Building
Spokane 1, Washington

OCT 22 1957

Re: Docket No. DMEA-4831-Selenium
Thomas Consolidated Mines
Valley Mine
Ferry County, Washington

Dear Mr. Watson:

We acknowledge receipt of your letter of October 9, 1957, on the denial of your application for Government assistance to explore the subject property.

After careful study of your proposed project, we are of the opinion that in order to make an economically successful operation of your property the selenium content of the ore should run in the hundredths of one percent rather than in the thousandths of one percent. The property should also have geologic possibilities of producing considerable tonnage of this grade ore to qualify under our program. Other factors of economic importance are mineralogic character of ore minerals, mining methods and costs, metallurgical recovery costs, marketing costs, price, and demand. While commercial grade selenium metal is selling around $10.00 a pound, the price a producer would realize would depend upon the type of the concentrate and its selenium content.

We noted the enclosed advertisement by the American Smelting and Refining Company, and agree that the contained information is substantially correct. For added information on selenium we are enclosing the following Bureau of Mines publications:

Preprint from Minerals Yearbook, 1954, Minor Metals.
Preprint from Bulletin 556, Selenium.
Mineral Industry Surveys, Selenium in August 1957.

We trust that the information contained herein will be of help to you in determining the merits of your proposed operations.

Sincerely yours,

C. O. Mittendorf (for)

Administrator

Enclosures 3
WCAnderson:gad 10/22/57

Copy to: Admr. R. File
Field Team, Region I
Mr. Kiilsgaard, 5222
Mr. Baroch, 3647
Mr. Houk

8623

THOMAS CONSOLIDATED MINES, INC.
640 PEYTON BUILDING • PHONE RIVERSIDE 7-0708
SPOKANE 1, WASHINGTON

OFFICIAL FILE COPY
DMEA
RECEIVED OCT 11 1957

DATE	INITIALS	CODE
10/11	C	220
10/11	wra	600
		225

October 9, 1957

C.O. Mittendorf, Administrator
United States Dept. of the Interior
Defense Minerals Exploration Admin.
Washington 25, D. C.

Re: Docket No. DMEA-4831-Selenium
Thomas Consolidated Mines
Valley Mine
Ferry County, Washington

Gentlemen:

Your letter concerning the Valley Mine denying exploration assistance for selenium is before me. As our application showed, the shaft collar which is the mine entry is caved for approximately fifty feet. Inasmuch as our application for selenium was predicated on the identification of that rare mineral by work done at Washington State College for a Master's Degree and really involved only the identification of the mineral in two hand specimens from the mine, we are considering the advisability of doing the necessary repair work to the property and pumping it out and doing adequate sampling to determine more precisely what the selenium content of the mine might be.

Your letter says:

> "Projects approved by the Defense Mineral Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program."

Please be kind enough to have your staff review the Valley application and give us what in your opinion would be an acceptable grade of selenium in the Valley Mine to warrant exploration assistance under a D.M.E.A. Contract.

With this information at hand as to what your requirements might be now that you have at hand the geological information on the Valley, we then would be in position to determine

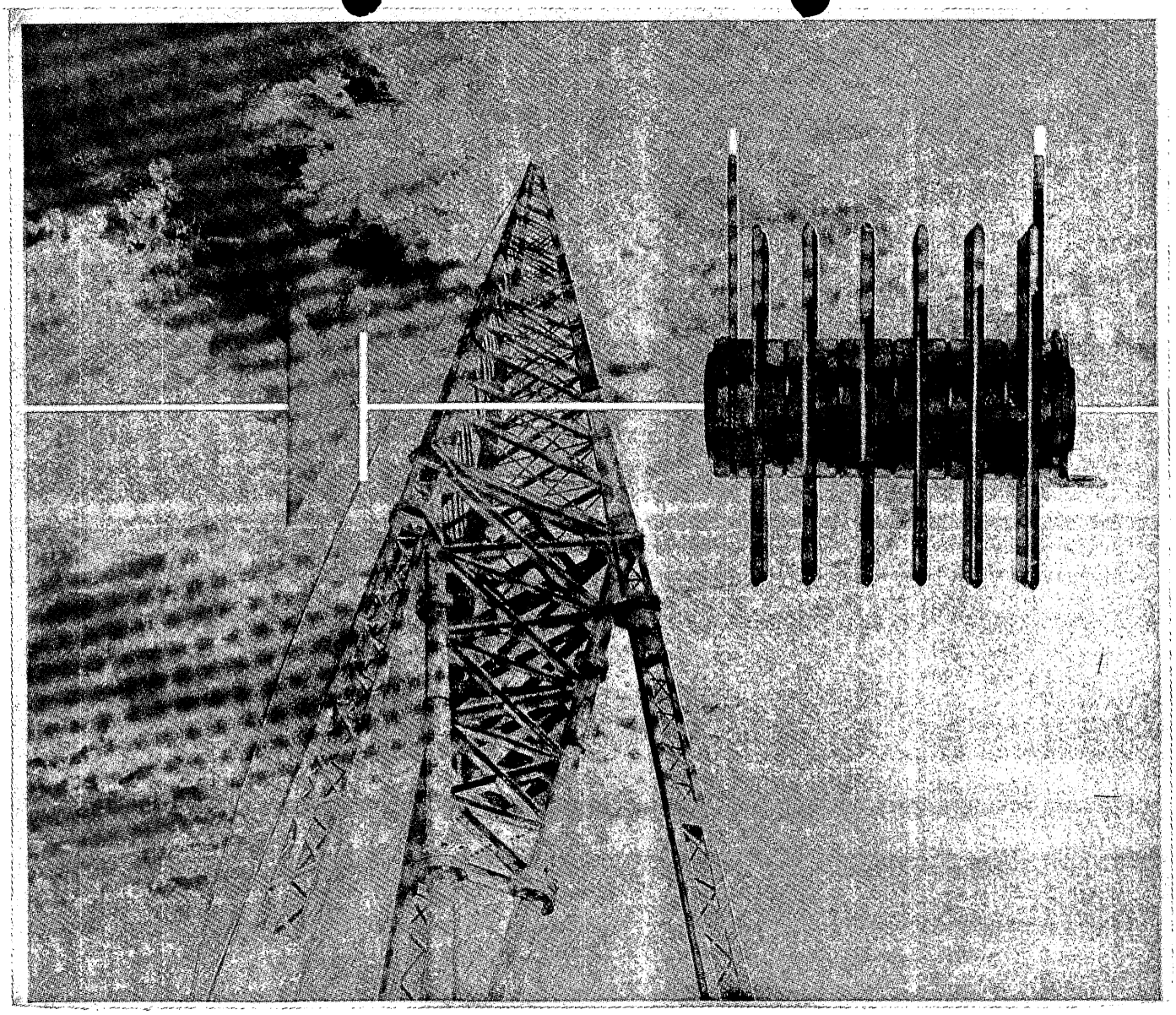
whether or not our investment in rehabilitating the mine and sampling for selenium content and the accompanying gold content would be a good mining risk.

I note in the enclosed advertisement of the American Smelting and Refining Company that no selenium is being mined as such and that in their words it "exists only in some ores, and then only in trace amounts...not more than one part in 300,000 or 400,000."

Sincerely,

David E. Watson
President

DEW/blb
enc.



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ASARCO works with more non-ferrous metals and elements than any other company. Selenium, indium, tellurium and most of the other rare metals and elements; and copper, lead, zinc, silver and other long-known basic raw materials are all constant subjects for ASARCO Research. We will be pleased to help you find ways and means of using these metals and elements more efficiently and economically.

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway, New York 5, N. Y.

ASARCO

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/27	Houk	600
9/30	Selmeier	130
	Lamb	130
	Williams	130
	Johnson	110
"	Mittendorf	100
		220

600

SEP 30 1957

Thomas Consolidated Mines
640 Peyton Building
Spokane 1, Washington

Re: Docket No. DMEA-4831-Selenium
Thomas Consolidated Mines
Valley Mine
Ferry County, Washington

Gentlemen:

Your application for aid for an exploration project and other reports available to us in Washington relating to the subject property have been reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information indicates to us that the probability of disclosing significant reserves of selenium is not sufficiently promising to justify Government participation. We regret to advise you, under these circumstances, that your application for exploration assistance is denied.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

C. O. Mittendorf (for)
Administrator

LGHouk:rsi 9/27/57
Copy to: Admr. R. File
Operating Committee
Field Team, Region I
Mr. Kiilsgaard, 5222
Mr. Baroch, 3647
Mr. Houk

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
9/27	Houk	600
		220

September 27, 1957

Memorandum

To: Mr. C. O. Mittendorf, Administrator

From: Lawrence G. Houk, Director, Division of Nonmetallic Minerals

Subject: Evaluation of application and field examination report
Docket No. DMEA-4831-Selenium-Gold
Thomas Consolidated Mines
Valley Mine
Ferry County, Washington

Denial of application is recommended.

Selenium: Only about 100 pounds of selenium is estimated as reserves worth approximately $1,050.00, if refined to 99.5% pure. According to the owner of the mine the total production of the mine has been 20,248.7 tons of ore containing 6,059.027 ounces of gold.

Minerals: Selenium most probably occurs as aurous selenide and on the basis of two samples each gram of the ore contains between 0.027 and 0.0608 mg. of selenium, an average of 0.0439 mg. of selenium and 0.224 mg. of gold. Of each 0.224 mg. of gold there are 0.0439 mg. of selenium. The selenium to gold ratio would be about 1:5.

Applicant's proposal: Reopen caved shaft and level workings, deepen the existing shaft 200 feet, and drive a total of 2,000 feet of crosscutting and drifting on three levels at an estimated total cost of $161,000.00.

Recommendations:

By the Field Team: Selenium content is not significant and we recommend that the application be denied without referral to the field.

By the Commodity Members:

Bureau of Mines: Selenium content appears to be too low for further consideration.

Geological Survey: The comment of the Field Team is well taken and I concur with the recommendation that the application be denied without a referral.

By the Division of Nonmetallic Minerals: Concurs in the Field Team's recommendation and considers this project to be an opportunist's proposal to reopen an

8623

an old gold mine. Because of the low selenium content of ore samples, 0.001%, the Division of Nonmetallic Minerals recommends denial without field referral.

LGHouk:gad 9/27/57
Copy to: Admr. R. File
Mr. Houk

IN REPLY REFER TO:

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

September 25, 1957
Re: DMEA 4831
Thomas Consolidated Mines
Valley Mine
Ferry County, Washington
$161,000 - Selenium

Memorandum

To: L. G. Houk, Defense Minerals Exploration Administration

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

Subject: Review of application

The applicant requests assistance in the amount of $120,750 to open an old gold mine in order to recover, according to the Field Team's analysis, a possible $1,050.00 worth of selenium.

The comment of the Field Team is well taken and I concur with the recommendation that the application be denied without a referral.

N. E. Nelson

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DMEA
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DATE
9/26 13 220
600

September 20, 1957

4831

Selenium
Thomas Consolidated Mines
Valley Mine
Ferry County, Wash.

Lawrence G. Houk, DMEA Member
Selenium Commodity committee
C. T. Baroch, Acting Chief C. T. Baroch
Branch of Rare and Precious Metals

Application

9/11/57 9/20/57

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	Houk	600

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Selenium content appears to be too low for further consideration.

Original

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RECEIVED SEP 13 1957

DATE	INITIALS	CODE

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

So. 157 Howard Street
Spokane 4, Washington

September 11, 1957

Mr. George C. Selfridge, Chairman
Operating Committee, DMEA
Department of the Interior
Washington 25, D. C.

Re: New Application (Selenium-Gold)
Thomas Consolidated Mines
Valley Mine
Ferry County, Washington

Dear Mr. Selfridge:

Enclosed are the original and two copies of an application for aid to explore for selenium in the Valley Mine, Ferry County, Washington.

The applicant, Thomas Consolidated Mines, proposes to reopen a caved shaft and level workings, deepen the existing shaft 200 feet, and drive a total of 2,000 feet of crosscutting and drifting on three levels at an estimated total cost of $161,000, of which the Government's share would be $120,750.

Supporting the application are two reports, one on the mine by Everett Hougland, the owner of the mine, the other on the relationship of selenium and gold in the ore of the Republic district by J. Haworth Jonte. According to Hougland, the total production of the Valley mine has been 20,248.7 tons of ore containing 6,059.027 ounces of gold. According to Jonte, the selenium most probably occurs as aurous selenide and on the basis of two samples from the Valley mine, each gram of the ore contains between 0.027 and 0.0608 mg of selenium and between 0.195 and 0.253 mg of gold, or an average of 0.0439 mg of selenium and 0.224 mg. of gold. Therefore, for each 0.224 mg of gold there are 0.0439 mg of selenium, and the selenium to gold ratio would be about 1:5. If this relationship is correct, then the 20,248.7 tons of ore would have contained about 100 Troy lbs. or about 82 lbs. avdp. of selenium.

According to Hougland, reserves at the Valley mine are about 24,500 tons. Assuming that the gold content is the same as that shipped and the supposed ratio of selenium to gold remains unchanged, the estimated reserves would contain about 7,330 ounces of gold and 1,466 Troy ounces or about 100 lbs. avdp. of selenium worth $1,050.00 (if refined to 99.5% pure) or $0.042 per ton of estimated reserves.

Following are the selenium content of ore samples taken in the Republic district by Bureau of Mines engineers under a reconnaissance survey of selenium deposits in Region I:

Mine	% Selenium
Republic mine	0.001
" "	< 0.001
Princess Maud	< 0.001
Valley mine 1/	0.001
Flag Hill	< 0.001
Knobb Hill	0.005 & 0.006 (check) 2/
" "	0.002 & 0.002 (check) 3/

1/ Mine under consideration in this application.
2/ Two independent laboratories got 0.009% and nil, respectively.
3/ Two independent laboratories got nil and nil, respectively.

On the basis of one Bureau of Mines sample taken at the Valley mine the ore would contain 0.02 lbs. of selenium worth $0.21 per ton of ore. Since the minimum detection for the analysis of selenium is about 0.001 percent, the selenium content could be less. The selenium content of the sample taken from the Valley mine is very small compared to that of many samples from other properties that were obtained in this reconnaissance survey.

In our opinion this selenium content is not significant and we recommend that the application be denied without referral to the field.

By Field Team, Region I

D.R. MacLaren

D. R. MacLaren, Alternate
Acting Executive Officer
U. S. Geological Survey

Thomas E. Howard

Thomas E. Howard, Acting Member
U. S. Bureau of Mines

Enclosures

cc: USBM (2)
Geologist

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

September 17, 1957

Thomas Consolidated Mines
640 Peyton Building
Spokane 1, Washington

Subject: DMEA 4831

Gentlemen:

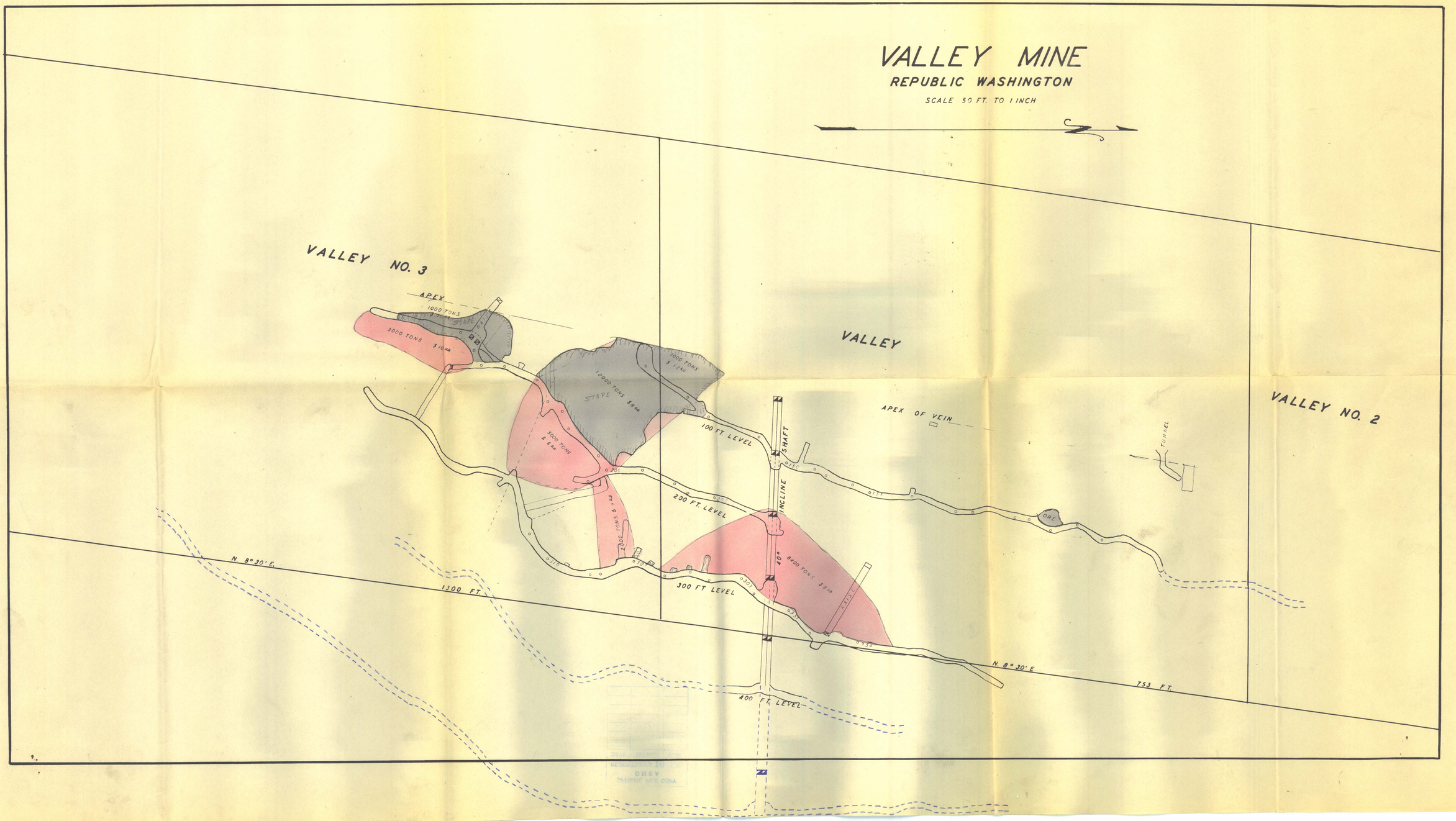
Your application for exploration assistance, dated September 6, 1957 submitted to our office at Spokane, Washington has been assigned Docket Number DMEA 4831 and referred to the Non Metallics Minerals Division in the Washington office. Kindly identify all future correspondence relating to your application by this Docket Number.

Sincerely yours,

Allen S. Dakan, Director
Operations Control and
Statistics Division

Copy to: Region I

VALLEY MINE

REPUBLIC WASHINGTON

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