MME Form 9
Rev. Mar. 59

UNITED STATES
DEPARTMENT OF THE INTERIOR
Office of Minerals Exploration

OFFICIAL DOCKET FILE Contract No. 14-23-_____ Docket No. MME-6492

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- [ ] Withdrawn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
- [ ] 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 Semiannual 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 Semiannual Inspection Reports
- [ ] Project Summary (Interim) by MME Engineers

Right Side

- [ ] Field Team Semiannual 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

52625

MME FORM 6 REFERENCE SLIP

REV. 2-59 OFFICE OF MINERALS EXPLO ION

TO: Chief, OME	DATE	INITIALS
1.	8/23/65	
2.		
3.		
4. M. L. Smelser		
5. M. L. Smelser for D. R. MacLaren		
FROM: Acting Fld. Officer, Reg. I		

FOR: Check items for action desired

X Action ____ Reply for signature of _____

____ Approval ____ Investigate ____ Surname

____ Comment ____ Recommendations ____ Signature

____ Conference ____ Rewrite ____ File

____ Instructions ____ Your information

REMARKS: Forwarding New Application (Molybdenum)
Keevil Mining Group Limited (Nuna Claims)
Glacier Bay Mining District, Alaska

In Mr. MacLaren's absence I am forwarding to you for review the attached application.

INT.-DUP. SEC., WASH., D.C. M56300-62

KEEVIL MINING GROUP LIMITED

SUITE 1000, 11 ADELAIDE STREET WEST, TORONTO 1. TELEPHONE EMPIRE 3-1571

TICK CORPORATION LIMITED
GOLDFIELDS MINING CORP. LTD.
LAMAQUE MINING CO. LTD.
MINING CORPORATION CO. LTD.
PICKLE CROW GOLD MINES LTD.
SILVERFIELDS MINING CO. LTD.
TEMAGAMI MINING CO., LTD.
and other associated companies

OFFICIAL COPY
O. M. E.
RECEIVED
AUG 26 1965
INITIALS | CODE

August 18th, 1965

Mr. D.R. MacLaren,
Acting Field Officer, OME,
U.S. Department of the Interior,
South 157 Howard Street,
Spokane, Washington. 99204
U.S.A.

Dear Mr. MacLaren:

With regard to your letter of May 24, 1965, we are submitting an application for financial assistance for a drilling program on the Nunatak molybdenum property in Alaska. Weather conditions dictate that the program be done in the month of June, July or August. As you stated in your letter that the time to process an application is usually 2 to 3 months, it was evident that our program could not be finished this summer. To do the program in two parts as you suggested, is not economically possible because of the costs involved in this location of moving a drill and camps around.

Yours very truly,

KEEVIL MINING GROUP LIMITED

/S/ E. G. Thompson

E.G. Thompson

EGT/ct

RECEIVED
AUG 23 1965
O.M.E.
SPOKANE, WASH.

MME Form 40
Jan. 65

RECEIVED
AUG 23 1965
BLM
SPOKANE, WASHINGTON

Budget Bureau No. 42-R1368
Approval expires Dec. 31, 1968

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

Pursuant to Public Law 85–701 (72 Stat. 700; 30 U.S.C. 641)

OFFICIAL COPY
O. M. E.
RECEIVED
AUG 26 1965
INITIALS | CODE

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

KEEVIL MINING GROUP LIMITED
c/o Suite 1000 - 11 Adelaide St.W.,
TORONTO 1, ONTARIO.

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER 6492

DATE RECEIVED 8/26/65

REGION I

DIVISION CODE

BUSINESS ORGANIZATION *(Check one)*

- INDIVIDUAL
- CORPORATION X
- PARTNERSHIP
- OTHER *(Specify)*

STATE IN WHICH FIRM IS ORGANIZED Ontario Canada

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
N.B. Keevil	866 Tennyson Ave., Port Credit, Ontario	President
J.H. Westell	73 Wimbleton Rd., Islington, Ontario.	Vice-Pres.
J.C. Frantz	18 Inez Court, Willowdale, Ontario	Vice-Pres.
J.W. Stephenson,	103 Ridley Blvd., Tor.12, Ontario	Treasurer
D.S. Brown	109 Pandora Circle, Scarboro, Ontario	Secretary

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE
Molybdenum

ESTIMATED COST OF PROJECT
$ $121,500

PROPERTY NAME	LOCATION COUNTY	STATE
Nuna Claims,	Glacier Bay Mining District,	Alaska

GENERAL INSTRUCTIONS

Before filling out this application, please read the *OME Regulations for Obtaining Federal Assistance in Financing Explorations for Mineral Reserves* (30 CFR Chap. III). 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 two 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 2, existing mine workings and geology in item 3, and the proposed exploration work in item 5. 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 3(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 Office of Minerals Exploration, Department of the Interior, Washington 25, D. C., or with the nearest OME 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, and that he would not ordinarily undertake the proposed exploration under current conditions and circumstances at his sole expense.

Aug. 13, 1965
DATED

J. Frantz
BY *(Signature)*

Vice-Pres.
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. Financial Eligibility:

(a) Submit evidence of efforts made within 90 days preceding the filing of this application to obtain credit from your bank of account and at least one other banking institution or other private source of credit. Such evidence shall include true copies of correspondence which show: (1) date of loan request, (2) amount and terms requested, (3) proposed use of loan funds, and (4) the replies from credit sources. If the loan was offered under terms which you consider unreasonable, state why you consider them so.

(b) List names and addresses of affiliated, parent, or controlling companies or organizations and state extent and nature of their interest.

(c) State how you propose to furnish your share of the cost of the exploration work.

2. Applicant's Rights in Land:

(a) State your interest in the land and mineral rights, whether owner, lessee, purchaser under contract, or other. If you are not the owner, submit one true copy of the lease, contract, or other document (with address of owner) under which you control the property. Describe all liens, mortgages, or other encumbrances on the land and state book and page number and official place where recorded.

(b) 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 adjacent land which you own or control. Describe any part of the land or workings which should not be subject to Government royalty and liens. If the land consists of unpatented claims, state book and page number for each recorded location notice, including amended locations, and official place where recorded. State all the names by which you know the property.

(c) For all land or mineral rights encumbered or not owned, submit five copies of Lien and Subordination Agreements on MME Form 52. If the agreements cannot be obtained, state reasons and provide copies of letters of refusal.

3. 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 land. Include existing mine workings and all production facilities.

(b) State your interest, if any, in operations described in (a).

(c) State, if 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, giving quantities and grades and sampling methods used. Support 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 have, indicating whether you require their return.

4. Accessibility of Property:

(a) To aid the OME representative who may examine the property, state name and address of person who will meet him; give directions for reaching the property; and describe accessibility of property and of any mine workings.

(b) Name the shipping and supply points and state the distances to the property.

5. Exploration Work:

(a) Describe fully the proposed exploration work giving individual footages and sizes of openings *for each item of work.* Use narrative, maps, plans, and sections as necessary. Show 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 *land boundaries* or to the closest identifiable corner.

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

(c) If an OME contract is executed, state how soon thereafter work would be started and finished. State your anticipated average daily or monthly rate of progress for each type of work.

6. Experience:

State your operating experience and background to conduct this exploration work and also that of the person who will supervise the work.

7. Estimate of Costs:

Furnish detailed estimates of the necessary costs *for each item of the work proposed in 5(a)* under the headings listed below with a total for each heading and the estimated total cost of the work. Costs for any work to be performed by an independent contractor should be listed separately under category (a) below. Costs for any work that is not to be performed by an independent contractor should be listed under categories (b) through (g).

(a) Independent contracts. State the total cost of any proposed independent contract for all or any part of the work, and the number of units and the unit cost for each type of work, such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, or 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. The cost of supervision, engineering and geological services, outside consultants, and labor should be itemized by numbers and classes of employees; rates of wages, salaries or fees; and periods of employment. State whether these services are available.

(c) Operating materials and supplies. List items of material and supplies giving quantity and cost of each. 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 equipment and tools costing $50 or more per unit. Give specifications and indicate how each item is to be acquired—i.e., rented, purchased or provided by the applicant. If rented or purchased, state the estimated rental or purchase price. If furnished by the applicant, state condition and present fair market value.

(e) Initial rehabilitation and repairs. Describe the type and the cost of *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 in the exploration work.

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

(g) Miscellaneous. Describe the type and estimate the cost of repairs and maintenance of the operating equipment listed in 7(d). Do not repeat initial repairs listed in 7(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*—The Government will not contribute to costs incurred before the date of the contract, or to costs of or incident to: (1) acquiring, using, or possessing land and any existing improvements, facilities, buildings, installations, and appurtenances, or the depreciation and depletion thereof; (2) general overhead, corporate management, interest and taxes (other than payroll and sales taxes); (3) insurance (other than employees' liability insurance); and (4) damages to persons or property (other than authorized repair to or replacement of equipment or other property used in the work).]

T.-DUP. SEC., WASH., D.C

KEEVIL MINING GROUP LIMITED
SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT,
CANADA

INFORMATION REQUIRED FOR FINANCIAL ASSISTANCE IN MINERAL EXPLORATION, NUNATAK PROPERTY GLACIER BAY AREA, ALASKA

1. Financial Eligibility

(a) See attached correspondence with Bank of Montreal and Canadian Imperial Bank of Commerce.

(b) Option held by Keevil Mining Group Limited, Suite 1000, 11 Adelaide St.W., Toronto. A company with 2,000 shares issued as per attached list. Bulk of exploration funds are provided by Teck Corporation Limited and Copperfields Mining Corporation Limited of same address.

(c) Keevil Mining Group share of the cost of exploration work would be furnished by Teck Corporation and Copperfields Mining Corporation and possibly by other mining companies.

2. Applicants Rights in Land

(a) The property is under option from James Walper (see attached agreement)

(b) The property consists of 35 unpatented lode mining claims, known as Nuna 1 to 30 and 34 to 38 inclusive, Juneau Recording District, Book 32 Pages 243 to 277 inclusive.

(c) Not applicable

3. Physical Description

(a)The deposit was discovered in 1941. The Nunatak was mapped by W.S.Twenhofel (U.S.G.S. Bull. 947-B) in 1942-43 and by R.S. Sanford, G.A. Apell and F.A. Rutledge of the Bureau of Mines in 1942. A total of 215 channel samples were taken and two diamond drill holes totalling 286 feet were drilled. The property has been staked intermittently for many years and examined by various companies. In the spring of 1964 the deposit was staked by James Walper

for a syndicate composed of Selco Exploration, Chesapeake Co. and Keevil Mining Group. The property was reported on by George Wahl (enclosed report) and turned down. The property was optioned by Keevil Mining Group in March 1965 and reported on by Dr. Gross (report attached) who recommended a drilling program of 5000 feet (7 holes) NX core at a total estimated cost of $ 125,000.00 U.S.

(b) Work in 1964 and 1965 as described in (a)

(c) No production

(d) No ore reserves as such. Zone of siliceous mineralization in the order of 200,000 tons per vertical might average 0.1% Mo S_2. There is no ore-body cropping. See reports by Twenhofel, Sanford et al, Wahl and Gross attached.

(e) A monzonite intrusive into limey argillites which has produced hornsfel sequence and a silicified mineralized halo. Only a part of the intrusive presently outcrops. See reports mentioned in (3 g)

(f) Samples as per reports. Reasons for the expectation of ore are quoted from reports by Dr. Gross.

"The monzonite stock and its satellites are believed to represent the top of a much larger intrusive in depth. The reason for believing this is that the limey argillites of the country rock have been extensively altered for distances of from 1,000 to upwards of 2,000 feet from the outcrop of the stock. Although it is true that limey argillites are easily metamorphosed, nevertheless, this is an extensive alteration zone for such a small exposure of intrusive and strongly suggests the presence of more intrusive at depth. The trend of this zone of alteration, like the axis of the intrusive itself, is across the strike of the bedding. In this way the limey argillites that outcrop in the southwestern part of the property can be followed along strike until they loose their identity as they approach the intrusive and develop into a "skarn-like" assemblage of minerals.

There is little doubt in my mind that the extensive zone of alteration, silicification, and quartzsulphide mineralization is related to the monzonite intrusive. I have already mentioned why I think this intrusive increases in size with depth. Low-grade molybdenite occurs from place to place within this intrusive and the problem remains to find out whether larger and richer deposits occur within the intrusive at greater (topographic) depth. The molybdenite concentration

might occur at the top of an intrusive apophyse that is covered so that the deposit although lower topographically would be "high" geologically. It seems to me that it is the occurence of molybdenite within the monzonite itself that could be the large tonnage maker. Therefore, drill holes have been designed to test this possibility.

(g) Reports by Twenhofel Sanford et al, Wahl, Gross and Race.

4.

(a) The deposit is on Nunatak Peak, Muir Inlet in the Glacier Bay district of South-eastern Alaska, (North lat. 58° 39' 30", West long. 136° 06' 30") The area is 78 air miles N 53° W of Juneau or 129 nautical miles. At the present time our company does not have a man in Juneau to take on OME representative to examine the property.

(b) as in (3 g)

5. Exploration Work

(a) 5000 feet of NX drilling in 7 holes as recommended report by W.H. Gross, P. Eng. Phd. and shown on map in report.

(b) Drill road from shore and levelling of drill sites is presently being done.

(c) Weather conditions would not allow us to start this year. Drilling could commence by June 15, 1966. Drilling footage could average 150' per day and it is expected that the program would be completed in one and one half months.

6. Experience

Our group of companies operate 5 mines in Canada and are continuously engaged in exploration work. The geologist who will set on the drill has not been designated at this time. The program was recommended and the drill holes spotted by Dr. W.H. Gross, P. Eng., Consulting Economic Geologist.

7. Estimate of Costs (report by W.H. Gross)

The drilling will be done under contract with a drilling contractor. Their estimated

figure is $ 15.00 per foot for a total of $ 75,000. Road and site preparations at a cost of $ 3,500 is presently being done by our company. Transportation, consisting of boat and fixed wing aircraft, is estimated at $ 10,000. Geological supervision costs of $ 8,000, food, fuel and cookery cost of $ 10,000, assays and freight costs of $ 3,500 and contingencies (15%) at ? $ 15,00,000. Total cost of $ 125,000, less $ 3,500 presently being done, leaves $ 121,500.

E.G. Thompson, P. Eng.,
August 12, 1965

Aug 13/65

Lode Book 32 Page 370
Juneau Recording Dist.

KEEVIL MINING GROUP LIMITED
SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT,
CANADA

Suite 1000,
11 Adelaide Street West,
Toronto, Ontario.

March 31, 1965.

James Walper, Esq.,
83 Spadina Road,
Toronto, Ontario.

Dear Sir:

This letter will serve to set out the agreement which we have reached with you today and upon being fully signed by both of us, and one copy being redelivered to us, will constitute a legal and binding agreement between us.

We understand that you are the recorded and/or beneficial holder of a 100% interest in certain mining properties located at Nunatak Bay, Alaska, more particularly described as follows:

Nuna 1 to 30 inclusive and
Nuna 34 to 38 inclusive, totalling 35 claims in all.

(described for convenience in this letter as the "mining claims"). You have represented to us that the mining claims were properly and legally acquired and that they are presently in good standing at least until the day of September 1, 1965, free and clear of any liens or encumbrances. You have further represented to us that you have the sole and complete power to deal with the mining claims.

For good and valuable consideration, you have agreed to grant to us immediate and exclusive possession of the mining claims for an exploration period extending for a maximum of five years from the date of this letter and are delivering to us herewith recordable transfers of the mining claims into the name of Reginald Michael Butler, our escrow agent under this letter agreement. We undertake to do sufficient assessment work on the mining claims, provided that the same shall be in accordance with good mining practice, for the purpose of maintaining them in

JUNEAU
Serial No. 65-1623

good standing for as long as the exploration period shall extend and for a period of not less than six months thereafter. Notwithstanding the foregoing grant it is understood and agreed that the exploration period may be terminated by us at any time upon notice to you or will be deemed to be terminated if any of the under-mentioned payments is not made within ten days after we shall have received notice from you that the same is overdue, which payments are as follows:

$10,000 on the last day of the thirtieth month after this letter agreement;

$15,000 on the last day of the fortieth month after this letter agreement;

$20,000 on the last day of the fiftieth month after this letter agreement;

$40,000 on the last day of the sixtieth month after this letter agreement.

No liability shall result from our failure to make any of the foregoing payments which are entirely at our option.

Provided that we shall have at any time made the then required payments specified above, the mining claims may, at our request, be transferred to a mining company, having an authorized capital of 5,000,000 shares, designated by us prior to the end of the exploration period and you shall receive within thirty days afterwards 500,000 vendors' shares of such company (90% of which will be escrowed in accordance with the usual Ontario Securities Commission requirements) as payment in full to you for the mining claims. In the event that such request for transfer shall be made prior to the date or dates upon which any of the aforesaid payments are required to be made, the requirement to make any of such subsequent payments shall accrue to the said company and failure on its part to make any of such payments as provided in this letter agreement shall entitle you to require the retransfer of the mining claims to you by it without any payment or the surrender of your aforesaid vendors' shares.

It is agreed that the mining claims shall remain in such company or a wholly-owned subsidiary thereof (unless retransferred to you), that you shall be entitled to nominate a director thereto which nomination we shall support, and that, if it is necessary to file a prospectus of such company in order to qualify your shares for sale to the public in Canada, such company shall co-operate with you to expedite such filing.

Lode Book 32 Page 372
Juneau Recording Dist.

From the beginning of the exploration period, the mining claims shall be transferred to and recorded in the name of our said escrow agent, to be transferred by him to such company in the event of such company acquiring the mining claims as hereinbefore provided or to be retransferred to you in the event of the termination of the exploration period prior to such acquisition.

During the exploration period we or such company shall have sole access to the mining claims and may explore and prospect on them, but during the exploration period at reasonable intervals and if the exploration period shall be terminated as aforesaid you shall have the right to receive all information obtained by us or such company respecting the mining claims and we or such company shall have the right to remove any plant or equipment for three months afterwards.

You agree to execute any other documents with respect to or to clarify the intent of this letter agreement as we may reasonably request.

Yours very truly,

KEEVIL MINING GROUP LIMITED

Per: J. H. Westoll Vice Pres.

J. H. Westoll

The foregoing truly represents our agreement in this respect and I agree to be bound by and comply with this letter.

James Walper

RECORDED - FILED
Juneau REC. DIST.
DATE 6/22 1965
TIME 1:00 P.M.
Requested by Keevil Mining Group Limited
Address Suite 1000, 11 Adelaide St. W.
Toronto 1, Ont.
Canada

1 (b)

KEEVIL MINING GROUP LIMITED
SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT.
CANADA

KEEVIL MINING GROUP LIMITED

Common Shareholders

as at June 30, 1965

Abex Mines Limited	100
Bamoos Minerals Limited	100
Bartec Mining Co. Limited	100
Conduc Mines Limited	100
Consolidated Nicholson Mines Limited	100
Copperfields Mining Corporation Limited	100
Feld Temagami Mines Limited	100
Inmont Copper Mines Limited	100
Jamaican Mining Limited	100
Lamaque Mining Company Limited	100
Mining Geophysics Company Limited	100
Pickle Crow Gold Mines Limited	100
Rocdor Mines Limited	100
Silverfields Mining Corporation Limited	100
Socrates Mining Corporation Limited	100
Teck Corporation Limited	100
Tegren Goldfields Limited	100
Villemaque Gold Mines Limited	100
Wabico Mines Limited	100
Zincfields Mining Corporation Limited	100
	2,000

KEEVIL MINING GROUP LIMITED

SUITE 1000, 11 ADELAIDE STREET WEST, TORONTO 1. TELEPHONE EMPIRE 2-1571

TECK CORPORATION LIMITED
GOLDFIELDS MINING CORP. LTD.
LAMAQUE MINING CO. LTD.
MINING GEOPHYSICS CO. LTD.
PICKLE CROW GOLD MINES LTD.
SILVERFIELDS MINING CO. LTD.
TEMAGAMI MINING CO., LTD.
and other associated companies

August 5, 1965.

Canadian Imperial Bank of Commerce,
25 King Street West,
TORONTO 1, Ontario.

Gentlemen,

Keevil Mining Group Limited has under option from James Walper 35 lode claims on Nunatak Mountain, Glacier Bay Mining District and Juneau Recording Precinct, Alaska.

Surface work done by our agents have indicated that the potential exists for a sizeable deposit of molybdenum mineralization. To carry out the recommendation of W.H. Gross, which essentially consists of 5,000 feet of drilling, we need to raise the sum of One Hundred and Twenty Five Thousand dollars U.S. ($125,000.00 U.S.).

Some of our associated companies would put up part of this sum and part might be raised by taking in partners. However, it is likely that $60,000 will still be needed. Would your bank consider loaning us this amount to do this programme? Full details can be supplied if our request receives favourable consideration.

Yours very truly,
KEEVIL MINING GROUP LIMITED

J.W. Stephenson

J.W. Stephenson
Treasurer

JWS/jb

PLEASE ADDRESS
REPLY TO
THE MANAGER

CABLE ADDRESS:
"CANBANK"

CANADIAN IMPERIAL
BANK OF COMMERCE

25 KING STREET WEST
TORONTO 1, ONT.

August 6, 1965

Our Reference M-7

Mr J. W. Stephenson
Treasurer
Keevil Mining Group Limited
Suite 1000, 11 Adelaide Street West
Toronto 1, Ontario

Dear Mr Stephenson:

We refer to your letter of August 5, 1965 asking that this Bank give consideration to a loan to your Company for $60,000 to carry out a drilling program on a group of claims which you have under option from James Walper on Nunatak Mountain, Glacier Bay Mining District and Juneau Recording Precinct, Alaska.

We regret that owing to the remoteness of the area and other considerations we would not be interested in extending the suggested accommodation.

Yours very truly

W. W. Pegg
Assistant Manager

1 (2)

KEEVIL MINING GROUP LIMITED

SUITE 1000, 11 ADELAIDE STREET WEST, TORONTO 1. TELEPHONE EMPIRE 2-1571

TECK CORPORATION LIMITED
GOLDFIELDS MINING CORP. LTD.
LAMAQUE MINING CO. LTD.
MINING GEOPHYSICS CO. LTD.
PICKLE CROW GOLD MINES LTD.
SILVERFIELDS MINING CO. LTD.
TEMAGAMI MINING CO., LTD.
and other associated companies

August 5, 1965

Bank of Montreal,
Board of Trade Branch,
11 Adelaide Street West,
Toronto 1.

Gentlemen:

Keevil Mining Group Limited has under option from James Walper 35 lode claims on Nunatak Mountain, Glacier Bay Mining District and Juneau Recording Precinct, Alaska.

Surface work done by our agents have indicated that the potential exists for a sizeable deposit of molybdenum mineralization. To carry out the recommendation of W. H. Gross, which essentially consists of 5,000 feet of drilling, we need to raise the sum of One Hundred and Twenty Five Thousand dollars U.S. ($125,000.00 U.S.)

Some of our associated companies would put up part of this sum and part might be raised by taking in partners. However, it is likely that $60,000 will still be needed. Would your bank consider loaning us this amount to do this programme? Full details can be supplied if our request receives favourable consideration.

Yours very truly,
KEEVIL MINING GROUP LIMITED

J.W. Stephenson
Treasurer

JWSs

1-426

Bank of Montreal,

BOARD OF TRADE BUILDING BRANCH
11 ADELAIDE STREET WEST
Toronto 1, Ont.

Eleventh
August
1 9 6 5

Mr. J.W. Stephenson,
Treasurer,
Keevil Mining Group Limited,
Suite 1000,
11 Adelaide St. West,
Toronto 1, Ontario.

Dear Mr. Stephenson:

With reference to your letter of the 5th instant inquiring whether this Bank would give consideration to advancing a loan of $60,000.00 to your good Company to carry out a drilling programme on 35 lode claims on Nunatak Mountain, Glacier Bay Mining District and Juneau Recording Precinct, Alaska under option from James Walper, we regret that due to the risk nature of the venture and other considerations we are unable to extend the accommodation requested.

Yours very truly,

Murray G. Pattullo
Manager

KEEVIL MINING GROUP LIMITED
SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT,
CANADA

MOLYBDENITE DEPOSITS OF THE NUNATAK AREA, MUIR INLET, GLACIER BAY

By W. S. Twenhofel

U.S.G.S. Bull. 947

INTRODUCTION

Muir Inlet is a large fiord that extends northward from the larger and more complex Glacier Bay fiord, a tributary to Icy Strait. (See fig. 1.) The Glacier Bay district is characterized by huge glaciers

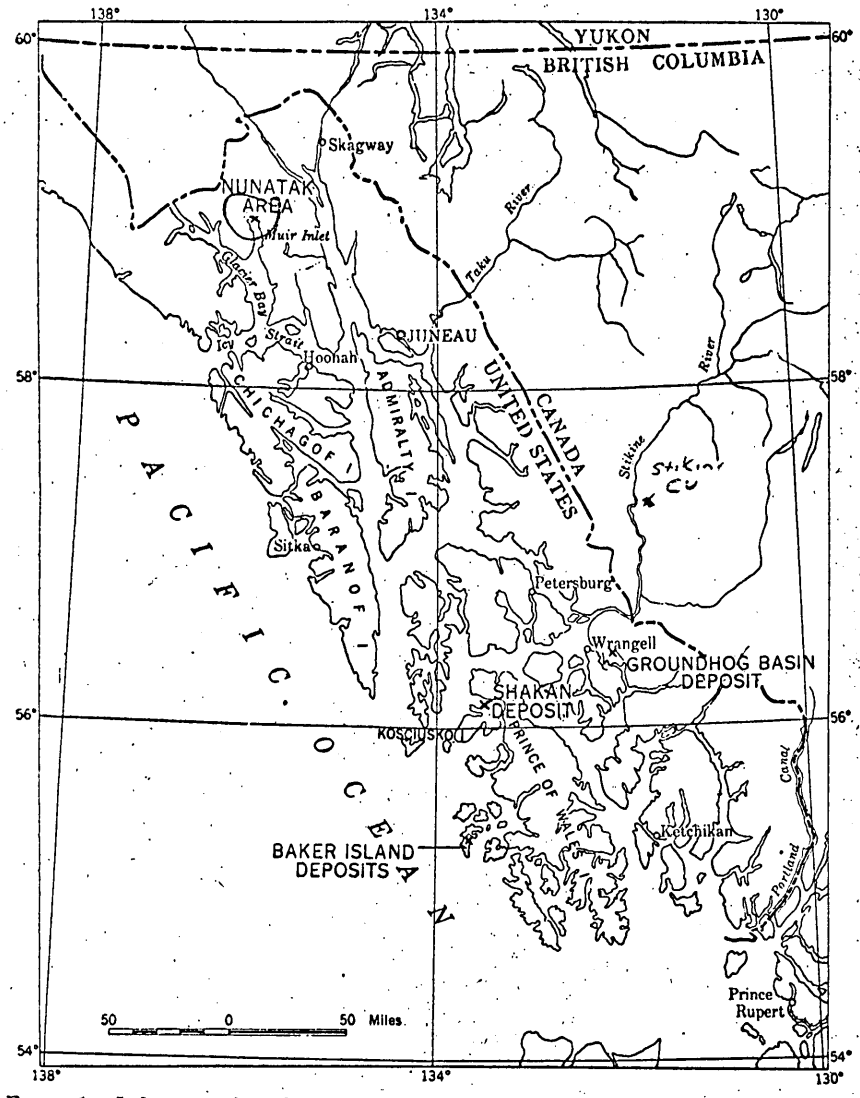


Figure 1.—Index map of southeastern Alaska, showing the location of molybdenite deposits investigated in 1942–43.

and mountains. The mountains are part of the Coast Range and St. Elias Range, both very rugged, high ranges, parts of which, in the Glacier Bay district, rise abruptly from sea level to altitudes of 10,000 feet or higher.

The molybdenite deposits are in a small mountain on the east side of Muir Inlet near its head and about 1½ miles south of the front of the Muir Glacier in 1942. (See pl. 1.) Because the small mountain was until very recently a nunatak in the midst of the glacial ice it will be referred to in this report as the Nunatak, and the general area of the deposit will be referred to as the Nunatak area.

The Nunatak area may best be reached by motor launch from Juneau, about 120 miles by water to the southeast. The nearest town is Hoonah, an Indian village about 65 miles to the south. The numerous icebergs that are frequently near the head of Muir Inlet make its waters dangerous for seaplanes and somewhat hazardous for small boats.[1] Muir Inlet is said to freeze over occasionally, making the Nunatak area especially difficult of access for short periods during winter.

Until 6 or 7 years ago much of the molybdenite deposit was buried beneath the Muir and McBride Glaciers, and even today the Nunatak is bounded on the east and north by a large mass of stagnant ice. As the retreat of the glaciers has recently exposed most of the Muir Inlet area and as there are very few shrubs and other plants the exposures, except for some morainal cover, are excellent.

In 1942 the Geological Survey party was in the Glacier Bay district from June 13 to September 15, and except for about 3 weeks the party was engaged in mapping the geology and molybdenite deposits of the Nunatak area. The writer was assisted by David M. Hopkins, geologist, during most of August and the early part of September, and by Ralph W. Mielke who served as camp hand during the last week of June and all of July and August. J. C. Reed visited the party many times and gave freely of his advice and time both in the field and in the office.

During August and the early part of September a program for testing the molybdenite deposits was conducted by a Bureau of Mines party under the direction of Mr. G. A. Apell and Mr. A. W. Tolonen. While the men from the Bureau of Mines were at the Nunatak the Geological Survey party boarded with them and received from them many other helpful courtesies.

CLIMATE

Data concerning the climate of the Glacier Bay district are meager. The only weather observations known to the writer are the amateur records kept by the Survey party during the summer of 1942 and the records obtained by Reid[2] in the summer of 1890. Reid's observations

[1] U. S. Coast and Geodetic Survey Chart 8306 is used for navigation in this area.
[2] Reid, H. F., Studies of Muir Glacier, Alaska: Nat. Geog. Mag., vol. 4, pp. 80–81, 1892.

show that the mean temperature for July and August was slightly more than 45°, about 10° or 11° colder than the mean temperature at Juneau during the same months. Reid's record of minimum temperature for July was 35.4° and for August 37.2°. A total of 3.06 inches of rain fell during July 1890 and 4.88 inches during August 1890.

The Survey party's record shows that a total of 17.2 inches of rain fell during a period of 86 days. The wettest month was September, in which 5.25 inches of rain fell during the first 15 days. There were 26 clear or partly cloudy days, 26 rainy days, and 34 cloudy days with no rain. There were no strong winds; usually the weather was very quiet. Temperature readings were taken early each morning and after supper each night so that the readings necessarily are much closer to the minimum than to the maximum temperature. The average of these readings was about 39° F. On many nights the temperature dropped close to freezing, but the only freezing temperatures recorded were on the night of September 14.

GEOLOGY

REGIONAL GEOLOGY

Numerous expeditions have visited Glacier Bay and Muir Inlet, but most of them were principally concerned with the glacial and botanical phenomena that are so well displayed there. The most comprehensive geologic report of the Glacier Bay district is by the Wrights.[3]

Glacier Bay lies within the northern extension of the mountains of the Alexander Archipelago and the Coast Range as well as within the southern extension of the St. Elias Range. From the small amount of data available it appears that Paleozoic calcareous shales and limestones are the predominant rocks of the Glacier Bay district. Rocks of a similar type are found on the northeast half of Chichagof Island. The sediments of the Glacier Bay district are believed to be part of the Chichagof-Glacier Bay anticlinorium.[4] Metamorphic equivalents of these rocks occur near the numerous granitic intrusives in this region. Most of the beds are tilted at high angles and generally trend northwestward.

GEOLOGY OF THE NUNATAK AREA

Reed[5] in 1936 climbed the Nunatak but did not recognize any molybdenite because the ice of the Muir and McBride Glaciers then covered most of the molybdenite showings now exposed.

---

[3] Wright, F. E., and Wright, C. W., The Glacier Bay National Monument in southeastern Alaska, its glaciers and geology, unpublished manuscript in files of the U. S. Geol. Survey.

[4] Buddington, A. F., and Chapin, Theodore, Geology and mineral deposits of southeastern Alaska: U. S. Geol. Survey Bull. 800, p. 315, 1929.

[5] Reed, J. C., Some mineral deposits of Glacier Bay and vicinity, Alaska: Econ. Geol., vol. 33, No. 1, pp. 56-57, 1938.

689318—46——2

In the summer of 1941 a Geological Survey party under the direction of J. C. Reed [6] discovered the molybdenite deposit. At that time no evidence of claims was seen. Subsequently, however, the Geological Survey was informed that John Johnson, Tom Smith, George Comstock, Carl Vevelstad, and S. H. P. Vevelstad had staked some of the deposits in 1941 prior to Reed's visit and some of them in August 1941 after Reed's visit. As of 1942 the claim owners had done no development work. In 1941 Reed was at the Nunatak for only 2 days, and time did not permit him to determine more than the broader characteristics of the molybdenite deposits.

The bedrocks of the Nunatak area include a metamorphosed sedimentary sequence of tightly folded Paleozoic (possibly Devonian) hornfels with some shale and limestone. (See pls. 2 and 3.) The earliest intrusions into the stratified rocks are a group of dark altered dikes and sills not shown on pl. 2. The hornfels was intruded by a small body of quartz monzonite porphyry probably early in Cretaceous time after the folding of the bedded rocks.

Around the intrusive, and developed by it, is a contact aureole characterized by abundant diopside in the hornfels. The diopside imparts a dark color to the normally light-colored hornfels. The contact aureole and the three recognized hornfels units (see pl. 2) are cut by myriad quartz veinlets. The quartz veinlets are increasingly abundant toward the intrusive mass. Near its periphery they coalesce and leave only faint remnants of the original rock. In places the outer part of the intrusive is almost completely silicified.

Bedded rocks.—The oldest rock unit exposed in the Nunatak area consists of dark blue, very fine-grained, thin-bedded limestone and a few shale beds. The limestone is estimated to contain about 50 percent calcite and about 50 percent quartz and feldspar, with a little carbonaceous material. Conformably overlying the limestone is a thick section of hornfels, which has been differentiated on the map into three units. All three units are fine-grained, hard, and dense, and they closely resemble chert. The hornfels consists principally of orthoclase and clinozoisite, with varying amounts of oligoclase and diopside. The hornfels ranges in color from light yellow green to salmon pink to chocolate brown.

The lower hornfels unit is characteristically thin-bedded and has a few limy beds. The middle unit is characteristically thin-bedded and contains many beds of coarse-grained, salmon-pink clinozoisite. The upper hornfels unit is thick-bedded.

Intrusive rocks.—The oldest intrusive rocks are greatly altered and deformed basaltic dikes and sills and are not shown on plate 2. In-

[6] Smith, P. S., Occurrences of molybdenum minerals in Alaska: U. S. Geol. Survey Bull. 926-C, pp. 178-180, 1942.

truded into the bedded rocks and altered dikes and sills is a small stock of quartz monzonite porphyry. In places, especially near its outer borders, it is largely silicified. The phenocrysts are large, euhedral, zoned crystals ranging from oligoclase to sodic andesine. The ground mass is finely crystalline quartz and orthoclase with some oligoclase. From 1 to 2 percent of fine-grained biotite and magnetite are also present. After the intrusion of the quartz monzonite porphyry the Nunatak area was intruded by hundreds of large and small dikes. These dikes are dominantly hornblende andesite porphyry with some dacite porphyry. They are characterized by a predominance of light-colored minerals. The phenocrysts are generally euhedral, zoned plagioclase crystals, which range from oligoclase to andesine. The hornblende phenocrysts are commonly twinned and are less numerous than the feldspar phenocrysts. Two of the dikes contain phenocrysts of quartz and plagioclase and hence are properly called dacite porphyry.

The ground mass of the dikes consists of tiny laths of sodic plagioclase intercrystallized with some hornblende. However, some of the dikes have a trachytic texture, and the dacites have a spherulitic ground mass. Accessory minerals include pyrite, magnetite, and sphene. The dike rocks appear fresh, although in a few the hornblende has been altered to chlorite.

Structure.—The general trend of the bedded rocks is about N. 5° W., but at most places, because of minor plications, the rocks strike about N. 30° E. Near the stock the bedding has been obscured. Steeply dipping, closely spaced joints cross all the bedrocks. The majority of these strike about N. 65° W. The numerous quartz veinlets for the most part are in these joints. Many faults strike northeastward and dip steeply southeastward. A few of the faults are zones as much as 75 feet wide. The most recent dikes are approximately vertical and trend northeastward. Fault movements both preceded and followed the formation of the quartz veinlets and the intrusion of the dikes.

MOLYBDENITE DEPOSITS

MINERALOGY AND PARAGENESIS

The mineralogy of the deposits is simple. The minerals introduced during the mineralization that brought in the molybdenite are pyrite, chalcopyrite, magnetite, quartz, orthoclase, oligoclase, hornblende, clinozoisite, diopside, and molybdenite.

Molybdenite (MoS_2), the only molybdenum mineral in the deposits, is the most conspicuous metallic mineral and in many of the veins is the only metallic mineral. It is unequally distributed principally as films and thin plates along and parallel to the margins of many of the quartz veinlets. Some molybdenite forms very thin seams without

quartz and, here and there, sparsely distributed aggregates of plate-like crystals lie within quartz veinlets. No molybdenite was observed in the hornfels fragments between the veinlets. Molybdenite is easily recognized by its softness and its typical metallic blue-black luster.

Pyrite is widely distributed throughout the mineralized zone, both in the quartz veinlets and in the hornfels between the veinlets. Because it is fine-grained and disseminated it is not as conspicuous as the molybdenite, although heavy mineral analyses show that pyrite is about as abundant as molybdenite. Some of the pyrite at the surface has been altered to limonite that now stains much of the mineralized area.

Chalcopyrite occurs in much the same manner as pyrite but in smaller amounts.

Quartz in veins and as a replacement mineral is the most abundant mineral in the deposits. The veinlets of the mineralized area are made up almost entirely of dense quartz.

Orthoclase and oligoclase are present in minor amounts as anhedral crystals intergrown with quartz in the veinlets.

Coarse-grained hornblende is widely but irregularly distributed throughout the stockwork. It forms veinlets and occurs along the margins of some quartz veinlets.

Clinozoisite is present as a replacement mineral in the hornfels and as a vein mineral. Much of the replacement clinozoisite is salmon pink, whereas the vein clinozoisite is light green.

Diopside is present as a replacement mineral and as a vein mineral. It occurs along the margins of the quartz veins and as irregular masses within the hornfels. It was not recognized in the field, as it is invariably masked by the more abundant hornblende.

The general order of deposition of the minerals associated with vein mineralization seems to have been amphibole and diopside, quartz and feldspar, molybdenite, pyrite and chalcopyrite, and finally clinozoisite. ← epidote minus iron.

No quicksilver minerals were observed in the field, but very small amounts of a red mineral thought to be cinnabar and of metallic quicksilver were observed in several heavy liquid concentrates of the rock from the deposits. It seems likely that the quicksilver and cinnabar are contamination from the crushing machine or sieves that were used in preparing the samples. Because of the small amount of quicksilver present it was not thought significant.

STOCKWORK

The molybdenite deposits of the Nunatak area are of two types—a stockwork type and a fault type.

The stockwork is by far the largest deposit. It embraces all the diopside-rich contact aureole described above and extends outward

beyond its limits but not inward into the intrusive core or its silicified outer parts. The stockwork as herein defined is that part of the zone of quartz veinlets already mentioned in which molybdenite is prevalent.

The zone of quartz veinlets, of which the stockwork is a part, is divisible into three parts: (1) An outer zone having a few quartz veinlets, (2) an intermediate zone, the stockwork, consisting of numerous anastomosing quartz veinlets, some of which carry molybdenite, and (3) a narrow envelope of almost completely silicified material at the outer borders of the quartz monzonite porphyry. The boundaries of the three zones are gradational and would undoubtedly be mapped somewhat differently by different persons. Neither the siliceous envelope nor the outer zone contains visible molybdenite except for a few scattered localities too small to show on the map. The numerous quartz veinlets that cut the hornfels and parts of the intrusive stock range in thickness from a fraction of an inch to as much as 9 inches. Most of the veinlets are between 1 inch and 2 inches thick. The veinlets, which increase in number toward the intrusive, comprise about 25 percent of the rock mass. The veinlets, particularly in the intermediate zone, cut the rock in all directions, but a preferred direction of N. 65° W. is recognizable.

Much of the area over which the stockwork crops out is steep with a maximum relief of about 1,100 feet above sea level. The deposit is covered by moraine in its northwestern part. To the northwest the deposit passes beneath Muir Inlet and to the northeast beneath an extensive moraine fringing a large mass of stagnant ice.

Where the zone of quartz veinlets projects conspicuously northwestward to Muir Inlet it contains most of the richer parts of the stockwork. In this part of the zone the bedrock has been folded into a well-defined anticline. The northwestward projection of the zone of veinlets may indicate that the quartz monzonite is at no great depth below the surface.

FAULT DEPOSITS

Several faults within the zone of quartz veinlets contain conspicuously more molybdenite than their wall rocks. The fault deposits are similar to the stockwork in that molybdenite is present generally along the margins of the quartz veinlets, but they differ from it principally in containing many open fractures, in containing molybdenite in thicker masses, and in being locally almost completely epidotized. The deposit along the Nunatak fault is particularly large and well mineralized.

In addition to the Nunatak fault deposit three other fault deposits are large and well mineralized. A few smaller and less mineralized faults will not be discussed.

The Nunatak fault deposit crosses the eastern part of the stockwork. The other three deposits lie east of the Nunatak fault, two of them within the stockwork and the third outside the stockwork but within the zone of quartz veinlets near its outer margin.

The Nunatak fault deposit crops out for a length of 2,000 feet. It disappears to the north beneath talus and moraine and to the south beneath moraine and a small lake. The known vertical range of the deposit is from about 380 feet to about 910 feet above sea level. Its width ranges from about 5 feet to as much as 20 feet and averages about 9 feet. The fault strikes about N. 5° E., and its dip steepens from 60° E. in its southern part to 75° E. at its northernmost exposure. The other fault deposits are approximately vertical and strike more eastward than the Nunatak fault deposit. They are a few tens of feet long and average about 3 feet wide.

The quartz veinlets that cross the fault zones are similar in most respects to the quartz veinlets elsewhere. The veinlets are better mineralized in the fault zones and seem to indicate that earlier fault movements formed places particularly favorable for molybdenite deposition. Recurrent movements along the faults have shattered the rock and the quartz veinlets and have displaced for short distances many postmineral dikes.

ORIGIN OF THE DEPOSITS

The close association of the quartz veins and their contained molybdenite with the quartz monzonite porphyry, and the fact that the zones of mineralization surround the intrusive stock indicate that the mineralization is genetically related to the stocklike body. It may be inferred that the small stocklike body now partly exposed is a cupola-like portion of a much larger body not exposed. Apparently, molybdenum-bearing fluids were liberated from lower portions of the igneous body and were deposited in the fractured rock that surrounds the instrusive. There is no apparent structural evidence to indicate why the locality of the present deposit was particularly favorable for igneous intrusion and consequent mineralization. Other deposits of molybdenite that have been described[7] are in or near igneous rocks and are regarded as genetically related to those rocks.

The fact that the siliceous outer parts of the intrusive mass grade inward into quartz veinlets penetrating the intrusive rock and far outward into the hornfels to form the zone of quartz veinlets indicates that the outer parts of the intrusive body may have contained the channels through which the silica-bearing solutions moved upward from depth.

[7] Butler, B. S., and Vanderwilt, J. W., The Climax molybdenum deposit, Colorado: U. S. Geol. Survey Bull. 846-C, pp. 233-236, 1933.

RESERVES

GRADE

All the molybdenite deposits of the Nunatak area are of very low grade. Two grades of molybdenite-bearing rock have been recognized and are represented on the geologic map. (See pl. 2.) The material with conspicuous molybdenite, and so designated on the geologic map, crops out over an area of about 170,000 square feet and contains enough molybdenite to be readily apparent even on casual inspection. Material designated as containing inconspicuous molybdenite crops out over an area of about 2,000,000 square feet and has so little molybdenite that it is revealed only by close examination. The distinction between the two types may not be everywhere consistent.

170,000 / 10 = 17,000 tons

or 8.5 million tons to 500'

100 million tons to 500'

The grade of the two types of material no doubt varies widely from place to place. Considerable information on grade, particularly in regard to the material mapped as containing conspicuous molybdenite, has been contributed by the Bureau of Mines. The Bureau of Mines party systematically collected a total of 249 chip, drill, and channel samples. Of these samples, 16 were taken from the Nunatak fault and 233 from the northwestern part of the stockwork.

The 177 samples from a part of the stockwork mapped as containing conspicuous molybdenite contain from 0.02 to 0.21 percent of molybdenum, except for 2 that are very much richer and contain 0.26 and 0.52 percent of molybdenum. The numerical average of the results is 0.075 percent. The 56 samples collected by the Bureau of Mines from material mapped as containing inconspicuous molybdenite contain from 0.02 to 0.11 percent of molybdenum, and the numerical average of the results is 0.048 percent of molybdenum. The samples from the Nunatak fault deposit contain from 0.04 to 0.34 percent of molybdenum with a numerical average of 0.102 percent. N.G.

Because the bright flakes and surfaces of molybdenite contrast strongly with their enclosing material the molybdenum content of the rock appears to be considerably greater than is indicated by the analytical results.

TONNAGE

For estimating tonnage the Nunatak fault deposit, which crops out over a vertical distance of about 500 feet, is assumed to extend to an average depth of about 300 feet and to have an average width of 9 feet and a length of 2,000 feet. Assuming a factor of 10 cubic feet to a ton, the Nunatak fault deposit contains about 500,000 tons of indicated molybdenite-bearing material of which, on the basis of surface mapping, 280,000 tons contain conspicuous molybdenite. Probably the Nunatak fault deposit extends to a greater depth than 300 feet, but to

be conservative that depth has been used for computations rather than some greater depth.

The stockwork crops out over an area of about 2,170,000 square feet and over a vertical distance of about 1,100 feet. It is assumed, for estimating tonnage, that the stockwork extends to an average depth of not less than 500 feet. On this basis the deposit contains about 100,000,000 tons of indicated molybdenite-bearing material, of which, on the basis of surface mapping, about 8,500,000 tons contain conspicuous molybdenite. Of this latter quantity about 1,200,000 tons are estimated to be above sea level.

The actual extent of the deposit below the present surface is unknown except for meager data furnished by two short holes drilled by the Bureau of Mines in the northwest part of the deposit, the deeper of which reaches about 169 feet below the surface or about 150 feet below sea level. However, because of the large vertical range of its outcrop, the stockwork is thought to continue to a depth of many hundreds of feet below the surface. Because the intrusive mass probably is larger in depth and because the stockwork surrounds the mass, the area of the stockwork may increase with depth.

If estimates are made without allowing for expansion of the stockwork downward the following table indicates roughly the tonnages in the several deposits for each 10 feet of depth.

Possible tonnages of molybdenite-bearing material in deposits of the Nunatak area, Glacier Bay, southeastern Alaska

Deposit	Tons per 10 feet of depth	
	Part mapped as containing conspicuous molybdenite	Part mapped as containing inconspicuous molybdenite
Stockwork	170,000	2,000,000
Nunatak fault	10,000	8,000

ECONOMIC CONSIDERATIONS

The price of molybdenite has been about 75 cents per pound of molybdenum for the past several years, and at that price the molybdenite deposits of the Nunatak area apparently could not be mined at a profit.

Any plan to undertake mining operations at the Nunatak or in the Glacier Bay area will need to take into account the difficulty of obtaining an adequate labor supply in this remote locality, the lack of usable timber within a radius of 50 miles, the heavy winter snows, and the lack of a fresh water supply. The topographic position of the deposit and its accessibility by small boat or steamer favor development.

SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT,
CANADA

KEEVIL MINING GROUP LIMITED

State of Alaska
DIVISION OF MINES AND MINERALS

CURSORY INVESTIGATION
MUIR INLET "NUNATAK" MOLYBDENUM DEPOSIT

by

William H. Race
State Mining Engineer

August
1963

Cursory Investigation
Muir Inlet "Nunatak" Molybdenum Deposit

The molybdenum deposit near Muir Inlet has been called the Nunatak deposit by former investigators because twenty years ago it was surrounded by glacier ice on three sides and the Inlet on the west side.

It is now a barren peak surrounded on three sides by glacial till and the western side by Muir Inlet. The morain is evidently settling as a result of buried remnants of the glacier melting, and erosion of the till by heavy rains. There are presently depressions (kettles) resembling dry lake beds, and steep sided stream beds a few of which have been cut to bedrock.

The geology of the deposit is described in Bulletins 947-B and 800. Also Economic Geology, Vol. 33, No. 1, pages 56-57, by J. C. Reed. The deposit has been sampled by the U. S. Bureau of Mines and these results presented in R.I. 4421. The deposit was quite thoroughly sampled by American Metal Climax Corporation, but these results are not known by the Division of Mines and Minerals.

The Nunatak was investigated by Mr. Elmer Winters of the Phelps Dodge Corporation, accompanied by W. H. Race, on the 8th and 9th of August, 1963. Transportation was by air from Juneau with Loken Air charter.

Three geologists working under a National Science Foundation Grant, in conjunction with the Polar Ice Group, were camped on the shore of Nunatak Cove and invited the visitors to stay with them. Since they were equipped with 10 x 12 tents, and we were equipped with pup tents, the offer was thankfully accepted.

Shortly after arrival we started our investigation from the south end to the north end via the east side. Winters chose the locations and took samples for his company. Race sampled two streams and took one thirty foot chip sample of freshly exposed bedrock in a stream bottom. The bedrock was a chert with many small veinlets of quartz and contained visible iron sulfide. The sample assayed 0.1% Cu, no Mo, Tr. Au, Tr. Ag. Soil samples taken nearby indicated the presence of copper. A scattered chip sample along the southeast side assayed 0.1 - 0.2% Cu. Visible moly was not found until the northeast fault zone was approached. An attempt was made to climb the peak from the northeast, but was found to be too steep. Evidence of American Metals Climax channel samples were seen during this attempt. It was obvious that they must have used ropes.

Bedrock was observed outcropping along the Muir Inlet north of the Nunatak. This occurance was investigated and found to be barren. The return to camp was made along the west side.

Samples were taken the next day along the west side from the south to the north. No visible moly was found until the fault area near the lake was reached. A hand picked specimen from the northwest side assayed 0.2 - 0.3% Cu and 0.5 - 0.6% Mo. This sample would represent the best metallization seen.

The return to Juneau was made on the evening of the 9th. The flight was up Adams Inlet and down the Endicott River to Lynn Canal. The watershed of Adams Inlet is relatively free of overburden and several prominent rust-stained areas were visible from the plane. Adams Inlet heads easterly, so affords a reasonably good cross section of the geological trend of the area. It would seem to be one of the better locations in Southeastern Alaska for geologic mapping and geochemical investigation.

KEEVIL MINING GROUP LIMITED
SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT,
CANADA

MOLYBDENITE PROSPECT

Nunatak, Muir Inlet, Alaska

W.G. Wahl Limited

August 24, 1964.

August 24th, 1964.

T. Parks, Esq.,
General Manager,
Selco Exploration Company Limited,
77 York Street,
TORONTO 1, Ontario.

Dear Mr. Parks:

Submitted herewith is a report of investigation on:

MOLYBDENITE PROSPECT

Nunatak, Muir Inlet, Alaska

This prospect lies on the east shore of Muir Inlet approximately 80 miles northwest of Juneau, Alaska. The Nunatak is a hill of Paleozoic Hornfels and limestones which have undergone intense thermal and mechanical metamorphism accompanied by metal deposition. No economic concentration of molybdenite or other metals was seen during the field investigation or has been mapped by the United States Geological Survey or the United States Bureau of Mines. No further work is recommended.

GENERAL

This prospect was submitted by Mr. James Walper of Toronto. Selco together with Keevel-Mining Group Limited and Chesapeak Limited agreed to underwrite the cost of staking and a field investigation. The claims were staked during the spring of 1964 and this report presents the results of a field investigation made in July 1964.

Access to this area is either by chartered fishing boat or chartered air service from Juneau, Alaska. Permission to prospect must be obtained from the park service as this prospect lies within the Glacier Bay National Park.

The climate is moderate and the precipitation is heavy. No records have been kept, but the climatic conditions would be similar to those experienced at Juneau. Glacial drift covers the lower flanks of the Nunatak and vegetation is sparse. It is estimated that more than 75% of the mineralized area is exposed and free of overburden.

GEOLOGY

The geology was mapped by the U. S. Geological Survey and the molybdenite rich areas were sampled by the U. S. Bureau of Mines. Their results were published in U. S. G. S. Bulletin 947. Their mapping was confirmed during the field examination and no new data was compiled.

The Nunatak is an isolated hill 1150 feet high rising above Muir Inlet. It is formed of tightly folded, metamorphosed, Paleozoic hornfels and limestones. These sediments have been cut by numerous faults and intruded by several different sets of dykes and one porphyry mass. All of the Nunatak shows evidence of extensive mineralization, but nowhere is there any mineralization of economic significance.

The Paleozoic rocks appear to have been folded and have undergone limited regional metamorphism prior to the injection of the intrusive material. It is believed that the intrusions, brecciation, faulting, and mineralization while not contemporaneous are related.

The monzonite porphyry appears to have been injected as a breccia and nowhere were normal intrusive contact phenomena observed. The porphyry is brecciated and the orientation of the crystals differ greatly from fragment to fragment. The fragments are highly silicified and the interstices are filled with vein quartz. Two samples, #8210 and 8212, are representative chip samples of approximately twenty foot of the quartz monzonite porphyry. These samples returned very low tenors of silver, copper, and molybdenum.

It is believed that the monzonite porphyry was injected first accompanied by faulting and brecciation of the sediments. Subsequently many narrow dykes were injected into the opening created by the porphyry emplacement. Concurrently with this activity the different types of mineralization occurred. The quartz mineralization occurred early, the molybdenite was late, and the pyrite-pyrrhotite occurred throughout the period of igneous activity.

The pyrite-pyrrhotite mineralization has the greatest areal extent and is responsible for imparting

a rusty-gossan like appearance to the Nunatak. These sulphides are found as small grains disseminated throughout all of the rock types. Occasionally these sulphides are found as veins and as irregular masses. Sample #7 was collected near the top of the Nunatak and consists of material with an exceedingly high tenor of pyrite and pyrrhotite. An assay of this material returned very low values in copper and silver and no molybdenite.

Silicification has the next greatest areal extent and appears to have a zonal relationship to the porphyry. The vein quartz which envelops the porphyry may constitute more than 90% of the rock. Farther out from the porphyry the quartz is found as numerous anastomosing veinlets. The outer limit of silicification is marked by the absence of quartz veinlets and is shown on the attached overlay as dash-dot (- . -) line. Sample #8219 was collected from the quartz envelope surrounding the northernmost exposure of porphyry. This sample consists of chip samples cut normal to the contact and represents 10 foot of quartz rich material. The quartz envelope was heavily stained with limonite. The sample assayed nil silver with 0.04% copper and 0.065% molybdenum.

Very sparse, irregular splotches of copper mineralization are marked by malachite alteration. This mineralization appears to be related to the pyrite-pyrrhotite

mineralization, but its true relationship is not known because of the limited occurrences. None of the copper stained areas exceed two feet in diameter. Sample #8208 is all of the material marked by malachite staining near the Nunatak fault. This sample represents about 30 pounds of sample and assayed 1.75 ounces of silver, 1.96% copper, and 0.035% molybdenum. Chalcopyrite was the only copper mineral identified. On the north shore of Nunatak Cove small zones of chalcopyrite-magnetite mineralization were found in the limestones adjacent to the northeast trending dykes. Nowhere was copper mineralization found which could be considered as anything except as a geological exception.

The extent and the relative amount of molybdenite mineralization is shown by stipping on the attached overlay. This mineralization is very conspicuous as it is usually found as a thin film on the joint faces which trend north 65 degrees west. It is rarely found as large irregular masses, veins, or as fine disseminations throughout the hornfels or porphyry. The greatest zone of molybdenite deposition is found trending northwest across the axis of a tight fold northwest of the Nunatak between the hill and the inlet. This is the area which was sampled in detail by the Bureau of Mines. Their results based on 177 chip, drill, and channel samples returned on assaying 0.02to 0.21% molybdenum with numerical average

of 0.075%. Samples #8215, 8216, 8217 each represent a chip sample 20 feet long taken from zones within the three hornfels series which showed the most conspicuous molybdenite mineralization. These samples returned 0.12%, 0.11% and 0.21% molybdenum. The numerical average of 0.15% is the cutoff grade at Endako. As the best material from the largest areal extent of conspicuous molybdenite mineralization does not make ore grade at the present price and technology, no further work is recommended.

The Bureau of Mines estimates that there is 17,000 tons per foot of depth averaging 0.075% molybden~~ite~~um and a further 200.000 tons per foot of depth of material grading 0.048% molybdenum. The field investigation confirmed the reasonableness of these figures.

The Nunatak fault is another zone of conspicuous molybdenite mineralization. Sample #8209 is a chip sample across 10 feet of the Nunatak fault. This sample returned on assaying 0.02% copper and 0.19% molybdenum. The Bureau of Mines sampling returned assays from 0.04% to 0.34% molybdenum, with an average of 0.102%. They estimated that there is 1000 tons per foot of depth of this molybdenum rich material in the Nunatak fault.

Samples numbered 8214 and 8219 were collected as high grade character samples to furnish material for limited metallurgical tests and trace element chemical assaying if warranted.

Sample #8211 is a chip sample across 30 feet of upper hornfels lying between the quartz monzonite porphyry and the Nunatak fault. This sample is representative of material which shows the greatest tenor of pyrite-pyrrhotite and molybdenite mineralization.

No further work is suggested as it appears that the molybdenum or copper mineralization has too low a tenor to be of economic interest.

All of which is respectfully submitted.

Sincerely yours,

W.G. WAHL LIMITED,

W.G. Wahl

W.G. Wahl, P.Eng.

Swastika, Ont. August 12,1964.

SWASTIKA LABORATORIES LIMITED
Certificate of Analysis
No. 36356

We have assayed twelve samples of ore,

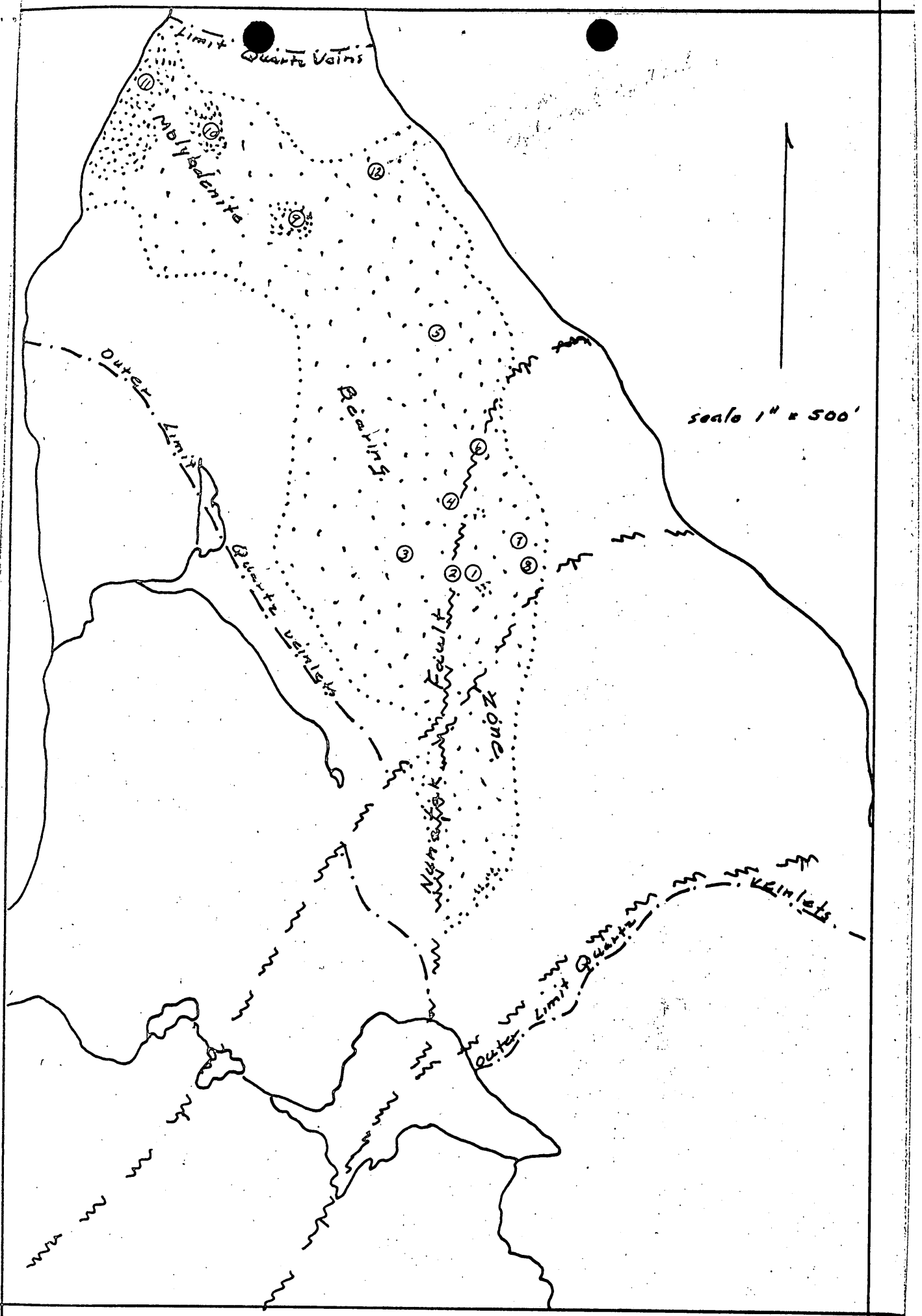
Received Aug. 10/64 and submitted by Selco Exploration Co.,Ltd.

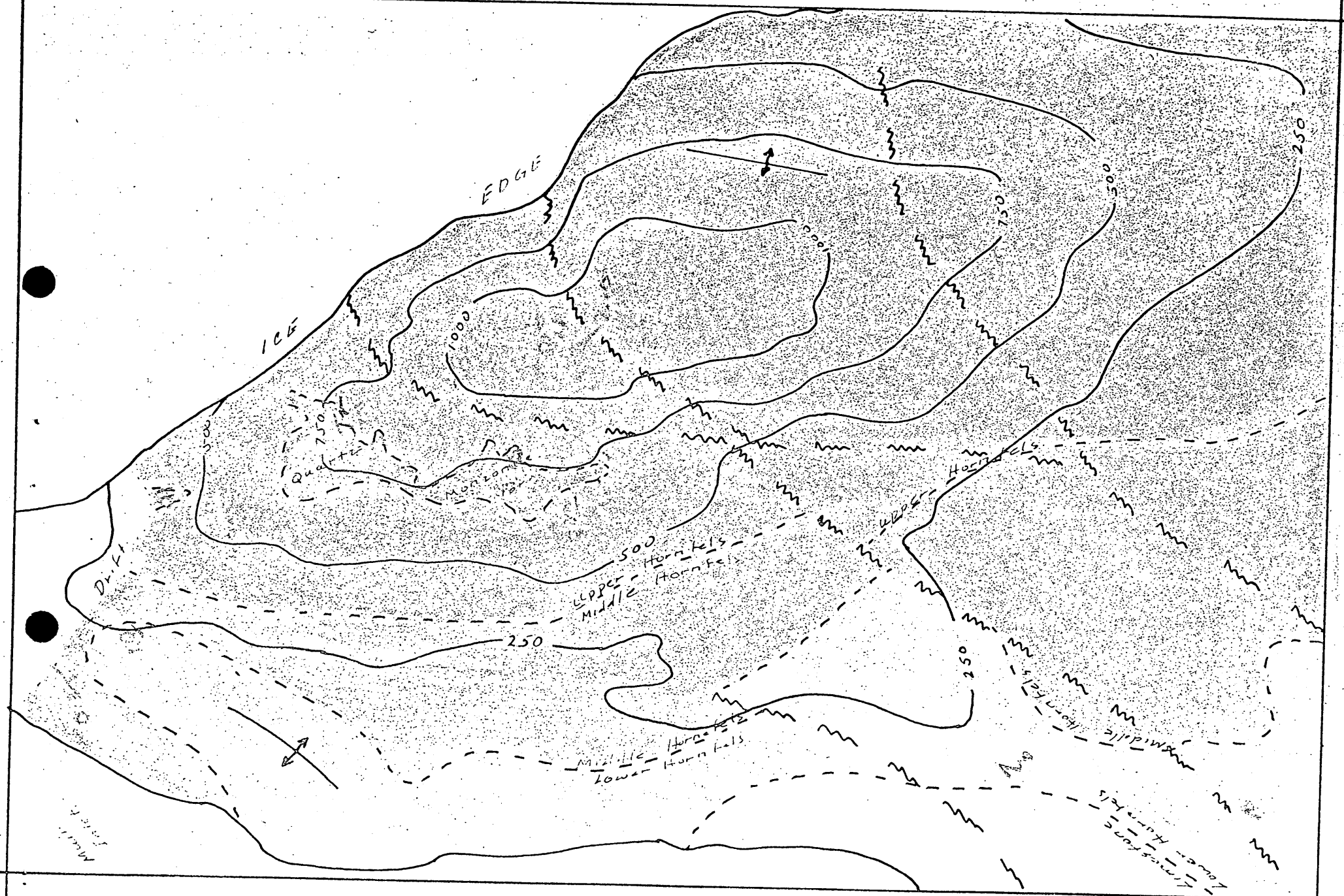
with the following results:

Sample No.		Silver per ton Ozs.	Copper %	Molybdenum %'	MoS2
8208	1	1.75	1.96	0.035	0.058
8209	2	Nil	0.02	0.19	0.316
8210	3 ✓	0.03	0.01	0.07	0.117
8211	4	0.03	0.02	0.17	0.283
8212	5 ✓	Nil	0.01	Trace	—
8213	7 ✓	0.05	0.08	None	—
8214	8 ✓	Nil	0.02	1.20	2.000
8215	9	Nil	0.02	0.12	0.200
8216	10	Nil	None	0.11	0.183
8217	11	Nil	None	0.21	0.350
8218	12 ✓	Nil	0.04	0.065	0.11
8219	1	1.38	1.86	0.23	0.38

Note:- The molybdenum results represent molybdenum occurring as molybdenite and are based on 5 gram samples by a modified Bonardi method, whereby oxide molybdenum is removed by a preliminary acid leach.

SWASTIKA LABORATORIES LIMITED
Per: Wm. Gerrie


Limit Quartz Veins
Molybdenite
Outer Limit
Quartz veinlets
Bearing
Zone
Northeast Fault
Outer Limit Quartz veinlets
scale 1" = 500'


ICE
EDGE
Drift
Quartzite
Monzonite
Upper Hornfels
Middle Hornfels
Upper Hornfels
Middle Hornfels
Lower Hornfels
Middle Hornfels
Lower Hornfels
Lower Hornfels
250
500
750
1000
250
250
250

3

R. I. 4421

MARCH 1949

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

BUREAU OF MINES
JAMES BOYD, DIRECTOR

KEEVIL MINING GROUP LIMITED
SUITE 1000,
11 ADELAIDE STREET WEST,
TORONTO 1, ONT.,
CANADA

REPORT OF INVESTIGATIONS

INVESTIGATION OF MUIR INLET OR NUNATAK MOLYBDENUM DEPOSITS, GLACIER BAY, SOUTHEASTERN ALASKA

BY

R. S. SANFORD, G. A. APELL, AND F. A. RUTLEDGE

R. I. 4421,
March 1949.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

INVESTIGATION OF MUIR INLET OR NUNATAK MOLYBDENUM DEPOSITS, GLACIER BAY, SOUTHEASTERN ALASKA[1]

By R. S. Sanford,[2] G. A. Apell,[3] and F. A. Rutledge[4]

CONTENTS

	Page
Introduction and summary	1
Acknowledgments	2
Location and accessibility	2
Physical features and climate	2
Property and ownership	3
Ore deposits	3
Sampling and analysis	5
Beneficiation tests	5

INTRODUCTION AND SUMMARY

The Muir Inlet or Nunatak molybdenum deposits are in the Glacier Bay district, Muir Inlet, Alaska, 78 miles northwest of Juneau.

The deposits were examined by Bureau of Mines engineers, and the area was mapped by a field party of the Federal Geological Survey during the summer of 1942.[5]

?

The following year the Bureau of Mines began developing the deposits. A total of 215 channel samples were taken, and 2 diamond drill holes totaling 286 feet were drilled. The samples were sent to the Bureau's laboratories at Rolla, Mo. for beneficiation.

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Report of Investigations 4421."

2/ Senior mining engineer, College Park, Md.

3/ Mining engineer, Minneapolis, Minn.

4/ Mining engineer, Juneau, Alaska.

5/ Smith, Philip S., Occurrences of Molybdenum Minerals in Alaska: U. S. Geol. Surv. Bull. 926-C, 1942, pp. 178-180.
Reed, J. C., Some Mineral Deposits of Glacier Bay and vicinity, Alaska: Econ. Geol. vol. 33, No. 1, Jan.-Feb. 1938, pp. 56, 57.

A discussion of the deposits, assay results, and drill logs are contained in this report.

ACKNOWLEDGMENTS

The authors acknowledge the assistance given by A. W. Tolonen and A. W. Erickson, former Bureau of Mines engineers, and special acknowledgment is made of the information and assistance given by W. S. Twenhofel of the Geological Survey.

LOCATION AND ACCESSIBILITY

The molybdenum deposits of the Muir Inlet or Nunatak Peak area are on Muir Inlet, in the Glacier Bay district of southeastern Alaska (figs. 1 and 2). The area is 78 airline miles N. 53° W. of Juneau, Alaska, at 58° 39' 30" north latitude and 136° 06' 30" west longitude. Water distance from Juneau is 129 nautical miles. Steamship lines pass the mouth of Glacier Bay at 37 nautical miles from the deposits, and, except for the hazard of icebergs, the route is navigable for ocean steamships.

During the summer, Muir Glacier is very active, and the icebergs constitute a transportation problem. Under normal conditions the ice would interfere with transportation to a certain extent but would not constitute a major hazard.

PHYSICAL FEATURES AND CLIMATE

The physical features are characteristic of a recently glaciated region. In 1926, the United States Navy made the first aerial photographs of Muir Inlet. At that time the mineralized area shown as No. 1 on figure 3 was partly covered to a depth of over 300 feet by ice of the Muir Glacier. Since that date this glacier has retreated 3-1/2 miles. The mineralized area is at present surrounded on three sides by active and stagnant glaciers. Stumps and broken tree trunks of an ancient, pre-glacial forest can be seen in places.

The large ice fields have a marked influence upon the climate. During the summer the temperature drops to almost freezing each night. There are more rain and lower temperatures in the Muir Inlet area than at Juneau, where the weather has been recorded for a number of years. The Juneau average annual precipitation is 80 inches and the mean temperature 42° F. The temperature at Juneau is very rarely lower than -7° F.

The region has almost no vegetation. Natural carriers must transport seeds for a considerable distance before vegetation can secure a foothold. Only an occasional small bush and some moss can be seen.

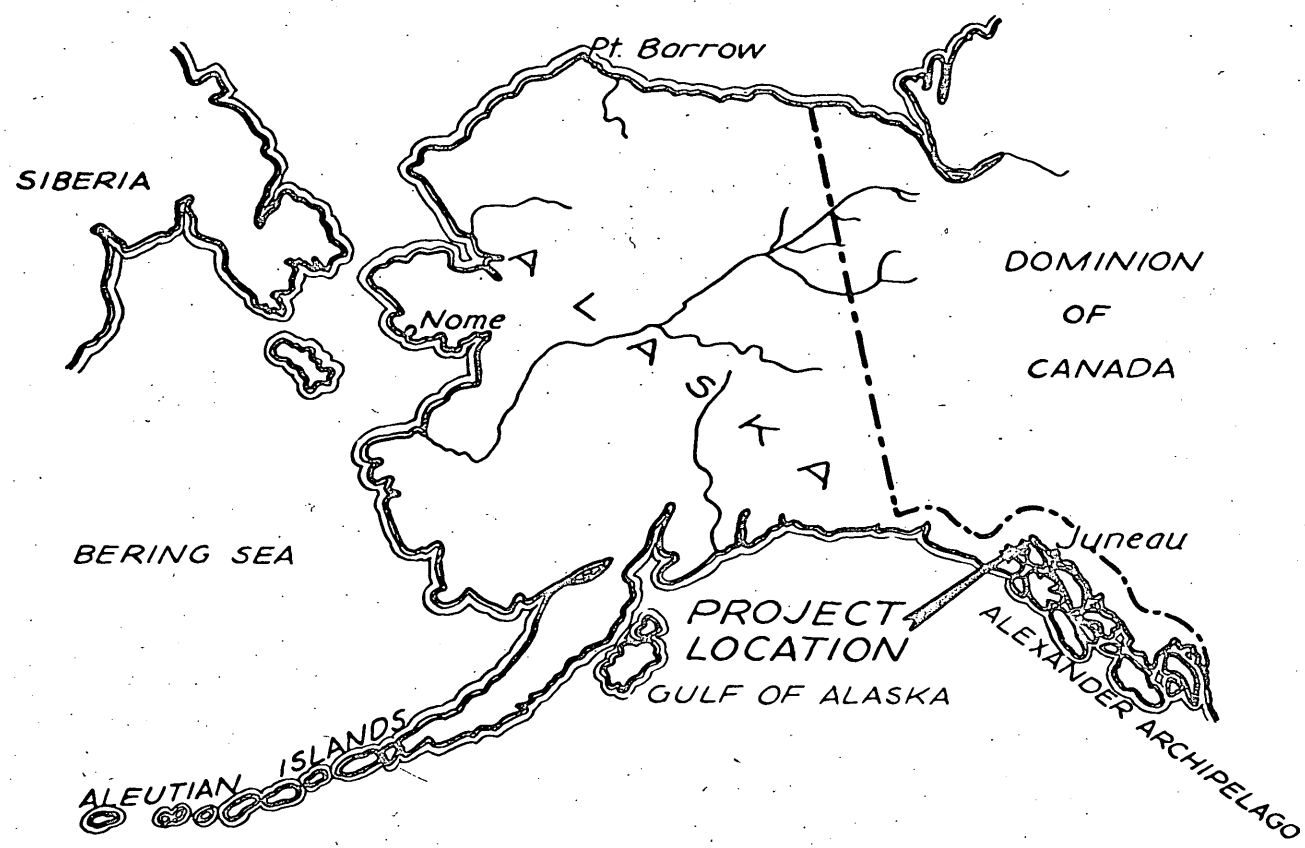


Figure 1. - Territory of Alaska index map.

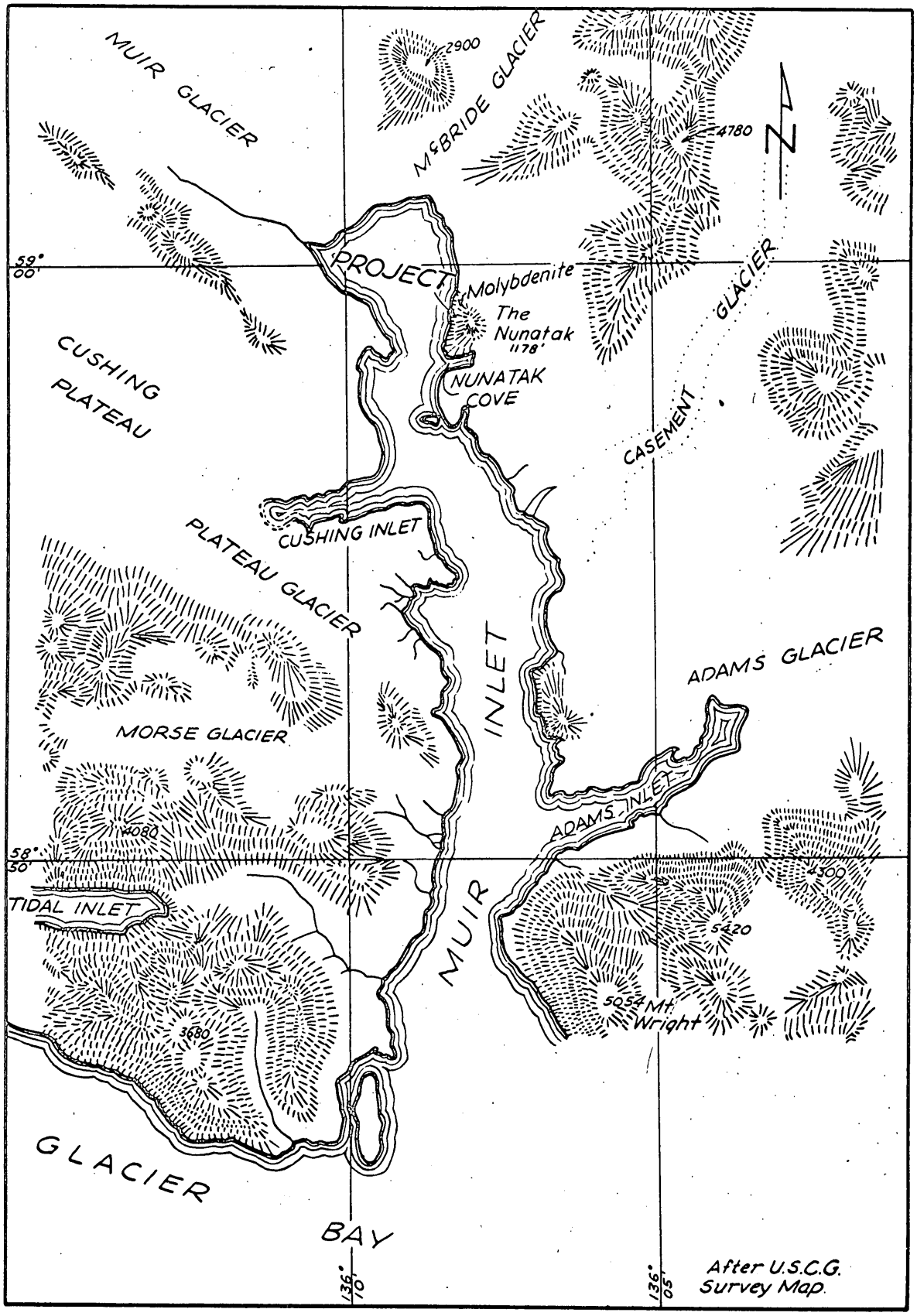


Figure 2. - Location map, showing molybdenite deposits.

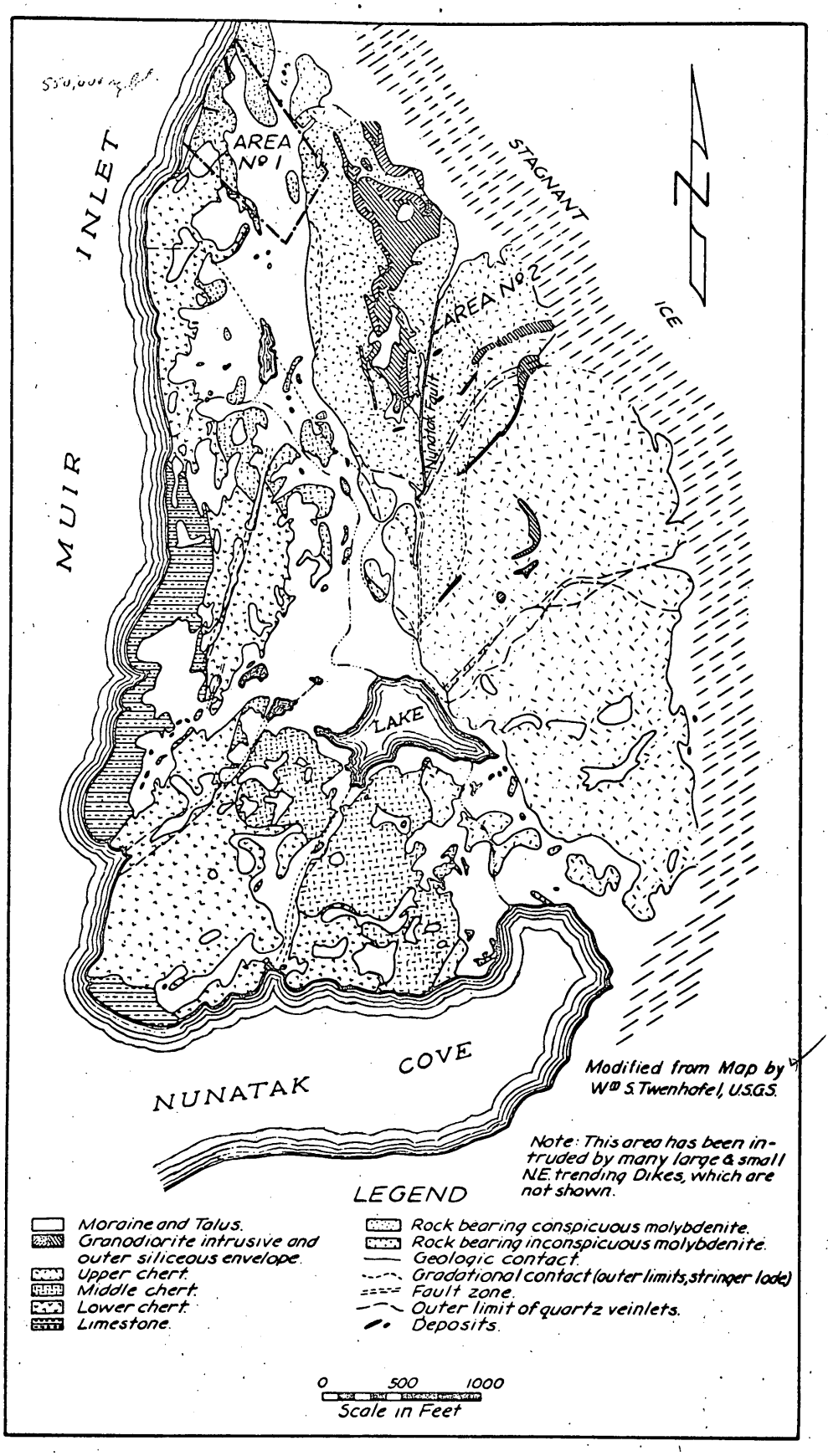


Figure 3. - Generalized geologic map, Nunatak area.

PROPERTY AND OWNERSHIP

Lode claims covering the mineralized areas were staked in 1941 and 1942 by three groups. The original discoverers, John Johnson, Hoonah, Alaska, and Tom Smith, Juneau, Alaska, located four claims. Later, S. H. P. Vevelstad and George Comstock, of Juneau, Alaska, located two claims.

The largest number of claims, 18, was located by Carl Vevelstad, Petersburg, Alaska. A list of unsurveyed claims with ownership follows: John Johnson and Tom Smith, O. K. Nos. 1, 2, 3, and 4; S. H. P. Vevelstad and George Comstock, Triton and Triton No. 1; Carl Vevelstad, Triton Nos. 2 to 20.

ORE DEPOSITS

Field studies of the Nunatak, Muir Inlet area, were made by the United States Geological Survey during the summer of 1942. The following description of the deposits is quoted in part from Twenhofel's report.[6]

> The bedrocks of the Nunatak area include a metamorphosed sedimentary sequence of tightly folded Paleozoic (possibly Devonian) hornfels with some shale and limestone. ***. The earliest intrusions into the stratified rocks are a group of dark altered dikes and sills ***. The hornfels was intruded by a small body of quartz monzonite porphyry, probably early in Cretaceous time after the folding of the bedded rocks.
>
> Around the intrusive, and developed by it, is a contact aureole characterized by abundant diopside in the hornfels. The diopside imparts a dark color to the normally light-colored hornfels. The contact aureole and the three recognized hornfels units ***.are cut by myriad quartz veinlets. The quartz veinlets are increasingly abundant toward the intrusive mass. Near its periphery they coalesce and leave only faint remnants of the original rock. In places the outer part of the intrusive is almost completely silicified.
>
> The general trend of the bedded rocks is about N. 5° W., but at most places, because of minor plications, the rocks strike about N. 30° E. Near the stock the bedding has been obscured. Steeply dipping, closely spaced joints cross all the bedrocks. The majority of these strike about N. 65° W. The numerous quartz veinlets for the most part are in these joints. Many faults strike northeastward and dip steeply southeastward. A few of the faults are zones as much as 75 feet wide. The most recent dikes are approximately vertical and trend northeastward. Fault movements both preceded and followed the formation of the quartz veinlets and the intrusion of the dikes.

6/ Twenhofel, W. S., Molybdenite Deposits of the Nunatak Area, Muir Inlet, Glacier Bay, Alaska: U. S. Geol. Surv. Bull. 947-B, 1946, pp. 12-16.

The molybdenite deposits of the Nunatak area are of two types :- a stockwork type and a fault type.

The stockwork is by far the largest deposit. It embraces all the diopside-rich contact aureole described *** and extends outward beyond its limits but not inward into the intrusive core or its silicified outer parts. The stockwork as herein defined is that part of the zone of quartz veinlets already mentioned in which molybdenite is prevalent.

note

Where the zone of quartz veinlets projects conspicuously northwestward to Muir Inlet it contains most of the richer parts of the stockwork. In this part of the zone the bedrock has been folded into a well-defined anticline.

Several faults within the zone of quartz veinlets contain conspicuously more molybdenite than their wall rocks. The fault deposits are similar to the stockwork, in that molybdenite is present generally along the margins of the quartz veinlets, but they differ from it principally in containing many open fractures, in containing molybdenite in thicker masses, and in being locally almost completely epidotized. The deposit along the Nunatak fault is particularly large and well-mineralized.

The Nunatak fault deposit crops out for a length of 2,000 feet. It disappears to the north beneath talus and moraine and to the south beneath moraine and a small lake. The known vertical range of the deposit is from about 380 feet to about 910 feet above sea level. Its width ranges from about 5 feet to as much as 20 feet and averages about 9 feet. The fault strikes about N. 5° E., and its dip steepens from 60° E. in its southern part to 75° E. at its northernmost exposure.

The quartz veinlets that cross the fault zones are similar in most respects to the quartz veinlets elsewhere. The veinlets are better mineralized in the fault zones and seem to indicate that earlier fault movements formed places particularly favorable for molybdenite deposition.

Molybdenite is the most conspicuous metallic mineral in the deposits, because much of it occurs as films and thin plates along the margin of the quartz veinlets. This mode of occurrence makes a visual grading of the ore difficult and is probably the reason the importance of the deposits has been overestimated in the past.

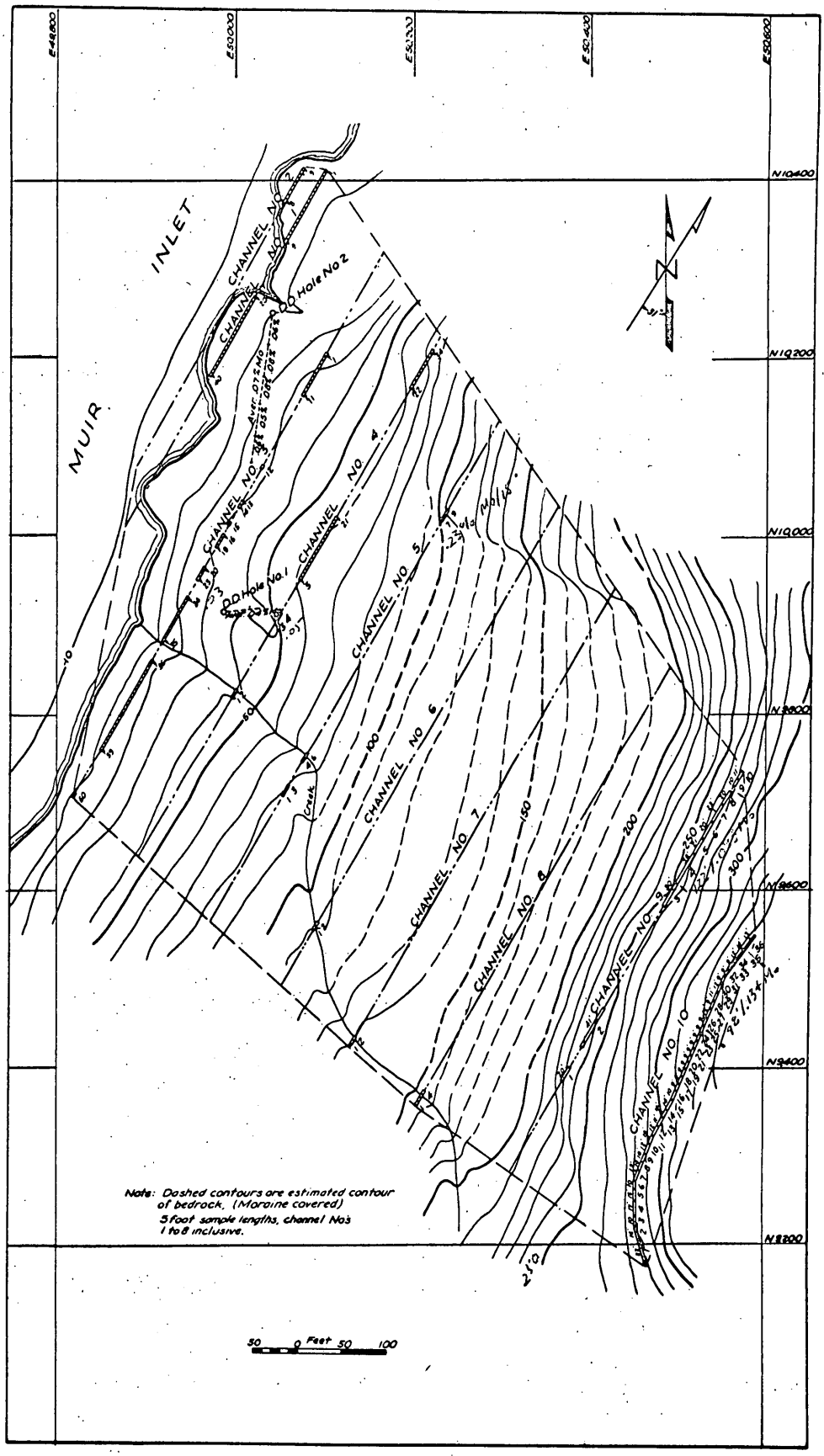
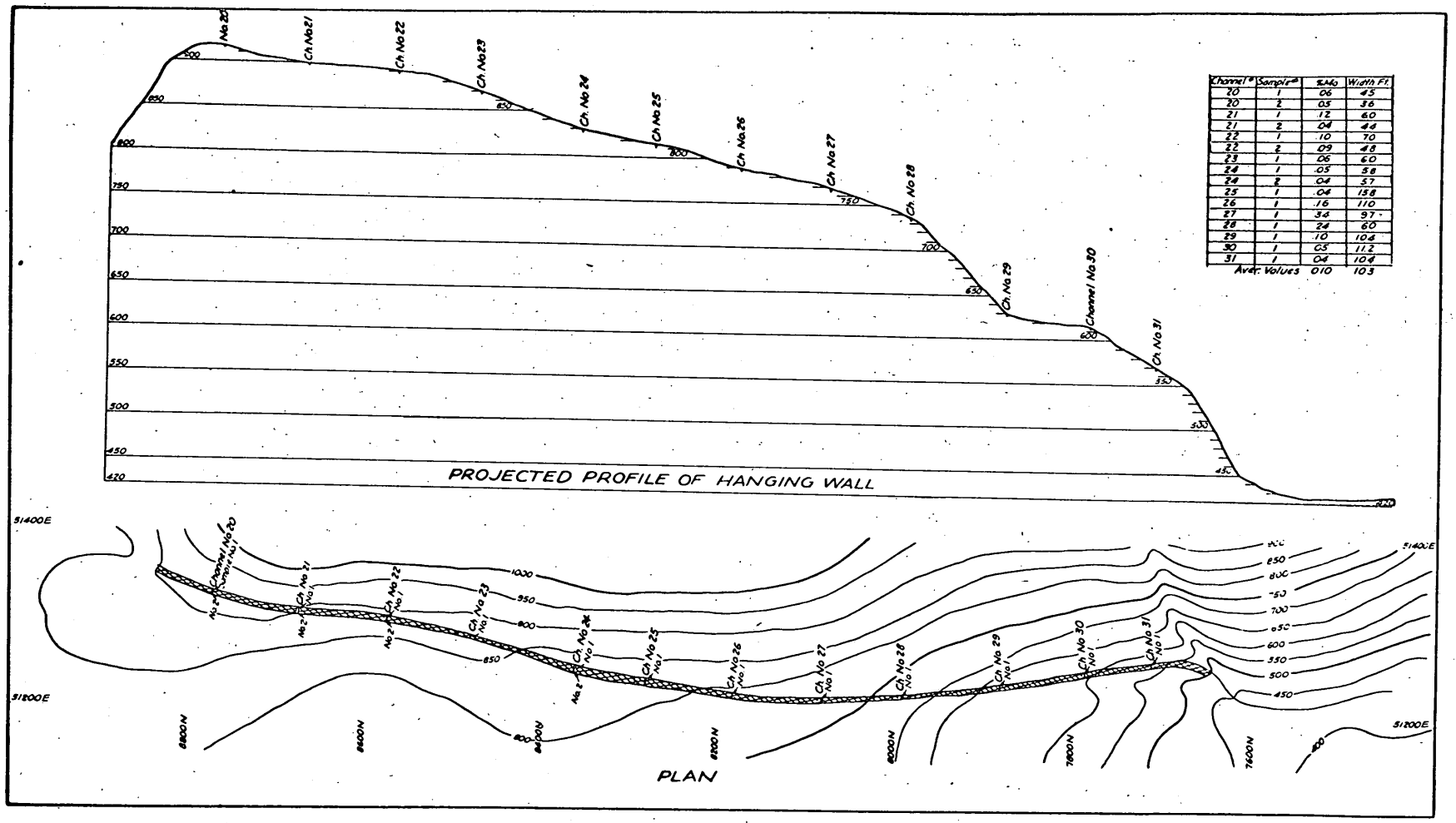


Figure 4. - Assay plan, area I.

CHANNEL #1		CHANNEL #2		CHANNEL #3		CHANNEL #4		CHANNEL #10	
Sample#	%Mo	Sample#	%Mo	Sample#	%Mo	Sample#	%Mo	Sample#	%Mo
1	0.09	7	0.05	44	0.06	30	0.06	10 8	0.04
2	.07	8	.03	45	.08	31	.06	10 9	.03
3	.09	9	.06	46	.04	CHANNEL #5		12 10	.04
4	.09	CHANNEL #3		47	.04	Sample#	%Mo	10 11	.04
5	.04	Sample#	%Mo	48	.02	1	.05	12 12	.06
6	.04	1	.05	49	.06	2	.03	11 13	.04
7	.08	2	.07	50	.04	3	.08	10 14	.05
8	.08	3	.03	51	.06	4	.05	14 15	.04
9	.09	4	.04	52	.05	5	.04	10 16	.04
10	.08	5	.08	53	.05	6	.05	8 17	.07
11	.10	6	.06	54	.06	7	.52	8 18	.05
12	.14	7	.08	55	.04	8	.06	8 19	.07
13	.08	8	.09	56	.06	9	.11	8 20	.07
14	.12	9	.10	57	.08	CHANNEL #6		8 21	.05
15	.04	10	.10	58	.05	Sample#	%Mo	8 22	.10
16	.05	11	.03	59	.06	1	.05	8 23	.08
17	.07	12	.08	60	.07	2	.04	8 24	.07
18	.05	13	.06	CHANNEL #4		CHANNEL #7		8 25	.11
19	.05	14	.06	Sample#	%Mo	Sample#	%Mo	8 26	.10
20	.09	15	.10	1	.08	1	.02	12 27	.09
21	.07	16	.05	2	.08	2	.04	8 28	.08
22	.06	17	.04	3	.07	CHANNEL #8		11 29	.13
23	.06	18	.02	4	.03	Sample#	%Mo	12 30	.20
24	.05	19	.03	5	.06	1	.05	8 31	.09
25	.05	20	.04	6	.07	2	.04	8 32	.21
26	.04	21	.02	7	.09	3	.04	8 33	.09
27	.05	22	.03	8	.09	4	.07	12 34	.11
28	.06	23	.03	9	.12	CHANNEL #9		14 35	.10
29	.09	24	.03	10	.09	Sample#	%Mo	13 36	.07
30	.05	25	.03	11	.06	20 1	.05		
31	.07	26	.02	12	.07	21 2	.05		
32	.05	27	.05	13	.14	20 3	.06		
33	.09	28	.03	14	15	4	.09		
34	.06	29	.03	15	.05	21 5	.08		
35	.07	30	.02	16	.13	20 6	.11	CHANNEL	%Mo
36	.08	31	.03	17	.08	23 7	.08	1	.07
37	.10	32	.04	18	.09	8	.11	2	.05
38	.04	33	.13	19	.07	10 9	.08	3	.05
39	.05	34	.03	20	.07	11 10	.07	4	.07
40	.06	35	.06	21	.06	CHANNEL #10		5	.11
CHANNEL #2		36	.07	22	.10	Sample#	%Mo	† 6	.05
Sample#	%Mo	37	.04	23	.05	1 32	.06	† 7	.03
1	.03	38	.08	24	.08	2 16	.10	‡ 8	.04
2	.05	39	.04	25	.05	3 10	.05	9	.07
3	.03	40	.04	26	.06	4 17	.05	10	.07
4	.07	41	.02	27	.04	5 18	.07		
5	.02	42	.07	28	.05	6 10	.09	Aver. all Channels	.07
6	.04	43	.03	29	.02	7 12	.06		

† - 2 samples not representative.
‡ - 4 " " "
5 foot sample lengths, channels 1-8 inclusive.

Figure 5. - Assay data, area 1.



Channel #	Sample #	%Ag	Width Ft.
20	1	.06	45
20	2	.05	36
21	1	.12	60
21	2	.04	44
22	1	.10	70
22	2	.09	48
23	1	.06	60
24	1	.05	58
24	2	.04	57
25	1	.04	158
26	1	.16	110
27	1	.34	97
28	1	.24	60
29	1	.10	104
30	1	.05	112
31	1	.04	104
Avg. Values		.010	103

Figure 6. - Plan and profile, area 2.

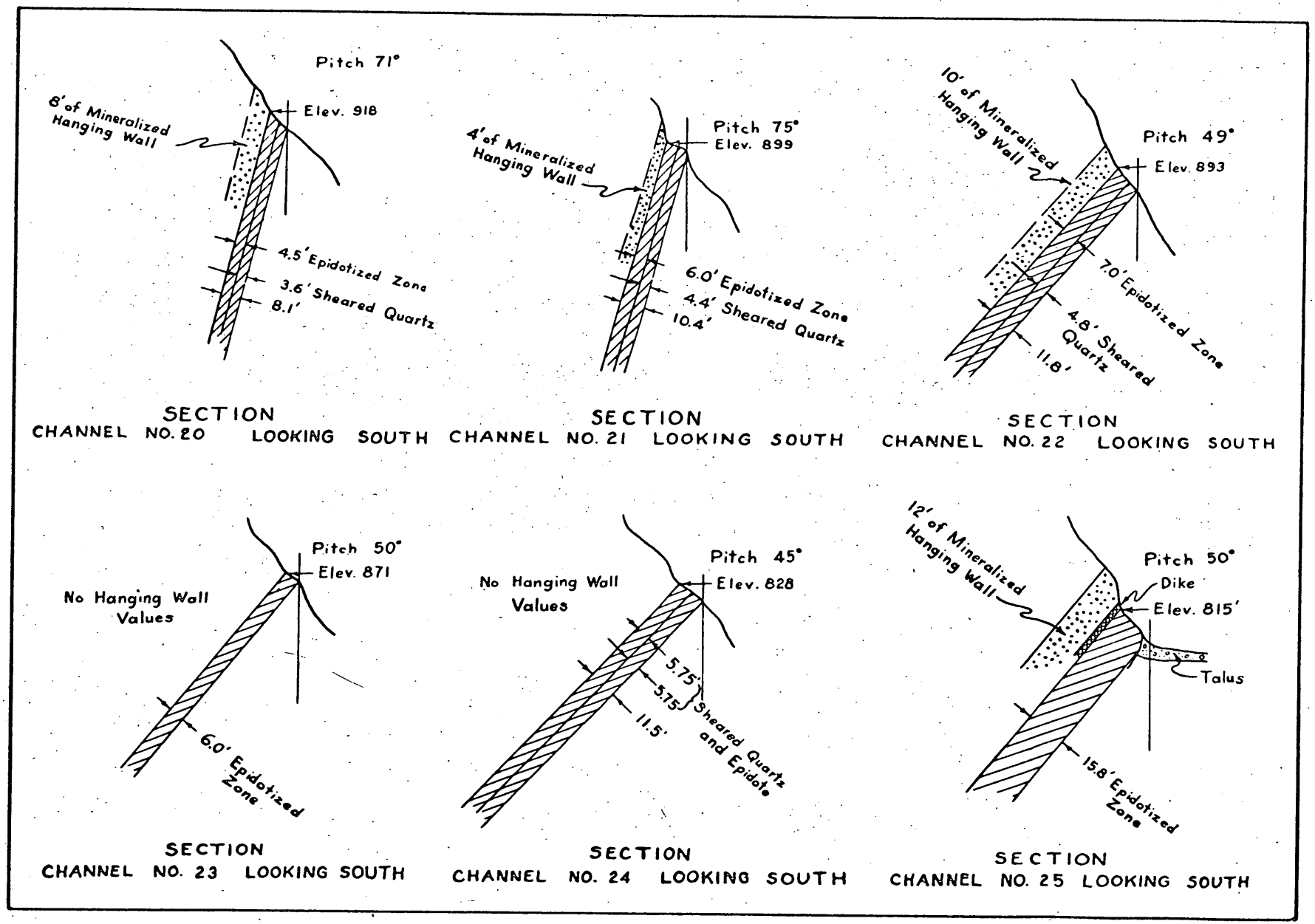


Figure 7. - Sections, area 2.

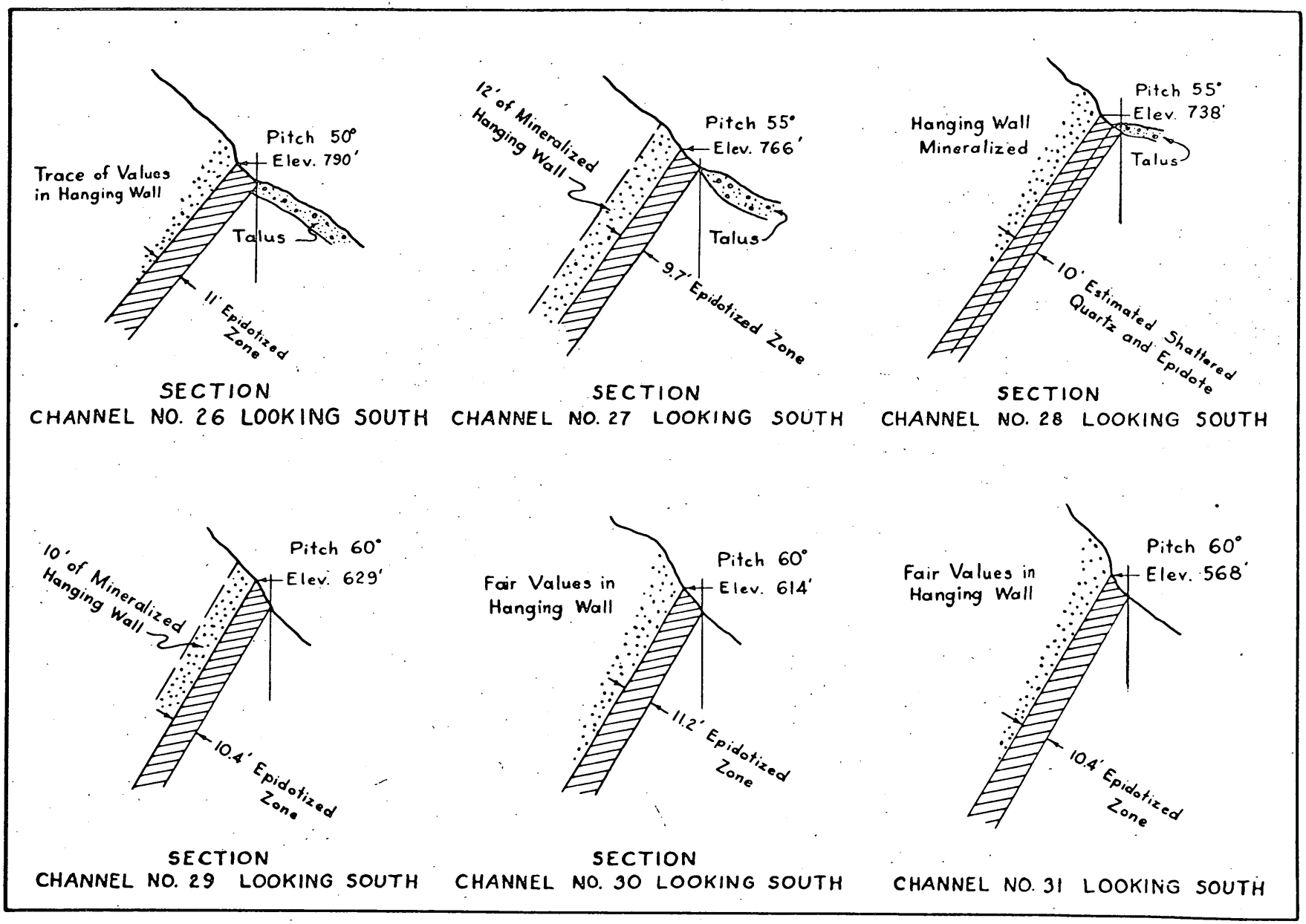


Figure 8. - Sections, area 2.

SAMPLING AND ANALYSIS

Stockwork deposits. - The stockwork molybdenite deposits outcrop over an area of about two million square feet and are partly covered by glacial moraine. The more noticeable mineralization is confined to an area of 550,000 square feet. This is designated as Area No. 1 and was selected for systematic exploration. (See fig. 3.)

A total of 203 channel samples were cut over a length of 1,440 feet. These samples averaged 0.07 percent molybdenum. The highest analysis from this group of samples was 0.52 percent molybdenum, and only four samples assayed 0.15 percent molybdenum or higher. The location of samples taken is shown on figure 4, and the analyses are shown on figure 5.

Two core drill holes were put down in this area. Hole 1 was drilled at an inclination of -30° and completed to a depth of 46.7 feet. Hole 2 was drilled at an inclination of -45° and completed to a depth of 238.1 feet. This hole reached a vertical depth of 169 feet below the surface or 158 feet below sea level. The location of the holes is shown on figure 4.

The grease ordinarily used to lubricate the drill rods could easily float the molybdenite when core drilling in this type of deposit. The possibility was anticipated, and provisions were made to recover all of the sludge for analysis.

The following tabulation gives the total weighted core and sludge analyses and the adjusted average analyses:

Hole	Percent molybdenum		
	Core	Sludge	Adjusted average
1	0.043	0.041	0.042
2	0.063	0.073	0.072

The same uniformly low-grade mineralization as found on the surface continued to the bottom of the holes. Only two samples obtained in the drilling contained more than 0.15 percent molybdenum.

Fault deposits. - There are four faults that contain more molybdenite than is found in the wall rock. The Nunatak fault, the largest, is well-mineralized. This deposit was selected for exploration and is designated Area 2. The samples were cut in 12 channels spaced over a length of 1,100 feet. These samples contained an average of 0.10 percent molybdenum. The average width of fault samples was 10.3 feet. Only three of the samples obtained from this deposit contained more than 0.15 percent molybdenum. The analysis of individual samples and a plan and profile of Area 2 are shown on figure 6. Sections through the fault at points sampled are shown on figures 7 and 8.

BENEFICIATION TESTS

Two representative samples were shipped to the Bureau of Mines Laboratory in Rolla, Mo., for metallurgical testing. One sample was taken near the first drill site in Area 1. The other sample was obtained from the shear zone in Area 2.

On the sample from Area 1, a concentrate containing 88.04 percent molybdenum sulfide was recovered, whereas on the one from Area 2 (shear zone) the recovered concentrate contained 94.49 percent molybdenum sulfide. As molybdenum concentrates are usually quoted on the basis of 90 percent minimum molybdenum sulfide content, the product made from the Area 1 sample was slightly below specification; the other concentrate, however, was considerably above the minimum.

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
1/5	Johnson	110
	Selfridge	120
		220

JAN 6

Mr. E. G. Thompson
Keevil Mining Group Limited
Suite 1000
11 Adelaide Street West
Toronto 1, Ontario
CANADA

Re: OME-6492 (Molybdenum)
Keevil Mining Group Limited
Nuna Claims
Glacier Bay Mining District, Alaska

Dear Mr. Thompson:

This is in reply to your letter of December 30, 1965, concerning the denial of the subject application.

The denial of your application for exploration assistance was based primarily on the lack of sufficient favorable geological information to support the expectation of finding an economic deposit of molybdenum on your property.

An application can always be reopened by the submission of new or additional information concerning the property to be explored.

Sincerely yours,

(signed) FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

FEJohnson/bih
1/5/65
cc to: Director's reading file
Division file
Economic Geology file
OME file
OME reading file
OME Region I

23263

KEEVIL MINING GROUP LIMITED

SUITE 1000, 11 ADELAIDE STREET WEST, TORONTO 1, TELEPHONE EMPIRE 2-1571

TECK CORPORATON LIMITED
COPPERFIELDS MINING CORP. LIMITED
LAMAQUE MINING CO. LTD.
MINING GEOPHYSICS CO. LTD.
PICKLE CROW GOLD MINES LTD.
SILVERFIELDS MINING CORP. LIMITED
and other associated companies

OFFICIAL COPY
O. M. E.
RECEIVED
JAN 3 1966
INITIALS | CODE
120
120
110

December 30, 1965.

Mr. Frank E. Johnson,
Chief,
Office of Minerals Exploration,
Department of the Interior,
Washington 25, D.C.,
U.S.A.

RE: OME -6492 (Molybdenum, Keevil Mining Group Limited
Nuna Claims, Glacier Bay Mining District, Alaska)

Dear Mr. Johnson:

In your letter of September 7th, 1965 which rejected our application for financial assistance you stated that "careful study of our application...and other information available to us indicate that the probability of disclosing significant ore reserves on the property is not sufficiently promising to justify Government participation.." Could you inform me if the application was turned down solely on the basis of unfavourable geology or if other factors such as (a) the cost of the program (b) the mineral sought after, (c) your own budget (d) something to do with our financial position or (e) our being a foreign company, caused the decision. As far as we can determine from professional opinions of engineers who have examined the property, it is a better than average target with one of the adverse factors being its location.

I have checked with two of your government people who are familiar with the property and neither one were asked for an opinion. Mr. Thorne who is the Supervising Mining Engineer in Juneau would not express an opinion unless requested by the O.M.E. However he was enthusiastic about the property during conversations with our personnel. Dr. Twenhofel who is chief of the Special Services Branch, Federal Center, Denver, mapped the area in the early 1940's. In a recent letter I received from him he states that although he has not been involved in molybdenum deposits for some time and did not feel particularily well qualified to offer an opinion on the potential of the Nunatak deposit" the size of the deposit is sufficiently large to be attractive as a potential ore deposit, but the grade at depth is unknown. Based on analogy with other genetically similar molybdenum deposits it is reasonable to explore the intrusive at depth with the hope of finding

.....2

mineralized material". It is generally accepted in the mining profession that the skarn mineralization that was worked on by the Bureau of Mines in the early 1940's was only an indicator of molybdenum mineralization. The potential of the property is mineralization in the acid intrusive which is thought to underlie the alteration area.

We are still attempting to raise sufficient funds to test the underlying intrusive and feel that a 3000 foot drilling program costing in the order of $ 50,000 could provide sufficient information to recommend additional work and interest a major company to put up additional funds. If consideration would be given to a new OME submission we would be pleased to submit a new application.

Yours very truly,

KEEVIL MINING GROUP LIMITED,

E.G.Thompson

EGT:ct

MME FORM 6 REFERENCE SLIP

REV. 2-59 OFFICE OF MINERALS EXPLORATION

TO: Chief, OME	DATE	INITIALS
1.	12/9/65	
2.		
3.		
4.		
5. D. R. MacLaren		

FROM: Field Officer, Reg. I

OFFICIAL COPY
O. M. E.
RECEIVED
DEC 14 1965

FOR: Check items for action desired

____ Action	____ Reply for signature of	INITIALS	CODE
____ Approval	____ Investigate		Surname
____ Comment	____ Recommendations		Signature
____ Conference	____ Rewrite		File
____ Instructions	X Your information		~~120 M~~
			120

REMARKS:

220

denied 9/7

INT.-DUP. SEC., WASH., D.C. M56300-62

One

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

~~REGION 1~~
Area VIII

ALASKA OFFICE OF
MINERAL RESOURCES

P. O. BOX [illegible]
JUNEAU, ALASKA

December 1, 1965

Mr. D. R. MacLaren
Acting Field Officer
OMS Region I
South 157 Howard Street
Spokane, Washington 99204

Dear Mac

Enclosed are copies of recent correspondence which will alert you to the possibility of applications for OMS assistance from Mr. E. G. Thompson (molybdenum) and Mr. Leonard Kaiser (placer gold).

Sincerely yours,

J. A. Herdlick
Area Director, Area VIII

Enclosure

Re: OMS-6492 (Molybdenum) - Denied
Keevil Mining Group Limited
Nuna Claims
Glacier Bay Mining District, Alaska

Area VIII

December 2, 1963

Mr. R. G. Thompson
Sherwil Mining Group Limited
Suite 1000
11 Adelaide Street West
Toronto, Ontario, Canada

Dear Mr. Thompson:

Reference is made to your letter citing the rejection of a proposed DMT drilling program on the molybdenum property in the Glacier Bay mining district, Alaska, your intention of making another application, and a request for our intercession in the property's behalf. We do not report on applications for exploration assistance unless specifically requested to do so by the Office of Mineral Exploration.

As you probably know, information on the deposit is available in two published reports: U.S. Geological Survey Bulletin 947-B, pages 9 to 18, Molybdenum Deposits of the Humpback Area, Muir Inlet, Glacier Bay, by W. S. Mansfield, and Bureau of Mines R.I. 4421, Investigation of Muir Inlet or Humpback Molybdenum Deposits, Glacier Bay, Southeastern Alaska. If you do not have these publications, they can be supplied by the Geological Survey and the Bureau of Mines.

Sincerely yours,

Robert L. Thorne
Supervising Mining Engineer

cc:
D. R. Mackelvie, OMT
Zinner
Hendlich
Mial Files

RLThorne:jo

KEEVIL MINING GROUP LIMITED

SUITE 1000, 11 ADELAIDE STREET WEST, TORONTO 1, TELEPHONE EMPIRE 3-1571

TECK CORPORATION LIMITED
COPPERFIELDS MINING CORP. LIMITED
LA MAQUE MINING CO. LTD.
MINING CORPORATION CO. LTD.
PICKLE CROW GOLD MINES LTD.
SILVERFIELDS MINING CORP. LIMITED
and other associated companies

November 23, 1965.

Mr. Thorne,
Bureau of Mines,
Juneau, Alaska,
U.S.A.

Dear Mr. Thorne:

As you probably know our company holds an option of the Nuna claims which cover the molybdenum property in Glacier Bay Mining District, Alaska. We applied for OME financial assistance for doing a drilling program on the property and were turned down because "the probability of disclosing significant ore reserves on the property is not sufficiently promissing to justify Government participation in the proposed exploration". Mr. Walper who originally brought the property to our attention states that you are familiar with the property and like its' potential. If this is true, would you pass your opinions along to Frank E. Johnson in Washington as we are going to make another attempt to get some help in this project. We believe that it is a good exploration bet but the total cost of a drilling program on this property would be four times as high as most of our programs in Canada because of location and taxes.

Yours very truly,

KEEVIL MINING GROUP LIMITED,

E.G. Thompson

EGT:ct

RECEIVED
NOV 29 1965
BUREAU OF MINES
JUNEAU, ALASKA

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

~~REGION 1~~
Area VIII

ALASKA OFFICE OF
MINERAL RESOURCES

P. O. BOX 2000
JUNEAU, ALASKA

December 3, 1965

Mr. D. R. MacLaren
Acting Field Officer
OME Region I
South 157 Howard Street
Spokane, Washington 99204

Dear Mac:

Enclosed are copies of recent correspondence which will alert you to the possibility of applications for OME assistance from Mr. E. G. Thompson (molybdenum) and Mr. Leonard Zaiser (placer gold).

Sincerely yours,

J. A. Herdlick
Area Director, Area VIII

Enclosure

Area VIII

October 2, 1965

Mr. Leonard [illegible]
[illegible] 33rd [illegible]
Spenard, Alaska

Dear Mr. [illegible]

Reference is made to your letter requesting [illegible] information relative to Government financing for a mining operation on your [illegible] claims on Peters Creek in the Talkeetna District.

To our knowledge, there are no Government programs for the financing of a project of this nature. If there is a possibility of discovering higher values with further exploration, the Office of Mineral Exploration (OME) might finance 50 percent of such [illegible]. An information booklet and the necessary application and coordination agreement forms are enclosed for your convenience [illegible] wish to apply for an exploration assistance loan. [illegible] completed, they should be sent directly to the [illegible], Region I, South [illegible] Howard Street, Spokane, Washington.

Sincerely yours,

R. L. Thorne
Supervisor, Mineral [illegible]

Enclosures

cc:
D. R. MacLaren, OME
Zinner
Herdlick
Mini Files

RLThorne:jc

1400 33rd Pl.
Spenard, Alaska
Nov. 22, 1961

J. A. Herdlick
Bureau of Mines
Juneau Alaska

Dear Sir;

I have a lease on 12 claims of gold placer ground on Peters Creek 40 miles northwest of Talkeetna. This ground was drilled by Norman Stines for Calumet & Hecla in 1942 and their logs show a block of ground with values of a little over one million dollars. The deposit is on a bench 80 feet above the present creek and is 400 feet by 1500 feet long. The pay gravel runs from 12 to 40 feet in depth, and the overburden (glacial till) is from 12 to 80 feet in depth. Total yardage is about 2½ million cu. yards.

I have been trying to finance this deal with an S.B.A. loan but they wont go for it and advised me to go to another Government Agency. They didn't know which one in particular so told me to find out through the Bureau of Mines.

Does the C.M.S. have an office in Juneau? or is there some other agency that I can contact? I'd appreciate any information that you can give me.

Sincerely Yours,

Leonard Zaiser

D
1963
OF MINES

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
9/1	Murphy	120
9/2	[illegible]	130
9/3	Johnson	110
		220
9/3	Ridgeway	
9/7	[illegible]	
		110
		220

Keevil Mining Group Limited
c/o Suite 1000 - 11 Adelaide St. W.,
Toronto 1, Ontario

Re: OME-6492 (Molybdenum)
Keevil Mining Group Limited
Nuna Claims
Glacier Bay Mining District, Alaska

Gentlemen:

Careful study of your application for financial assistance in exploring the subject property and of other information available to us indicates that the probability of disclosing significant ore reserves on the property is not sufficiently promising to justify Government participation in the proposed exploration. Accordingly, we regret to inform you that your application for exploration assistance is denied.

Sincerely yours,

(signed) FRANK E. JOHNSON

Frank E. Johnson
Chief, Office of
Minerals Exploration

FMMurphy/gla (9-1-65)
cc to: Director's Reading File
Division copy
Economic Geology copy
OME File
OME Reading File
OME Region I (2)
Mr. Selfridge (2)
120M

23263

August 26, 1965

Keevil Mining Group Limited
c/o Suite 1000 - 11 Adelaide St. W.
Toronto 1, Ontario

Subject: OME - 6492

Gentlemen:

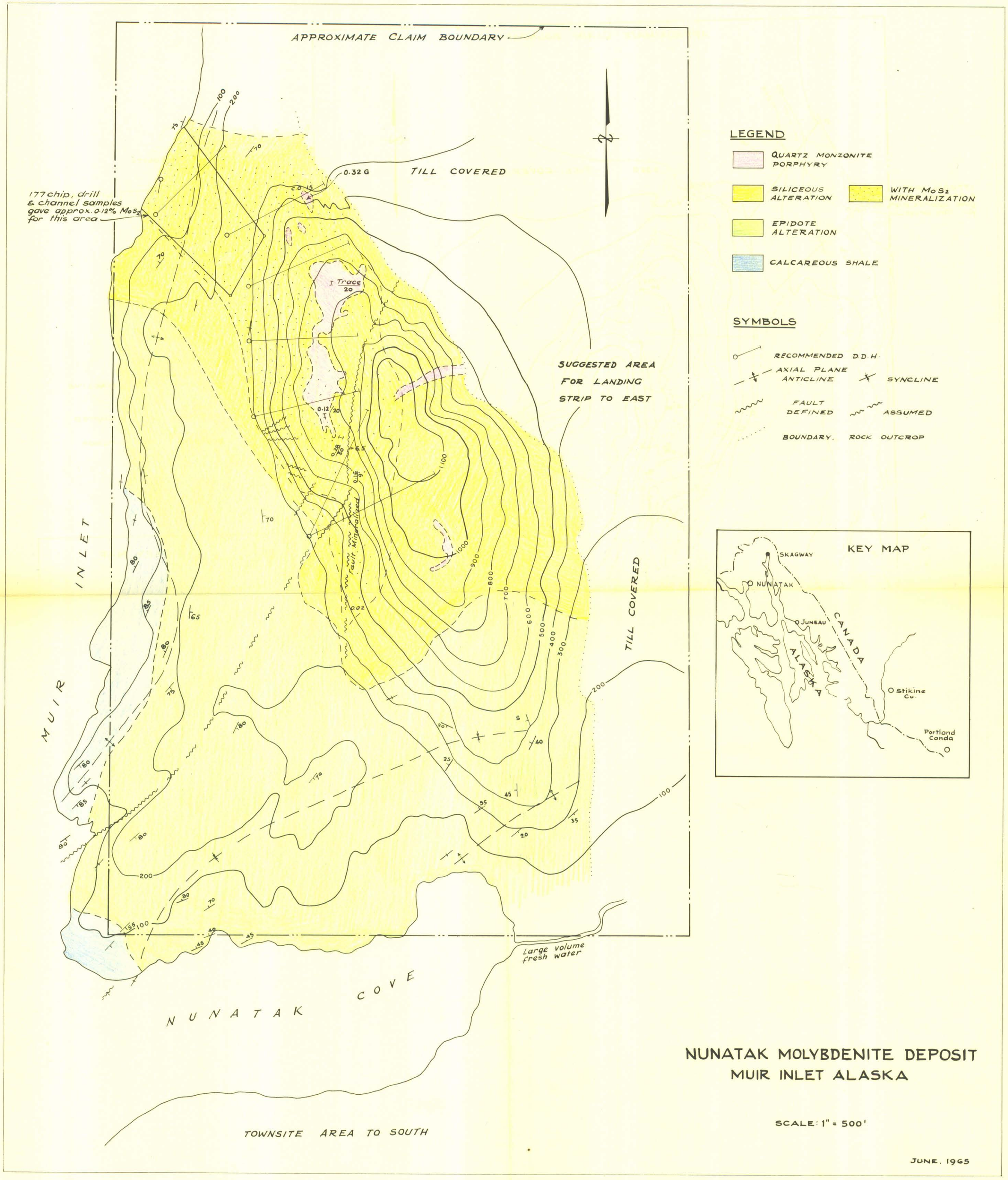
Your application for exploration assistance, dated August 13, 1965, submitted to our office at Spokane, Washington, has been assigned Docket Number OME - 6492.

Please identify all future correspondence relating to your application by this docket number.

Sincerely yours,

Frank E. Johnson
Chief, Office of
Minerals Exploration

Copy to Region I



NUNATAK MOLYBDENITE DEPOSIT
MUIR INLET ALASKA

SCALE: 1" = 500'

JUNE, 1965