MME Form 9
Rev. Nov. 65

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey

OFFICIAL DOCKET FILE Contract No. _____ Docket No. 6796

Application
- [ ] Denied
- [x] Withdrawn

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

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

Folder No. 1:

Left Side

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

Right Side

- [ ] Project Summary (final)
- [ ] Work Completed Analysis (final)

All other material filed in chronological order including the following reports if checked:

- [ ] Field Team 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

72195-65

MME FORM 6 REFERENCE SLIP

REV. 2-59 OFFICE OF MINERALS EXPLORATION

TO:	DATE	INITIALS
1. Chief, OME	7/7/69	
Re: OME- 6796 (Gold-Silver)		
2. Crystal Mines, Inc.		
Crystal-Bullion Mines		
3. Jefferson County, Montana		
4.		
5. Willard P. Puffett WPP		
FROM: Field Officer, Region I		

FOR: Check items for action desired

____ Action	____ Reply for signature of ____	
____ Approval	____ Investigate	____ Surname
____ Comment	____ Recommendations	____ Signature
____ Conference	____ Rewrite	____ File
____ Instructions	X Your information	

REMARKS: Attached are bids for underground work, diamond drilling, and rotary-percussion drilling at the Crystal mine. Information in the transmittal letter suggests the originally planned trenching has been done. The bids appear to be very complete for all three categories of work. This will complete the application.

UTICA MINES LTD. (N.P.L.)

SUITE 2002 · 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

OFFICIAL COPY
O. M. E.
RECEIVED
JUL 11 1969

INITIALS	CODE
	~~430~~
bal	120
	122

unassigned

July 4, 1969

U.S. Department of the Interior,
Geological Survey,
Spokane, Wash.
U.S.A.

Attention: Mr. W. Puffett

Dear Sir:

Re: Crystal Mines Inc. OME-6796

Enclosed you will find six (6) bids for the proposed drilling program as well as two bids on the proposed underground development for Crystal Mines Inc. property in Basin, Montana.

Since last talking to you the Company has gone ahead on the outlined trenching program, on surface, and finished off the underground crosscuts (with good results thus far I might say).

As our program shows, we are not the kind of Company that sits on our properties long. With option payments continually pressing us we get on with the job and get two dollars of work for a dollar spent. It has been our organization's policy to bring in mines as soon as we can. Three to date. Time is money. This we know from experience.

We are hoping that the Department, seeing our program progress as it is, will see fit to grant us assistance on our exploration, drilling and/or underground development in the very near future.

Yours very truly,

UTICA MINES LTD. (N.P.L.)

John C. L. Black,
Secretary-Treasurer.

JB:dw
Encls.

046488

RECEIVED
U.S. GEOLOGICAL SURVEY
JUL 10 8 38 AM '69
BUDGET & FINANCE

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

Crystal Mines, Inc.
Box 1954
Butte, Montana 59701
May 24, 1969
Telephone 406-723-4789

Specifications for Underground Work out of the Lower Crystal Tunnel.

I Extension of the lower tunnel along the dike a minimum of 400'. Contract will commence at the face of the lower tunnel. There is a cave 100' from the face, any repair work on the cave will be done by Crystal or will be a cost-plus item charged to Crystal.

Specifications
(1) Raw, 6' wide X 7' high.

(2) Timber when needed.
(a) Sets on 6' centers
(b) Timber Detail
native pine
8"X8" cap 6'-4" long
8"X8" post 7'-6" long
8" batter on post
4"X6" spreader and collar brace
bridge lagging and back lagging 2"X-X6'
side lagging when needed 2"X-X6'
sets must be sufficiently blocked

(3) Rail, 20# minimum

(4) Ties, 3' centers

(5) Grade 6"/100'

II Crosscutting out of the lower tunnel a minimum of 200'.

Specifications
(1) Length 0'-40'

(2) Other specifications, none

III Raising out of the lower tunnel a minimum of 450'

Specifications
(1) One raise from the extended lower tunnel to the surface.
(a) Length, approximately 300', with two intermediates, in essence three 100' raises.
(b) Minimum size 6'X8', two compartment.
(c) Angle, 70 - 65 degrees

RECEIVED
JUL 7 1969
SPOKANE WASH.

(2) Approximately 150' of raising, no one raise over 100'.
(a) Angle, 70 - 65 degrees
(b) Other specifications, none.

IV Crosscutting out of the raises and intermediates a minimum of 200'.

Specifications
(1) Length 0' - 40'

(2) Other specifications, none

V Sampling procedure.
One pound grab samples will be taken from each car. The material will be accumulated in a sample sack, provided by Crystal, to form one sample from each round.

VI Muck from the development headings will be stacked in the lower mine yard, in areas provided for by Crystal.

VII The contractor shall furnish a surety bond in form satisfactory to Crystal.

VIII Contractor shall maintain effective coverage for all his employees under one of the authorized plans of the Workmen's Compensation Act of the State of Montana.

IX Bid is for an O.M.E. loan and must meet their requirements.

Crystal Mines, Inc.
David R. Shoemaker
David R. Shoemaker
Mine Manager

HAROLD B. SPENCER, PRESIDENT
JAMES QUIGLEY, VICE-PRESIDENT
FRANCIS W. McCABE, SEC'Y-TREASURER

P. O. BOX 290
TELEPHONE 433-6876
AREA CODE 801

CENTENNIAL DEVELOPMENT COMPANY

MINING ENGINEERS AND CONTRACTORS

EUREKA, UTAH 84628

RECEIVED
JUL 7 1969
O. N. E.
SPOKANE, WASH.

June 23, 1969

Crystal Mines, Inc.
P.O. Box 194
Butte, Montana 59701

Gentlemen:

In accordance with your request, we are pleased to offer to extend the Lower Tunnel at your Crystal Mine and drive cross-cuts and raises, under the following specifications and the following terms:

SPECIFICATIONS

Tunnel is to start at the face, with air lines, water lines and track installed, and tunnel timber repaired to the face. Tunnel is to be 6' x 7' with 20# rail on ties on 3' centers. Cross-cuts are to be from 0-40', raises are to be 0-300', on 65-70 degree inclination. Short raises are to be 5' x 8', timbered, with chute and manway. 300' raise to the surface is to be 6' x 12' with three compartments. Samples are to be taken from each car and the muck stockpiled in the lower mine yard.

OWNER TO PROVIDE

Owner is to keep mine road in repair and clear of snow, and have sufficient room on the lower dump to stockpile samples. Owner further, is to repair lower tunnel to good working condition with 4" air line, 1" water line and rail to the face.

CONTRACTOR TO PROVIDE

Contractor is to provide all supervision, labor, equipment, materials and supplies necessary to perform the work with all payroll insurance, fringe benefits, and comprehensive liability insurance. Contractor will also furnish a bond.

CENTENNIAL DEVELOPMENT COMPANY

RECEIVED
JUL 7 1969
O. M. L.
SPOKANE, WASH.

FIRM PRICES

I.	Drifting from face	Per lineal foot	$ 95.00
	8" x 8" sets on 6' centers, including extra ground removed	Per set	$240.00
II.	Cross-cuts from lower tunnel, 0-40'	Per lineal foot	$ 40.00
III.	(1) Raise to surface, 3 compartments, 6' x 12' including 8" x 8" timber	Per lineal foot	$225.00
	(2) Raise to maximum of 150', 2 compartments 6' x 8' including 8" x 8" timber	Per lineal foot	$125.00
IV.	Cross-cuts from raises, bare	Per lineal foot	$ 50.00

We appreciate the opportunity of making this offer and trust you will call on us again for work of this kind.

Very truly yours,

Centennial Development Company

James Quigley

James Quigley
Vice-President

JQ/ss

ACE TRADING COMPANY

MINING & CONTRACTOR'S EQUIPMENT

P. O. BOX 16

BUTTE, MONTANA

TELEPHONE: AREA CODE 406 - 792-1013

RECEIVED JUL 7 1969 O. M. E. SPOKANE, WASH. WPP

June 1, 1969

Mr. David R. Shoemaker
Mine Manager
Crystal Mines, Inc.
Box 1954
Butte, Montana 59701

Dear Dave:

We are pleased to submit our prices for your proposed development project at the Crystal Mine near Basin, Montana.

1.	Drifting, per foot	$ 75.50
2.	Drift Timber, per foot	21.75
3.	Drift Crosscuts, per foot	58.25
4.	Two compartment timbered raise, per foot	101.75
5.	Other raise, per foot	59.75
6.	Raise crosscutting, per foot	66.50
7.	Extras, at cost, plus	5%

These prices are based on the following conditions and specifications:

CONDITIONS

The Contractor Shall:

A. Provide and Pay for:

1. All Labor and supervision required for the project.
2. All Payroll taxes, including Montana Industrial Accident, Unemployment Compensation and Social Security.
3. All materials, new and used, entering into the construction of the work; Such materials to become the property of the owner upon completion of the project.
4. All supplies; Such as: Fuel oil, explosives, etc.
5. Labor for one pound grab samples to be taken from each car. Such samples to be mixed according to the instructions of the company's representative.

ACE TRADING COMPANY

MINING & CONTRACTOR'S EQUIPMENT

P. O. BOX 16

BUTTE, MONTANA

TELEPHONE: AREA CODE 406 - 792-1013

RECEIVED JUL 7 1969 O. M. E. SPOKANE, WASH.

B. Provide, Operate and Maintain:

1. All surface and underground equipment necessary for completion of the project, including , but not limited to:

   a. compressed air
   b. electric power
   c. dump truck
   d. fuel and water storage
   e. drift mucker and accessories
   f. mine motor and accessories
   g. mine lights and accessories
   h. mine to surface telephone
   i. drills, drill steel and bits and accessories
   j. ventilation equipment and supplies
   k. all small tools

C. Furnish an adequate performance bond.

D. Operate and maintain existing adit from surface to beginning of caved section an approximate distance of 2100 feet during contract portion of project.

E. Carry out the work in an efficient and workmanlike manner in accordance with the laws of the State of Montana and good mining practice.

The Company Shall:

1. Provide plans for proposed development work so as to minimize delays.
2. Provide for contractors use, at no cost, to the contractor, all existing buildings in present condition.
3. Provide all existing facilities and equipment in present condition at no cost to the contractor including underground Powder Magazine, underground receiver, water tank, pipe, track, etc.

ACE TRADING COMPANY

MINING & CONTRACTOR'S EQUIPMENT

P. O. BOX 16

BUTTE, MONTANA

TELEPHONE: AREA CODE 406 - 792-1013

RECEIVED JUL 7 1969 O. SPOKANE, WASH

4. Provide and maintain sufficient storage area for waste disposal within immediate mine location.
5. Provide for maintenance of access road.
6. Provide for transportation of grab samples from mine site.
7. Pay invoices twice monthly. Invoices to be rendered for periods 1-15 and 16-31 inclusive and are to be paid on the 25th and 10th respectively.

SPECIFICATIONS

A. Drifting

1. Drifting from lower tunnel to be a minimum of 400 feet along the vein approximately as shown on Crystal Mines Map dated 5/19/69.
2. Nominal excavation size to be 6' wide x 7' high above rail.
3. Rail, 20# minimum.
4. Ties placed at 3' centers
5. Grade 6" per 100' in favor of the load.
6. Air, water, power and ventilation lines as required.
7. Main drift to be timbered at the request of company's representative.

   a. Sets on 6'0" Centers
   b. Timber local pine rough
   c. Caps, 6'4" long, 8"x8"
   d. Posts, 7'6" long, 8"x8" on 8" batter
   e. Spreaders and collar brace 4"x6"
   f. All lagging 2"x6", side lagging as required
   g. Adequate alignment and blocking

B. Raising

1. One - two compartment timbered raise to extend to surface and approximate distance of 300 feet.
2. Minimum excavation size 6' x 9'.
3. Raise inclined from 65 - 70 degrees from horizontal.

ACE TRADING COMPANY

MINING & CONTRACTOR'S EQUIPMENT

P. O. BOX 16

BUTTE, MONTANA

TELEPHONE: AREA CODE 406 - 792-1013

RECEIVED JUL 7 1969 O.M. SPOKANE, WASH.

4. Raise to include separate waste compartment, ladders and landings, timber slide, air, water and ventilation lines.
5. Other raising to be a minimum total distance of 150'.

C. Crosscutting

1. Crosscutting from lower tunnel to be a minimum of 200 feet at approximately right angles to the line of the drift.
2. Crosscutting from raises to be a minimum of 200 feet.
3. Crosscuts to be driven nominal excavation size 5' wide x 6' high.
4. Crosscuts to be cleaned of blasted material upon completion of driving. No further maintenance to be required.

GENERAL

A. The cost of the repair work required recovering caved section approximately 100 feet from contract face to be at the company's expense. This work to be done by the contractor at cost plus 5%. This repair work to include cleaning of track from crossout #7 to the start of the cave.

B. The cost of providing an auxiliary escape way from the lower tunnel to surface to be at the company's expense. This work to be done by the contractor at cost plus 5%.

C. Costs in cost plus work to include total payroll for labor and supervision, equipment rentals, equipment operation and maintenance and any materials, tools or supplies required.

Yours very truly,

Ace Trading Company

Herbert G. Young, President

HGY/pac

Crystal Mines, Inc.
Box 1954
Butte, Montana 59701
May 24, 1969
Telephone 406-723-4789

Specifications for a minimum of 2500' of rotary-percussion type drilling. Plus 5000' additional contigent upon the results of the first 2500'.

I Approximately 4 holes will be drilled from each drill site, an average vertical depth of 125'.

II Angle of the holes will be approximately 70 degrees. But bid must allow Crystal flexibility in hole angle.

III Recovery and sampling procedure to be specified by contracter.

IV Drill site preparation and any snow removal work will be done by Crystal.

V Contractor shall maintain effective coverage for all his employees under one of the authorized plans of the Workmen's Compensation Act of the State of Montana.

VI Bid is for an O.M.E. lean and must meet their requirements.

Crystal Mines, Inc.
David R. Shoemaker
David R. Shoemaker
Mine Manager

RECEIVED
JUL 7 1969
O.M.E.
WPP

J. D. Chaffin
DRILLING COMPANY
VISUAL SAMPLE RECOVERY BY REVERSE AIR VACUUM
851 Haverford Ave., Pacific Palisades, Calif. 90272 (213) 454-4822

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

May 28, 1969

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Attention: Mr. David R. Shoemaker
Mine Manager

Gentlemen:

Thank you very much for your request for a bid on your drilling at your crystal mine out of Butte, Montana.

I will furnish drill and drill truck, air compressor and air compressor truck and two pickup trucks to transport drill crews to and from the drill site, furnish all drill bits, together with down-the-hole hammer and all hammer bits, split samples at your direction, either every two feet or every five feet (you furnish bags, I will furnish plastic bags at cost, if desired--small, 4 cents, large, 9 cents, each) and bag and label all samples as to footage and number of hole, drill a hole of $3\frac{1}{2}$ inches in diameter and set surface pipe or conductor pipe down through three to four feet of overburden, supply all labor to operate the drill and sample all the samples and drill holes at angles to 45° off vertical and to depths of 125 feet as required, for a firm bid of $6.50 per foot.

If casing is required, due to caving, and cannot be recovered, the charge for diamond drill type casing without collars will be $57.90 per ten-foot joint, plus casing shoes so casing can be driven--shoes $27.00 each.

A charge of (two) $2.00 per foot will be made to ream hole out in order to set casing. This includes reamer bits. There will be a charge of $1.00 per foot to remove casing from hole provided it will pull without too much trouble; otherwise we may have to leave casing in the hole. Then the afore-mentioned prices apply.

If, after one hour of trying to free casing, owner requests we continue to try to recover casing, a standby charge of $25.00 per hour will be made until casing is recovered or abandoned.

If drill is shut down due to mechanical breakdown, there will be no charge, but if drill is shut down for any reason other than breakdowns, such as snow blocking roads or drill sites, or drill stopped for the lack of drill pads, a standby charge of $25.00 per hour, based on the hours the drill has been working.

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

If a sealing agent, such as cement, or other agents is required to seal off any major cracks, caving material such as loose rock, sand, or any other loss of circulation problems where cement or its equivalent will have to be used, then there will be a charge of $25.00 per hour for cementing, plus the cost of cement or other material, for the actual time needed to cement and allow for cement to set so it can be drilled out, the afore based upon the regular time drill has been working.

This bid is based on a dry reverse air vacuum recovery with down-the-hole hammer for hard rock drilling and will not work where water is encountered. Drillers will try to dry up holes with seeping water by blowing hot air down hole, but if this does not dry up or blow the water out so we can drill dry, then we will request the drill be moved to another drill site or a different hole.

Drill time, two 12-hour shifts per day, working at least 12 days on and 2 days off, or 24 days on and 4 days off.

Drill pads to be at least big enough so truck can be turned around to back up to angle hole in order to drill angle holes. The pad must be big enough to park three trucks.

Move in and move out from Los Angeles to drill site and return; if drilling goes over 2,000 feet and owner continues to drill the additional 5,000 feet, then the contractor will pay for one way on move in and move out. A flat charge each way of $750.00 otherwise will be charged to move 4 trucks to Montana and return.

A formal contract will be signed which will cover all insurance and public liability will be carried to $300,000.00, as per formal contract to be signed before job starts; billing to be made on the first and fifteenth of each month, payment to follow upon receipt of billing.

Thank you very much for the opportunity to bid on this drilling project.

I am,

Very truly yours,

J. D. Chaffin
J. D. CHAFFIN DRILLING COMPANY

JDC/ar

1668 W. 1ST AVENUE
VANCOUVER 9, B.C.

TELEPHONE 732-6721

D. W. COATES
ENTERPRISES LTD.

June 25, 1969

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

Mr. David R. Shoemaker,
Mine Manager,
Crystal Mines, Inc.
Box 1954.,
Butte, Montana 59701,
U. S. A.

Dear Mr. Shoemaker;

Re: Rotary - Percussion Drilling
Your specifications dated May 24/69.

We present herewith for your perusal our tender on your exploration program as outlined in your letter of May 24th.

(a) Schedule of Rates: (Min 2500')

From	To	Price Per Foot
0	250' in depth	$7.75

(b) Overburden:

The above schedule of rates includes the first 20' of overburden cased in any hole. Should the amount of overburden in any one hole be greater than 20', then the casing will be placed in that hole on a field cost basis.

(c) Transportation:

The above schedule includes transporting the contractors' men, equipment and supplies from his base to job site and return.

(d) Moving between drill site location:

Moves between drill site locations will be performed on a filed cost basis. To facilitate the moves, the Contractor has his drill mounted on a crawler tractor.

(e) Reaming Casing:

Should it be necessary to prevent cave ins by reaming casing, this function will be performed on a field cost basis.

(f) Water Supply:

The drill is basically an air drill and can obtain excellent samples when the rock is dry and by the addition of additives when a slight enflow of water occurs. Should the flow of water into the hole be great where a total water system is required, then the supply of water for this system will be to the Companys' account.

1668 W. 1ST AVENUE
VANCOUVER 9, B.C.

TELEPHONE 732-6721

D. W. COATES
ENTERPRISES LTD.

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

From our discussion with the mine manager and visit to the property, we do not believe water will be a problem.

(g) Room and Board:

The above schedule includes the board and lodging for the Companys' drill crew.

(h) Field Cost Operations:

The following rates will apply when the machine is on field cost operations such as moving between drill site locations; waiting for instructions from the engineer.

Labour	$6.00/man hr.
Drill	$15.00/mach. hr.

The Contractor owns a Huston HD-150 Vacuum drill mounted on a crawler tractor. The Huston drill is a reverse air vacuum rig; samples are collected via cyclone and deposited in clear plastic tubes for visual inspection.

Thank you for giving us this opportunity to tender on your exploration program. Should there be any questions regarding this tender, please do not hesitate to contact us.

Yours very truly,
D. W. Coates Enterprises Ltd.

D. W. Coates.

DWC/ac.

RECEIVED
JUL 7 1969
O.M.E.
SPOKANE WASH.

Crystal Mines, Inc.
Box 1954
Butte, Montana 59701
May 24, 1969
Telephone 406-723-4789

Specifications for 4 1000' diamond drill holes.

I Size, AQ Wireline

II One hole will be drilled from each drill site, a depth of 1000'.

III Angle of the hole will be approximately 70 degrees. But bid must allow Crystal floxibility in hole angle.

IV Recovery and sampling procedure to be specified by contractor.

V Drill site preparation and any snow removal work will be done by Crystal.

VI Contractor shall maintain effective coverage for all his employees under one of the authorized plans of the Workmen's Compensation Act of the State of Montana.

VII Bid is for an O.M.E. loan and must meet their requirements.

Crystal Mines, Inc.
David R. Shoemaker
David R. Shoemaker
Mine Manager

Longyear

E. J. LONGYEAR COMPANY
General Offices, 76 South 8th St.
Minneapolis, Minnesota 55402, U. S. A.
TELEPHONE: 339-7631 • CABLE LONGCO

REPLY TO:
865 West 2600 South
Salt Lake City, Utah 84119
Phone 486-9318

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

June 17, 1969

Crystal Mines, Inc.
Box 1954
Butte, Montana 59701

Attention: Mr. David R. Shoemaker
Mine Manager

PROPOSED DIAMOND CORE DRILLING PROGRAM VICINITY BASIN, MONTANA

Gentlemen:

In response to your recent request, and based on information supplied by our Mr. Wesley Brown, we are pleased to submit below for your consideration, our proposal to cover the exploration drilling of the subject project.

1. We understand that the program as now planned will consist of approximately 4,000 linear feet of drilling in four 70 degree angle holes ranging in depths to 1,000 feet. We also understand that AQ size core is desired; and that the formation is to consist of quartz monzonite. Water is available from a small stream approximately five miles from the drilling area. We understand that you will prepare and maintain all access roads and drill sites, and that tractor service, as required, will be furnished by you at no charge to the Longyear Company.

2. For this work we propose to furnish one Longyear unitized skid-mounted core drill, together with the necessary accessory equipment required to complete the work as now planned. We further propose to operate the drill two-eight hour shifts per day, six days per week.

3. We will carry public liability insurance covering personal injury and property damage, and Workmen's Compensation insurance, and also all-risk insurance on the drilling equipment protecting against loss by theft, fire, flood, landslides and other similar hazards. Certificates showing the coverage referred to will be furnished upon request.

RECEIVED JUL 7 1969 O.M.E. SPOKANE, WASH.

Crystal Mines, Inc. June 17, 1969

4. Based on the conditions as outlined above, we are pleased to quote as follows:

a) Mobilization and demobilization of personnel and drilling equipment - $1,000.00 Lump Sum

b) Overburden drilling -

0 - 50' in depth	$ 8.50/ft.

c) Diamond core drilling -

	AQWL	BQWL
0 - 500' in depth	$7.50/ft.	$ 7.75/ft.
500 - 1000' in depth	$8.25/ft.	$ 8.50/ft.

d) Reaming for casing, if and when required -

All sizes	$ 3.50/ft.

e) Casing lost in hole -	80% List Price
Casing left in hole at your request -	100% List Price

f) Moving, rigging down, and rigging up -	$15.00/hr.
g) Delays for your convenience or for which you are responsible -	$15.00/hr.
h) Casing, cementing, waiting for cement to set, drilling out cement, and any other drill hole stabilizing operations -	$17.00/hr.

i) Drill mud, drill mud additives, cement, and any other drill hole stabilizing agents to be invoiced to you at our cost, f.o.b. jobsite.

j) Water tank truck rental - $325.00 per month, plus $3.25 per hour for truck driver, if needed.

k) Core boxes, cardboard construction, to hold 10 feet of core, if furnished by us -	$ 1.25/box

5. Drill cores will be turned over to your representative at the individual drill hole locations in core boxes furnished by you.

6. Statements covering the work performed will be prepared as promptly as possible after the fifteenth and last day of each month and payment will be due within twenty days from receipt of invoice.

Crystal Mines, Inc. June 17, 1969

7. This proposal is subject to the condition that you secure written approval of your arrangement for payment for the work to be performed before it is commenced. Written approval can only be given by a corporate officer by separate letter. Also, such approval can be withheld in his sole discretion.

8. We appreciate the opportunity to quote on this project. If awarded the work, we would be prepared to commence operations within approximately ten days from receipt of official notice to proceed.

Sincerely yours,

E. J. Longyear Company

D. F. Crotty

David F. Crotty
Manager, Rocky Mt. Zone

DFC:e

ACCEPTED:

CRYSTAL MINES, INC.

By:_____

Date:_____

RECEIVED
JUL 7 1969 W M
O.M.E.
SPOKANE, WASH

RECEIVED
JUL 7 1969 6 pp
O. M. E.
SPOKANE, WASH.

AIR POWER DIVISION

JOY MANUFACTURING COMPANY
900 WOODLAND AVENUE
MICHIGAN CITY, INDIANA 46360

June 12, 1969

Crystal Mines, Inc.
Post Office Box 1954
Butte, Montana 59701

Attention: Mr. David R. Shoemaker, Mine Manager

Dear Mr. Shoemaker:

Thank you for inviting us to bid on approximately 4,000 feet of angle hole drilling near Basin, Montana.

Please consider the following:

Mobilization - Lump Sum	$2,000.00.
<u>BX Wire Line Core Drilling</u>	
0. to 500. feet	$9.40 per foot.
500. to 1000. feet	$9.90 per foot.
Standby Time for your convenience	$12.00 per hour.
Water Truck Rental	$300.00 per month plus 15¢ per mile.
Cementing, if necessary	$15.00 per hour.
Reaming, if necessary	$5.00 per foot.
Drilling Mud used	$2.20 per 50-lb. bag.
Drilling Mud Additives used	f.o.b. job site.
Casing lost or ordered left in place	$2.00 per foot.
Weather-treated Cardboard Core Boxes	$1.25 each.

RECEIVED
JUL 7 1969
O. M. E.
SPOKANE, WASH.

Sheet No. 2 To: Crystal Mines, Inc.
June 12, 1969

Dozer Work and Site Preparation,
if necessary At actual cost plus 15%.

If awarded this work, we will use a modern JOY 22-H.D. skid-mounted core drill, with the necessary operating equipment.

Our employees will be covered with Workmen's Compensation insurance under the state laws of Montana.

We will expect Crystal Mines to make and maintain suitable access roads. If we are requested to level the drill sites, make or maintain access roads, we will ask Crystal Mines to pay for the bulldozer charge at actual cost plus 15%.

We are in a position to start this work two to three weeks after notice to proceed.

Yours truly,

JOY MANUFACTURING COMPANY

J. M. Murray, Manager
Contract Drill Division

JMM:rh

SPRAGUE & HENWOOD, Inc.

Contract Division
REGIONAL OFFICE

2151 North Redwood Road (P.O. Box 2556)
Salt Lake City, Utah 84110 (801) 328-4271

DIAMOND DRILLING • MINERAL EXPLORATION • SOIL SAMPLING • PRESSURE GROUTING

S&H SINCE 1883

EXECUTIVE OFFICES & PLANT
SCRANTON, PENNSYLVANIA

May 29, 1969

RECEIVED JUL 7 1969 W.M.E. SPOKANE, WASH.

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Attention: David R. Shoemaker

Gentlemen:

In accordance with your request, we herewith submit our proposal for drilling at the Crystal Mine near Basin, Montana.

It is our understanding this proposal is for purposes of an OME application and that the total diamond drilling will be approximately 4,000' and the non-core rotary quantity will be 2,500' with a possibility of an additional 5,000'

Proposal

Item 1.	Mobilization and demobilization, personnel, vehicles and drilling equipment	Lump Sum		$2,100.00
Item 2.	Non-Core - Minimum Size 2 15/16" (recovering sludge samples) 0 - 150' depth	Per Foot		8.00
Item 3.	Core Crilling - Per Foot	NX W/L	BX W/L	AX W/L
	0 - 500' depth	12.40	11.90	11.40
	500 - 1000' depth	13.00	12.50	12.00
Item 4.	Reaming to enlarge hole for casing advancement	@ 60% Coring Schedule		
Item 5.	Cementing holes and drilling out cement	Per Hour		27.00
Item 6.	Regaining circulation for sample collections	Per Hour		25.00
Item 7.	Standby time or delays requested by customer	Per Hour		15.00
Item 8.	Casing left in holes by request or lost after efforts to recover	@ Current list price - less 10%.		

continued page 2

SPRAGUE & HENWOOD, INC.

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

RECEIVED
JUL 7 1969 W MP
O. M. E.
SPOKANE, WASH.

Proposal continued
May 29, 1969

Item 9.	Drilling mud, lost circulation materials, additives and cement	@ Invoice Cost F. O. B. job	
Item 10.	Water truck rental	Per Month	275.00
	Plus 15¢ per mile		

Conditions

1. Sprague and Henwood, Inc. services shall include:

   (a) #142 S & H skid-mounted core drill, hydraulic head, angle derrick (2 each)
   (b) All tools, accessories, bits and ancilliary vehicles to conduct operations.
   (c) 4 two-man drill crews, double shifts, 6 days per week (8 hour shifts)
   (d) Full time supervisor
   (e) Non-Core drilling will utilize water and drilling mud, circulation will have to be maintained for recovery of samples.
   (f) Certificates of insurance, as required.

2. Crystal Mines Inc. services shall include:

   (a) Drill site preparation and access roads, to accommodate trucks, and all-weather maintenance.
   (b) Handling of all samples and cores after such has been placed in containers at drillsites.
   (c) Sample and core containers.

We appreciate the opportunity to submit this proposal and trust it is satisfactory for your purposes.

Very truly yours,

SPRAGUE AND HENWOOD, INC.

Vincent D. Nourse

Vincent D. Nourse
Ass't Vice President

VDN:rp

DIAMOND CORE DRILLING
DIAMOND DRILLING EQUIPMENT
GROUTING
FOUNDATION TESTING
MINING
QUARRYING
SHAFT SINKING
TUNNEL DRIVING
MINE PLANT DESIGN
AND FABRICATION

Boyles Bros. DRILLING COMPANY

CONTRACTORS-ENGINEERS-GEOLOGISTS

East 1415 Riverside P. O. Box 4307
SPOKANE, WASHINGTON 99202
Phone (509) 534-0862

General Offices and Plant
1624 Pioneer Road P. O. Box 58
SALT LAKE CITY, UTAH 84110
Phone (801) 487-3671

BRANCH OFFICES
ARIZONA (PHOENIX)
CALIFORNIA (AUBURN)
COLORADO (GOLDEN)
KENTUCKY (LOUISVILLE)
NEVADA (SPARKS)
OKLAHOMA (NORMAN)
WASHINGTON (SPOKANE)
CHILE (SANTIAGO)
CABLE: BOYLESBROS
MEXICO, D.F.
PERU (LIMA)
CABLE: BOYLESCOP

June 10, 1969

Mr. David R. Shoemaker
Crystal Mines Inc.
P.O. Box 1954
Butte, Montana

Dear Mr. Shoemaker:

We are pleased to submit estimates for core and percussion drilling at the subject mine. The estimates are attached with pertinent copies of your specifications.

Should you have any questions, please contact us at your convenience.

Sincerely,

E.A. Hainze
District Manager

RECEIVED
JUL 7 1969
O.M.E.
SPOKANE, WASH.

DIAMOND CORE DRILLING
DIAMOND DRILLING EQUIPMENT
GROUTING
FOUNDATION TESTING
MINING
QUARRYING
SHAFT SINKING
TUNNEL DRIVING
MINE PLANT DESIGN
AND FABRICATION

Boyles Bros. DRILLING COMPANY

CONTRACTORS-ENGINEERS-GEOLOGISTS

East 1415 Riverside P. O. Box 4307
SPOKANE, WASHINGTON 99202
Phone (509) 534-0862

General Offices and Plant
1624 Pioneer Road P. O. Box 58
SALT LAKE CITY, UTAH 84110
Phone (801) 487-3671

BRANCH OFFICES
ARIZONA (PHOENIX)
CALIFORNIA (AUBURN)
COLORADO (GOLDEN)
KENTUCKY (LOUISVILLE)
NEVADA (SPARKS)
OKLAHOMA (NORMAN)
WASHINGTON (SPOKANE)
CHILE (SANTIAGO)
CABLE: BOYLESBROS
MEXICO, D.F.
PERU (LIMA)
CABLE: BOYLESCOP

RECEIVED WPP
JUL 7 1969
O.M.E.
SPOKANE, WASH.

Estimate for four 1,000 foot diamond drill holes:

	NCWL	NXWL	BXWL	AXWL
0-500 feet	11.60	10.40	9.40	8.40
500-1000 feet		11.20	10.20	9.10

Mobilization and Demobilization (includes setting up on first hole): $1,050.00
Overburden Drilling at $15.00/LF.

1) Boyles Bros. Drilling Co. will supply a CP 15 or equal core drill capable of coring to 2,000 feet with NX, BX or AX wireline. Our prices include a water truck (1200 gallon), pumps, drill rod, core barrels and diamond bits.

2) Access roads and drill sites will be constructed and maintained at no cost to Boyles Bros. Drilling Co.

3) Cementing if required will be at the rate of $15.00 per hour plus cost of cement, cement admixtures, or cement substitutes charged at list price FOB jobsite.

4) Drill mud and additives will be charged at list price FOB jobsite.

5) Moving from hole to hole, setting up, tearing down and laying and retrieving water supply systems at $15.00/hour.

6) Reaming if required at $6.50/foot.

7) Casing left in hole at your request or lost in hole charged at list price FoB jobsite.

8) Surveys and delays for your convenience will be at $15.00/hour.

9) Should the work begin later than 15, September, 1969, so that winter operating conditions must be met, an increase of 5% for drilled footage will be required.

10) Core boxes can be supplied at $1.00 each.

DIAMOND CORE DRILLING
DIAMOND DRILLING EQUIPMENT
GROUTING
FOUNDATION TESTING
MINING
QUARRYING
SHAFT SINKING
TUNNEL DRIVING
MINE PLANT DESIGN
AND FABRICATION

Boyles Bros. DRILLING COMPANY

CONTRACTORS-ENGINEERS-GEOLOGISTS

East 1415 Riverside P. O. Box 4307
SPOKANE, WASHINGTON 99202
Phone (509) 534-0862

General Offices and Plant
1624 Pioneer Road P. O. Box 58
SALT LAKE CITY, UTAH 84110
Phone (801) 487-3671

BRANCH OFFICES
ARIZONA (PHOENIX)
CALIFORNIA (AUBURN)
COLORADO (GOLDEN)
KENTUCKY (LOUISVILLE)
NEVADA (SPARKS)
OKLAHOMA (NORMAN)
WASHINGTON (SPOKANE)
CHILE (SANTIAGO)
CABLE: BOYLESBROS
MEXICO, D.F.
PERU (LIMA)
CABLE: BOYLESCOP

RECEIVED WPP
JUL 7 1969
O.M.E.
SPOKANE, WASH.

Estimate for drilling a minimum af 2500 feet of rotary-percussion type holes.

1) Drilling angle holes at $4.80/linear foot.

2) Mobilization and demobilization at $1,050.00.

3) Construction of access roads, drill site preparation and snow removal, if any, at no cost to Boyles Bros. Drilling Co.

4) Casing lost or left in holes at your direction charged at list price FOB jobsite.

5) Additives such as Baroid product "quick foam" at list price FOB jobsite.

6) Collection system for chips, dust or cuttings will be at central bin or mass baffled collection drum. If size segregation is desired, a markup in costs will be necessary.

7) Sample jars or bags will be supplied if desired at list price FOB jobsite.

8) Delays , no fault of Boyles Bros., or standby at your request at $16.00/hour.

9) Moves between sites, setup and teardown at $16.00/hour.

10) Should the work extend into snow weather, an increase of 5% per linear foot drill will be required.

IN REPLY REFER TO

UNITED STATES
DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY
U.S. Court House, Rm. 656
West 920 Riverside Avenue
Spokane, Washington 99201
May 29, 1969

OFFICIAL COPY
O. M. E.
RECEIVED
JUN 2 1969

INITIALS	CODE

Memorandum

To: Chief, Office of Minerals Exploration

From: Willard P. Puffett, Geologist, OME, Region I

Subject: Transmittal of Application for Financial Assistance
Crystal Mines, Inc. (Gold-Silver)
Crystal-Bullion Mines
Jefferson County, Montana

Enclosed is an application from Crystal Mines, Inc., to explore for gold and silver by underground work at the Crystal mine and by bulldozing and rotary-percussion drilling along the vein outcrop between the Crystal mine and the Bullion mine, a distance of about 1-3/4 miles. Mr. John Black brought the application to our office on Monday, May 19, 1969, at which time we discussed items in the application and aspects of the OME program. Mr. Black was told that the total cost of the proposed exploration was probably too high to be favorably considered but that possibly some elements of his proposal might merit consideration. He was also told that OME funds for this year had been allocated and funds for next year were not certain. Nevertheless, Mr. Black left the application. He was requested to submit bids for bulldozing and rotary-percussion drilling in addition to a detailed cost of the proposed work. These data have not been received but will be forwarded to you after arrival here.

There is considerable information in the files about the Crystal mine. It was the subject property of Docket No. DMA-821, Contract Idm-E62 (Rescinded), and OME-6178 (Copper-Lead-Zinc) (Withdrawn). The geology of the area is in U.S. Geological Survey Bulletin 1151 and Professional Paper 428.

The vein on which the exploration is proposed can be traced on the surface between former operating mines for more than 3 miles. At the Crystal mine the vein is actually a zone made up of 2 or 3 separate veins, each or all of which have been mined separately. The ore is somewhat complex; being either gold-silver-copper or gold-silver-lead-zinc.

The applicant hopes that bulldozing and drilling from the surface will prove the existence of sufficient ore on which to start an

open-pit mining operation. He reports that some open-pit mining is currently being done at the Crystal mine, and the ore is being sold to a smelter of The Anaconda Company.

The applicant is an American corporation, whose parent company is Utica Mines, Ltd. (N.P.L.), a Canadian corporation whose stock is listed on the Vancouver Stock Exchange. A copy of the annual report of Utica Mines, Ltd., is submitted with the application; on the second page of this report are discussions of the Crystal and Bullion Mine Property, and a statement to the effect that they are applying to the U.S. Department of the Interior Geological Survey for exploration assistance. The balance sheet lists working capital of $856,944.00 as of December 31, 1968; how much of this can be applied to the Crystal and Bullion Mine Property is not known. It does appear, however, that the applicant is financially capable of paying for his share of the exploration costs. There are copies of letters to and from lending institutions that show the applicant has made unsuccessful efforts to borrow the necessary funds for his proposed exploration.

The required number of signed copies of the Lien and Subordination Agreements accompany the application. However, as the parent company is incorporated in Canada, I wonder if Performance Bonds will have to be posted in case a contract is offered.

The feasibility of the proposed project will depend in a large part on the costs of the work and whether the ore to be found qualifies for assistance. Bulletin 16 of the Montana Bureau of Mines and Geology lists the following production from the two mines:

Mine	Ore (tons)	Gold (oz)	Silver (oz)	Copper (pounds)	Lead (pounds)	Zinc (pounds)
Crystal	22,586	3,579	343,591	536,915	2,060,623	939,190
Bullion	22,779	3,564	217,519	426,241	762,990	2,847

The calculated average precious metal content of the ore produced is 0.16 ounces of gold per ton and 12.4 ounces of silver per ton. The copper content is about 1.5 percent, and the lead content is 3.1 percent. These figures suggest that the main value of the ore is in its precious metal content although parts of the vein might have high values in base metals. Until we receive copies of bids for drilling and bulldozing, we cannot calculate estimated costs of the work.

There have been two contracts awarded for exploration to be done at the Crystal mine, but for one reason or the other, the contracts have been rescinded or the applicants have refused them. The vein appears to be worthy of further exploration and drilling from the surface by rotary-percussion drills might be successful in discovering additional ore shoots.

Willard P. Puffett

Willard P. Puffett

Enclosures

Re: DMA-821 (Copper-Lead-Zinc)
Golden Messenger Corporation
The Crystal Mine
Jefferson County, Montana
Contract Idm-E62 (Rescinded)

and

OME-6178 (Silver-Gold-Lead-Zinc Copper)
E. E. Lewis, Inc.
Crystal Mine
Jefferson County, Montana

MME Form 40
(Revised Nov. 68)

RECEIVED
MAY 19 1969
U.S. G.S.
SPOKANE, WASH.

Budget Bureau No. 42-R1368
Approval expires Dec. 1971

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OFFICIAL COPY
O. M. E.
RECEIVED
JUN 2 1969
INITIALS CODE

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

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

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

Crystal Mines Inc.,
Box 1954,
Butte, Montana 59701

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER: 6496

DATE RECEIVED: 6/2/69

REGION: 1

DIVISION CODE:

BUSINESS ORGANIZATION *(Check one)*

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

STATE IN WHICH FIRM IS ORGANIZED: Montana

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
Isaac Shulman	#404, 510 W. Hastings St. Vancouver 2, B.C.	President
Howard A. Johnson	First National Bank Bldg., Butte, Montana	Vice-President
John C.L. Black	#2002, 1177 W. Hastings St. Vancouver 1, B.C.	Secretary-Treasurer

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE: Gold-Silver

ESTIMATED COST OF PROJECT: $249,200

PROPERTY NAME	LOCATION COUNTY	STATE
Crystal-Bullion	Jefferson,	Montana

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. II). 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 Department of the Interior, U.S. Geological Survey, Office of Minerals Exploration, Washington, D. C., 20242, 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.

CRYSTAL MINES INC.

per: [signature]
BY *(Signature)*

John C. L. Black
Secretary-Treasurer.
TITLE

May 7, 1969
DATED

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 (1) true copies of your letters to credit sources which show date of loan request, amount and terms requested, and proposed use of loan funds and (2) true copies of 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 signed by owner on MME Form 52. If the agreements cannot be obtained, state reasons and whether you can furnish a performance bond.

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.

(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) 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. State your reasons for expecting to find ore.

(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, address, and telephone number 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 time and materials *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 price 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).]

UTICA MINES LTD. (N.P.L.)
SUITE 2002 - 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

1. FINANCIAL ELIGIBILITY

A. Enclosed are the letters to and from the Banking institutions and private source which outlines the Company's request for exploration funds.

B. Crystal Mines Inc. is a wholly owned subsidiary of Utica Mines Ltd. (N.P.L.) with registered offices in First National Bank Building, Butte Montana and Mine offices in Butte, Montana and Head Office in Suite 2002, 1177 West Hastings Street, Vancouver 1, B.C.

C. The last Annual Report of Utica Mines Ltd. shows the Company has ample funds for their share of the proposed program as well as authority from the Board to use these funds (see Directors' Report to Shareholders).

January 28, 1969

Royal Bank of Canada,
796 Granville Street,
Vancouver 2, B.C.

Attention: Mr. H. R. McLean,
Bank Manager.

Dear Roy,

As per our telephone conversation of today I wish to formally apply for the loan of $330,000.00 as discussed for exploration.

Enclosed you will find our consultants' reports as well as any other pertinent data we have on this property.

The loan applied for will be made in the name of Crystal Mines Inc., a wholly owned subsidiary of Utica Mines Ltd.

Roy, we at Utica are really grateful for what you have done for us in the past and needless to say this property is the best thing we have seen yet.

Yours sincerely,

UTICA MINES LTD. (N.P.L.)

John C. L. Black,
Secretary-Treasurer.

JB:dw
Encl.

THE ROYAL BANK OF CANADA

GRANVILLE & ROBSON BRANCH
796 GRANVILLE ST., VANCOUVER 2, B.C.

Telephone 681-5421

May 6, 1969

Crystal Mines Inc.,
c/o Utica Mines Ltd.
#2002, 1177 W. Hastings Street,
Vancouver, B. C.

Gentlemen:

While we consider Utica Mines Ltd. to be a highly valued, important client of this bank, and they enjoy a healthy financial position which would warrant the granting of credit, we regret that we are not in a position to provide some $330,000 requested for expansion work in the name of Crystal Mines, Inc. Unfortunately, we are faced with lending restrictions in view of the tight money situation prevailing at this time and we are obliged to apportion our funds to meet demands for operating purposes.

Yours truly,

H. R. McLean
Manager

February 2, 1969

Mr. Morris Black,
100 Adelaide Street West,
Toronto 1, Ontario.

Dear Mr. Black:

We have been keeping you up to date on the company's activities and as you probably know we acquired the Crystal-Bullion property out of Basin, Montana.

You will find enclosed copies of Dennis McKelvie's report and finding re this property.

As you hold the present Debentures on Utica Mines, Keremeos operations, we felt you should perhaps have a chance to further participate in the company's financing of new properties.

Mr. McKelvie points out in his report that expenditures in the amount of $330,000 in stages will be needed to explore these properties thoroughly.

We are asking you at this time if you can see yourself or one of your private companies loaning Utica these funds required.

If so interested please contact this office as soon as possible so I can call a Board meeting to discuss the proposed financing.

Hope you and your family are well and we are looking forward to seeing you out in Vancouver in the very near future.

Yours very sincerely,
UTICA MINES LTD. (N.P.L.)

John C. L. Black,
Secretary-Treasurer.

JB:dw

FROM THE DESK OF

MORRIS BLACK

April 14, 1969

Crystal Mines Inc.,
c/o Utica Mines Ltd. (N.P.L.)
Suite 2002, 1177 W. Hastings St.,
Vancouver 1, B.C.

Dear President:

As the debenture holder of Utica Mines Ltd. I am exceptionally proud of the way the Company has progressed..

Your continuing Policy of Expansion to new endeavours certainly makes my investment look just that much more secure. However I regret that your request for additional funds in the amount of $330,000 for exploration on your Montana Property, although warranted, is not available at this time.

If after you do the needed exploration work and a feasibility study shows that you have sufficient ore to build a concentrator, then if that opportunity again presents itself for debenture funds, need I tell you all you have to do is just command.

Sincerely,

Morris Black.

:MB

February 28, 1969

First National Bank,
Butte, Montana,
U.S.A.

Attention: President

Dear Sir:

We again write to you along the same lines as we did in January regarding the financing of our proposed financing.

You will find a copy of our consultant's report where he has outlined a series of phases of exploration total $330,000. Although we would not need this at one time, we would like some idea of commitment if you are going to help in any way.

Please review the merits of this program and let us have your answer sometime within the next thirty days if possible.

Yours very sincerely,

UTICA MINES LTD. (N.P.L.)

John C. L. Black,
Secretary-Treasurer.

JB:dw

FIRST NATIONAL Bank
Butte, Montana
Affiliated with NORTHWEST BANCORPORATION

April 25, 1969

Mr. John C. L. Black
Secretary Treasurer
Crystal Mines, Inc.
Suite 2002
Board of Trade Building
1177 West Hastings Street
Vancouver 1, British Columbia

Dear Mr. Black:

We wish to advise you that we have reviewed your request for financing of $330,000.00 over a 2 year period for your mining operation in Basin. After reviewing your request, we find that we would be unable to assist you by advancing credit on your mining operation in Basin.

Sincerely yours,

R E McClellan

R. E. McClellan
Cashier

REMc:m

UTICA MINES LTD. (N.P.L.)
SUITE 2002 · 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

2. APPLICANT'S RIGHT IN LAND

A. Enclosed are two copies of Agreements on both the Crystal and Bullion Properties as well as the Assignment of Lease and Option from Mr. J. E. McInnes who as the company lawyer acted as Trustee. In the Agreement on the Crystal items No. 6 Royalties and No. 7 Minimum Royalty Payment outlines the company's financial encumberances and in the Agreement on the Bullion items in Clause 6 and Clause 7 outlines the same on this property.

B. Legal descriptions are outlined in both the Agreements.

C. Enclosed are five copies of the Mine Form 52 signed by the owners on the claims not owned.

December 2, 1968

Utica Mines Ltd. (N.P.L.)
904 - 510 West Hastings Street,
Vancouver, B.C.

ASSIGNMENT OF LEASE AND OPTION

Acting on your behalf, I entered into a Lease and Option Agreement dated November 8, 1968 with Albert Bullock, Sharon Bullock, his wife, Allan Bullock, Arla Bullock, his wife, all of Basin, Montana, Donald W. Johnson, Miriam Johnson, his wife, of DesMoines, Washington, Keith Johnson and Laurel Johnson, his wife, of Butte, Montana, U.S.A. covering 15 patented and 13 unpatented mining claims situate in a contiguous block in Township 7 North, Ranges 5 and 6 West of the Montana Meridian Jefferson County, State of Montana, U.S.A., on which is located what is known as the "Crystal" and "Bullion" Mines. I entered into the Agreement as a Trustee for your Company. In consideration of that fact and in consideration of the sum of One ($1.00) Dollar which you have paid to me and which I do hereby acknowledge, I hereby assign, transfer and sell over to you all of my interest whatsoever in the said Lease and Option Agreement and the said mineral claims.

DATED the 15th day of November, A.D. 1968.

Witness

James McInnes

LEASE AND OPTION AGREEMENT

THIS AGREEMENTmade this 8th day of November, 1968, between Delbert M. Bullock and R. Sharon Bullock, husband and wife, Allan J. Bullock and Arla M. Bullock, husband and wife, of Basin, Montana, Donald W. Johnson and Miriam M.Johnson, husband and wife, of DesMoines, Washington, and Keith P. Johnson and Laurel P. Johnson, husband and wife, of Butte, Montana, the Lessors, and James E. McInnes, of 534-789 West Pender, Vancouver, British Columbia, the Lessee, WITNESSETH:

1. PROPERTY LEASED: The Lessors hereby lease unto the Lessee, and the Lessee hereby leases from the Lessors the following described mining property situated in Township Seven (7) North, Ranges Five and Six (5&6) West, of the Montana Meridian, in Jefferson County, Montana, to-wit:

A. Patented Mining Claims as follows:

	Lot or Survey No.
1.Crystal	6037
2.Mammoth	10216
3.Vermillion	7986
4. Snowbird	10438
5.Commerce	6038
6.St. Lawrence	6035
7.Sparkling Water	5693
8.Jack	6036
9.Moccason	5692
10.Lincon	10438
11.Alpine	10438
12.Holland	10438
13.James	10438

B. Unpatented Mining Claims as follows:

1. Commerce Fraction
2. K Fraction
3. Blue Goose

Together with any and all water, water rights, ditches and ditch rights appurtenant to said leased properties, or any part thereof, owned or used in connection therewith, and the right to use the same, together with all buildings and other improvements now on said properties and owned by Lessors and

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

any and all ore dumps and tailing dumps situated on said leased properties, together with all and singular the tenements, hereditaments and appurtanances belonging or in anywise appertaining to said leased properties.

C. Excepting and reserving herefrom unto the Lessors Delbert M. Bullock and Allan J. Bullock the right to continue their present open pit operations upon the said properties, with the proviso that they will discontinue said operations at any time during the period of this lease and option when and if, in addition to all other payments provided for in this Lease and Option, the Lessee shall pay (1) whatever is then the entire unpaid balance of the present indebtedness of the said Lessors to the Small Business Administration, P. O. Box 1690, Helena, Montana, which now amounts to approximately $25,000.00 and is due and payable at the rate of at least $700.00 per month, and (2) the balance then unpaid upon the mining machinery and equipment now payable by the said Delbert M. Bullock and Allan J. Bullock, at the rate of approximately $1,000.00 per month and used in their said open pit operations, the unpaid balance upon which is now approximately $20,000.00. The said Lessors covenant to make the said payments throughout their said operations.

2. TERM: This lease shall commence at the date hereof, and shall continue for a term of fourteen (14) years thereafter, unless sooner terminated or forfeited in accordance with the provisions hereof.

3. OWNERSHIP: The respective fractional ownerships of all the said properties are as follows, and all payments payable hereunder (except payments made under Section 1.C) shall be applicable in the said proportions, to-wit:

Delbert M. Bullock,	one-third;
Allan J. Bullock,	one-third;
Donald W. Johnson,	one-sixth; and
Keith P. Johnson,	one-sixth.

4. POSSESSION: The Lessee shall be entitled to the possession of the said properties as of the date hereof and

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

shall proceed with due diligence to the development and operation thereof; he shall conduct said operations in a good and minerlike manner, such as to develop and preserve the said properties in good and proper condition as a workable mine or mines during the life of this Lease and Option; he may at his discretion construct and operate on said property or elsewhere a mill for the treatment of ores and minerals from the said properties and other mining claims; and he shall market the ores, minerals and concentrates from these properties at any suitable and responsible smelter, mill or mint.

5. MINING LOCATIONS: All additional mining claims located by either or any party hereto adjoining said leased properties or within two miles thereof during the life of this agreement shall be located in the names of the said Lessors and shall automatically be included within this lease and option. No claims within said area shall be leased, optioned, purchased or otherwise acquired by or on behalf of the Lessors.

6. ROYALTIES: The Lessee shall pay, or cause to be paid to the Lessors as rental for the said leased property, a royalty of five per cent (5%) upon the net smelter, mill and mint returns upon any and all ores and minerals extracted or removed from the said leased properties.

The term "net smelter, mill and mint returns" is hereby defined as the cash proceeds of all such ores and minerals, less the cost of transportation and treatment charges unless already deducted, together with any subsidy, bonus or similar payments payable by the Federal Government or any agency thereof, or from any other source, upon the said proceeds, provided that the payment of royalties on such subsidy, bonus or similar payment is not contrary to law or governmental regulation. Said royalties shall be paid on or before the tenth day of each month upon all such net smelter, mill and mint returns received during the preceding month.

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

7. MINIMUM ROYALTY PAYMENTS: Minimum royalty payments shall be made as follows:

(a) $5,000.00 at the above date of this agreement, the receipt of which payment is hereby acknowledged by the Lessors;

(b) $6,000.00 on or before the 8th day of May, 1969;

(c) $25,000.00 on or before the 8th day of November, 1970;

(d) $25,000.00 on or before the 8th day of November, 1971;

(e) $25,000.00 on or before the 8th day of November, 1972; and

(f) $100,000.00 on or before the 8th day of November of each year thereafter during the period of this lease and option until the total of all said payments made under this Section 7 shall have aggregated the purchase price stated in option section 19 infra.

Any and all said royalty payments upon sales of ores and minerals from the said properties during the period after each such minimum royalty payment shall be credited upon and be deducted from the next minimum royalty payment or payments due under this Section 7.

8. SUBLEASE: The Lessors hereby sublease to the Lessee, under and subject to the lease and option from the Bullion Mining Company, a copy of which, marked Exhibit "A", is hereto attached and hereof made part, the following patented lode mining claims in the same area, to-wit:

1. Bullion Lode Mining Claim, Survey No. 5108; and

2. West Bullion Extension Lode Mining Claim, Survey No. 10199.

A. The Lessee shall during the continuance of this Lease and Option make to the Bullion Mining Company through the Lessors, all payments required by Clauses 6 and 7 of said company's lease and option and this Sublease, which are as follows, to-wit:

(a) $1,000.00 on or before the 8th day of November, 1969;

(b) $1,000.00 on or before the 8th day of November, 1970;

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

(c) $1,000.00 on or before the 8th day of November, 1971;
(d) $1,000.00 on or before the 8th day of November, 1972; and
(e) $21,000.00 on or before the 30th day of June, 1973.

B. The Lessors shall before the termination of said lease and option attempt to obtain from the Bullion Mining Company an extension of said Lease and Option, and upon such extension the time or times for the payment of said final $21,000.00 shall be accordingly extended.

C. Until the said final purchase payment shall have been paid to the Bullion Mining Company under its said lease and option and this Sublease, any ores and minerals removed from said Bullion and West Bullion Extension Mining Claims shall be kept and shipped separately from all other ores and minerals, and the Lessee shall pay to the Bullion Mining Company through Lessors a royalty of ten per cent (10%) of the net smelter, mill and mint returns as defined in said lease and option, and the amount thereof shall be credited upon and deducted from the final $21,000.00 payment under said lease and option and this Sublease.

D. Each said payment made under subsection A of this section 8 shall be credited upon and deducted from the next payment due to the Lessors under section 7 of this Lease and option.

E. The Lessee shall keep, perform and fulfill all requirements and provisions of said lease and option applicable to lessees and sublessees.

F. Upon the final payment under said lease and option from the Bullion Mining Company, the ores and minerals from the said two mining claims shall no longer be segregated from other ores, and shall be subject to the five per cent (5%) royalty under section 6 hereof.

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

9. ADDITIONAL MINING LOCATIONS: All additional mining claims located by either or any party hereto adjoining said leased and subleased properties or within two miles thereof shall be located in the names of the above named Lessors, and all such claims shall automatically be included within this lease and option; the said subleased claims upon the full payment therefor under said lease and option from the Bullion Mining Company shall automatically be included within this lease and option.

10. ANNUAL ASSESSMENT WORK: The Lessee shall perform all necessary annual assessment work or labor for or upon the said unpatented mining claims for each year of this lease beginning with the year 1969, and shall file a proper affidavit or affidavits in the office of the County Clerk and Recorder of Jefferson County, Montana, on or before July 15 of each year, showing that such work has been done on behalf of the Lessors as owners of said property. Copies of all said affidavits shall be delivered to the Lessors concurrently with the filing thereof.

11. PROTECTION AGAINST LIENS AND LIABILITIES: The Lessee shall keep the said leased property free and clear of liens for labor done or performed thereon, or materials furnished to the Lessee on or for the same, and shall save the Lessors harmless from all costs, loss, or damage which may arise by reason of injury to any persons employed by the Lessee in or on the said leased property or any part thereof, or which may arise by reason of injury to any person, livestock or other property thereon during the Lessee's possession or occupancy of the leased property, arising out of the Lessee's operations thereon.

12. COMPLIANCE WITH LAW: The Lessee shall conduct his operations in compliance with all applicable laws and

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

and regulations of duly constituted governmental authority, and in such manner as to avoid any pollution or contamination of streams or water courses.

13. INSPECTION BY LESSORS: The Lessors shall have the right at their own cost and risk to be present in person or by representatives at all reasonable times during operations, but without any interference with operations, and to examine the workings and operations of the Lessee upon said leased property and to examine the Lessee's maps, plats and other records of his operations hereunder.

14. PROPERTY AND PRODUCTION TAXES: The Lessee shall pay when due and before delinquent any and all taxes which may be hereafter lawfully levied upon said leased and subleased property, and all taxes upon any and all personal property of whatever nature placed upon the said property by the Lessee during the term of this agreement. Lessors and Lessee shall each pay their respective portions of any and all gross or net product or proceeds taxes, if any, which are or may hereafter be levied upon or against production from said leased and subleased properties.

15. WORKMEN'S COMPENSATION AND OPERATING TAXES: The Lessee shall at all times during the term of this agreement maintain effective coverage for all his operations and all employees in said operations under this agreement, under one of the authorized plans of the Workmen's Compensation Act of the State of Montana, and shall make prompt payment of Unemployment Compensation, Social Security and Withholding Taxes.

16. DEFAULT; NOTICE: Time is of the essence of this agreement, and failure of the Lessee to make or cause to be made any payments as herein provided, or to keep or perform any agreement on his part to be kept or performed in accordance with the terms and provisions hereof shall, at the election of

OWARD A. JOHNSON
TTORNEY AT LAW
UTTE, MONTANA

the Lessors, cause the termination hereof, and any and all moneys which shall have been paid by the Lessee to the Lessors in royalties or otherwise shall be retained by the Lessors as rent for the possession and use of said leased properties; provided, however, that in the event of such default and the election of the Lessors as aforesaid to terminate this agreement on account thereof, the Lessors shall give the Lessee a written notice specifying the particular default or defaults relied upon, and the Lessee shall have thirty days after such written notice within which to remedy said default or defaults; if said default or defaults shall be remedied, this agreement shall then be automatically restored to good standing and shall not terminate by reason of said default or defaults.

A waiver by the Lessors of a particular breach of any covenant or agreement shall not be construed as a waiver of any other breach, and the remedying of any particular breach shall not impair the Lessors' rights resulting from any subsequent breach.

17. FORCE MAJEUR: In the event the Lessee shall be delayed at any time in keeping or performing any agreement on his part to be kept or performed hereunder by any act or neglect of the Lessors, or by strikes, lockouts, other labor unrest, unusual delay in transportation, order of duly constituted governmental authority, unavoidable casualty, act of God, or any other cause beyond the reasonable control of the Lessee, with the exception of financial inability, such delay shall not be deemed a breach of this agreement or a default on the part of the Lessee constituting a cause for the termination of this agreement, and during any time said Lessee is so delayed he shall be excused from the performance of such of the provisions hereof as shall be thereby prevented

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

or delayed, except those required by said Bullion Mining Company lease and option and this Sublease, section 8.

18. REMOVAL OF PERSONAL PROPERTY: Any and all machinery, equipment, implements, rails, pipes, tools and other property of whatever nature that may be placed upon the said leased property by the Lessee shall be and remain his personal property and shall not become a part of the real estate or a fixture or fixtures thereon, and may be removed therefrom by the Lessee or his successors or assigns at any time prior to the termination of this agreement by lapse of time or otherwise, or at any time within ninety days thereafter; provided, however, that all timbering in place in any shaft, drift, tunnel or other underground working and all buildings and other structures erected on said leased property shall remain in and upon the leased property and become a part thereof; and provided, further, that any of Lessee's said property not removed within ninety days after termination of this agreement shall then be deemed affixed to the real estate.

19. OPTION TO PURCHASE: In further consideration of these presents and of the covenants and conditions to be kept and performed by the Lessee hereunder, the Lessors hereby grant to the Lessee during the effective period of this agreement the sole and exclusive option to purchase said leased and subleased property for the sum of $1,000,000.00; any and all payments made hereunder except those made under section 1.C., if any, shall apply upon and be credited against said purchase price. Upon exercise of this option by the Lessee and full payment of said purchase price, the Lessors shall immediately execute and deliver to the Lessee a grant deed of the said leased and subleased property. This option to purchase is an integral part of and is dependent upon the lease wherein this option is contained; and if said lease shall

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

hereafter terminate for any cause, then this option shall expire and shall than be void and of no further force or effect.

20. ABSTRACT: The Lessor shall immediately have the abstracts of title to said leased and subleased properties continued to the date hereof, and shall deliver the same to the Lessee, who shall then forthwith cause said abstracts to be examined, and shall deliver a copy of the title opinions to Lessors, together with said abstracts. In the event that such opinion discloses material defects in title, the Lessors shall forthwith proceed to cure such defects. The said abstracts shall remain the property of the Lessors until payment in full of the option purchase price hereunder, whereupon they shall be delivered to the Lessee with the deeds to said property.

21. CANCELLATION BY LESSEE: The Lessee shall have the right to cancel, terminate and surrender this agreement and relinquish the leased and subleased property to the Lessors at any time during the term hereof, or any extension or renewal hereof, by giving the Lessors written notice at least thirty days prior to the effective date of such termination. With such notice the Lessee shall pay Lessors any accrued royalties and payments not theretofore paid, and shall deliver to Lessors copies of all maps, plats, assay and smelter returns, and other production and geological records of his operations on said leased property, in default of which he shall not be entitled to remove personal property under sections 18 and 22 hereof. Provided, that notwithstanding any other provision of this agreement, in the event the Lessee shall terminate this lease or abandon said property, and shall have not performed the annual assessment work or labor upon said unpatented mining claims for the then current

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

assessment year, the Lessee shall pay to the Lessors the sum of $100.00 for each said unpatented claim to indemnify said Lessors against the cost of performing said annual assessment work or labor for the said assessment year.

22. SURRENDER OF POSSESSION: Upon termination of this agreement by lapse of time or otherwise, the Lessee shall surrender peaceable possession of the said leased property and every part thereof to the Lessors, and the Lessors may take immediate possession thereof; provided, however, that the Lessee shall have ninety days after such termination, as hereinabove provided, within which to remove all property which he is entitled to remove hereunder, after first complying with all the provisions of section 21 hereof.

23. ADDRESSES FOR NOTICES AND PAYMENTS: Any notices to be given hereunder shall be deemed complete when the same shall have been placed in any Canadian or United States Post Office, securely sealed in an envelope properly addressed to the party or parties to whom the same shall be directed, with full first class postage prepaid thereon. All payments and notices to the Lessors shall be addressed to them at 6-10 First National Bank Building, Butte, Montana, 59701. Any such notices to the Lessee shall be addressed to him at his post office address above mentioned, or upon his assignment hereof to his assignee at Basin, Montana, or at such other address of which it shall have theretofore notified the Lessors in writing.

24. U.S. FUNDS: All monies payable hereunder shall be paid in United States Funds.

25. SUCCESSORS AND ASSIGNS: This agreement is assignable and shall extend to and be binding upon and inure to the benefit of the successors and assigns of the respective parties hereto. Upon such assignment the above named Lessee shall be

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

released from any and all obligations and liabilities hereunder.

Delbert M. Bullock

R. Sharon Bullock

Allan J. Bullock

Arla Bullock

Keith P. Johnson

Laurel P. Johnson

LESSORS

LESSEE

STATE OF WASHINGTON)
COUNTY OF KING) ss.

On this _____ day of November, 1968, before me, _____, a Notary Public for the State of Washington, personally appeared Donald W. Johnson and Miriam M. Johnson, husband and wife, to me personally known to be the persons described in and whose names are subscribed to the within instrument, and severally acknowledged to me that they executed the same.

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

Notary Public for the State of Washington
Residing at _____, Washington
My commission expires _____

STATE OF MONTANA)
COUNTY OF SILVER BOW) ss.

On this 8th day of November, 1968, before me, Marian M. Karns, a Notary Public for the State of Montana, personally appeared Delbert M. Bullock and R. Sharon Bullock, husband

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

and wife, to me personally known to be the persons described in and whose names are subscribed to the within instrument, and severally acknowledged to me that they executed the same.

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

Marian F. Kerns
Notary Public for the State of Montana
Residing at Butte, Montana
My commission expires March 9, 1971

STATE OF MONTANA)
: ss.
COUNTY OF SILVER BOW)

On this 8th day of November, 1968, before me, Marian F. Kerns, a Notary Public for the State of Montana, personally appeared Allan J. Bullock and Arla M. Bullock, husband and wife, to me personally known to be the persons described in and whose names are subscribed to the within instrument, and severally acknowledged to me that they executed the same.

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

Marian F. Kerns
Notary Public for the State of Montana
Residing at Butte, Montana
My commission expires March 9, 1971

STATE OF MONTANA)
: ss.
COUNTY OF SILVER BOW)

On this 8th day of November, 1968, before me, Marian F. Kerns, a Notary Public for the State of Montana, personally appeared Keith P. Johnson and Laurel P. Johnson, husband and wife, to me personally known to be the persons described in and whose names are subscribed to the within instrument, and severally acknowledged to me that they executed the same.

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

Marian F. Kerns
Notary Public for the State of Montana
Residing at Butte, Montana
My commission expires March 9, 1971

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

STATE OF MONTANA)
COUNTY OF SILVER BOW) ss.

On this 8th day of November, 1968, before me, Marian F. Kerns, a Notary Public for the State of Montana, personally appeared James E. McInnes, to me personally known to be the person described in and whose name is subscribed to the within instrument, and severally acknowledged to me that he executed the same.

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

Marian F. Kerns
Notary Public for the State of Montana
Residing at Butte, Montana
My commission expires March 9, 1971

HOWARD A. JOHNSON
ATTORNEY AT LAW
BUTTE, MONTANA

EXHIBIT "A"

LEASE AND OPTION

THIS AGREEMENT, made and entered into this 1 day of July, 1968, by and between the BULLION MINING COMPANY, a corporation organized and existing under and by virtue of the laws of the State of Montana, party of the first part, hereafter called "first party", and Allan John Bullock and Delbert Bullock of Basin, Montana, party of the second part, hereafter called "second party".

WITNESSETH: That for and in consideration of the sum of ($1.00) to it paid by second party, receipt whereof is hereby acknowledged, and the further consideration of the performance of said second party of the covenants, agreements and conditions on their part to be performed as herein set forth, and as conditions precedent, said first party has leased and let, and by these presents does lease and let unto said second party, for a period beginning at the date hereof and expiring on June 30, 1973, the following described mining property situated, lying and being in the Cataract (unorganized) Mining District, in the County of Jefferson, State of Montana, to-wit:

"The Bullion Quartz Lode Mining Claim, patented Survey No. 5108, and the West Bullion Extension Quartz Lode Mining Claim, patented, Survey No. 10199"

The second party may remove ore from the said premises above described, and may do development work thereon, but at all times shall perform all work and labor done on said premises in a good workmanlike and minerlike fashion, and at all times properly and securely timber all shafts, drifts, and openings made by then wherever necessary, in accordance with good mining and in compliance with the law.

CLAUSE 1. The second party shall pay the first party as royalty in consideration of the execution of this lease, and the use of, possession and occupancy of the said premises, ten percent (10%) of the net smelter returns upon all ores taken from said premises and sold or treated; and by net smelter returns shall be understood the gross returns on all ores so sold and treated, less the cost of transportation and treatment charges. Said payments of royalty shall be payable by the purchaser of the ore or concentrate to the first party, and the

second party shall notify the purchaser to pay the royalty direct to the first party when and as said purchaser is paying for the ore or concentrate. Such payments together with the purchasers certificate of analysis of the ore or concentrates shall be sent to the Treasurer of the Bullion Mining Company. In the event said second party shall exercise their option to purchase hereunder, the royalties and other payments so received by said first party shall be applied upon the purchase price hereinafter provided, but otherwise they shall be deemed exclusively as rental payable to the first party hereunder. It is further covenanted and agreed that the said second party shall be solely liable for and shall pay for all work and labor performed and material used on said premises, and shall suffer no lien or encumbrance to be placed on said property.

CLAUSE 2. Said second party covenants and agrees that they shall and will apply for, take out and continuously during their tenure hereunder, maintain Workman's Compensation Insurance from the Industrial Accident Board of the State of Montana, and make all unemployment and Social Security payments provided by law, coincident with the employing of any person or persons to work in or in connection with said mine.

CLAUSE 3. The said second party covenants and agrees to and with said first party, that not less than the equivalent of fifty man shifts' work in each month during the life of this lease shall be done at the mine upon said mining property beginning in the month of July, 1968. Each day a bulldozer is used for eight hours on the premises it shall be counted by the first party as equivalent to eight (8) man shifts exclusive of the man or men operating it.

CLAUSE 4. Said second party covenants and agrees to surrender and deliver up to the said first party the said premises together with the appurtenances and all improvements which may be made or placed thereon during the tenure hereof and he shall leave all rails, pipe lines and improvements in mine (except that said second party shall have the right to remove all other moveable equipment placed therein by him) in as good condition and order as the same will be should said mine be cleaned out and repaired by him, and the mine

in all points and particulars ready for immediate and continuous work, without demand or notice, upon the expiration of this contract or at any time prior thereto in the event of a sooner termination or forfeiture thereof, as hereinafter provided.

CLAUSE 5. The party of the first part, for itself, its servants and agents, hereby reserve the right to, and may enter upon the [illegible] for the purpose of inspection, and shall therein have the free use of all passages, ropes, windlasses, hoists, ladders, machinery and equipment, at all reasonable times during the term hereof.

CLAUSE 6. It is further covenanted and agreed that the said second party shall have the sole option and privilege of purchasing the premises hereby leased, and all thereof, from the said first party at any time during the term of this lease or the extension thereof, for the sum and price of Twenty-Five Thousand Dollars ($25,000.00) lawful money of the United States of America, less any sums that theretofore have been paid to said first party as royalty hereunder.

CLAUSE 7. It is further covenanted and agreed that the said second party shall have the privilege of subleasing the premises hereby leased, and the sublessee shall have six months from the date of issue of said sublease to prospect the premises, and then if the said sublessee has not surrendered sublease to said second party said sublessee shall make a first yearly payment of One ThousandDollars ($1,000.00) lawful money of the United States of America to said first party. Yearly payments thereafter of one-thousand dollars ($1,000.00) lawful money of the United States of America shall be made each year the sublease is in effect and on the same date of the first payment. All yearly payments shall be made to the said first party. Said second party shall notify said first party in writing within ten days after said second party grants a sublease, and shall give first party a copy of the sublease.

CLAUSE 8. The ores and minerals mined from said land may be cleaned and prepared for market thereon in an independent operation or at a central concentrating plant located on this or other lands

in connection with other ores, and if cleaned at a central concentrating plant same shall be weighed, assayed, treated and concentrates determined, and complete and permanent records shall be made and kept of said entire operation, which shall be open to inspection and audit of said first party at all reasonable times, and said first party may likewise be present and observe said operation at all reasonable and seasonable times.

CLAUSE 9. Party of the second part shall furnish party of the first part a complete log of each and every hole drilled on said premises and at reasonable times a map or print showing definite location in reference to the property lines.

CLAUSE 10. It is further agreed and covenanted, that this lease and option constitute one inseparable contract, that a failure upon the part of said second party to perform any of the agreements or conditions herein contained on their part to be performed, and , or kept, or to make any of the payments in the amounts and within the time herein specified, shall work a forfeiture and termination of this lease and option by said second party, and all of their rights thereunder, and upon the happening thereof, all of the rights of the second party hereunder shall ipso facto terminate and be at an end and all the monies paid hereunder therefore shall be retained by said first party as earned rentals and liquated damages suffered by such breach, and this agreement shall be of no further force or effect.

CLAUSE 11. In case of failure of second party to keep and perform the terms of this lease, the first party may give thirty days' written notice of the violation complained of, and if such violation or default is not removed within said period said lease shall thereupon terminate, at the option of the first party, which remedy shall be exclusive.

CLAUSE 12. Time is the essence of this agreement in its entirety, and of every act, payment and, or performance required of the said second party. This agreement is binding upon and shall inure to the benefit of the heirs, executors, administrators, success-

ors and assigns of the respective parties hereto.

IN WITNESS WHERETO, said first party has caused these presents to be executed by its officers hereunto duly authorized and its seal affixed thereto, and said second party has hereunto set his hand and seal the day and year first above written.

[illegible] MINING COMPANY

George [illegible]

Its President
Party of the First Part

Delbert [illegible]

Allen [illegible]

Parties of the Second Part

Joseph P. Lyden
Its Secretary

CRYSTAL MINES, INC.
Jefferson County, Montana
Interim Progress Report to April 30, 1969

The following report is a resume of progress attained to date on the Crystal Bullion property in Jefferson County, Montana. The work is supervised by David R. Shoemaker, resident manager, with Centennial Development Company performing the underground rehabilitation, crosscutting and sampling operations.

Also included are recommendations for a continuation of exploration during the next few months when weather conditions will permit surface work.

CLAIM LOCATION

Fourteen new claims have been located to provide protection for the existing patents. These new claims are Duke, Mammoth South, Mammoth West, Crystal South, Lincon West, Commerce North, Moccason North, Moccason West, Bullion North, Bullion South, West Bullion Extension North, West Bullion Extension South, Blue Geese North, and John. The relative location of these are shown on the attached claim map.

In addition, approximately ten claims will be located as soon as weather permits.

UNDERGROUND PROGRESS

(i) Centennial Development has completed the mobilization of all necessary equipment for the preliminary underground investigations.

(ii) Partial rehabilitation of the lower adit has provided access to the working areas.

(iii) Crosscuts 1 and 2 have been completed and 3 and 4 are in progress. Each pair of crosscuts is designed to probe the full width of the vein. A total of 45 feet of crosscutting has been done to date.

(iv) Although sampling results are incomplete a visual examination indicates that the best mineralized zone encountered is in

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

crosscut No. 3 into the hanging wall and a grab sample across 6.0 feet has assayed 33.50 oz/T silver; 0.15 oz/T gold; 3.50% copper, 1.52% lead and 0.50% zinc. A car assay from the same zone but not necessarily the same part of the zone assayed 13.0 oz/T silver; 0.09 oz/T gold; 1.30% copper; 1.20% lead and 2.10% zinc.

GENERAL

(i) An office has been established in Butte with its address as follows:

Crystal Mines, Inc.
Box 1954
Butte, Montana 59701

(ii) Other property submissions have been made to Mr. Shoemaker and examination will be conducted on those of most interest.

ORE SHIPMENTS

The Bullock brothers are continuing to ship fluxing material to the smelters at Helena and Anaconda. An unusually heavy snowfall has limited access to certain portions of the open cuts and total tonnage shipped during the winter is less than in previous years. The monthly averages since December 1968 are as follows:

	Month	Tons	Oz/T Au	Oz/T Ag
(i) To Anaconda from Crystal Claim				
	Jan.	371	0.041	4.88
	Feb.	725	0.032	3.74
	March	607	0.035	3.57
	April	(no returns to date)		
	Average		0.035	3.93

(ii) To Helena from Crystal Claim

All shipments to the A.S. & R. smelter have been stockpiled for later treatment and no information on size or grade is available.

(iii) To Anaconda from St. Lawrence Claim

Only one railway car has been shipped from the St. Lawrence claim and although complete returns have not been received the

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

control assay is as follows: 0.045 oz/T gold; 8.5 oz/T silver and 1.2% copper.

(Note:

Assuming 90% recovery and metal prices of $35/ounce gold, $1.90/ounce silver and $0.40/pound copper, the expected values of the material are $7.83/ton from the Crystal claim and $24.60/ton from the St. Lawrence claim.)

RECOMMENDATIONS

Underground

(a) Crosscutting to be continued until the total width of the vein material has been opened up and sampled in at least five places. This work will be expanded as results warrant and at the discretion of Mr. Shoemaker.

(b) Extension of the lower adit along the vein a minimum of 400 feet in order to explore the vein 380 feet below the good material observed on the St. Lawrence claim. In addition, approximately 200 feet of crosscutting may be required here. After location of the mineralized zone on the lower adit 450 feet of raises and 200 feet of crosscutting will explore the zone between the lower adit and surface. Car sampling will be continued throughout this phase of the program.

Surface

(a) Location of ten additional claims when weather permits (approximately May 15, 1969).

(b) Trenching across the width of the vein system between the Crystal and Bullion showings at intervals not greater than 500 feet and at smaller intervals where necessary. A D-8 Caterpillar with a ripper would be the most efficient machine for this purpose.

(c) Drilling to an average vertical depth of 125 feet from a minimum of 12 stations established along the length of the vein from the hanging wall side with four holes from each station. Approximately 7,500 feet would be required. Equipment of the rotary-percussion type would be the most effective and economical here where an accurate sample is required.

(d) Drilling of four 1,000 foot diamond drill holes to test the structure at depth. This work would be done contingent upon

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

the results of the first half of the shallow drilling.

General

(a) Metallurgical testing of the oxidized surface material and the sulphide-rich underground material. This would include tests of high-copper and low-copper zones as well.

(b) At the completion of the above programs a preliminary feasibility study should be made before proceeding with further surface and/or underground exploration and development.

PROGRAM SCHEDULE

The time distribution of the outlined program should be as follows:

I	May 1 - May 31	(a)	Underground crosscutting.
		(b)	Preparation of samples from underground for metallurgical testing.
		(c)	Location of additional claims.
II	June 1 - July 31	(a)	Surface trenching and sampling.
		(b)	Preparation of samples from surface for metallurgical testing.
III	Aug. 1 - Nov. 30	(a)	Extension of lower adit.
		(b)	Additional crosscutting in lower adit extension.
		(c)	Raising from lower adit to surface.
		(d)	Crosscutting from raise between lower adit and surface.
		(e)	Shallow drilling.
		(f)	Deep-hole drilling.

Respectfully submitted:

D. L. McKelvie, P. Eng.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

Report on Crystal Mine, Basin, Montana
for
UTICA MINES LIMITED

ALRAE ENGINEERING LTD.

November 5, 1968

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

TABLE OF CONTENTS

	Page
SUMMARY	1
INTRODUCTION	2
PROPERTY	2
LOCATION AND ACCESS	2
HISTORY	3
GEOLOGY	3
SUMMARY OF PAST PRODUCTION	4
RESULTS OF METALLURGICAL TESTING	5
CONCLUSIONS	6
RECOMMENDATIONS	7
COST ESTIMATES	7
CERTIFICATE	9

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

SUMMARY

1. The Crystal Mine and surrounding claims in Jefferson County, Montana, is located on a major vein system which has supported several mines along its length.

2. Smelter shipments during the past few years have averaged more than six ounces of silver per ton with other values in gold, lead, zinc and copper.

3. Surface and underground exploration indicates the vein is continuous along the claim group for approximately 9,000 feet, has an average width of 30 feet and is continuous down-dip to 700 feet.

4. Acquisition of the property is recommended.

5. An exploration program of surface stripping and underground development should be carried out.

6. The estimated expenditure for the initial phase of the program consisting of stripping is $97,000.00.

7. Drifting and crosscutting is estimated to cost $330,000.00.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

INTRODUCTION

The following report is based on a personal examination of the Crystal Mine and surrounding properties which was made on October 30, 1968 at the request of Utica Mines Ltd., Vancouver, B.C. Mr. A.G. Ditto and the writer visited the property accompanied by the Bullock brothers of Basin, Montana, who hold two-thirds interest in the mine, the remaining one-third being held by the Johnson brothers of Butte, Montana. In addition to the first-hand information obtained during the examination, the following references have been used:

(a) Report on the Crystal Mine, by C.H. Steele, 1936

(b) Report on the Crystal Group of Lode Claims by A. V. Corry, 1915

(c) Report of Flotation Tests, by S.R.B. Cooke, 1942

(d) Report on the Crystal Mine, by R.J. Dionne, 1963

(e) Smelter shipment reports by Anaconda Copper Mines and American Smelting and Refining Co. as submitted by the owners.

PROPERTY

The property described in this report consists of eighteen contiguous mining claims, fifteen of which are patented.

LOCATION AND ACCESS

The Crystal Mine is located approximately eight miles northerly from the town of Basin, Montana, and all the claims are situated within Sections 17, 18, 19, 20 T7N, R5W Principal Meridian, Jefferson County. The claims are on Jack Mountain at an elevation of 8,200 feet, approximately 2,000 feet above the main valley floor.

Access is by gravelled road from Basin which is on Interstate Highway 91, 30 miles northeast of Butte and 43 miles southwest of Helena, Montana.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

HISTORY

The group of claims in which the Crystal Mine is located have been worked sporadically since the 1880's at which time it was known as the Green Lode. The property was subjected only to small high grade operations until October 1912, when A.C. Ray began an active development program. Since then several operators have sunk numerous shallow shafts and adits of various lengths. On the Crystal vein two adits, one 200 feet below the surface showing and the other 360 feet below surface, have been driven. The upper adit explored the vein for 1,700 feet. The lower adit consists of 900 feet of crosscut to the vein and 1,000 feet of drifting along the vein. Several short winzes were sunk below the lower adit. All of this underground work was done to develop small high grade lenses within the main vein system.

On surface, operators in more recent years have shipped ore from surface pits to the smelters at Anaconda and Helena, Montana. The present owners have made shipments of approximately 80 cars. The material is used as a flux at the smelters and the operators are paid for the metal content without treatment charges if the silica content is sufficient. The owners are limited to 1,000 tons per month to each smelter.

GEOLOGY

The Crystal claim and surrounding properties are located on a vein system, known as the Eva May, which has been traced for approximately 14 miles. It consists mainly of aplite with massive quartz and sulphides and occurs within the Boulder Batholith, a large granitic mass in which the Butte deposits are found, and which is similar to those with which other mineral deposits in Montana are associated. The batholith is Lower Cretaceous in age and consists primarily of quartz monzonite.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

At the Crystal Mine, the vein is highly leached with the aplite having been reduced to latite and the remnant quartz is badly broken where the sulphides have been removed. Galena and some tetrahedrite remain as unweathered primary minerals. In the underground workings which were explored from the lower adit, the vein is leached to a lesser extent than on surface but is still badly broken with the quartz and aplite being thoroughly honeycombed with rusty crack fillings and secondary copper minerals.

Structurally, the vein has a consistent strike and dip of E - W and 70°N, respectively. Its width varies from 15 to 50 feet where exposed and averages about 30 feet. The length is estimated to be for the entire length of the claim block, approximately 9,000 feet. Both the hanging and foot walls are marked by two to six inches of talc. The mineralization consists of galena, sphalerite, bornite, pyrite, chalcopyrite, arsenopyrite, tetrahedrite, covellite and chalcocite in widely varying amounts arranged in more or less parallel bands with quartz. The actual composition and arrangements is highly inconsistent with the sulphides existing as dissemination or as lenses and sheets of varying size.

SUMMARY OF PAST PRODUCTION

Three of the claims covered by this report have produced some ore at different times of the property's history. These are the Crystal, the St. Lawrence and the Bullion. Production statistics are completed only for the Crystal Mine and may be summarized as follows:

		Tons	Au	Ag	Pb	Cu	Zn
Copper ore	1899-1942	12,370	.208	12.80	--	2.8	--
Lead-zinc ore	1917-1942	8,960	.092	19.97	10.9	0.5	11.3
Surface ore	1942-1956	1,670	.078	7.60	2.3	0.33	1.16

These figures represent grades during production years when the operators were selective in mining and much of the material

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

up to 1942 was hand-cobbed.

Samples of assays on shipments submitted by the present owners are given below to indicate the grade encountered from the surface material when the full vein width is taken in mining and shipped directly to the smelter.

Year	Tonnage	Au oz/ton	Ag oz/ton	Pb %	Cu %	Zn %	Smelter
1966	114	.095	8.0	3.35	.05	.50	A.S. & R.
1966	128	.115	7.65	.04	.05	1.20	A.S. & R.
1968	152	.080	5.95	1.25	.05	.50	A.S. & R.
1968	540	.112	6.79	-	.13	-	A. C. M.
1968	260	.036	4.26	-	.08	-	A. C. M.
1968	57	.06	5.09	-	.19	-	A. C. M.
1968	113	.108	6.55	-	.08	-	A. C. M.
1968	127	.095	9.35	-	.08	-	A. C. M.
	AVERAGES	.089	6.56				

In 1968, a 132 ton shipment was also made from the Bullion claim, 5,000 feet ~~east~~ west of the Crystal, and included only material from the dump outside the adits. This shipment assayed 4.95 oz. Ag/T, 3.45% Pb, .05% Cu and 1.1% Zn.

Also in 1968, 87 tons were shipped from the surface of the St. Lawrence claim immediately ~~east~~ west of the Crystal and this assayed 0.048 oz. Au/ton, 5.45 oz. Ag/ton and 1.22% Cu.

RESULTS OF METALLURGICAL TESTING

Several metallurgical tests were run on ores from the Crystal and Bullion claims in 1943 and 1944. These are summarized by H.G. Poole of the United States Bureau of Mines in a report dated January 31, 1944, as follows:

> "The ores all show favourable amenability to concentration. However, better operation and improved metallurgy would be obtained by keeping the higher copper-bearing ores for separate treatment. The presence of antimony in one phase of copper mineralogy would involve penalties in a lead concentrate."

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

"The Crystal ores were of good milling grade but the samples of Bullion ore were submarginal."

CONCLUSIONS

The Crystal Mine and associated claims are located on 9,000 feet of strike length of the Eva May vein system and previous work on the claims strongly indicates continuation of the vein for this entire length. It has been exposed by surface and underground work for approximately 6,000 feet. Further geological work and surface stripping would be required to substantiate its continuation and to reveal the effect of a large fault which crosses the vein near the east end of the St. Lawrence claim. It is expected that the vein will contain a minimum of 6 oz. Ag per ton and .09 oz. Au per ton with additional values in copper, lead and zinc. The base metal content is inconsistent along the strike length and down the dip but the precious metal values are consistent in any part of the vein so far explored.

Conservatively estimating the length of the vein as 6,000 feet, approximately 1,800,000 tons could be realized to a depth of 100 feet and this material could be economically mined from surface. If the property were to be mined from underground an adit could be driven from the Bullion claim, 700 feet below the Crystal and 6,000 feet to the east. The tonnage of vein material indicated if the vein were found to be continuous would be 12,500,000 tons. Sufficient tonnages could be available to support a 2,000 ton per day mill. Extension of the vein below the 700 foot level is expected based on the known depth of the vein in other locations. However, considerable geological, engineering and metallurgical work is required before such a plant could be considered economically feasible.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

Based on past performance, material approaching $13.50/ton is expected throughout the vein system. Mining and milling costs on the open pit material is estimated at $5.50/ton and at $10.00 per ton on the underground operation. This indicates operating profits of $8.00/ton and $3.50/ton from open and underground respectively.

RECOMMENDATIONS

Acquisition of the property described in this report is recommended along with an exploration program to begin as soon as the property is acquired. Further claims should be obtained to protect the vein system to the north.

As a first stage, the entire strike length of the vein sh should be stripped and arrangements made for bulk sampling from previously unexplored parts of the vein. In addition, metallurgical testing should be commenced as soon as possible to investigate the feasibility of mill construction. This phase of the project could be completed in three months.

If the surface stripping, sampling and metallurgical testing return favourable results, exploration from underground is recommended. A 6,000 foot adit from the Bullion claim along the vein would explore the structure from approximately 700 feet below the Crystal surface exposure. Crosscuts at regular intervals, to be determined after the tunnel has advanced in the vein, would be required to test the width and grade. Approximately 2,000 feet of cross-cuts would be needed.

COST ESTIMATES

Phase I

Claim staking - 20 claims @ $100/claim	$ 2,000.00
Surface stripping - approx. 300,000 yds	75,000.00
Bulk sampling	2,000.00
Metallurgical tests, feasibility studies engineering, supervision	10,000.00

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

Phase I (Continued)

Contingencies		$ 8,000.00
	TOTAL	$ 97,000.00

Phase II

6,000 feet of drift @ $35/foot		$ 210,000.00
2,000 feet of cross-cut @ $40/foot		80,000.00
Engineering and supervision		10,000.00
Contingencies		30,000.00
	TOTAL	$ 330,000.00

NOTE:

Drift and cross-cutting estimates are based on non-support tunnels. If support is required, an additional $10/foot is estimated. This may be required for one-half the footage, resulting in an increased expenditure of $40,000.00.

Respectfully submitted:

D. L. McKelvie, P. Eng.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

CERTIFICATE

I, Dennis L. McKelvie, residing at 2589 Hoskins Road, North Vancouver, B. C., do hereby certify that:

1. I am a consulting geological engineer.

2. I graduated from the Provincial Institute of Mining, Haileybury, Ontario, in 1954.

3. I graduated from Queen's University, Kingston, Ontario, in 1958 with a B. Sc. degree in Geological Sciences (Engineering).

4. I am a registered Professional Engineer in the Provinces of British Columbia and Ontario and a fellow of the Geological Association of Canada.

5. I have practiced my profession since 1958 in the employ of McIntyre Porcupine Mines Limited, American Smelting and Refining Company, and Alrae Engineering Ltd.

6. I have personally examined the property described in this report.

7. I have no interest, direct or indirect, in the securities or properties of Utica Mines Ltd., or in the property described in this report.

DATED AT VANCOUVER, this 5th day of November, A.D. 1968.

D. L. McKelvie, P. Eng.

TO PROTECT OUR CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS AND EXTRACTS FROM OUR REPORTS MUST RECEIVE OUR WRITTEN APPROVAL.

crosscuts, and a main crosscut adit 90 feet below the vein outcrop. Altogether, there is about 400 feet of drifts and crosscuts. The workings are open and in good condition. The deposit is a northwesterly striking structure in fine-grained granite or grano-aplite. A northeasterly striking dacite dike cuts both the granite and the vein. The principal ore mineralization of the vein took place in the vicinity of the dike. A small ore body about 2 feet wide and 8 to 10 feet long was mined from surface to a depth of about 6 feet. The vein in the main adit workings ranges in width from 1 to 6.5 feet. The combined stope length on both sides of the dike is about 40 feet.

The visible ore minerals are cerussite and fine-grained galena in a gangue of quartz ranging from the normal crystalline to the chalcedonic variety. A small amount of pyrite is present. The radioactive mineral, torbernite, appears to be associated with chalcedonic quartz, galena, cerussite, sphalerite, limonite, malachite, azurite, and chrysocolla.

Copper King

Paradee & Schrader (1933, p. 296) described the Copper King as a prospect 3 miles northeast of Basin which was developed (in 1911) by a 125-foot tunnel and a 35-foot shaft. The narrow east-trending vein contains quartz, tetrahedrite, and pyrite. They further state that "a product containing 24 ounces of silver and $1.60 in gold to the ton and running 94 percent silica is obtained. This ore was shipped to copper smelters for use as converter lining, and a bonus of 15 cents was paid for each unit in excess of 75 percent silica."

Cracker (Mt. Thompson)

The unpatented Cracker claim is 5 miles northeast of Basin. It is about a quarter of a mile east of Cataract Creek at an altitude of 6,550 feet. The workings are also known as the Mt. Thompson mine but should not be confused with the Mt. Thompson claim about a mile to the southeast. The property is held by W. E. Paget and John MacGinniss of Basin.

Numerous pieces of lead ore scattered about an old ore bin gave evidence of some past production. The mine is developed by an adit which, according to MacGinniss, is 1,600 feet long. The adit is caved at the portal. The width and extent of the vein could not be determined. Pieces of vein material 12 to 18 inches across in the dump contain galena, pyrite, chalcopyrite, and manganese oxide.

Crescent

On the crest of the Continental Divide in secs. 20, 21, 28, and 29, T. 8 N., R. 5 W., 2 miles east of the Josephine mine, is the Crescent mine owned by the Holter Estate of Helena. During the summer of 1959 the property was being developed by the Montana Gold and Silver Co. The altitude in the vicinity of the mine workings ranges from 7,700 feet to 8,000 feet. The property is a[illegible] by automobile over 6 miles of steep [illegible] road from Rimini, on the eastern slope of [illegible] tinental Divide; there is no access to the [illegible] by roads from the Basin-Boulder region.

The Crescent property was discovered a[illegible] veloped prior to 1900. According to local r[illegible] the high penalty on zinc imposed by ore [illegible] and the cost of pumping water from the [illegible] workings resulted in the mine being closed [illegible] before the turn of the century. Production [illegible] tics are available for the years 1935 to 195[illegible] ing these years 399 tons of ore were shipped [illegible] yielded 190 ounces gold, 3,392 ounces silver, [illegible] pounds copper, 45,934 pounds lead, and [illegible] pounds zinc.

The mine workings include 2 shafts and 2 le[illegible] The upper level, which is a 670-foot adit-drift [illegible] 60 feet below the collar of the No. 1 shaft. In [illegible] the adit was examined. The vein is in quartz m[illegible] zonite and contains argentiferous galena, py[illegible] chalcopyrite, and quartz. It has a strike rang[illegible] between N. 85° E. to east, and a dip between [illegible] S. and vertical. The No. 2 shaft sunk near the p[illegible] tal of the adit-drift connects with the 120-f[illegible] drifts and crosscuts. Shaft No. 1 is caved, a[illegible] shaft No. 2 is flooded.

Crystal

The Crystal mine, 8 miles north of Basin [illegible] secs. 19 and 20, T. 7 N., R. 5 W. at the head [illegible] Uncle Sam Gulch, is about at the center of t[illegible] known strike-length of the Eva May-Crystal-Ba[illegible] lion vein. The altitude at the portal of the ma[illegible] workings is 7,800 feet. The property, consisting [illegible] 10 patented claims and 3 claims held by locatio[illegible] is owned by the Golden Messenger Corp., W. S. Norman, president, Spokane, Wash.

The mine, a small but steady producer since 1908, has a recorded total production of 22,58[illegible] tons ore which yielded 3,579 ounces gold, 343,59[illegible] ounces silver, 536,915 pounds copper, 2,060,62[illegible] pounds lead, and 939,190 pounds zinc. Production for the period 1911 to 1919 is included with the Comet mine.

The mine workings consist of 2 adits, each about 3,000 feet in length. Raises and crosscuts from the adits develop the vein through a vertical range of about 200 to 300 feet. A few shallow winzes have been sunk below the lower adit.

The Crystal vein is a zone of sericitized aplite or grano-aplite enclosed in quartz monzonite. It strikes N. 70° to 80° W. and dips 70° N.; it averages about 50 feet in width. The ore shoots within the zone comprise numerous disconnected lenses of quartz and sulfides 2 to 5 feet or more in width and of varying length separated from each other by aplite or grano-aplite. Post-mineral cross faults and strike faults displace the ore within the zone.

crystal

Metallic minerals include galena, sphalerite, chalcopyrite, and pyrite in a gangue of quartz. Ore piled on the ore house contains principally galena and sphalrite.

Custer

The Custer mine is in sec. 4, T. 6 N., R. 5 W., on the broad divide between Big Timber Creek and Cataract Creek 3 miles northeast of Basin. The altitude at the portal of the adit is 6,700 feet.

The principal period of operation at the mine was during the first decade of the present century. Production for 6 years between 1903 and 1912 is: 8,472 tons ore containg 470 ounces gold and 106,065 ounces silver.

The chief mine opening is an adit, the length of which is estimated to be 1,500 feet. The mine workings, in addition to the adit, include a 150-foot winze and a shallow shaft.

According to Knopf (1913a), the vein, in places as much as 30 feet wide, is enclosed in sericitized granite. Ore shoots within the vein generally are under 1 foot in width and are very irregular in width and direction. The ore was said to contain about 40 ounces silver and $18 in gold per ton.

East Katie

The East Katie (Lot 7) as described by Pardee & Scharder (1933, p. 290) is on the north side of the Boulder River at Basin almost opposite the Hope-Katie or Basin Jib mine. Recent production (1952 to 1956) which was credited to the Basin Jib mine probably came from this property.

According to Pardee & Schrader (1933, p. 290), C. H. Clapp determined that the east-striking East Kaite vein is a part of the Hope-Katie lode that had been displaced about 800 feet to the north by faulting. The vein, which is cut, but not displaced, by a quartz porphyry dike, contains quartz, pyrite, and a little chalcopyrite. The ore is classed as a low-grade milling ore. The authors state that a streak of galena was found on the 200-foot level and that rich gold ore occurs in places.

The property was developed in 1929 by a 200-foot shaft and drifts. In 1955 the shaft was extended.

Enterprise

Adjoining the Buckeye claim on the east is the patented Enterprise claim (M.S. 1329) owned by the Hauser Investment Co. of Helena. This property is in sec. 36, T. 8 N., R. 6 W., about 10 miles north of Basin.

It appears probable that the Buckeye mine and the Enterprise mine were worked as a single operation during past periods of activity. The 2 shafts are within 200 yards of each other.

The extent of the mine workings is estimated at about 1,000 feet. The shaft is caved and inac

the vein is in a bleached zone in nite similar to the vein in the Buck tallic minerals in the dump are gal erite with considerable iron pyrit gangue.

Eva May

The Eva May mine is on Cataract north of Basin. The property, consi ented and 7 unpatented claims in se T. 7 N., R. 5 W., is owned by Ne Sloan, Inc., Basin.

The mine was one of the important ers in the vicinity of Basin. Early i century the property was equipped gravity concentrator. The remainin gives evidence of a substantial succ of operation. Between 1905 and 1949 t duced 206 tons ore containing 8 ounce ounces silver, 6,035 pounds copper pounds lead.

The Eva May shaft reached a de feet in 1907, and it is still the deepes Boulder batholith outside of the B The horizontal workings from the sh 8 levels aggregating several thous drifts and crosscuts. The collar of the covered by the dump of a bulldozer recently to further explore the vei recent work includes a 420-foot adit plore the vein at about the 100-foot shaft.

The Eva May mine is at the easte Eva May-Crystal-Bullion vein which nized strike length of more than 3 width averages about 30 feet acco lingsley and Grimes (1918). Inform the vein in the Eva May mine was o numerous local residents familiar wi day operations. The vein, according ple, ranged in width from 20 to 50 f shoots within the vein ranging from in width and from 50 to 100 feet in ore shoots are near the walls of the e which is composed largely of granit aplite. Knopf (1913a) states that t well as some of the coarse crystallin quartz, contains black tourmaline. states that the mine dump contains blue-grey cryptocrystalline quartz.

Metallic minerals in the ore are cha lena, sphalerite, tetrahedrite, and Stringers of ore encountered in the r en adit contain chiefly galena and sp white quartz gangue.

Gray Eagle

The Gray Eagle mine is in sec. 35, W. on Bishop Creek about 1¾ miles Comet mine, northeast of Basin, at a

It was reported locally that high-grade silver e was mined from the property in the early ys. In 1918 and 1919, the mine produced 46 tons e which contained 29 ounces gold and 3,994 nces silver.

An adit estimated to be 500 feet long explored d developed a vein in quartz monzonite striking 70° E. and dipping 80° S. The vein has been pped to the surface for a distance of about 125 et. The stope averaged in width about 2½ feet. e wall rock of the stope was only slightly al-red.

The vein can be observed only in places where lars had been left. In these pillars the vein con-ted of fine-grained iron pyrite in a gangue of nse grey quartz. No silver minerals were noted, d the pillars may have been left in barren parts the vein.

Buckeye (Boston)

The Buckeye mine (M. S. 374) is at the head of sin Creek about 1½ miles south of the Jose-ine mine, or about 10 miles north of Basin. The operty is in sec. 36, T. 8 N., R. 6 W. and is ned by M. R. Anderson of Butte. The vein was covered in 1868 by C. K. Riale and the claim tented in 1875. The property was worked from 63 to 1908, from a shaft 100 feet deep. Accord-g to Ruppel (1958) some ore was mined in 1882-84, and the shaft was rehabilitated.

A few small shipments were made of ore valued $15 per ton containing gold-bearing pyrite and nor quantities of silver-bearing galena. New chinery was installed in 1897, and from 1898 1901 the mine made apparently small but regu-shipments of gold-bearing pyrite concentrates. e original shaft caved in late 1901, and 1902 new shaft was sunk to a depth of 200 feet. A el was driven westward on the vein at that pth. The ore from this level was milled at the ne, and the concentrates were reportedly valued about $30 per ton. The mine was closed in 1903 d briefly reopened in 1907-1908. It has been idle ce 1908, except during World War II, when a all flotation plant was built to re-treat tailings m the former gravity concentrator.

Total Buckeye production for 12 years between 02 and 1949 was 1,813 tons ore that yielded 309 nces gold, 18,227 ounces silver, 3,425 pounds per, 76,590 pounds lead, and 13,797 pounds c. Under the name of Boston, the mine produced tons ore which yielded 9 ounces gold, 1,692 nces silver, 23,886 pounds lead, and 489 pounds c.

The vein, where exposed near the surface in sided workings, occupies a wide bleached zone quartz monzonite; it comprises 3 to 5 feet of ered quartz monzonite and vein quartz. Metal-minerals in the dumps include pyrite, galena, sphalerite in a quartz gangue. The vein ikes N. 85° and dips vertically. The gangue consists of massive grey quartz in which small amounts of tourmaline may ocassionally be observed.

Bullion

The Bullion mine (M. S. 5108), in secs. 13 and 14, T. 7 N., R. 6 W., is owned by the Bullion Min. Co., c/o Joseph P. Lyden of Joplin, Mo. The property consists of 2 patented claims, the Bullion and the West Bullion Ext. (M. S. 10199).

Ruppel (1958) states that the Bullion vein was discovered about 1882 and patented in 1897 when the major exploration and development work was started. In 1905, the mine was operated by the Cataract Copper Min. Co., which installed a 150-ton concentrator. The company also had a 200-ton smelter. In 1912 and 1913, the Northwestern Metals Co. operated the Bullion mine in conjunction with the Grey Eagle, Crystal, and Comet mines. During 1918 and several years after, it was operated by the Bullion Min. Co which shipped both copper ore and lead ore. In 1929, the Schmit- Bullion Min. Co., was organized to work the property, and about $10,000 was spent in new mining and milling equipment. A small flotation mill was installed. Several hundred tons of sulfide lead ore were treated in this plant by the company in 1930. The next reported shipments were made in 1937 and consisted of crude ore. The mine has been operated intermittently since that time. The 2 adits on the west side were opened in 1955, and the upper adit was actively worked. The total production for 25 intermittent years between 1905 and 1947 is 22,779 tons ore which yielded 3,564 ounces gold, 217,519 ounces silver, 426,241 pounds copper, 762,-990 pounds lead, and 2,847 pounds zinc.

The mine consists of 3 adits, a shaft started in 1882, and several stopes, crosscuts, winzes, and raises. The lowest adit extends eastward on the vein about 2,000 feet. From about 600 feet to 1,100 feet inside the portal the vein has been developed by 4 crosscuts, an inclined winze 100 feet deep on the vein, 2 inclined raises to the intermediate adit, and a stope 250 feet long. The intermediate adit is about 900 feet long and explores the vein through several short crosscuts into the footwall and by a stope 500 feet long. The intermediate adit is connected with the upper adit by inclined raises. The upper adit is about 350 feet long and has a few short appended crosscuts.

Ruppel states further that the Bullion vein is the western extension of the vein explored by the Crystal mine and occupies a fault zone that trends N. 70° W., dips 50° to 70° N., and cuts coarse-grained light-grey quartz monzonite. The vein ranges from a few inches to about 40 feet in thickness; it is thickest in the lower adit and thins to only a few feet at the surface. According to Knopf (1913a, p. 124) the metallic sulfides in the vein, in order of decreasing abundance, are pyrite, tetrahdrite, galena, dark-colored sphalerite, chalcopyrite, and arsenopyrite in a gangue of white

Bullion

quartz and post-sulfide grey flinty quartz. Uranium is associated with late chalcedonic quartz and pyrite. The lower adit is known as the carbonate tunnel because of abundant siderite. The intermediate adit is called the sulfide tunnel because of the abundant pyrite.

Assay and smelter returns on the ore mined from 1935 to 1947 were: gold, .04 to .05 ounce per ton; silver, 3 to 5 ounces per ton; lead, 2 to 5 percent; zinc, 3 to 4 percent; copper, about 0.1 percent; and iron, 6.5 percent. The metal content of the vein decreases appreciably eastward, and near the face of the lower tunnel the vein is essentially barren of metallic sulfide.

Records and maps of the intermediate adit suggest that the typical ore grade at this level was about as follows: gold, 0.2 ounce per ton; silver, 9.0 to 9.5 ounces per ton; copper, 1 to 1.5 percent; and iron, 15 percent. The intermediate adit appears to have been mined for its precious metal and copper content; galena and sphalerite occurred only in small, although commonly high-grade pods.

Butte and Philadelphia

The Butte and Philadelphia prospect is on the flank of the Three Brothers peaks. In 1911 one of 3 parellel veins had been developed by a 250-foot adit. Pyrite, along with minor amounts of galena, sphalerite, and quartz, occurs in a 7- to 10-foot crushed zone in quartz monzonite. No production is recorded. (Pardee & Schrader, 1933, p. 294.)

Comet

The Comet mine is 6 miles northeast of Basin at the head of High Ore Creek. The altitude at the shaft collar is about 6,400 feet. The property is owned by R. H. Mills, Spokane, Wash., successor to the Basin Montana Tunnel Co.

This is one of the oldest mines in Jefferson County. The first attempt at large-scale operation was made by the Alta-Montana Co. about 1880. In 1883 the Comet mine and the Alta mine near Wickes, together with several others in the vicinity, were sold to the Helena Min. and Reduction Co. This company did extensive development work and increased the capacity of the concentrating plant from 35 tons to 120 tons per day. The wears from 1883 to 1893 were the most productive in the mine's history.

Many large mines in the vicinity were permanently closed in 1893 as a result of the silver panic, but the Comet continued to operate. In 1907, the Montana Consolidated Copper Co. (which also owned the Grey Eagle) deepened the Comet shaft to 600 feet. The mine was operated continuously for the next 20 years. In 1929 lessees shipped several cars of crude ore to smelters and 12,000 tons of milling ore to the Timber Butte mill in Butte. Shipments to Timber Butte were discontinued on October 1, 1930, when that mill was closed.

The Basin Montana Tunnel in 1926. This company acquired ty, together with other claims trict, aggregating about 2,000 mine was the principal operati tation mill was constructed at ore from company mines as w from other district mines. Thi ished until 1941, when in April and later dismantled. Since tha have comprised small leasing ac

Knopf (1913a) credits the C production valued at $13,000,0 Since 1902, when the recording ures in greater detail was starte logical Survey, the Comet mine production of 496,086 tons ore y ounces gold, 3,117,779 fine ounce pounds copper, 28,535,228 poun 486,020 pounds zinc.

The mine is opened by a 900-f with 9 levels. Drifts and crosse 7 levels aggregate more than 2 Little development has been don levels. The mine was inaccessibl erty was visited in 1950.

Ore shoots in the Comet mine a zone of mineralized granite or g 150 feet wide striking N. 80° steeply north. The granitic zone sericitized and contains consider The presence of tourmaline class posits as being in the older gr by Knopf (1913a). This assum verified by the fact that the de younger dacite dike 35 feet wide.

Figure 5 shows the plan of th which contains the most develo and a longitudinal section of the showing the general outline of s

Individual ore bodies compri bands of sulfides and quartz sepa granite or altered grano-aplite. S include galena, sphalerite, pyrit and rarely arsenopyrite.

Comstock

The Comstock group, 2½ mile includes 2 patented claims own Johnson of Butte and 6 unpaten by the partners Paul K. Williams Sandquist and George Mayer of

The group has been prospecte of years and has made a small pro silver ore. Interest recently has a small but definite radioactivity production has been made for th tent.

The mine workings comprise a f along the vein outcrop, a few sh

TABLE 35.—Mine production of gold, silver, copper, lead, and zinc, 1902-57, by mines, in terms of recoverable metals, continued.

CATARACT DISTRICT, continued

Year	Ore (tons)	Gold (oz.)	Silver (oz.)	Copper (lb.)	Lead (lb.)	Zinc (lb.)
CRESCENT						
1935	8	9	192	57	705	—
1939	30	12	264	452	3,101	—
1940	32	14	356	159	2,340	—
1941	10	5	63	138	951	—
1942	127	69	995	2,364	18,710	—
1943	10	4	100	151	2,625	—
1947	52	13	286	381	3,243	2,542
1952	39	14	165	264	2,059	3,396
1956	91	50	971	1,500	12,200	9,200
Total	399	190	3,392	5,466	45,934	15,138
CRYSTAL						
1908	605	230	8,247	29,855	—	—
1911, 1912, 1913, and 1914 production included with Comet mine.						
1915	279	132	3,571	12,865	—	—
1916	1,408	290	14,994	81,096	12,338	—
1917	1,620	219	20,058	80,428	69,582	152,784
1918	1,584	195	22,350	51,822	129,993	169,574
1919	1,365	130	32,134	30,538	357,157	—
1920	3,152	343	70,697	62,332	655,728	—
1921	588	110	11,648	9,404	59,426	5,722
1922	549	121	6,720	28,523	—	—
1923	93	15	1,038	2,912	—	—
1925	1,052	95	18,305	8,874	185,397	94,597
1926	768	40	11,882	5,282	145,410	147,297
1927	668	43	10,173	8,859	113,285	154,914
1928	283	9	5,915	3,070	73,602	65,145
1929	214	10	5,916	3,028	61,852	61,240
1930	69	2	1,996	794	28,575	10,269
1932	12	13	88	55	—	—
1935	67	4	616	198	7,614	10,160
1936	134	13	1,490	913	6,756	—
1937	520	113	6,766	18,155	6,736	—
1938	2,031	417	22,218	29,411	20,055	16,277
1939	1,645	394	20,784	2,323	30,098	14,000
1940	1,183	209	21,560	25,390	16,793	—
1941	652	135	8,149	22,210	7,380	—
1942	447	152	4,110	8,093	—	—
1943	119	17	1,201	2,848	4,611	6,242
1944	56	17	759	—	—	—
1945	631	61	7,331	1,979	53,305	7,813
1948 (Dump)	39	8	304	1,470	—	—
1952	230	12	828	1,810	8,740	15,640
1953 (Dump)	523	30	1,743	2,348	6,190	7,516
Total	22,586	3,579	343,591	536,915	2,060,623	939,190
CUSTER						
1903	305	25	5,279	—	—	—
1904	6,560	295	78,720	—	—	—
1905	1,344	67	16,128	—	—	—
1908	202	46	5,486	—	—	—
1910	37	35	132	—	—	—
1912	24	2	320	—	—	—
Total	8,472	470	106,065	—	—	—
DAILY WEST No. 1, 2, 3						
1951	30	—	42	81	1,820	3,115
1953	12	—	18	—	737	1,093
1955	56	—	81	—	8,300	7,800
1957	4	—	7	—	600	600
Total	102	—	148	81	11,457	12,608
DORIS						
1934	55	1	81	368	3,570	4,439
EMMA B.						
1911	17	—	605	—	4,900	—
EVA MAY						
1906	23	2	414	2,070	2,300	—
1908	12	—	341	1,433	—	—
1936	19	1	354	260	731	—
1937	8	1	245	386	1,427	—
1943	102	3	882	1,486	2,648	—
1949 (Dump)	42	1	270	390	—	—
Total	206	8	2,506	6,035	7,106	—
FIRST SHOT						
1909	119	23	3,437	238	—	—
GARFIELD						
1904	26	18	450	—	—	—
1905	40	25	1,039	—	—	—
1920	16	1	292	198	—	—
1921	35	11	413	418	3,573	—
1926	4	2	27	23	500	—
1939	69	5	330	—	—	—
Total	190	62	2,551	639	4,073	—

Year	Ore (tons)	Gold (oz.)
GOLCONDA		
1938	589	57
1939	68	4
Total	657	61
GOLDEN THREAD		
1954*	30	4
1949 (Tings)	345	32
1950	22	3
1951	66	1
1956	20	2
1957	5	2
Total	488	44
GRAY LEAD		
1928 (Dump)	150	11
1929 do.	50	12
1930	150	6
1931	25	5
1932	135	12
1934	170	12
1935	180	5
1934	170	12
1935	180	5
1936	80	13
1938	300	10
1939	150	6
1940	45	5
1941	80	4
1942	150	10
1942	90	4
1944	70	3
1945	70	4
1946	20	2
1947	150	5
1948	70	2
1949	100	4
Total	2,235	135
GREEN MOUNTAIN		
1916	11	—
1920	34	—
Total	45	—

* 1945 production included in

Year	Ore (tons)	Gold (oz.)
GRAY EAGLE		
1902	4,000	400
1903	3,000	150
1904	1,000	120
1905	1,200	120
1906	2,407	209
1907	215	47
1909	43	6
1910	249	19
1911	76	10
1912	24	1
1913 and 1914 production in		
1915	47	4
1916	35	1
1919	124	6
1920	311	11
1921 production included with		
1922	73	7
1929	1,353	131
1939	1,046	55
Production after 1930 includ		
Total	15,203	1,297
GIULIO		
1907	51	28
1910	21	9
Total	72	37
HATTIE FERGUSON		
1904	320	60
1905	12	4
1906	132	28
1907	399	94
1914	19	4
1924	74	16
1925	460	90
1928	16	1
1934	77	15
1941	7	1
Total	1,516	313

TABLE 35.—Mine production of gold, silver, copper, lead, and zinc, 1902-57, by mines, in terms of recoverable metals, continued.

CATARACT DISTRICT, continued

Year	Ore (tons)	Gold (oz.)	Silver (oz.)	Copper (lb.)	Lead (lb.)	Zinc (lb.)
BOULDER, continued						
1939	1,141	525	1,611	—	—	—
1940	506	298	670	—	186	—
1941	186	95	975	—	518	—
1942	79	72	220	120	—	—
1944	58	21	46	—	—	—
1946	49	39	71	—	—	—
1947	9	9	15	—	—	—
1948	5	2	5	—	112	43
1952	127	113	250	88	2,360	720
1956	93	66	131	79	—	1,000
1957	30	20	107	—	—	—
Total	4,425	3,305	8,527	1,173	4,195	1,763
BOULDER VESTEL						
1918	33	18	2,733	—	—	—
1919	13	11	1,261	—	—	—
Total	46	29	3,994	—	—	—
BUCKEYE (BOSTON)						
1902	400	125	1,042	—	—	—
1908	810	104	2,326	1,491	—	—
1921	67	10	2,893	—	14,780	—
1922	111	13	4,641	450	23,912	3,797
1923	62	8	1,727	270	15,319	—
1925 (Tailings)	9	2	104	—	938	—
1926	28	12	474	330	4,190	—
1928	10	1	398	—	1,650	—
1937	37	6	588	166	4,773	—
1938	91	6	1,361	35	1,000	—
1939	149	9	2,534	683	10,028	10,000
1949	39	13	139	—	—	—
Total	1,813	309	18,227	3,425	76,590	13,797
BULLION						
1905	6,539	783	48,272	129,683	—	—
1909	1,064	283	17,707	33,785	—	—
1912	1,325	339	20,841	40,998	103,046	—
1913	1,577	261	30,246	30,043	405,165	—
1914	186	10	4,937	1,032	8,365	—
1915	100	8	2,023	—	21,385	—
1917	72	7	1,118	—	19,454	—
1918	1,069	344	17,403	39,382	60,618	—
1919	1,596	533	18,309	45,928	2,304	—
1920	682	182	9,167	17,820	26,027	—
1921	133	59	1,359	2,809	—	—
1925	68	27	624	1,166	—	—
1927	59	30	1,025	—	—	—
1928	132	56	1,595	—	—	—
1930	600	22	5,769	4,060	72,452	—
1935	500	40	2,265	3,549	6,908	—
1936	6,000	425	25,487	58,956	8,888	—
1937	414	76	3,645	8,276	—	—
1938	14	3	73	—	—	—
1940	136	20	1,280	3,743	—	—
1941	250	43	2,434	4,639	—	—
1943 (Dump)	169	6	550	223	7,195	—
1944	29	2	363	85	5,684	—
1945	39	3	635	20	9,727	1,787
1947	26	2	392	44	5,772	1,060
Total	22,779	3,564	217,519	426,241	762,990	2,847
BURT						
1929	5	2	157	—	2,628	—
1932	5	3	126	7	1,705	—
Total	10	5	283	7	4,333	—
CANADIAN GROUP						
1917	11	—	42	—	—	—
1918	35	18	2,852	43	—	—
Total	46	18	2,894	43	—	—
CAVANAUGH						
1934	23	13	184	272	7,538	—
COLEMAN & JOHNSON						
1952	183	10	345	—	9,011	11,507
COLUMBIA & RUBY						
1906	841	720	23,717	—	—	—
1907	924	4,374	56,569	—	—	—
1908	817	1,363	24,447	—	—	—
1909	1,205	1,751	34,518	—	—	—
1910	1,099	2,420	35,507	345	—	—
COLUMBIA & RUBY, continued						
1911	784	159	325	—	—	
1912	149	128	3,653	14	—	
1913	108	113	7,134	—	—	
1914	17	10	524	—	—	
1915	35	28	865	—	—	
1916	94	261	6,051	165	—	
1917	5	3	279	—	—	
1920	98	46	379	—	—	
1925	1	2	8	—	—	
1926	1	3	6	—	—	
1927	24	6	118	—	—	
Total	6,202	11,387	194,100	524	—	
COMET						
1902	1,366	360	19,216	—	288,320	
1904	348	61	2,746	—	60,880	
1905	1,550	429	27,358	—	232,253	
1906	1,600	709	13,880	—	115,432	
1907	1,398	459	21,881	3,793	209,870	
1908	7,780	698	44,924	37,469	374,458	
1909	204	38	4,535	1,633	38,246	
1910	84	24	1,233	3,094	5,800	
1911	865	213	12,640	3,956	163,325	
1912	892	253	15,054	20,689	151,335	
1913	1,500	386	23,548	73,207	151,515	
1914	272	97	3,923	9,561	7,598	[illegible]
1916	16,546	657	38,214	40,578	327,484	8[illegible]
1917	19,690	2,007	113,847	103,277	892,713	3,356,
1918	8,375 }	2,246	138,420	89,405	1,202,838	2,294,0
(Tailings)	21,522 }					
1919	6,745	913	70,930	75,784	384,578	281,6
1920	3,051	536	38,499	14,924	498,231	40,4
1921	227	40	4,225	896	33,305	
1922	28	—	750	—	—	
1925 (Tlgs)	1,444	100	7,661	—	66,642	212,3
1926 do.	977	58	5,362	—	49,244	140,0
1928	35)	334	28,761	24,286	364,670	667,6
(Tailings)	4,978)					
1929	12,233)	1,290	118,908	110,812	1,559,100	2,403,5
(Tailings)	5,729)					
1930	2,190)	801	73,914	61,595	863,648	840,5
(Tailings)	6,761)					
1932	61	30	881	352	8,579	
1933	431	111	3,680	2,625	51,101	4,8
1934	10,080	755	66,244	32,966	476,931	419,9
1935	58,992	3,288	317,369	200,539	2,393,155	2,018,
(Tailings)	773					
1936	62,323	5,040	424,276	226,188	3,319,667	2,707,
(Tailings)	408					
1937	65,190	4,737	375,212	254,300	3,835,200	2,086,[illegible]
1938	38,188	3,156	249,351	191,071	2,589,152	1,193,
1939	59,420	4,914	372,896	272,740	3,255,425	2,113,[illegible]
1940	57,824	6,354	425,408	328,704	3,777,385	1,546,[illegible]
1941	9,756	1,060	89,924	42,285	679,526	186,[illegible]
1942 (Dump)	793	84	7,382	1,530	38,131	
1943 do.	491	18	3,423	1,029	14,340	
1944 (Clngs)	2	2	30	10	476	
1945 (Dump)	34	20	458	165	2,502	2,[illegible]
1946 do.	28	21	362	275	2,122	2,[illegible]
1947 (Tlgs)	1,527	59	2,273	2,784	8,703	16,[illegible]
1948 do.	232	44	2,016	955	17,860	25,1
1949	112	23	2,178	575	11,390	17,7
(Dump)	280					
1950	676	24	3,375	1,444	9,831	20,7
1951	100	4	535	90	2,038	1,6
1952	5	—	77	—	229	4
Total	496,086	42,443	3,177,779	2,235,676	28,535,228	23,156,0
CONGO						
1939	40	22	839	261	1,829	-
1940	178	85	3,095	1,390	3,112	-
1941	89	35	884	498	—	-
Total	307	142	4,818	2,149	4,941	-
COPPER BELL						
1937	3	—	24	—	108	-
1943 (Tlngs)	425	57	2,181	54	1,213	-
Total	428	57	2,205	54	1,321	-
COPPER BLOCK						
1910	26	24	616	—	8,470	-
1913	7	4	105	—	879	-
1915	28	9	244	—	—	-
Total	61	37	965	—	9,349	-

OFFICIAL
COPY
O. M. E.
RECEIVED
JUN 2 1969

INITIALS	CODE

REPORT ON THE

CRYSTAL MINE

Near

BASIN, JEFFERSON COUNTY, MONTANA

BY

C. H. STEELE

BUTTE, MONTANA

JUNE 27, 1936

REPORT ON THE

CRYSTAL MINE

near

BASIN, JEFFERSON COUNTY, MONTANA

INTRODUCTION:

Mr. J. A. Prohock, of the Crystal Mines Company, requested than an examination and report be made on the Crystal Mine, to determine the advisability of development work beyond the present workings, particularly westward to that part of the vein productive of ore in the St. Lawrence Claim.

The owners' familiarity with the location, ownership, and physical features of their property precludes the necessity of a description of these features. A plentiful supply of timber for mining and sufficient water for all purposes during the greater part of the year are important assets.

GEOLOGY AND MINERALOGY:

On the Crystal Claim the Crystal Vein extends in a general east-west course and dips north 60° roughly paralleling an aplite dike in typical quartz monzonite (granite) of the Boulder Batholith. Extensively mined in the Eva May Mine, 2 miles to the east, and in the Bullion Mine, one and one-half miles to the west, with smaller productive ore shoots between, this vein is known over a length of 3½ miles as a wide, persistent, well mineralized fissure offset by a few widely separated crossfaults.

Within the limits of the Crystal Mine workings the vein averages 30 feet in width, the mineralization being principally quartz and iron pyrite, with lenses of chalcopyrite, sooty chalcocite, tetrahedrite, galena and sphalerite, from 6 inches to 5 feet in width. The copper minerals are confined to the elevations within 200 feet of the surface, while the galena and sphalerite are more plentiful below. These oreshoots overlap in many instances and have been mined separately. No attempt has been made to distinguish between the hangingwall and footwall stopes on the accompanying Longitudinal Section Map 4. While the data for the preparation of this map was meager, it shows the general distribution of stoping along the strike of the vein and clearly illustrates the proportion stoped per foot of development. The shorter lengths of stoping above

the Lower Tunnel, as compared with those over the Upper Tunnel, are due in part to the lower grade ore encountered and in part to the irregular drifting not having thoroughly prospected all ore possibilities. The details of the geology exposed are shown on Maps 2 and 3.

Little is known concerning the St. Lawrence ore shoot, shown on Map 4, because of the inaccessible condition of the workings. According to Mr. A. V. Corry's report, $50,000 worth of ore was shipped from this shaft in 1900. Knowing that at that time only copper, lead, gold and silver ores were purchased by the smelter s and that generally a penalty was charged for the contained zinc, it is reasonable to suppose that only those ores free from zinc were shipped. The mineralization now remaining on the dumps is the only evidence of what might be expected in the workings below, and even this is hardly reliable as evidence of sorting of the dumps is apparent. Three large general samples of the remaining low grade material averaged 0.08 oz. gold, 8.5 oz. silver, 3.2% lead, and 2.1% zinc. While various reports claim greater widths for the ore in the St.Lawrence shoot than those in the Crystal Mine, this is doubtful judging from the limited known workings, unless an excess of water interfered and prevented more extensive work.

DEVELOPMENT:

Development has been accomplished by many shallow shafts and two tunnels, as shown on Maps 1, 2, 3, and 4. The Upper Tunnel is only partially accessible and, although old records supplied much of the information in the inaccessible parts, the absence of a map showing the extreme west work and the caved condition of the workings make it impossible to show this work. Three samples in the open part of the back east of the cave averaged 1.8 feet in width and assayed 0.03 oz. gold, 10.0 oz. silver, 7.3% lead, and 8.8% zinc.

The west 350 feet of this level is unsatisfactorily developed. North and south crosscuts should be driven at 100 foot intervals across a vein of this width and character to avoid missing ore shoots.

The Lower Tunnel, 160 feet vertically below the Upper Tunnel, is shown on Map 3. It has more satisfactorily developed the vein than the west part of the Upper Tunnel, however, several ore possibilities still exist in the undeveloped parts of the vein within the area already partially opened. Near the west end of this tunnel 1.0 foot of silver, lead, zinc ore is developed for 25 feet with waste in the

breast. This streak represents but a small part of the width of mineralization developed farther east. A 25 foot crosscut north from 40 feet east of the west face should cut the hangingwall portion of the vein and then the widest part of the mineralization exposed should be followed westerly.

The James Vein 1900 feet north of and paralled to the Crystal is developed by surface cuts and two tunnels now caved. A sample of the sorted pyritic ore on the Lower Dump assayed 0.23 oz. gold, 8.0 oz. silver, 1.1% lead and 2.2% zinc, and one of the zinc ore assayed 0.08 oz. gold 16.2 oz. silver, 5.7% lead, and 32.0% zinc. This ore shoot is said to be 18 inches wide, but is toofar removed from the Crystal for consideration except as a separate unit. Nothing is known concerning the quantity of this ore to be expected, but it is safe to assume that all profitable direct shipping ore has been mined from above the tunnels. With a mill in operation nearby, this ore occurrence should be investigated.

SHIPMENTS:

Shipments of the high grade ore parts of the vein have been made from this property, principally by lessees at various intervals beginning in 1899, with the latest in June of this year. The aggregate quantity of ore shipped according to available records is 10,440 dry tons, 6,501 tons of which was sent out as copper ore. It averaged 3.0% copper, 0.24 oz. gold, and 13.2 oz. silver per ton, and the remainder 3,939 tons of zinc ore averaged 0.7% copper, 0.08 oz. gold, 18.0 oz. silver, 10.7% lead and 16.7% zinc. (Shipments to the American Smelting and Refining lead smelter at East Helena, between the period 1920-26, afterthe Lower Tunnel reached the ore body, are not included in Mr. Steele's summary, as they were not made available to him at the time his report was written. These shipments consisted of 94 cars containing 3,780 dry tons, the net contents of which averaged 0.098 oz. gold, 23½ oz. silver, 11.46% lead, 5.8% zinc, and 0.066% copper, realizing $105,036.40 after deducting treatment and freight, or $27.79 net per ton. No payment was made for the zinc contents).

Judging from the types of mineralization exposed, the greater part of the copper ore came from above the Upper Tunnel, while the zinc ore came from between the levels. The quantity of ore of both types shipped is small compared with the areas stoped, indicating an average width of 1 ½ feet. Although the high grade ore mineable at a profit is known

to have been narrow, it probably averaged more than this and the narrow width indicated by comparing tons shipped with area stoped is in error due to incomplete shipment records, an inaccurate stope map, and the fact that low grade ore was probably broken and not shipped when preparing to mine the high grade.

ORE RESERVES:

An accurate estimate of ore reserves is impossible. Mr. Bullock, at present operating a stope over the west part of the Lower Tunnel and thoroughly familiar with the old inaccessible workings, believes that some of the stope filling might be used profitable as mill feed, in case a mill was operating on the property. An estimate of quantity or grade of such material is obviously impossible. Mr. Bullock is at present stoping two, and in places three, streaks of ore averaging 1.4 feet in width. He has lately shipped 389 tons of ore, which averaged 16.6 oz. silver, 0.09 oz. gold, 10.2% lead and 11.2% zinc. Locally, in the east face of his stope, 8.8 feet of ore is exposed which assays 11.0 oz. silver, 0.09 oz. gold, 8.7% lead, and 23.0% zinc. If this ore averages 3.0 feet in width east from his present work, and the boundary of the next stope east of his workings shown on Map 4 is approximately correct, 4,000 tons of ore similar to his late shipments may be expected from this portion of the vein.

Silver, lead, zinc ore will be found below the stoped parts of the vein below the Lower Tunnel. Assuming that the boundaries shown on Map 4 are correct and that the ore will average 3.0 feet in width, 8,500 tons of ore may be expected per 100 feet of depth. Charging off all costs against this ore and assuming that it would not average higher in grade than Bullock's shipments, it could be sent to the Basin Montana Tunnel Company Mill and show a profit of at least $2.00 per ton, or a total of $17,000. This, together with a possible profit of $4.00 per ton on the ore east of Bullock's stope, or $16,000, shows a total profit of $33,000.

The above figures should be considered only as rough estimates, since the average 3.0 foot width used may be twice as high as the actual width and this type of ore may not extend downward 100 feet. They serve, however, as an indication of the future possibilities within the present developed area, and in case future developemnt is unsuccessful in developing sufficient ore to justify a mill, a substantial amount, if

not all, of the expenditures necessary for new development may be recovered from the ore already indicated. All assumptions are made on current metal prices.

RECOMMENDATIONS:

To investigate the future ore possibilities of this vein four general recommendations are apparent:

1. Crosscut the hangingwall of the vein on the Lower Tunnel level at the two points shown on Map 4.

2. Continue the Lower Tunnel main west drift for 800 feet crosscutting the full width of the vein at 100 foot intervals. These crosscuts should total 300 feet, which, added to the drifting, total s 1100 feets.

3. Sink a 100 foot winze from the Lower Tunnel at the most favorable location in the widest and highest grade ore shoot and drift east and west at this new level for 300 feet to cover the present known ore shoots.

4. Crosscut the hangingwall of the vein on the Upper Tunnel level at the two points shown on Map 3.

Recommendation No. 1 should be completed first and then No. 2, followed later by Nos. 3 and 4.

COSTS:

While a portion of the present mine equipment may be used, the greater part of it is worn out and unsatisfactory. Electric power may be obtained within 1½ miles, and being entirely reliable in every way is most advisable. A good compressor and motor will be required. Three small buildings are necessary, namely, a compressor house, boarding house and bunk house. New track will be required and 1000 feet of 3 inch air line. At least two new drills with necessary steel and bits will be needed as well as the many miscellaneous tools necessary for mining. Allowing 10% for contingencies onthe above, the total equipment, etc., should not exceed $13,000. Then, to complete Recommendation No. 2 to a total length of 1100 feet, an additional $11,000 will be required, making a total of $24,000, which, in case of abandonment, would be reduced $4,000 by salvaging certain equipment, leaving $20,000 net.

C. H. Steele Report, 1936

Obviously, any ore develped and later mined would reduce this net cost and even if the porject is entirely unsuccessful, ore should exist below the known ore shoots to at least partially offset this expenditure. In case sufficient ore is found, estimates of mill cost may be made and the advisability of such construction decided upon.

CONCLUSIONS:

If full realization of the speculative nautre of the above suggested development work is clearly realized, then such work on this wide vein, known to have been productive of profitable ore at three widely separated points, should be undertaken. While the above estimates of present possible ore reserves tend to show thatpossibilities of breaking even on the work exist, no assurance can be positively given that this will be the case, since accurate records for ore width and grade are not available. However from the facts that are apparent, a substantial portion of the expenditure to equip the property and do the lateral development suggested should be saved in case of failure to find ore.

Respectfully submitted

C. H. Steele

copy
bm

R E P O R T

ON THE

CRYSTAL GROUP OF LODE CLAIMS

JEFFERSON COUNTY, MONTANA

MAY 15, 1915

ARTHUR V. CORRY, E.M.

Butte, Montana, May 15, 1915

Mr. A. C. Ray
Basin, Montana

Dear Sir:

Pursuant to your request of the 2nd inst., we made an examination of the Crystal Group of Lode Claims, and submit herewith our report. The property examined consists of the St. Lawrence, Sur. No. 6035; the Jack Lode, Sur. No. 6036; the Crystal Lode, Sur. No. 6037; and the Commerce Lode, Sur. No. 6038; and the Mammoth Lode, unsurveyed. (Mammoth now patented, Sur. No. 10216. The following additional claims now included in the Crystal Group, viz., Lincoln, 10438; Holland, 10438; Snowbird, 10438; Alpine, 10438 and the James, 10438).

LOCATION.

The Crystal Group is situated in Fractional Township 7 N., Range 5 W., in unorganized Cataract Mining District, Jefferson County, Montana. It is 8 miles north of Basin, a station on the Great Northern Railway, 29.8 miles east of Butte and 43.5 miles west of Helena. The property is situated at an elevation of approximately 7,650 feet above sea level. It traverses at right angles one of the north and south flanking ridges abutting Jack Mountain. It is easily accessible at all times of the year by means of a good wagon road from Basin. Freight haul from the mine to the railroad costs $3.00 per ton; railroad freight to Butte costs $0.65 per ton and cost of treatment on the ore from $4.50 to $6.00 per ton. The accompanying district map shows the position of the property. The area of the individual claims comprising this group is as follows, to-wit:

							Acres
St. Lawrence,	Sur.	No.	6035,	Patent	No.	34456, Area	20.20
Jack	"	"	6036	"	"	" "	2.57
Crystal	"	"	6037	"	"	" "	20.55
Commerce	"	"	6038	"	"	" "	20.61
Mammoth, unsurveyed				.....			20.66
					Total Area		84.59

TITLE.

Mr. A. C. Ray informs us that he has a complete abstract of title on the Crystal Group, togetherwith a written opinion setting forth the status of ownership. Reference to this is advised for details of bond to purchase. Suffice to say that the terms and conditions of all contracts are liberal.

HISTORY

The Crystal Group was worked in a desultory manner since the early eighties, at which time it was known as the Green Lode. Even at that early date, the mineral showing was sufficient to justify the owners in having an official survey made. The frequent stampedes to new camps attracted the owners of the Green claim, resulting in their neglect to represent annually. Accordingly it was relocated as the Crystal on Januarylst, 1885.

It was operated thereafter by tributeers, who, each in their turn gutted the property of its easily developed high grade ore. Until October, 1912, no intelligent, well directed plan of development was applied to this property. On this date Mr. A. C. Ray took a lease upon the group and commenced an active campaign of development. This was incidental to his principal business of extracting the high grade ore streaks for shipping. The attached list of ore shipments made by Mr. Ray during this period shows that 945 tons of ore was shipped. This had a net value of $22.08 in gold, silver and copper, after deducting $5.50 per ton for treatment, $3.00 per ton for wagon haul and $0.65 freight to Butte.

GEOLOGY

These claims lay wholly in an area of sheeted granite technically known as quartz monzonite, this being a part of the Boulder Batholith, the same formation within which Butte is situated. The Crystal vein occupies one of these sheeted zones. This vein is 25 feet wide. Upon either wall there occurs a talc streak from 2 to 6 inches wide. Next follows a more or less banded arrangement of the vein filling and ore. The minerals found in the vein are as follows, to-wit: chalcopyrite, bornite, pyrite, zinc blende, arsenical pyrite, tetrahedrite, and an earthy chalcocite. These occur intimately intermixed, but they are arranged in more or less parallel bands with the quartz. These swell into lenses or ore sheets, often overlapping, and of comparatively great extent. The general filling of the vein between walls is uniformly well mineralized. The zone of oxidation extends from the surface a distance of from 25 to 175 feet, the copper contents of the ore usually being leached. The vein is frequently faulted a few feet by a system of north and south faults. The argument as to encountering higher grade secondary ores beneath these faults is plausible, and justifies additional development in depth.

DEVELOPMENT

The Crystal vein is one of the strongest veins in this area of great veins. Its outcrop may readily be traced a distance of over six thousand feet. At frequent intervals along its strike, shafts have been sunk from 60 to 125 feets deep, and ore shipped therefrom. This is especially noticeable upon the Crystal, St. Lawrence and Commerce Claims.

Upon the Crystal, previousto Ray's advent, leases shipped as follows:

From	December 1899 to	November 1900...	508 tons	averaging	$ 9.33
"	October 1907 to	" 1907...	130 "	"	16.08
"	August 1908 to	December 1908...	378 "	"	15.60

From the above values there has been deducted from $4.00 to $5.50 for treatment, $3.00 wagon haul, and $0.65 freight.

A shipment of 31.5 tons of ore was made from the St. Lawrence dump. This averaged 2.34% copper, 14.1 ozs. silver and 0.11 ozs. gold, a total value of $15.16 per ton, after the customary deductions.

On September 10th, 1913, a shipment of 26.7 tons was made from the old dump at the portals of the Crystal Tunnel. This averaged 1.88% in copper, 7.8 ozs., in silver and 0.18 ozs. in gold, a total of 11.73 dollars per ton.

Upon both the Crystal and St. Lawrence claims a series of cuts and shafts expose the vein at numerous points, from a great many of which samples were taken. These will be discussed at length later on herein. A verified list of all available ore shipment returns is attached herewith as addenda. The accompanying claim maps show the respective position of the several claims: Like wise, there is shown a longitudinal section and a cross section showing vein structure, etc. There is also a general plan map of the underground workings, upon which is shown the location of the several samples hereinafter described.

The group is susceptible of economical exploration through tunnel workings, which is the method that has been adopted. A tunnel 900 feet long has been driven upon the vein westerly from the east end line of the Crystal Claim. This affords a vertical depth of 220 feet, or 270 feet on the dip of the vein. A second adit, Tunnel "A" has been started upon the Mammoth claim to crosscut the Crystal vein. This adit is 165 feet vertically below Tunnel "B", and will give a new stopping back of 200 feet on the vein. This tunnel has been driven

313 feet, and an additional 300 feet will intersect the Crystal vein.

The present working adit, Tunnel "B" develops the Crystal vein for 900 feet. By means of numerous crosscuts, raises, stopes, and winzes, the vein is fairly well developed. Although the lessees' system of stoping only the shipping ore has resulted in an irregular series of stopes jumping from one streak to another, the work is of benefit, inasmuch as it demonstrates the generaus distribution of these ore shoots in a very wide vein of lower-grade material. The relative amount of stoping is shown in Section B-B, accompanying this report. This discloses less than 5% of the vein mined.

The following series of samples were taken from the outcrop and underground workings on this property.

ST. LAWRENCE LODE.

Sample No. 8814.

This was a sample taken from the dump of the west shaft on the St. Lawrence. This shaft was sunk about 15 years ago, and lessees shipped approximately $50,000.00 therefrom. This assayed 20.10 ozs. silver, $2.40 in gold and 3.0% in copper.

Sample No. 8979.

This was from the dump of No. 2 shaft on this claim. This shaft was sunk 30 years ago. The surface workings on this claim show the Crystal vein for a width of 20 feet. There are approximately 20 tons of this ore on the dump. It assayed 17.20 ozs. silver, $1.20 in gold and 8.40% in copper.

CRYSTAL LODE.

Sample No. 8843.

This was of 6 tons of ore in an old bin at the collar of shaft No. 2 on this claim. At this point the croppings of the vein show 20 feet of vein width, with neither wall in sight. This sample assayed 6.90 ozs. in silver, $10.80 in gold, and 1.75% in copper.

Sample No. 8898.

This was a sample of oxidized ore from the vein croppings at Shaft No. 3. There are about 10 tons of this ore on the dump. It assayed 8.50 ozs. in silver, $1.20 in gold, and 0.10% in copper.

Sample No. 8780.

This was of oxidized, honey-vombed quartz croppings from shaft No. 4. It assayed 15.20 ozs. in silver, $5.60 in gold and a trace in copper.

Sample No. 8974.

This was a grab sample taken at avrious points on the dump at the Air Shaft. There are approximately 1,000 tons of this ore. It assayed 20.60 ozs. in silver, $10.40 in gold, and 2.50% in copper.

Sample No. 8855.

This wa a grab sample taken all around the 2nd class dump at portals of Tunnel "B" on the Crystal. It assayed 3.70 ozs. in silver, $2.00 in gold, and 1.35% in copper, and 0.70% zinc. There are approximately 2,500 tons of this material.

Tunnel "B" Main Working Adit.

Sample No. 8504.

This was a sample of 8 feet of oxidized ore in the main working tunnel at Station 8798 plus 50 ft. It assayed trace in silver and gold and 0.18% copper.

Sample No. 8753.

This was of 8 feet of oxidized ore at the intersection of drift with No. 1 Fault, 100 ft. west of Station 8798. This assayed 0.80 ozs. silver, $0.20 in gold and 1.65% in copper.

Sample No. 8889.

This was of 4 feet of harder ore at the same point in drift. It assayed 1.00 ozs. in silver, $0.20 in gold and 0.20% in copper.

Sample No. 8812.

This was of 9 feet of oxidized ore in the crosscut at Station 8492 plus 10 feet. It assayed 0.10 ozs. in silver, $0.20 in gold and 0.95% in copper.

Sample No. 8972.

In the same crosecut. This was of 4 feet of ozidized ore overlying sample No. 8812. It assayed 3.80 ozs. in silver, $1.60 in gold and 3.10% in copper.

Corry Report, 1915,

Sample No. 8775.

This was of 30 inches of the heavy sulphide hanging wall streak in the same crosscut. It assayed 19.00 ozs. in silver, $1.60 in gold and 2.60% in copper.

Sample No. 46.

This was of 4 feet of sulphide ore on the sill at bottom of Raise No. 1. It assayed 3.70 ozs. in silver, $1.60 in gold and 2.90% in copper.

Sample No. 8767.

This was of 5 feet of sulphide ore in top of Raise No. 1. It assayed 11.70 ozs. in silver, $1.60 in gold, 7.70% in copper and 8.70% in zinc.

Sample No. 77.

This was of 7 feet of ore in crosscut at station No. 8860 minus 23 feet. It assayed 4.00 ozs. in silver, $1.20 in gold and 3.50% in copper.

Sample No. 88.

This was of 12 feet of oxidized foot wall streak in the same crosscut. It assayed 00.20 ozs. in silver, trace in gold and 0.35% in copper.

Sample No. 90.

This was a sample of 7 feet of sulphide ore in the back of drift at station 8860 plus 15 feet. It assayed 11.30 ozs. in silver, $1.60 in gold, 0.60% in copper and 15.60% in zinc.

Sample No. 47.

This was of 5 feet of hard sulphide ore in 8455 crosscut. It assayed 6.40 ozs. in silver, $2.80 in gold, 1.95% in copper and 0.25% in zinc.

Sample No. 48.

This was of 5 feet of heavy sulphides in sill at Station 8455. It assayed 11.0 ozs. in silver, $1.60 in gold, 0.35% in copper and 0.35% in zinc.

Corry Report, 1915,

Sample No. 71.

This was of 4 feet of sulphide in east face of 8455 drift. It assayed 5.60 oz.s in silver, $1.20 in gold and 3.55% in copper.

Sample 114.

This was of 7 feet of sulphide ore at Station 8385 plus 10 feet. It assayed 4.70 ozs. in silver, $2.40 in gold and 1.45% in copper.

Sample No. 110.

This was of 10 feet of ore in the stope off Raise No.2, 40 feet above sill of Level. It assayed 5.90 ozs. in silver, $6.00 in gold and 1.90% in copper.

Sample No. 8890

This was of 8 feet of ore in the stope off Raise No. 3, 50 feet above sill of level. It assayed 6.30 ozs. in silver, $4.00 in gold and 5.20% in copper.

Sample No. 15926.

This was of 5 feet of intermixed ore in the top of Raise vertically above Station No. 8455. It assayed 7.00 ozs. in silver. $6.80 in gold and 2.20% in copper.

Sample No. 112.

This was a sample of 10 feet of intermixed ore in top of Raise No. 4. It assayed 6.00 ozs. in silver, $3.20 in gold, and 6.10% in copper.

Sample No. 118.

This was a sample of 5 feet of heavy sulphides in the east face of 8532 Drift. It assayed 3.4 ozs. in silver, $1.20 in gold, 0.55% in copper and 0.10 in zinc.

Sample No. 97.

This was of a 10 foot streak of heavy sulphides at Station 8532. It assayed 12.00 ozs. in silver, $9.60 in gold and 2.00% in copper.

Sample No. 82.

This was of 20 feet of oxidized ore in the main drift

at west end of workings. It assayed 1.10 ozs. in silver, $0.00 in gold and 1.35% in copper.

Sample No. 89.

This was of 2 foot sulphide streak at bottom of Raise No. 5. It assayed 24.40 ozs. in silver, $8.80 in gold and 7.85% in copper.

This completed the sampling.

ORE RESERVES.

It is impossible to even approximate the ore reserves in this property as but little effort has been made to block out ore. A rough idea as to the possibilities of production may be had by a study of the present stopes, and an analysis of numerous vein cross-sections underground.

These observations, in conjunction with the great improvements in metallurgical practice which make it possible to successfully treat complex, low grade ores, justifies the classification of the entire vein filling for a height of 50 feet above the tunnel level as possible ore. Taking into consideration the great strength of the Crystal vein, and its generous mineralization for 2,500 easterly and westerly, it is reasonable to predict a continuation of the ore body for at least 1,000 feet along its strike. This ore in places averages approximately 12 cubic feet to the ton.

What proportion of this block 50 x 20 x 1000 feet will actually prove to be ore can be determined only by blocking out same by crosscuts, drifts and raises.

The showing of shipping ore faces in the old stopes justifies the further extention of Tunnel "B", and the driving of Tunnel "A" to intersect the Crystal vein, and the drifting west there from both faces. From the vein exposures in the two winzes in Tunnel "B", it is safe to anticipate an improvement in the grade of the ore in the vein underlying Tunnel "B".

Upon this development work being completed, a proper method of treatment for the ore can be worked out, and a suitable plant erected on Cataract Creek, to which point it is feasible to transport the ore by Aerial tram.

RESUME

A careful sampling of all the accessible exposed ore faces shows that the entire vein must be treated as a deposit of uniform, low grade ore, necessitating mining large tonnages and local metallurgical treatment.

Note

The Crystal vein is a strong, well mineralized fissure of great continuity affording large ore shoots.

Lessees have shipped a very considerable tonnage of copper-silver-gold ore. Their work has been confined to the high grade streaks, to the neglect of the proper development of the property.

Tunnel "A" will develop an additional 200 feet of ore, and is advisable inasmuch as it will serve to prospect the vein most economically.

CONCLUSIONS

We respectfully submit that the Crystal Group is a meritorious property warranting further development.

Note

We advise that the ore bodies so far disclosed in Tunnel "B" justify the continuation of said tunnel, westerly beneath the Jack and St. Lawrence Claims. Also, that Tunnel "A" should be extended to its intersection with the Crystal vein and drifting thereon.

We recommend that suitable equipment be installed at Tunnel "A" for the purpose of expediting this development work.

And finally, we advise that a development fund of $75,000.00 be provided for the complete development of this property, believing that such is fully warranted by the past performances and present appearances of the property.

Respectfully submitted

Harper, MacDonald & Co.

By Arthur V. Corry

Corry Report 1915

ORE SHIPMENTS FROM CRYSTAL MINE.
BASIN, JEFFERSON COUNTY, MONTANA.

		Water	Dry Wt.	Cu.	Ag.	Au.	Net Value	[illegible]
Dec. '99	57453	3.5%	55452	2.10	18.0	0.31	118.01	10.03
Dec. '99	14200	1.5	13969	6.00	35.00	0.32	146.59	27.03
Jan. '00	23258	4.8	22578	8.00	15.8	0.20	7.79	5.00
Jan. '00	58235	1.2	57392	0.10	10.07	0.22	84.13	6.13
Jan. '00	57105	3.0	57402	1.70	14.00	0.51	245.04	8.70
Feb. '00	77055	2.5	75394	2.50	15.00	0.33	234.72	10.60
Feb. '00	42505	2.0	40054	2.00	16.00	0.27	163.67	10.01
Feb. '00	53474	2.2	55352	1.00	24.00	0.36	129.37	10.03
Feb. '00	19110	1.5	18898	1.00	12.00	0.31	60.41	6.40
Feb. '00	18793	1.5	18512	2.60	16.50	0.29	89.84	9.47
Mar. '00	40210	1.6	39006	1.30	15.00	0.32	111.93	6.70
Mar. '00	17534	1.2	17334	1.97	13.50	0.35	48.02	8.33
Apr. '00	50150	1.5	50400	1.60	16.20	0.29	90.60	10.00
Apr. '00	37514	1.00	37160	1.80	14.20	0.23	80.03	8.53
Jul. '00	12714	1.0	12586	3.50	17.0	0.14	79.25	12.61
Jul. '00	24442	0.5	24322	2.0	11.70	0.34	154.24	5.53
Jul. '00	32154	0.6	31940	1.00	11.60	0.42	189.69	9.02
Jul. '00	24446	0.5	24322	3.00	11.70	0.34	108.00	8.53
Jul. '00	37184	0.5	37020	2.20	14.50	0.33	170.03	10.51
Jul. '00	24254	1.0	24142	1.85	12.00	0.34	103.34	8.02
Aug. '00	20230	1.0	20332	3.70	37.60	0.58	270.57	19.04
Aug. '00	42500	1.0	42052	3.70	20.70	0.20	325.65	16.14
Aug. '00	38130	1.0	37720	3.00	22.50	0.35	346.04	19.53
Aug. '00	33970	1.00	33620	4.10	23.70	0.35	608.76	19.50
Sep. '00	50200	1.1	49608	3.00	24.20	0.31	444.69	18.03
Sep. '00	55360	1.1	54978	1.00	12.70	0.35	178.46	7.43
Oct. '00	52720	1.0	52105	4.40	23.50	0.28	533.33	21.03
Nov. '00	56000	2.5	523.50	3.30	25.00	0.33	370.23	18.16

1017312 = 50 g. t. m

The above ore was shipped to the M.O.P., Colorado and Butte Sampling Works. Payments varied from 90 to 92% Au., 80% Ag. $20.00 per oz. for the gold and 10.5 per lb. for the copper.

Oct. '07	63200	2.2	66700	4.07	17.40	0.23	851.61	16.53
Oct. '07	58040	1.7	58038	4.07	15.20	0.22	414.69	14.37
Oct. '07	47000	1.7	46200	4.50	19.00	0.25	301.75	15.03
Nov. '07	43260	1.3	42638	4.23	12.54	0.24	318.10	14.70
Nov. '07	49054	1.3	48004	4.07	23.50	0.23	445.96	18.00

Shover

The above ore was shipped to the Washoe Smelter (first two) and to the U.S.S. Co. The Washoe Smelter settled on a basis of 90% copper less 3 cts per lb., 90% Au. and 90% Ag. The U.S.S. Co. paid $19 oz. Au.

262638

28
5
33

Rev/page 84

33

		Water	Dry Wt.	Cu.	Ag.	Au.	Net Value	Net per Ton
Aug. '08	57560	1.0	5984	.60	16.00	0.43	471.82	16.56
Sep. '08	57100	1.5	53824	4.10	13.40	0.40	600.00	15.00
Sep. '08	78889	2.2	77153	4.50	17.00	0.40	595.28	15.43
Sep. '08	65790	3.3	63619	3.60	15.60	0.59	528.90	16.65
Oct. '08	66860	3.0	64889	3.50	14.70	0.62	598.30	16.91
Oct. '08	44350	5.1	42088	6.00	19.90	0.40	416.46	19.79
Nov. '08	80500	2.3	78647	3.60	16.90	0.46	593.38	15.09
Nov. '08	67800	2.1	66386	2.40	14.30	0.50	408.93	12.23
Nov. '08	76450	2.4	75639	3.50	18.00	0.54	615.61	16.72
Dec. '08	70430	2.4	68740	4.00	18.90	0.53	612.12	17.81
Dec. '08	84670	5.0	80437	3.20	11.60	0.44	456.47	11.35

10,226.44 = 511 tons

Ores shipped prior to A. C. Ray management.

			Cu.	Ag.	Au.	Net Value
Oct. '12	58.7 Tons	2.7 Water	2.04	15.80	0.33	382.42
Nov. '12	41.1	4.7	5.63	17.90	0.26	615.60
Dec. '12	56.4	3.5	6.04	16.40	0.21	1235.97
Jan. '13	48.5	1.6	6.33	17.80	0.22	1157.44
Jan. '13	49.75	3.3	5.95	19.40	0.20	$1157.99
Jan. '13	84.5	4.5	5.05	16.60	0.18	954.29
Feb. '13	54.1	4.4	5.46	15.10	0.19	925.26
Feb. '13	42.86	4.1	3.29	14.20	0.205	498.59
Mar. '13	56.26	2.2	4.53	13.20	0.26	627.72
Apr. '13	54.62	3.0	4.57	16.30	0.32	945.49
Apr. '13	39.25	1.6	3.53	13.10	0.425	634.69
Aug. '13	65.59	2.2	4.02	12.30	0.34	809.18
Aug. '13	52.42	1.5	4.24	12.30	0.32	792.19
Sep. '13	52.42	1.5	4.14	12.30	0.34	811.77
Sep. '13	44.84	1.5	5.2	15.60	0.40	939.08
Sep. '13	27.15	1.5	1.28	7.8	0.18	140.76
Sep. '13	31.50	1.2	2.34	14.10	0.11	260.09
Sep. '13	44.0	1.2	5.40	14.50	0.24	826.93
Nov. '13	40.0	2.5	3.94	11.70	0.40	661.52
Dec. '13	37.1	2.5	4.72	15.70	0.30	623.36
Dec. '13	42.1	2.5	3.12	17.0	0.27	556.83
Jul. '14	53.3	2.0	3.78	13.4	0.53	597.51
Oct. '13	44.8	2.5	5.62	16.80	0.39	1025.32

1061.36

The first two shipments above were shipped to the Washoe. The remaining shipments were shipped to the Pittsment Smelter, Butte, and payment was made for 90% of the copper at 8 cts. less than market, 90% paid for both gold and silver, with a treatment charge of $5.80 per ton. The net values above are arrived at by deducting $3.00 wagon haul to the railroad, $0.65 freight and treatment $5.80.

11 Shipments

23

34

Previously 28 + 5

23
11
34
33
57

Butte, Montana
26th October, 1942

Report of Flotation Tests of Complex Sulphide Ores.

The following is a report of certain flotation tests made on three ores supplied by Mr. W. L. Bell. All three ores were received as coarse samples which were crushed to half-inch size in a gyratory crusher and further reduced to minus 10 mesh by stage crushing, using a coffee-mill. The crushed samples were each thoroughly mixed and sampled for assay.

The ores were stage-ground in either steel ball-mills with cast-iron balls or in porcelain Abbe mills with flint pebbles prior to flotation. The particular mode of grinding seems to have had no significance as far as flotation was concerned.

Ore No. 1.

This ore (labeled as W L B) was a complex lead-zinc-copper ore carrying the following minerals in approximate order of abundance:

Quartz	Galena
Pyrite	Chalcopyrite
Sphalerite	Tetrahedrite
Arsenopyrite	Covellite

A microscopic examination of several samples of the ore showed that the pyrite and arsenopyrite are liberated from the quartz at sizes coarser than 48-mesh. The Spahlerite is coarse and seems to be essentially free from interlocked minerals at 48-mesh. The galena and copper minerals are free at 65-mesh, but the chalcopyrite and covellite are associated at much finer sizes.

The head analyds of this ore is as follows:

Gold	0.10 oz.
Silver	8.1 oz.
Copper	2.3 %
Lead	3.4 %
Zinc	6.8 %

A spectrographic analysis of certain products from the ore shows that antimony and bismuth are associated with the galena and chalcopyrite.

Testof S.R.B. Cooke

Flotation tests were made with the purpose of preparing lead, copper and zinc concentrates, and a gold enriched pyrite concentrate.

The complexity of the ore rendered it difficult to judge by eye the quality of the separations effected by flotation. A complete study of the efficacy of various flotation reagents would require a considerable outlay for assay of products, and the results presented must of necessity be regarded as preliminary only, and subject to modification and probable improvement.

The products from what was apparently the best test were assayed, and the data are presented in Table 1.

With an ore of this tye the general scheme of concentration should be to float the galena and the copper minerals together as a bulk concentrate, using cyanide as a sphalerite and pyrite depressant, and lime as a pH regulator. Unfortunately some compromise is necessary, for with a high pH (high lime) galena tends to be depressed although the flotation of copper minerals is enhanced. Control of the cyanide is somewhat critical also, for with too little, sphalerite and pyrite will float; with too much, chalcopyrite will be depressed. With the ore under examination the cyanide should not exceed 1.0 lb. per ton of ore, and the lead-copper flotation should be effected at a pH close to 8.0.

Separation of the copper minerals from the galena in this bulk concentrate is obtained by refloating in the presence of potassium dichromate. Normally the copper will then float and the galena will be depressed.

Next in order is sphalerite, which is floated after conditioning with copper sulphate and after raising the pH to approximately 10.0 with lime. Flotation of iron sulphides and arsenopyrite is effected by lowering the pH to below 7.0.

This scheme of concentration, one of considerable complexity when all cleaning steps are included, is outlined on Page 3 of this report.

The results of a laboratory flotation test conducted along the lines given above are summarized in Table I. They are not good. The lead concentrates are low in grade. The copper concentrates contain too much zinc and lead. The zinc concentrates are low in grade and contain too much pyrite. The iron concentrates contain insufficient gold to warrant shipment.

The difficulty seems to be primarily one of separation, due not to interlocking of the various minerals, but to poor

selectivity of the reagents. The separation is complicated by the presence of tetrahedrite, the response to flotation of which has never been satisfactorily elucidated. A very considerable amount of work and research will have to be done on this ore before effective separation with adequate recoveries may be obtained.

The assays given in Table I furnish two useful conclusions:

(1) The gold occurs exclusively with the iron minerals (pyrite or arsenopyrite or both)

(2) The silver occurs with the lead and copper minerals, particularly with the galena and tetrahedrite. The spectograph confirms this.

Test of S.R.D.Cooke

MONTANA SCHOOL OF MINES

Butte, Montana

FLOTATION MEMORANDUM

TABLE I

Date 6th Oct., 1[illegible]

Ore No. WLB Test No. 5 Ore Complex Zn. pb. - Cu

Grind:
Primary -10 Mesh Final: Mill Steel Mesh -65 Mesh Time [illegible]

Water: Grind Tap & Reagents Flotation Tap and Grind Water

Percent Solids 23% Flotation machine used Fagergren

Product	Weight grams	Weight percent	Assay, percent Au	Ag	Cu	Pb	Zn
Lead Cons	64.4	5.32	0.08	27.4	4.1	35.5	[illegible]
Copper Cons	145.2	11.99	0.05	47.0	13.6	14.4	18.[illegible]
Zinc C.L Cons	138.1	11.40	0.19	6.2	1.6	1.2	54.[illegible]
Zinc Mids	34.5	2.85	0.14	4.3	1.9	1.5	0.[illegible]
Iron Cons	331.0	27.33	0.22	3.2	0.8	0.7	0.[illegible]
Tails	498.0	41.11	0.005	0.3	0.05	0.3	0.0[illegible]
Composite	1211.2	100.00	0.10	8.9	2.3	3.6	6.[illegible]
Heads			0.10	8.1	2.3	3.4	6.[illegible]

Reagents	Grind	Pb - Cu *	Zn. Cond	Zn R
	Pounds per ton of crude [illegible]			
KCN	1.0			
Zn SO4 7 H2O	2.0			
Lime	1.0	0.50	2.0	
Aerofloat 31		0.05		
Cresylic Acid		0.05		
Cu SO4 5 H2O			1.5	
NA Aerofloat				0.[illegible]
NA Aerofloat "B"				0.[illegible]
Sulphuric Acid				
Potassium Dichromate				
Barrett No. 4				
Amyl Xanthrate				
ph	6.9	7.9	10.5	
Time, minutes			10.	

Remarks: * Pb -Cu as a bulk concentrate R - rougher concentrate

Cond - Conditioner Cl - Cleaner

Percent of the Total					
u	Ag	Cu	Pb	Zn	
.4	16.3	8.4	38.0	2.0	
.1	63.1	70.2	48.3	34.4	
.1	7.9	7.9	3.8	62.5	
.1	1.5	2.3	1.2	0.3	
.2	9.8	9.4	5.3	0.8	
.1	1.4	0.9	3.4	0.0	
.	100.	100.	100.	100.	

Pounds per ton of crude ore			
ron K.	Zn.Cl.	Pb-Cu	(Separation)
	No		
	Regent	0.15 0.10	
2.0			
		1.5 0.08	
0.10			

Ore No. 2.

With the failure to make satisfactory separations and grades from the first ore, two other samples were submitted for testing. These samples, Nos. 2and 3 (labeled W L B A and W L B B respectively) represented the result of selectively sampling the vein from which ore No. 1 came.

Ore No. 2 contained essentially pyrite, arsenophrite, chalcopyrite and tetrahedrite, with little zinc and lead.

A head assay gave the following results:

Gold	0.14 oz.
Silver	11.7 oz.
Copper	2.95 %

It was desired to ascertain whether a bulk iron concentrate could be prepared carrying sufficient silver and copper to warrant shipment. Test W L B A-1 (Table II) shows that this is quite feasible.

Beyond mentioning that the reagent consumption is low, no further discussion of this ore is necessary.

Testof S.R.B.Cooke

MONTANA SCHOOL OF MINES

Butte, Montana

FLOTATION MEMORANDUM

TABLE II Date 8th Oct. 1942

Ore No. WLBA Test No. 1 Ore Pyrite-Arsenopyrite-Copper-Gold Complex

Grind:
Primary -10 Final: Mill Steel Mesh -65 Time

Water: Grind Tap Flotation Tap and Grind Water

Percent Solids 33% Flotation machine used Hofergren

Product	Weight, grams	Weight Percent	Assay, percent Au	Fe.	Cu.	Percent of the Total Au.	Ag.	Cu.	
Bulk Cons	285.0	49.0	0.20	22.60	5.60	85.0	95.5	97.2	
Mids	32.9	5.5	0.03	4.00	0.60	2.5	2.0	1.6	
Tails	265.0	44.7	0.035	0.70	0.10	1.5	2.7	1.2	
Composite	592.9	100.0	0.14	11.3	2.86	100	100	100	
Heads			0.14	11.7	2.95				

Reagents	Rougher circuit	Cleaner	Pounds per ton of crude ore					
Aerofloat 31	0.05	No						
Pentasol Xanthate	0.10	Reagent						
Cresylic Acid	0.05							
Barrett No. 4	0.05							
SULPHURIC Acid	0.10							
pH	8.6							
Time, minutes								

Remarks: This questionable whether the Barrett No. 4 serves any useful purpose. The pH of the grind water was 7.0.

MONTANA SCHOOL OF MINES

Butte, Montana

FLOTATION MEMORANDUM

TABLE III

Date 14 Oct., 19[illegible]

Ore No. WLBB Test No. 4 Ore Zinc - Lead - Copper

Grind:
Primary -10 Mesh Final: Mill ASBR Mesh -100 Time

Water: Grind Tap Flotation Tap and Grind Water

Percent Solids 33% Flotation Machine used Fagergren

Product	Weight, Grams	Weight Percent	Assay, Percent Au	Ag	Cu	Pb	Zn
Lead Cleaner Cons	128.5	21.95	0.05	65.4	1.85	58.5	5.[illegible]
Head Mids	109.8	18.76	0.11	24.4	0.80	11.7	17.[illegible]
Zinc Cleaner Cons	82.1	14.03	0.07	10.2	0.42	1.7	46.[illegible]
Zinc Mids	70.0	11.96	0.14	10.5	0.45	4.8	3.[illegible]
Cu - Fe Sec. Cons	37.0	6.32	0.10	9.0	0.45	9.0	0.[illegible]
Tails	158.0	26.99	0.005	0.6	0.00	1.5	0.0
Composite	585.4	100.00	0.07	22.3	0.70	16.9	12.1
Heads			1.06	21.6	0.60	16.4	13.[illegible]

Reagents	Pounds per ton of Crude Ore: Con-ditioner	Lead R	Zinc Conditioner	Zinc Rougher
Lime	2.0	1.0	2.0	
KCN	0.5			
ZnSo4 7H2O	1.5			
Aerofloat 31		0.03		
Cresylic Acid		0.05		0.0[illegible]
Na Aerofloat				(0.[illegible]
Na Aerofloat "B"				(0.[illegible]
Amyl Xanthate				
Sulphuric Acid				
CuSo4 5H2O			5.0	
ph	8.5	9.0	10.2	
Time, minutes			15	

Remarks: Scavenger cons ph of grind water - 6.25 ph at end of lead roughing - 7.7 % acid aerofloat and aerofloat "B" added during LAST 5 mins. of conditioning.

	Percent of the Total				
	Ag	Cu	Pb	Zn	
24.7	64.2	59.8	76.4	10.4	
7.4	20.6	21.6	13.1	23.8	
1.9	6.4	8.5	1.4	54.1	
.4	5.6	7.7	3.3	8.3	
9.6	2.6	4.1	3.4	0.1	
.0	0.7	0.0	2.4	0.0	
00	100	100	100	100	

Pounds per ton of crude ore			
Lead Cleaner	1st Zinc Cleaner	2nd Zinc Cleaner	Fe - Cu Scavenger
		0.5	
0.2			
			0.05
		0.05	
			0.10
			1.0

Ore No. 3.

A head assay of this ore (labeled W L B B),, essentially a lead-zinc ore with minor quantities of copper, follows:

Gold	0.06 oz.
Silver	21.6 oz.
Copper	0.60 %
Lead	15.4 %
Zinc	13.2 %

The scheme of concentration adopted was to prepare lead and zinc concentrates, passing as much of the copper as possible into lead concentrates. A large number of tests was made, and one test which appeared satisfactory was selected for assay. The summarized results are presented in Table III.

The ore seems to present no difficult problems, and selectivity and grade of concentrates are satisfactory. Thorough cleaning of rougher concentrates is essential to preserve grade. Two lead cleanings and two or three zinc cleanings may be necessary in practice.

The lead concentrate contains 5.8% zinc, representing 10.6% of the total zinc content of the ore. This is fine zinc which floats rather too readily. Adequate cleaning and the use of cyanide in the lead cleaning circuit should materially reduce the quantity of zinc carried by the lead concentrate.

Cleaning of the zinc concentrates should give a higher grade concentrate by rejection of more iron. Further tests are necessary to ascertain whether more copper and silver can be collected with the lead concentrate rather than passing into the zinc circuit.

It may or may not be desirable to collect a scavenger concentrate to combine with the bulk concentrate prepared from Ore No. 2.

On the basis of this test it may be stated that overall lead recovery should be between 85 and 90%, in a concentrate containing at least 60% lead. One test gave a lead concentrate containing 63.8% lead.

The zinc recovery should be between 80 and 90% and with sufficient cleaning the concentrates should contain 50 to 55% zinc. At least 70% of the copper and 80% of the silver will go with the lead.

Further tests should show an upward trend in these figures.

Test of S.R.B. Cooke

Comments.

(1) All flotation tests were made on ore stage ground in closed circuit with screens. Because of the resistance of the quartz to grinding and of the relative softness of the sulphides, corresponding grinds in practice where mechanical classifiers will be used in closed circuit with ball mills could be at least one screen size coarser than those used in the tests.

(2) The reagents adopted are standard reagents.

(3) Higher pulp dilutions than that used in test W L B B-4 (23%) were used in several tests on Ore No. 3. The results were not as satisfactory as those given in Table III.

(4) Rather close pH control will be necessary with ores similar to No. 3.

(5) It has repeatedly been noticed that the zinc collectors (sodium aerofloat and sodium areofloat "B") are most effective when conditioned for at least 5 minutes with the pulp following the usual 10 minute conditioning with copper sulphate and lime.

S.R.B. COOKE
Research Metallurgist

UTICA MINES LTD. (N.P.L.)
SUITE 2002 · 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

3. PHYSICAL DESCRIPTION

A. Since 1905 mining from the Crystal and Bullion claims has occurred from underground and surface. Maps of the Bullion workings are unavailable but the Crystal plans are enclosed. The Bullick brothers of Basin have shipped fluxing material for the past few years. An underground rehabilitation and crosscutting was begun on the Crystal Lower Adit in February 1969 and is in progress. A surface trenching and sampling program will begin approximately June 1, 1969.

B. UTICA MINES LTD. has financed all exploration work since January 1969 with a total cost of $24,500.00 to April 31, 1969.

C. Production Statistics:

Crystal Mine: 1908 - 1953 - 22,586 produced yielding 3,579 oz. gold, 343,591 oz. silver, 536,915 lb. copper, 2,060,623 pounds lead and 939,190 lbs. zinc. (Ref: Mines and Mineral Deposits, Jefferson County, Montana, Bulletin 16)

Bullion Mine: 1905 - 1947 - 22,779 tons produced yielding 3,564 oz. gold, 217,519 oz. silver, 426,241 lbs.copper, 762,990 lbs. lead and 2,847 lbs. zinc. (Ref: Bulletin 16)

In later years fluxing material has been shipped from surface to the smelters at Anaconda and Helena.

D. Proven ore reserves cannot be calculated from the information available at this time.

E. Geology

The Crystal claim and surrounding properties are located on a vein system, known as the Eva May,

3. PHYSICAL DESCRIPTION (continued....)

E. Geology (continued....)

which has been traced for approximately 14 miles. It consists mainly of aplite with massive quartz and sulphides and occurs within the Boulder Batholith, a large granitic mass in which the Butte deposits are found, and which is similar to those with which other mineral deposits in Montana are associated. The batholith is Lower Cretaceous in age and consists primarily of quartz monzonite.

F. Sampling has been by smelter returns on fluxing material shipments made to the Anaconda smelter at Anaconda, Montana, and the American Smelting and Refining Co. smelter at Helena. The average return from 1966 - 1968 was 0.089 oz. Au/ton and 6.56 oz/Ag/ton. In 1969 the average return from the Anaconda smelter has been 0.035 oz./ton gold and 3.93 oz./ton silver.

1969 shipments to the Helena smelter have not been run and no returns are available.

G. Enclosed you will find two (2) copies of Crystal Mine Report by C. H. Steele, two (2) copies of the Crystal-Bullion Mines Reports by Alrae Engineering Ltd. and two (2) copies of reports on the Mines and Mineral Deposits, Jefferson County from the Government Report.

UTICA MINES LTD. (N.P.L.)
SUITE 2002 · 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

4. ACCESSIBILITY OF PROPERTY

A. Mr. D. R. Shoemaker, Box 1954, Butte, Montana 59701
Telephone - A.C. 406 - 723-4789.

B. Highway and rail at Basin, Montana, supplies at Butte, Helena.

UTICA MINES LTD. (N.P.L.)
SUITE 2002 · 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

5. EXPLORATION WORK

A. Lower Adit Extension - Lengthening of existing lower adit on Crystal vein by 400 feet to test the downward extent of the rich material exposed on the St. Lawrence claim. From this extension raises would be driven to connect the lower adit with surface and crosscuts driven at intermediate points to test the width and grade of the vein system.

Drifts	6' x 9'	5' x 7
Raises	5' x 5'	
Crosscuts	6' x 7'	

Rotary-percussion Drilling - 7,500 feet of drilling in 50 holes from 12 stations will test the grade of the vein system to the 150 foot level. The holes will be drilled from the hanging wall of the vein at various azimuths and dips to completely sample the vein.

Diamond drilling - Contingent upon the results of the percussion drilling and trenching a series of four 1,000 foot diamond drill holes will be put down to probe the vein at deeper elevation.

B. No access road is required to property but a toteroad passable to the drilling rigs will be required for approximately 6,000 feet between the Crystal and Bullion claims.

C. It is hoped that the drilling and lower adit extension can begin immediately upon notification that the contract is executed. It is expected that four months will be required for completion of the 400 feet of drifting, 450 feet of raising and 700 feet of crosscutting from the lower adit. The Rotary-percussion drilling will require two months for the 7,500 feet and the diamond drilling will require three months from its starting date.

UTICA MINES LTD. (N.P.L.)
SUITE 2002 - 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

6. EXPERIENCE

Crystal Mines Inc. being a wholly owned subsidiary of Utica Mines Ltd.(N.P.L.) of Vancouver, Canada has the guidance of competent management as well as competent knowledge and advice in the mining industry.

On the Board of Utica Mines it has two of the country's leading mining and geological engineers with a broad experience in operations both in U.S.A. and other parts of the world. Namely: Mr. Albert Koffman, Noranda Mines Ltd., Central Canada Division and Mr. E. A. Scholz, Executive Vice President and Manager of World Wide Exploration of the Placer Development Co. Ltd., Vancouver, Canada.

The people here and before mentioned as well as our Mine Manager, Mr. D. R. Shoemaker (Qualifications separately submitted) will proceed with the guidance of senior consultants on the development envisaged on these properties.

D. R. SHOEMAKER

EXPERIENCE:

Graduated from the University of Arizona in Tucson, Arizona, February 1965 with a Bachelor of Science in Mining Engineering. First entered the University in the fall of 1956 and majored in geological engineering. Left school in 1961 and entered the army. In February 1964 returned to school and changed his major to mining engineering.

The record of his employment is as follows:

Summer employment during college:

1957 - Homestake Mining Co. Lead, South Dakota - underground laborer.

1958, 1960 - Homestake Sapin Partners Grants, New Mexico - underground surveyor's helper.

1964 - Homestake Mining Co. - geologist helper in general geological exploration work in Nevada and Colorado.

In February 1965 went to work for Inspiration Con. Copper Co. at their Christmas Mine. While at Christmas worked as an underground surveyor and contract engineer. Was responsible for the surveying and the measurement and calculation of the weekly bonus, for approximately 1/3 of the mine. In January 1966, decided that the property had a bleak future and sought employment elsewhere.

In January 1966 was employed by Phelps Dodge in Bisbee. From January 1966 to July 1966, worked in the pit, doing mostly surveying. In July 1966 was transferred to the underground as a mine engineer or stope engineer.

As a mine engineer was responsible for the engineering work on four levels of the mine. Duties included the engineering control and mapping of approximately twenty stopes. In addition he was doing the geology in the stopes and sub level development. Either he or the geologist drew up the development proposals, raises or crosscuts, and submited them to the mine Superintendent for his approval. Because of the nature of the ore an extensive sampling program was carried on. In connection with this sampling program it was his responsibility to make sure ore was not left unprotected. Another duty, working in conjunction with the geology dept., was the annual estimate of the underground ore reserves. His last and main duty was to assist the production dept. in any way he could. 90% of stopes were square-set and the other 10% being cut and fill.

UTICA MINES LTD. (N.P.L.)
SUITE 2002 - 1177 WEST HASTINGS ST., VANCOUVER 1, B.C., CANADA
TELEPHONE: 683-3326

7. ESTIMATE OF COSTS

A.	Lower Adit Extension:	
	400 feet @ $68.50/ft. (untimbered) (areas requiring timbering additional $21.00/ft)	$27,400.00
	Raises: 450 feet @ $100.00/ft.	45,000.00
	Crosscuts: 400 feet @ $60.00/ft.	24,000.00
	Drilling:	
	Rotary-percussion - 7,500 ft. @ $6.00/ft.	45,000.00
	Diamond drilling - 4,000 ft. @ 18.50/ft.	74,000.00

(Note: Bids have been requested but not all have been received.)

B.	Mine manager - 4 months @ $1,200/month	4,800.00
	Foreman - 4 months @ $1,000/month	4,000.00
	Outside Consultants - 30 days @ $150.00/day	4,500.00
C.	Fuel & Lubricants for Tractor 6000 gals. @ $0.25	1,500.00
D.	D-8 Tractor with ripper @ $3,500/month (rental-purchase)	7,000.00
E.	None	
F.	None	
G.	Sample analysis: 1600 samples @ $5.00	8,000.00
	Accounting - 4 months @ $1,000/month	4,000.00
		$ 249,200.00

MME Form 52
Jan. 1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

FOR GOVERNMENT USE ONLY
Operator
Docket No. OME –
Contract No. 14-23-090–
Contract Date

LIEN AND SUBORDINATION AGREEMENTS 1/

To the United States of America:

That certain land in the County of Jefferson, State of Montana, described ~~as follows~~: 2/ in a certain "Memorandum of Mining Lease, Sublease and Option", dated November 22, 1968, and recorded in Book ____, Page ____, of the records of the County Clerk and Recorder of said County.

hereinafter called the "land", is the subject of a proposed exploration contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government" and

Crystal Mines, Inc., a Montana corporation 3/

hereinafter called the "Operator". In consideration for and as an inducement to the Government executing the Contract, the undersigned:

1. (a) Being the owner of an interest in the land, hereby grants to the Government a lien upon all of his right, title, and interest in the land and upon any production of minerals therefrom to secure the payment to the Government of the royalty on production provided for by the Contract, and agrees if the Operator's interest should be surrendered or terminated at any time prior to the expiration of the rights of the United States under said Contract to pay royalty to the Government according to the terms of said Contract; or

(b) Being the holder of a claim, lien, or encumbrance against the land, hereby subordinates his claim, lien, or encumbrance in or against the land and in any production therefrom to the rights of the Government under the Contract with respect to royalty on production and liens to secure same. 4/

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

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

Encumbrances upon the St. Lawrence, Jack and Crystal lode mining claims, Survey Nos. 6035, 6036 and 6037, in favor of Small Business Administration, an agency of the United States, to secure an indebtedness of Delbert M. Bullock, R. Sharon Bullock, Allan J. Bullock and Arla M. Bullock, per promissory note dated January 31, 1968, in original amount of $27,500.00.

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

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease /or contract, deed, or other document/ dated _____, and recorded in Book ____, Page ____, official records of said county". If (b) is used, the book and page of recordation must be inserted above. If the space provided is insufficient, use an Annex and refer to the Annex in the space.

3/ Insert name exactly as it appears in the Application MME Form 40.

4/ Subparagraph 1(a) does not apply to the holder of a claim, lien, or encumbrance.

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

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

6. Added provisions None (State "None" or "See Annex No. ____".)

Dated this 8th day of May, 1969.

R. Lorraine Bullock		(Street)
Delbert M. Bullock (Seal)	Basin, Montana 59631	(City & State)
Ada Bullock		(Street)
Allan J. Bullock (Seal)	Basin, Montana 59631	(City & State)
Donald W. Johnson	22335 19th Ave. South	(Street)
Marian M. Johnson (Seal)	Des Moines, Washington 98106	(City & State)
Laurel P. Johnson	3001 Ottawa Street	(Street)
Laurel P. Johnson (Seal)	Butte, Montana 59701	(City & State)
		(Street)
(Seal)		(City & State)
		(Street)
(Seal)		(City & State)

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

_____ (Corporate Seal)

MME Form 52
Jan. 1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

FOR GOVERNMENT USE ONLY
Operator
Docket No. OME –
Contract No. 14-23-090–
Contract Date

LIEN AND SUBORDINATION AGREEMENTS 1/

To the United States of America:

That certain land in the County of Jefferson, State of Montana, described ~~as follows:~~ 2/ in a certain "Memorandum of Mining Lease, Sublease and Option", dated November 22, 1968, and recorded in Book _____, Page _____, of the records of the County Clerk and Recorder of said County.

hereinafter called the "land", is the subject of a proposed exploration contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government" and

Crystal Mines, Inc., a Montana corporation 3/

hereinafter called the "Operator". In consideration for and as an inducement to the Government executing the Contract, the undersigned:

1. (a) Being the owner of an interest in the land, hereby grants to the Government a lien upon all of his right, title, and interest in the land and upon any production of minerals therefrom to secure the payment to the Government of the royalty on production provided for by the Contract, and agrees if the Operator's interest should be surrendered or terminated at any time prior to the expiration of the rights of the United States under said Contract to pay royalty to the Government according to the terms of said Contract; or

(b) Being the holder of a claim, lien, or encumbrance against the land, hereby subordinates his claim, lien, or encumbrance in or against the land and in any production therefrom to the rights of the Government under the Contract with respect to royalty on production and liens to secure same. 4/

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

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

Encumbrances upon the St. Lawrence, Jack and Crystal lode mining claims, Survey Nos. 6035, 6036 and 6037, in favor of Small Business Administration, an agency of the United States, to secure an indebtedness of Delbert M. Bullock, R. Sharon Bullock, Allan J. Bullock and Arla M. Bullock, per promissory note dated January 31, 1968, in original amount of $27,500.00.

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

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in Book _____, Page ____, official records of said county". If (b) is used, the book and page of recordation must be inserted above. If the space provided is insufficient, use an Annex and refer to the Annex in the space.

3/ Insert name exactly as it appears in the Application MME Form 40.

4/ Subparagraph 1(a) does not apply to the holder of a claim, lien, or encumbrance.

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

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

6. Added provisions None (State "None" or "See Annex No. ____".)

Dated this 8th day of May, 1969.

R. Sharon Bullock		(Street)
Delk M. Bullock (Seal)	Basin, Montana 59631	(City & State)
Arla Bullock		(Street)
Allan J. Bullock (Seal)	Basin, Montana 59631	(City & State)
Donald M. Johnson	22335 19th Ave. South	(Street)
Miriam M. Johnson (Seal)	Des Moines, Washington 98106	(City & State)
Keith P. Johnson	3001 Ottawa Street	(Street)
Laurel P. Johnson (Seal)	Butte, Montana 59701	(City & State)
		(Street)
(Seal)		(City & State)
		(Street)
(Seal)		(City & State)

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

_____ (Corporate Seal)

MME Form 52
Jan. 1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

FOR GOVERNMENT USE ONLY
Operator
Docket No. OME –
Contract No. 14-23-090–
Contract Date

LIEN AND SUBORDINATION AGREEMENTS[1]

To the United States of America:

That certain land in the County of Jefferson, State of Montana, described ~~as follows~~:[2] in a certain "Memorandum of Mining Lease, Sublease and Option", dated November 22, 1968, and recorded in Book _____, Page _____, of the records of the County Clerk and Recorder of said County.

hereinafter called the "land", is the subject of a proposed exploration contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government" and

Crystal Mines, Inc., a Montana corporation [3]

hereinafter called the "Operator". In consideration for and as an inducement to the Government executing the Contract, the undersigned:

1. (a) Being the owner of an interest in the land, hereby grants to the Government a lien upon all of his right, title, and interest in the land and upon any production of minerals therefrom to secure the payment to the Government of the royalty on production provided for by the Contract, and agrees if the Operator's interest should be surrendered or terminated at any time prior to the expiration of the rights of the United States under said Contract to pay royalty to the Government according to the terms of said Contract; or

(b) Being the holder of a claim, lien, or encumbrance against the land, hereby subordinates his claim, lien, or encumbrance in or against the land and in any production therefrom to the rights of the Government under the Contract with respect to royalty on production and liens to secure same.[4]

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

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

Encumbrances upon the St. Lawrence, Jack and Crystal lode mining claims, Survey Nos. 6035, 6036 and 6037, in favor of Small Business Administration, an agency of the United States, to secure an indebtedness of Delbert M. Bullock, R. Sharon Bullock, Allan J. Bullock and Arla M. Bullock, per promissory note dated January 31, 1968, in original amount of $27,500.00.

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

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in Book _____, Page ____, official records of said county". If (b) is used, the book and page of recordation must be inserted above. If the space provided is insufficient, use an Annex and refer to the Annex in the space.

3/ Insert name exactly as it appears in the Application MME Form 40.

4/ Subparagraph 1(a) does not apply to the holder of a claim, lien, or encumbrance.

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

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

6. Added provisions None (State "None" or "See Annex No. ____".)

Dated this 8th day of May, 1969.

R. Sharon Bullock		(Street)
Delbert M. Bullock (Seal)	Basin, Montana 59631	(City & State)
Ada Bullock		(Street)
Allan J. Bullock (Seal)	Basin, Montana 59631	(City & State)
Donald W. Johnson	22335 19th Ave. South	(Street)
Miriam M. Johnson (Seal)	Des Moines, Washington 98106	(City & State)
Keith P. Johnson	3001 Ottawa Street	(Street)
Laurel P. Johnson (Seal)	Butte, Montana 59701	(City & State)
		(Street)
(Seal)		(City & State)
		(Street)
(Seal)		(City & State)

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

_____
(Corporate Seal)

MME Form 52
Jan. 1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

FOR GOVERNMENT USE ONLY
Operator
Docket No. OME –
Contract No. 14-23-090–
Contract Date

LIEN AND SUBORDINATION AGREEMENTS[1]

To the United States of America:

That certain land in the County of Jefferson, State of Montana,

described ~~as follows:~~[2] in a certain "Memorandum of Mining Lease, Sublease and Option", dated November 22, 1969, and recorded in Book _____, Page _____, of the records of the County Clerk and Recorder of said County,

hereinafter called the "land", is the subject of a proposed exploration contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government" and

Crystal Mines, Inc., a Montana corporation [3]

hereinafter called the "Operator". In consideration for and as an inducement to the Government executing the Contract, the undersigned:

1. (a) Being the owner of an interest in the land, hereby grants to the Government a lien upon all of his right, title, and interest in the land and upon any production of minerals therefrom to secure the payment to the Government of the royalty on production provided for by the Contract, and agrees if the Operator's interest should be surrendered or terminated at any time prior to the expiration of the rights of the United States under said Contract to pay royalty to the Government according to the terms of said Contract; or

(b) Being the holder of a claim, lien, or encumbrance against the land, hereby subordinates his claim, lien, or encumbrance in or against the land and in any production therefrom to the rights of the Government under the Contract with respect to royalty on production and liens to secure same.[4]

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

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

Encumbrances upon the St. Lawrence, Jack and Crystal lode mining claims, Survey Nos. 6035, 6036 and 6037, in favor of Small Business Administration, an agency of the United States, to secure an indebtedness of Delbert H. Bullock, E. Sharon Bullock, Allan J. Bullock and Arlo U. Bullock, per promissory note dated January 22, 1969, in original amount of $27,500.00.

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

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease [or contract, deed, or other document] dated _____, and recorded in Book _____, Page ____, official records of said county". If (b) is used, the book and page of recordation must be inserted above. If the space provided is insufficient, use an Annex and refer to the Annex in the space.

3/ Insert name exactly as it appears in the Application MME Form 40.

4/ Subparagraph 1(a) does not apply to the holder of a claim, lien, or encumbrance.

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

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

6. Added provisions None (State "None" or "See Annex No. ____".)

Dated this 6th day of May, 1960.

R. Sharon Bullock		(Street)
D. Alf T. McBullock (Seal)	Basin, Montana 59631	(City & State)
Orla Bullock		(Street)
Allan J. Bullock (Seal)	Basin, Montana 59631	(City & State)
Donald W. Johnson	22335 19th Ave. South	(Street)
Vivian M. Johnson (Seal)	Des Moines, Washington 98198	(City & State)
Seth P. Johnson	2508 Oregon Street	(Street)
Laurel P. Johnson (Seal)	Butte, Montana 59701	(City & State)
		(Street)
(Seal)		(City & State)
		(Street)
(Seal)		(City & State)

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

_____
(Corporate Seal)

MME Form 52
Jan. 1959

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION

FOR GOVERNMENT USE ONLY
Operator
Docket No. OME –
Contract No. 14-23-090 –
Contract Date

LIEN AND SUBORDINATION AGREEMENTS[1]

To the United States of America:

That certain land in the County of Jefferson, State of Montana, described ~~as follows:~~[2] in a certain "Memorandum of Mining Lease, Sublease and Option", dated November 22, 1968, and recorded in Book _____, Page _____, of the records of the County Clerk and Recorder of said County.

hereinafter called the "land", is the subject of a proposed exploration contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government" and

Crystal Mines, Inc., a Montana corporation [3]

hereinafter called the "Operator". In consideration for and as an inducement to the Government executing the Contract, the undersigned:

1. (a) Being the owner of an interest in the land, hereby grants to the Government a lien upon all of his right, title, and interest in the land and upon any production of minerals therefrom to secure the payment to the Government of the royalty on production provided for by the Contract, and agrees if the Operator's interest should be surrendered or terminated at any time prior to the expiration of the rights of the United States under said Contract to pay royalty to the Government according to the terms of said Contract; or

(b) Being the holder of a claim, lien, or encumbrance against the land, hereby subordinates his claim, lien, or encumbrance in or against the land and in any production therefrom to the rights of the Government under the Contract with respect to royalty on production and liens to secure same.[4]

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

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

Encumbrances upon the St. Lawrence, Jack and Crystal lode mining claims, Survey Nos. 6035, 6036 and 6037, in favor of Small Business Administration, an agency of the United States, to secure an indebtedness of Delbert M. Bullock, R. Sharon Bullock, Allan J. Bullock and Arla M. Bullock, per promissory note dated January 31, 1968, in original amount of $27,500.00.

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

2/ Either (a) insert the legal description of the land, or (b) strike out the words "as follows" and insert "in a lease /or contract, deed, or other document/ dated _____, and recorded in Book _____, Page ____, official records of said county". If (b) is used, the book and page of recordation must be inserted above. If the space provided is insufficient, use an Annex and refer to the Annex in the space.

3/ Insert name exactly as it appears in the Application MME Form 40.

4/ Subparagraph 1(a) does not apply to the holder of a claim, lien, or encumbrance.

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

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

6. Added provisions None (State "None" or "See Annex No. ____".)

Dated this 8th day of May, 1959.

R. Sharon Bullock		(Street)
Delk M. Bullock (Seal)	Bacin, Montana 59631	(City & State)
Ada Bullock		(Street)
Allan J. Bullock (Seal)	Bacin, Montana 59631	(City & State)
Donald W. Johnson	22335 19th Ave. South	(Street)
Miriam M. Johnson (Seal)	Des Moines, Washington 98198	(City & State)
Ruth P. Johnson	3001 Ottawa Street	(Street)
Laurel P. Johnson (Seal)	Butte, Montana 59701	(City & State)
		(Street)
(Seal)		(City & State)
		(Street)
(Seal)		(City & State)

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

_____ (Corporate Seal)

UTICA MINES LTD. (N.P.L.) Annual Report 1968

For the period ending December 31, 1968

UTICA MINES LTD.

(N.P.L.)

HIGHLIGHTS — 1968

- Financial results summarized:
  - Gross Production — $2,483,131
  - Earnings which provided working capital — $791,540
- Working Capital — $856,944 with marketable securities taken at cost.
- All interest on Debenture paid up to December 31, 1968 in the amount of $297,103.
- 128,652 tons of ore milled for a recovery of 1,067,971 ounces of silver and 2,713 ounces of gold.
- Silver prices received from smelter ranged from $1.85 U.S. in January to a high of $2.46 in May.
- Company optioned a silver, gold property in Basin, Montana known as the Crystal and Bullion Mines on November 8th, 1968 and began work at the property in January 1969.

EXCHANGE LISTING

Shares of this Company are listed on the Vancouver Stock Exchange.

DIRECTORS

Albert A. Koffman	Winnipeg, Man.
E. A. Scholz	Vancouver, B.C.
Isaac Shulman	Vancouver, B.C.
George Wilkinson	Vancouver, B.C.

OFFICERS

Isaac Shulman	President
Albert A. Koffman	Vice-President
John C. L. Black	Secretary-Treasurer

GENERAL MANAGER

Orton Perry, Utica Mines Ltd., Keremeos, B.C.

HEAD OFFICE

Suite 2002, Board of Trade Building
1177 West Hastings Street
Vancouver 1, B.C.

MINE OFFICE

Keremeos, B.C.

AUDITORS

McDonald, Currie & Co., Vancouver, B.C.

SOLICITORS

Shulman Tupper & Company, Vancouver, B.C.

TRANSFER AGENT AND REGISTRAR

Guaranty Trust Company
624 Howe Street
Vancouver, B.C.

Directors' Report to the Shareholders

TO THE SHAREHOLDERS:

The directors are pleased to submit the annual report covering the fiscal year ending December 31, 1968. This report covers the Company's balance sheet, related Financial Statements, the Auditor's report, the General Manager's report on operations on the Utica mine at Keremeos, B.C., together with information on other projects related to your Company's operations.

UTICA MINE PROPERTY, KEREMEOS

During the year 128,652 tons of ore were milled. Of this 119,648 tons of ore came from the underground mine production and 9,004 tons came from the mine dumps. The mill heads averaged 9.3 ounces of silver per ton and the tails 0.81 giving the mill a recovery of 91.53%. Because of the increased price of silver in the first half of the year it was economic to treat the stated dump material. Settlement prices from the smelter were subject to fluctuations from a high of $2.46 (U.S.) to a low of $1.85 (U.S.) during the year.

For the year ending December 31, 1968 the gross metal value produced was $2,483,131.00. After payment of treatment charges, net proceeds were $2,353,248. The net cash generated after deducting Mine operating expenses, Head Office expenses, Debenture Interest and after adding Interest Income came to $791,540. After depreciation the net earnings were $718,330. Working Capital increased by $701,952 to $856,944.

The Federal Government notified the Company that following their comprehensive review of ore reserves and the future potential of the mine, that the three-year tax free period would commence November 1st, 1967. In this report the two months of November and December 1967 production results are shown with comparison along with their respective income and depreciation which was previously shown in the 1967 annual report as preproduction. Net earnings for the months of November and December 1967 amounted to $135,553.

In the mine, development proceeded on a routine basis with measured and indicated ore reserves being 318,000 tons with geologically inferred ore reserves remaining unchanged at 383,000 tons at year end. Mine exploration, lateral development and surface exploration was deferred to the extent possible in order to maximize the net cash earnings during the three-year federal tax exemption period.

The collective agreement between the Company and the United Steelworkers of America will not be up for negotiations until the end of the Federal Tax Free period November 1, 1970.

CRYSTAL AND BULLION MINE PROPERTY

This silver, gold property located in Jefferson County, Montana (comprising 18 contiguous claims) was optioned on November 7, 1968 and a wholly-owned U.S. subsidiary Crystal Mines Inc. was formed to explore and develop this property.

This property was acquired after an examination by the Company's mining consultant, Mr. D. L. McKelvie, P. Eng. of Alrae Engineering Limited, Vancouver, B.C.

Mr. McKelvie has "conservatively" estimated the present length of the vein at 6,000 feet containing approximately 1,800,000 tons of mineralized vein material in the first 100 feet of depth available for cheap open pit mining. He further states that if this length were mined to an average depth of 700 feet, an estimated 12,500,000 tons of mineralized vein material would be available. The total length of this vein zone on the property is approximately 14,000 feet.

Ore shipments from this property have been made intermittently for many years and local smelters are currently accepting approximately 1000 tons of open cut ore per month for fluxing purposes. This ore has averaged per ton 7.1 oz. of silver, .09 oz. of gold, 1.9% lead, and 1.8% zinc. The first two phases of the Company's program which includes a comprehensive channel sampling of both the surface and known underground work-

ings will commence in early 1969 and should take between four and five months to complete.

An application to the U.S. Department of the Interior Geological Survey for Exploration Assistance is being prepared. If obtained, this financial assistance will provide up to 75% of the cost of the proposed exploration program.

OTHER PROPERTIES

The Endako area, B.C. Molybdenite prospect (28 mineral claims) was kept in good standing during the year.

The Cardiff Township, Ontario uranium prospect (95 acres) was kept in good standing during the year.

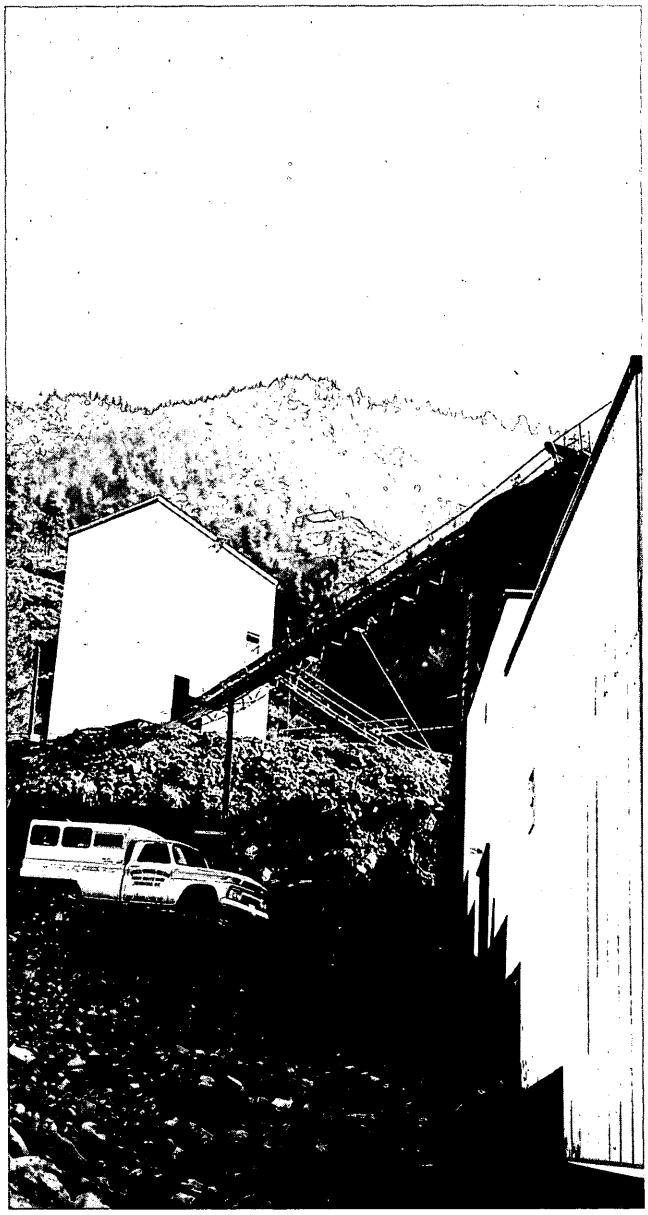
ACKNOWLEDGMENTS

It was with great regret that your Board of Directors accepted the resignation of Mr. P. M. Reynolds in July. Mr. Reynolds' association with Utica dates back to when he was elected a Director in 1966 and appointed Vice-President, guiding the Company through the development and construction stages to a successful operating mine. The Board takes this opportunity to thank Mr. Reynolds for his services to the Company.

On behalf of the Shareholders, your Directors express appreciation to Mr. Orton Perry, the General Manager, his staff, and employees for their effective operation performance during the year.

On behalf of the Board

President



Report on Mine Operations

The following is a report on the operations at the mine property covering the year 1968:

PRODUCTION

The concentrator operated very satisfactorily throughout the year until the latter part of December when unusually severe temperatures for this location disrupted the production. Average milling rate per seven day week was 350 T.P.D.

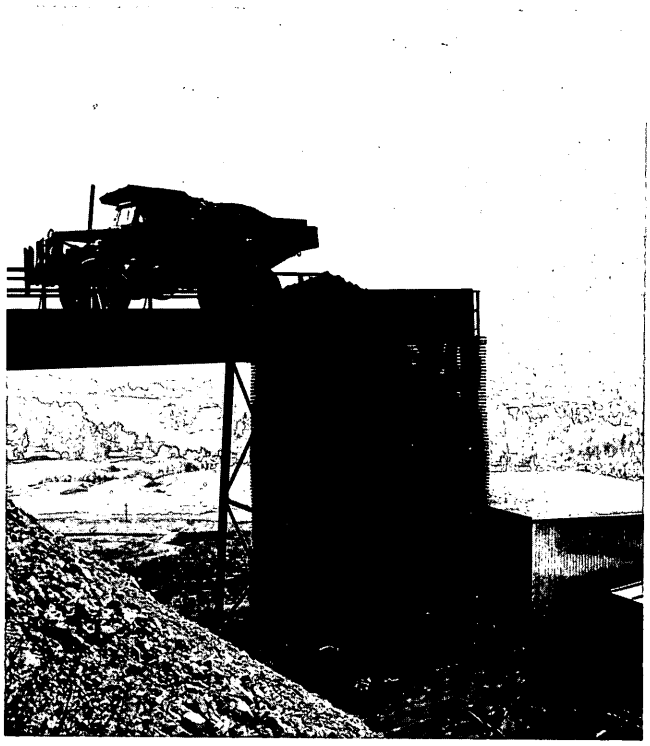
Ore Milled (Dry Tons)		128,652.2 Tons
Concentrates Produced		
- Jig	428.50 Tons	
- Bulk	4,046.87 Tons	
		4,475.37 Tons
Silver Recovered		1,067,971.33 Ozs.
Gold Recovered		2,713.57 Ozs.
Lead Recovered		205,929.00 Lbs.
Zinc Recovered		200,037.00 Lbs.
Calculated Heads (oz/ton) Silver		9.3 Ozs.
Calculated Tails (oz/ton) Silver		0.81 Ozs.
Recovery % Silver		91.53%

OPERATING COSTS

	1968 TOTALS	COST/ TON MILLED
Exploration & Development	$ 137,217.14	1.07
Stoping	567,672.86	4.41
Milling	197,259.01	1.53
Plant	173,683.48	1.35
Ore Handling & Marketing	129,883.07	1.01
Gen. Expense & Overhead	411,900.78	3.20
	$1,617,616.34	$12.57

DEVELOPMENT & EXPLORATION

Development was carried on chiefly from the 26, 25 and 2400 levels where drifting, cross cutting and diamond drilling was designed to explore:



(a) The probable extension of the ore body to the east.

(b) The upward persistence of the vein structure above the 2600 level.

This exploration was notably successful in intersecting a new vein at the eastern extremity above and below the 2400 level. The new structure has a radically different dip and strike and work is presently being pursued to trace it eastward through a series of faults and dykes. One diamond drill hole 100' down dip below the 2400 level intersected the above vein and returned an assay of 19.4 oz. silver over a true width of 5.0'. Additional encouragement has also been achieved in following the vein structure up dip in the western section above the known workings of the 2600 level. Several months of further exploration in the above areas will be required to determine the true significance of each of these developments.

UTICA MINES LTD.
(N.P.L.)

Exploration of known occurrences on the 3000 level and the 1700 level has been deferred pending the completion of a detailed study of the underground fault pattern.

During the summer a geo-chem survey was conducted on the company claims. Interesting anomalies will be further investigated during the coming season.

SUMMARY

Level	Drifts & Cross Cuts	Raises & Box Holes	Diamond Drilling
3010	632		903
2622	837	213	1,154
2570	1,252	226	3,652
2422	1,937	559	2,554
1755	100	53	1,107
Total	4,758	1,051	9,370
Capital Development	197'	232'	
Total Development	4,955'	1,283'	9,370'

ORE RESERVES

Due to the complexity of the vein system and the irregular mineralization it is difficult to project ore occurrences too far beyond known working faces.

Allowing for tonnage milled ore reserves remain substantially the same.

CAPITAL EXPENDITURES

During the year expenditures totalled $134,005.52. This represents —

(a) New office building to house the accounting, engineering and warehouse departments.

(b) A conversion from surface ore handling to an underground ore pass. To provide this facility a 197' truck adit was driven from the 2200 level and a 7' x 8' ore pass was raised to the 2400 level.

(c) A D-7 tractor for $18,000.00 and a new crew truck for $4,500.00.

GENERAL

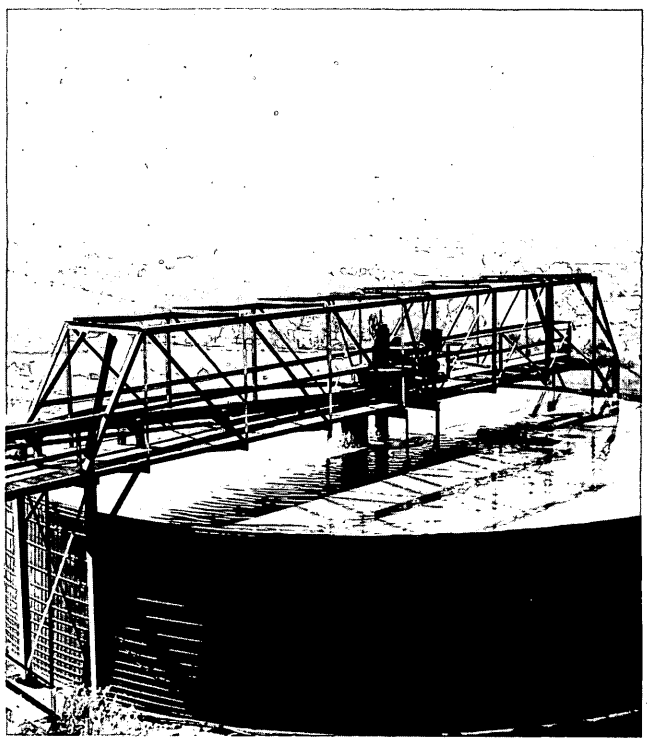
No major difficulties have been encountered during the year other than a seasonal shortage of labour caused by a lack of accommodation during the summer tourist season.

The decrease in the price of silver materially affected the profit at the mine.

The writer wishes to express his appreciation to the President and Directors for their valuable assistance and to the staff for their continued loyalty.

Respectfully submitted,

GENERAL MANAGER
UTICA MINES LIMITED (N.P.L.)



Balance Sheet as at

For the period end

UTICA M

(N.

Assets

	1968 $	1967 $
CURRENT ASSETS		
Cash	56,702	20,708
Short-term deposits	550,000	
Concentrate settlements receivable — at net realizable value	164,050	284,189
Other accounts receivable	41,858	10,490
Concentrate inventory — at estimated net realizable value	39,139	27,736
Supplies inventory — at cost	65,954	35,508
Marketable securities — at cost (quoted value $145,000)	110,450	
Prepaid expenses	14,177	8,633
	1,042,330	387,264
POWER DEPOSIT (note 2)	68,000	100,000
INVESTMENTS — at cost		13,002
FIXED ASSETS		
Land — at cost	41,760	41,760
Plant and equipment — at cost less accumulated depreciation (note 3)	1,067,482	1,058,516
Mineral properties (notes 1 and 4)	321,408	429,460
	1,430,650	1,529,736
DEFERRED EXPENDITURES (Note 1)		
Preproduction (note 5)	2,072,622	2,063,235
Development	45,144	
Exploration and development — other properties	49,954	49,954
Organization	9,601	9,601
	2,177,321	2,122,790
	4,718,301	4,152,792

SIGNED ON BEHALF OF THE BOARD

Director

Director

December 31, 1968

ing December 31, 1968

NES LTD.

.L.)

Liabilities

CURRENT LIABILITIES		
Accounts payable and accrued liabilities	185,386	232,271
7-1/2% INCOME DEBENTURES (note 6)	1,900,000	1,900,000
	2,085,386	2,132,271

Shareholders Equity

CAPITAL STOCK (note 7)		
Authorized — 5,000,000 common shares of no par value		
Issued and fully paid — 4,834,371 shares (4,829,371 shares at December 31, 1967)	2,179,968	2,172,468
RETAINED EARNINGS (DEFICIT)	452,947	(151,947)
	2,632,915	2,020,521
	4,718,301	4,152,792

UTICA MINES LTD.
(N.P.L.)

Statement of Retained Earnings

	Year ended December 31, 1968 $	Fourteen months ended December 31, 1967 $
DEFICIT — BEGINNING OF PERIOD	(151,947)	(235,824)
Cost of and exploration expenditures on mineral properties abandoned (note 4)	(113,434)	(51,675)
Write-off of long-term investments carried at nominal value	(2)	(1)
Net earnings for the period (note 5)	718,330	135,553
RETAINED EARNINGS (DEFICIT) — END OF PERIOD	452,947	(151,947)

Statement of Earnings

	Year ended December 31, 1968 $	For two months ended December 31, 1967 (note 5)
REVENUE FROM CONCENTRATES PRODUCED	2,483,131	409,093
Less: Treatment and marketing costs	129,883	16,724
	2,353,248	392,369
OPERATING EXPENSES		
Cost of concentrate production	1,414,787	220,356
Administrative costs	46,186	5,500
	1,460,973	225,856
OPERATING INCOME		
OPERATING INCOME	892,275	166,513
OTHER EXPENSE AND (INCOME)		
Interest on long-term debt	142,500	23,750
Interest earned	(35,815)	(3,500)
Gain on sale of investments	(5,950)	
EARNINGS WHICH PROVIDE WORKING CAPITAL	100,735	20,250
DEPRECIATION	791,540	146,263
NET EARNINGS FOR THE YEAR (note 9)	73,210	10,710
	718,330	135,553

AUDITORS' REPORT TO THE SHAREHOLDERS

We have examined the balance sheet of Utica Mines Ltd. (N.P.L.) as at December 31, 1968 and the statements of earnings and retained earnings and source and use of working capital for the year then ended. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

Generally accepted accounting principles, as presently applied to mining, require that deferred expenditures be amortized by charges to income in amounts and over periods which can vary according to the rate at which ore reserves will be absorbed into production. The company does not amortize deferred expenditures by a charge to current operations but has adopted a policy referred to in note 5. It is not possible or practicable to determine the ultimate ore reserves or the life of the mining properties at this time. Based on presently determined ore reserves, the earnings for the year would have been reduced by approximately $350,000 if deferred expenditures had been amortized. On this basis total amortization from commencement of production would be approximately $400,000 and retained earnings would have been reduced by that amount.

Subject to the qualification set out in the preceding paragraph, in our opinion these financial statements present fairly the financial position of the company as at December 31, 1968 and the results of its operations and the source and use of its working capital for the year then ended, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding period.

Vancouver, B.C., April 2, 1969.

'McDonald, Currie & Co.,' CHARTERED ACCOUNTANTS

UTICA MINES LTD.
(N.P.L.)

Statement of Source and Application of Funds

	Year ended December 31, 1968 $	Fourteen months ended December 31, 1967 $
SOURCE		
From operations	791,540	146,263
Receipt of portion of power deposit (note 2)	32,000	
Sale of 136,500 shares of Endako Mines Ltd. (N.P.L.)		1, 501,500
Sale of and reclassification of long-term investments	13,000	
Sale of capital stock	7,500	67,500
	844,040	1, 715,263
USE		
Preproduction	9,387	263,300
Development	45,144	
Purchase of plant and equipment - net	82,176	1, 046,035
Acquisition of interest in mineral properties (note 4)	5,381	
Power deposit		100,000
	142,088	1, 409,335
INCREASE IN WORKING CAPITAL	701,952	305,928
WORKING CAPITAL (DEFICIENCY) — BEGINNING OF PERIOD	154,992	(150,935)
WORKING CAPITAL — END OF PERIOD	856,944	154,993
REPRESENTED BY:		
Current assets	1,042,330	387,264
Current liabilities	185,386	232,271
WORKING CAPITAL — END OF PERIOD	856,944	154,993

Notes to the Financial Statements

For the period ending December 31, 1968

UTICA MINES LTD.

(N.P.L.)

1. VALUES

The amounts shown for mineral properties and deferred expenditures represent costs to date and are not intended to reflect present or future values.

2. POWER DEPOSIT

Terms of the power deposit were renegotiated during the year. It is repayable at $5,000 per year, with interest at 6% per annum. The deposit recovery is subject to specified minimum annual power usage.

3. PLANT AND EQUIPMENT

Plant and equipment costs and related accumulated depreciation, calculated on a straight line basis, are as follows:

	1968				1967
	Cost $	Annual rate	Accumulated depreciation $	Net $	Net $
Machinery and equipment	865,813	5%	117,509	748,304	761,975
Automotive equipment	62,871	20%	26,147	36,724	22,861
Buildings	330,395	5%	47,941	282,454	273,680
	1,259,079		191,597	1,067,482	1,058,516

4. MINERAL PROPERTIES

Mineral properties as at December 31, 1968 are as follows:

	Value ascribed to 300,000 shares $	Cash payments $	Value assumed from Santos Silver $	Total $
Horn Silver property, Keremeos, B.C.		73,043	86,500	159,543
Endako, B.C. claims	150,000	6,000		156,000
Cardiff County claims, Ontario			484	484
Interest in Montana claims, U.S.A. (see below)		5,381		5,381
	150,000	84,424	86,984	321,408

During 1968 the company abandoned its mineral claims in the Pine Point and Rock Creek areas and wrote off their cost of $113,434 to retained earnings.

The Montana claims are held under a lease option which runs for a 14 year period to November 28, 1982, providing for the greater of annual minimum royalty payments ($6,000 U.S. in 1969) or a royalty of 5% of net smelter returns, all to apply against a total purchase price of $1,000,000 U.S. Full title passes to the company when the total purchase price is paid.

Notes to the Financial Statements

For the period ending December 31, 1968

UTICA MINES LTD.

(N.P.L.)

5. DEFERRED PREPRODUCTION EXPENDITURES

(a) As at December 31, 1967, the company did not deem itself to be in production. The Department of National Revenue subsequently deemed the company to have commenced production on November 1, 1967. Accordingly, the company has adjusted its accounts to reflect this change. Net earnings for the two months ended December 31, 1967 of $135,553 were included as a credit to deferred costs as at that date and have now been removed from deferred costs and credited to retained earnings. The 1967 comparative figures have been adjusted to reflect this change.

(b) The company does not amortize deferred expenditures by a charge to current operations. Under the Federal Income Tax Act, these expenditures can be deferred until after the three year tax exempt period. It is the company's intention to write these expenditures off to retained earnings after that period, which expires on October 31, 1970.

6. 7-1/2% INCOME DEBENTURES

The 7-1/2% income debentures of $1,900,000 are due January 1, 1977, are non-transferable until after due date and provide that no principal payment be made until due date. The company has pledged all of its property and assets both present and future, as security therefor. Interest is payable on the first days of January and July of each year but only to the extent of the net income, as defined, for the preceding six months. Interest accrued to December 31, 1968 of $71,639 is included in current liabilities and was paid in January, 1969.

7. CAPITAL STOCK

(a) Since incorporation, the following shares have been issued for the consideration indicated:

	Shares	Amount
		$
For cash	4,276,020	1,890,000
For mineral properties	300,000	150,000
For mineral properties since abandoned or sold	165,782	15,000
For net assets of Santos Silver Mines Limited	92,569	124,968
	4,834,371	2,179,968

(b) During the year ended December 31, 1968, the company issued 5,000 shares for $7,500 cash pursuant to a share option agreement with a director. There were no share options outstanding as at December 31, 1968.

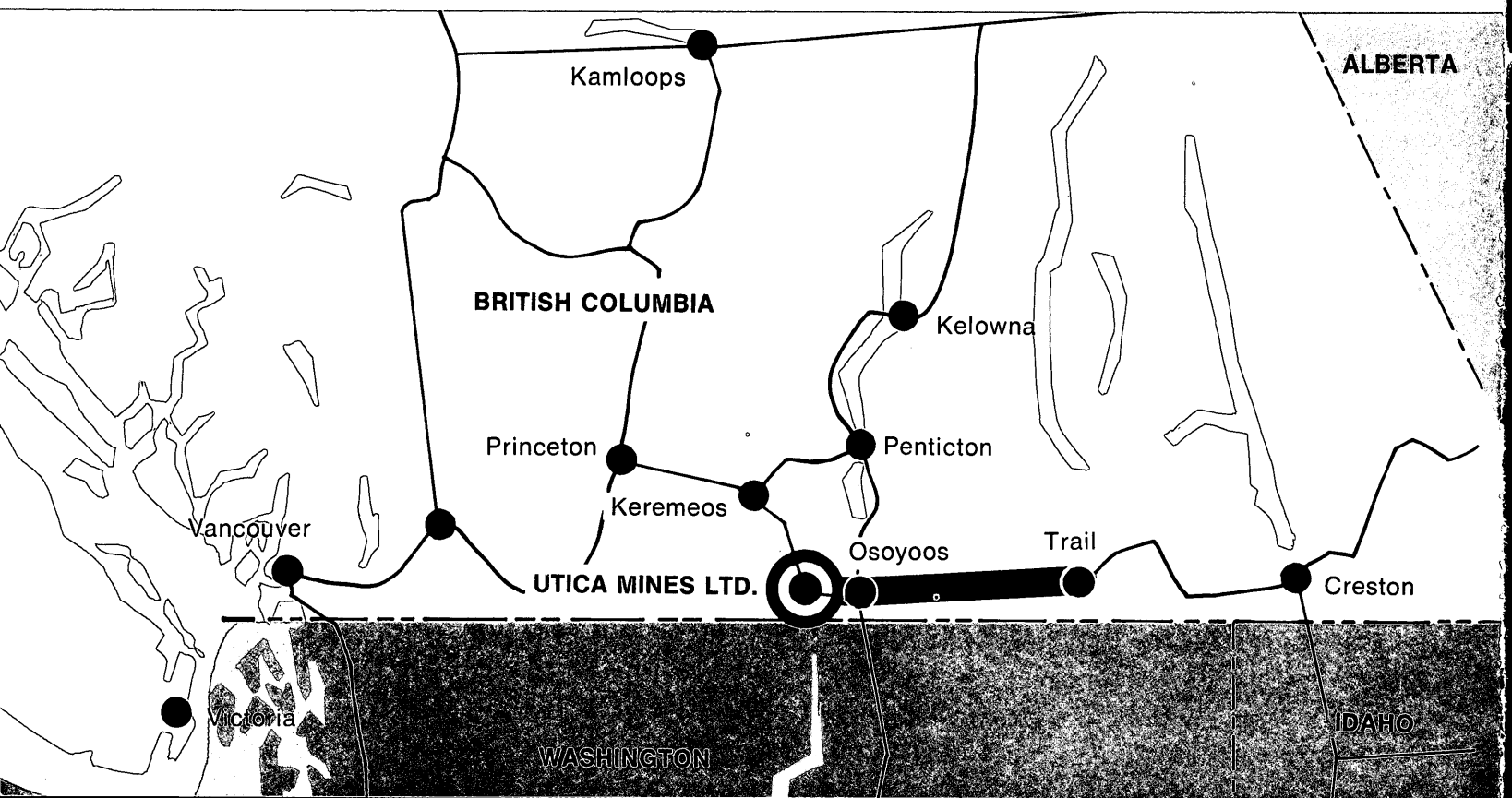
8. REMUNERATION OF DIRECTORS AND SENIOR OFFICERS

During the year ended December 31, 1968, the directors and senior officers of the company, as defined by the British Columbia Securities Act, 1967, received aggregate remuneration as follows:

	$
Directors	Nil
Senior employees	53,611
	53,611

9. INCOME TAX

Under the provisions of the Income Tax Act, the income from the Keremeos mine is exempt from federal income taxes for a three year period commencing November 1, 1967.


Kamloops
ALBERTA
BRITISH COLUMBIA
Kelowna
Princeton
Penticton
Keremeos
Vancouver
Osoyoos
Trail
UTICA MINES LTD.
Creston
Victoria
IDAHO
WASHINGTON

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
8/25/70	Emerick	120
8/26	Kirkemo	120
		220

August 25, 1970

Memorandum

To: The File

From: William L. Emerick
Office of Minerals Exploration

Subject: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

The Applicant has not replied to our letter of July 22, 1970. Accordingly, the subject docket is transferred to the inactive file and the application considered as having been withdrawn.

William L. Emerick

William L. Emerick

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region I
Mr. Emerick
130

WLEmerick/bsl 8/25/70

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
7/22/70	Emerick	120
7/22	CAC	220
		120M

AIRMAIL

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Re: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

Gentlemen:

On April 7, 1970, we requested additional information which is necessary for the processing of your application.

We wish to cooperate fully in allowing you ample time to submit the information, however, for administrative and fiscal reasons this office cannot indefinitely defer action on an application. If we do not receive the data within 30 days from the date of this letter, we shall consider the application as having been withdrawn.

Sincerely yours,

William L. Emerick

William L. Emerick
Assistant Chief
Office of Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region I
Mr. Emerick

WLEmerick/bsl 7/22/70

OME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
4/7/70	Peterson	120
		120
4/7	cae	220
		120M

AIRMAIL

APR 7 1970

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Re: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

Gentlemen:

In accordance with your request of April 1 we shall continue to keep your application for exploration assistance in active status.

As our funding situation has not changed from that mentioned in our letter of December 19, 1969, the outlook that sufficient funds will be available to support a program as large as you have proposed is not favorable. It appears that a modified project embracing one phase of the original proposal, rotary drilling from surface sites for example, might receive more favorable consideration. Under these conditions, please advise whether you would be interested in a less ambitious program of exploration.

Should you decide to continue with the application, we must have your assurance that Crystal Mines, Inc., can post a performance bond covering the Government's share of the estimated cost of the work in the event of an exploration contract. Such a bond, with a domestic bonding company, is required because your company is controlled by a foreign-based firm. A standard Performance Bond form 25 is enclosed for your study.

We shall continue to hold the application pending your reply. Further action will follow the outline mentioned in our letter of December 19, 1969. Nothing in this letter should be construed as a commitment by the Government to grant an exploration contract.

Sincerely yours,

Harold Kirkemo (glr)

Harold Kirkemo
Chief, Office of
Minerals Exploration

Enclosure

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region I
ECPeterson/bsl 4/7/70

COPY
O. M. E.
RECEIVED
APR 6 1970
INITIALS CODE

April 1, 1970
Crystal Mines, Inc.
P. O.Box 1954
Butte, Montana 59701

U. S. Department of the Interior
Geological Survey
Office of Minerals Exploration
Washington D.C. 20242

Attention: Mr. Harold Kirkemo

Gentlemen:

Re: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

This is to inform you that we are certainly interested in our application for OME financial assistance.

Very truly yours,

CRYSTAL MINES, INC.

M. Skripsky, Geologist

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
3/17/70	Peterson	120
		120
5/17	cal	220
		120M

AIRMAIL

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Re: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

Gentlemen:

On December 19, 1969, we wrote you outlining the current situation regarding the processing of pending applications for OME financial assistance. Will you please inform us of your plans regarding your application. If you have decided not to pursue it further, will you please so inform us.

If we do not receive a reply from you within 30 days from the date of this letter, we will assume that you are no longer interested in your application and we shall consider it as having been withdrawn.

Sincerely yours,

Harold Kirkemo (gla)

Harold Kirkemo
Chief, Office of
Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region I
Mr. Peterson

ECPeterson/bsl 3/17/70

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
12/18/69	Peterson	120
		120
		220
		120M

DEC 19 1969

AIRMAIL

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Re: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

Gentlemen:

We wrote you on July 18, 1969, to advise that our funding situation then precluded full consideration of your application for financial assistance to explore the Crystal and Bullion mines. In late November 1969 we learned that funds for contracting purposes in the fiscal year ending June 30, 1970, are sufficient for only a few new contracts. The extent of future contracting will depend on availability of funds.

Owing to curtailment of the program, the processing of applications is being delayed. Therefore, field examinations necessary to reach decisions on applications are being made largely in connection with other field work of the program. In due course of time we will inform you whether or not your application can be approved for a contract when funds are available. Priority on available funds will be given to approved applications offering the best opportunities for making significant discoveries.

Under these circumstances, should you wish to withdraw your application, please so advise. If you wish to keep your application in active status, we will process it as explained above.

We regret that this action is necessary, but under present funding circumstances we cannot offer better service at this time.

Sincerely yours,

Harold Kirkemo (gla)

Harold Kirkemo
Chief, Office of
Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region I
Mr. Peterson

ECPeterson/bsl 12/18/69

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
7/18/69	Peterson	120
		120
7/22	coe	220
		120M

JUL 18 1969

AIRMAIL

Crystal Mines, Inc.
P. O. Box 1954
Butte, Montana 59701

Re: OME-6796 (Gold-Silver)
Crystal Mines, Inc.
Crystal and Bullion Mines
Jefferson County, Montana

Gentlemen:

Reference is made to your application for exploration assistance dated May 7, 1969.

We have postponed processing applications received recently pending definite information regarding availability of funds for the fiscal year beginning July 1, 1969. Although appropriations have not yet been made for the current year, we understand that funds will be much less than were available for the year that ended June 30, and we are authorized to operate only at the level of the anticipated reduced funds. Under this situation, action on pending applications must be postponed, as proposed contracts already drafted and awaiting execution will require more funds than are available. When we can again process new applications, first priority will be given to those offering the best opportunities for making significant discoveries.

We regret that we cannot make a decision on your application at present and we are unable to estimate when we may be of possible assistance to you. When circumstances permit, we will process your application within the limitations stated above.

Sincerely yours,

Harold Kirkemo (glr)

Harold Kirkemo, Chief
Office of Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
Region I
Mr. Peterson

ECPeterson/bsl 7/18/69

June 2, 1969

Crystal Mines Inc.
Box 1954
Butte, Montana 59701

Subject: OME-6796

Gentlemen:

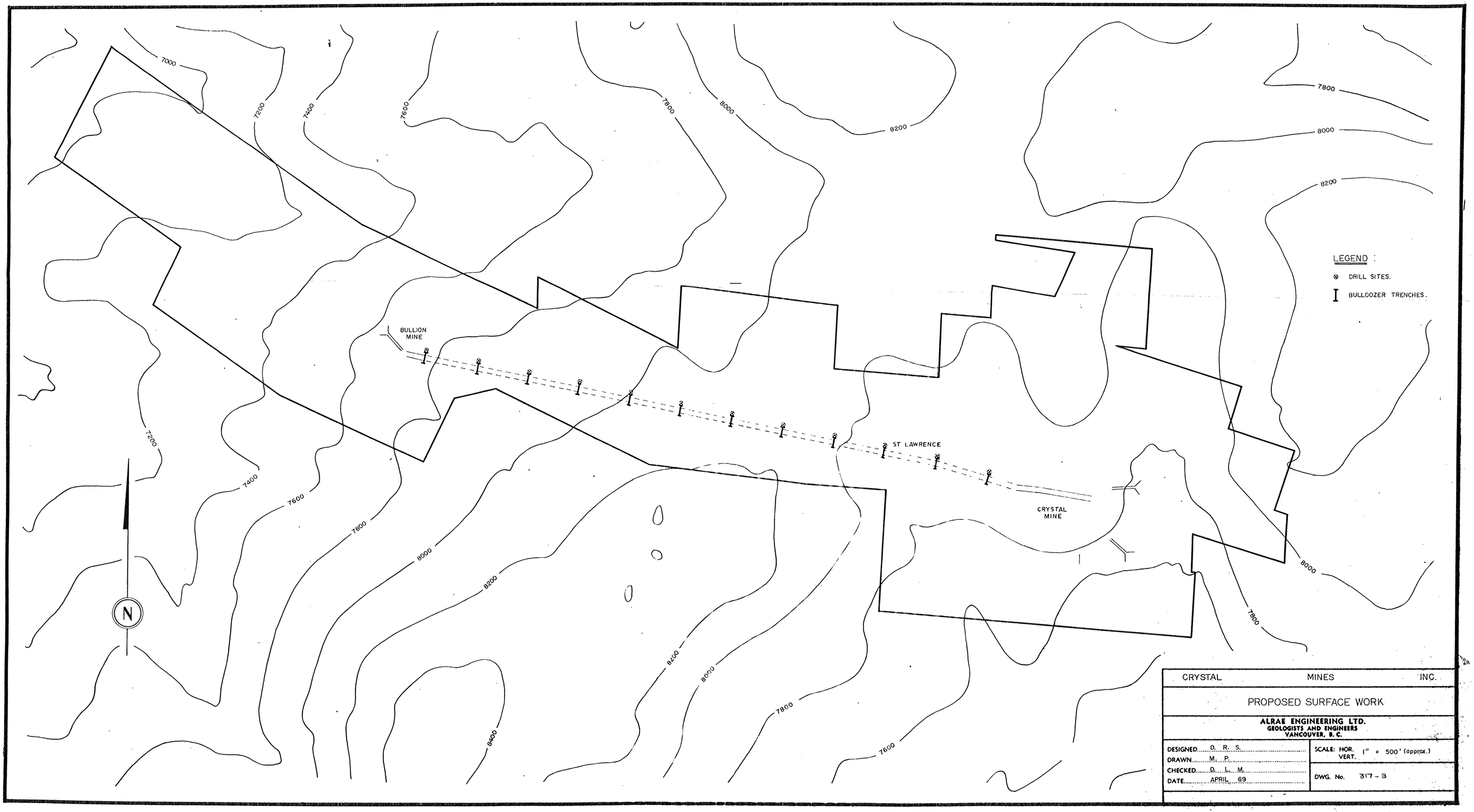
Your application for exploration assistance, dated May 5, 1969, submitted to our office at Spokane, Washington, has been assigned Docket No. OME-6796.

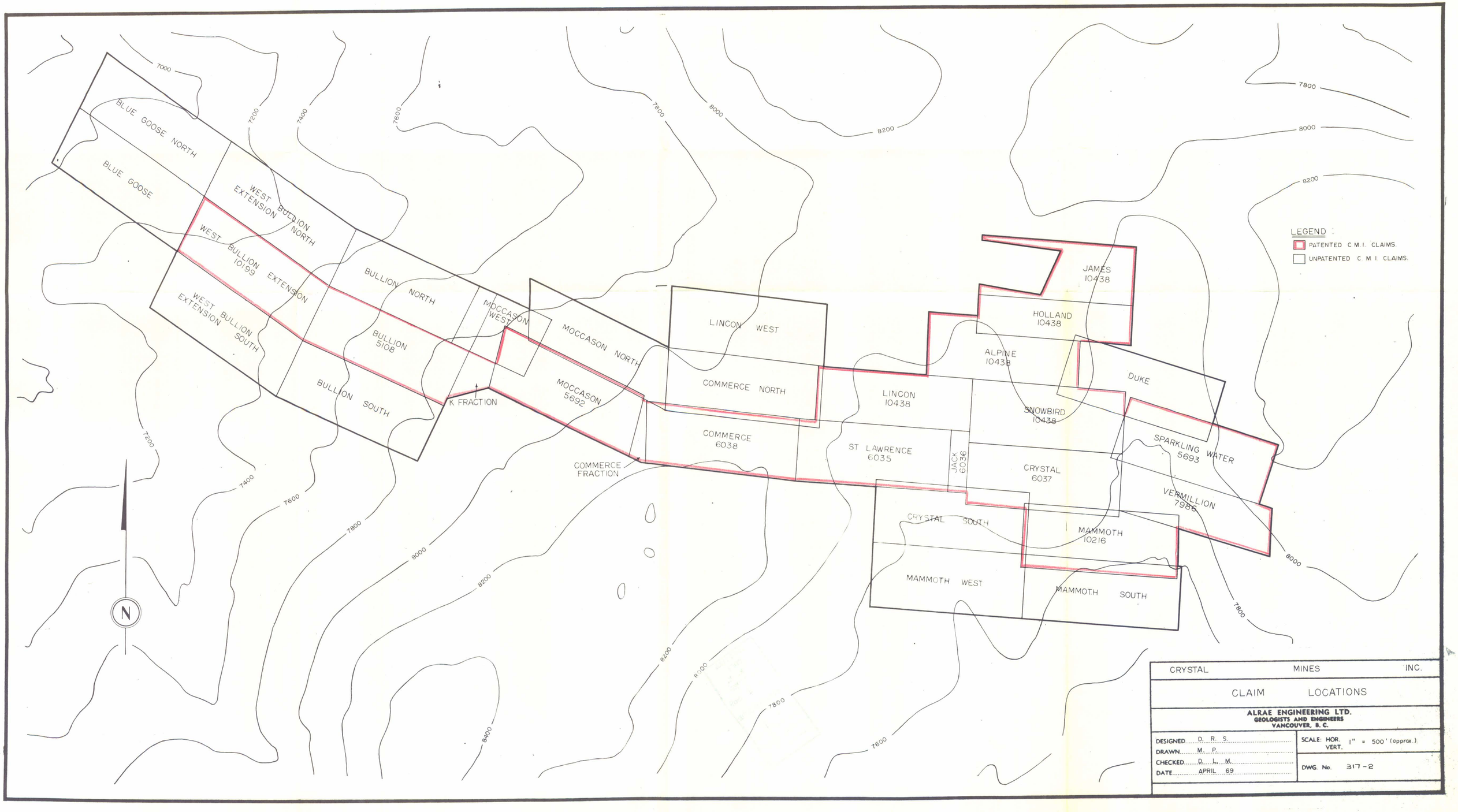
Please identify all future correspondence relating to your application by this docket number.

Sincerely yours,

Harold Kirkemo
Chief, Office of
Minerals Exploration

Copy to Region I


7000
7200
7400
7600
7800
8000
8200
8400
BULLION MINE
ST LAWRENCE
CRYSTAL MINE
N
LEGEND :
DRILL SITES.
BULLDOZER TRENCHES.
CRYSTAL MINES INC.
PROPOSED SURFACE WORK
ALRAE ENGINEERING LTD.
GEOLOGISTS AND ENGINEERS
VANCOUVER, B.C.
DESIGNED D. R. S.
DRAWN M. P.
CHECKED D. In. M.
DATE APRIL 69
SCALE: HOR. VERT. 1" = 500' (approx.)
DWG. No. 317 - 3


BLUE GOOSE NORTH
BLUE GOOSE
WEST BULLION EXTENSION NORTH
WEST BULLION 10199 EXTENSION
WEST BULLION EXTENSION SOUTH
BULLION NORTH
BULLION 5108
BULLION SOUTH
MOCCASON WEST
MOCCASON NORTH
MOCCASON 5692
K FRACTION
COMMERCE FRACTION
LINCON WEST
COMMERCE NORTH
COMMERCE 6038
ST LAWRENCE 6035
JACK 6036
LINCON 10438
ALPINE 10438
HOLLAND 10438
JAMES 10438
SNOWBIRD 10438
CRYSTAL 6037
DUKE
SPARKLING WATER 5693
VERMILLION 7986
CRYSTAL SOUTH
MAMMOTH 10216
MAMMOTH WEST
MAMMOTH SOUTH
LEGEND
PATENTED C.M.I. CLAIMS.
UNPATENTED C.M.I. CLAIMS.
N
7000
7200
7400
7600
7800
8000
8200
8400
CRYSTAL MINES INC.
CLAIM LOCATIONS
ALRAE ENGINEERING LTD.
GEOLOGISTS AND ENGINEERS
VANCOUVER, B.C.
DESIGNED D. R. S.
DRAWN M. P.
CHECKED D. L. M.
DATE APRIL 69
SCALE: HOR. 1" = 500' (approx.)
VERT.
DWG. No. 317-2

CRYSTAL MINES INC.
MAP SHOWING LOCATION OF
PROPOSED CROSSCUTS & THE
EXTENSION OF THE LOWER
TUNNEL TO THE ST. LAWRENCE
4-28-39
D.R.S.
SCALE 1"=50'
DUKE
SPARKLING WATER
5653
VERMILLION
7986
LOWER TUNNEL
EL 7636
UPPER TUNNEL
EL 7801
CROSSCUTS TO BE DRIVEN TO EDGE OF VEIN
CROSSCUTS No 3 & 4 ARE BEING DRIVEN NOW
No 1 Intermediate
El. 7739
No 2 Intermediate
El. 7744
Powder magazine
air receiver
CRYSTAL
6037
MAMMOTH-I
10216
SNOWBIRD
10438
BULLOCK'S CUT'S
SURFACE EL. 8000
JACK
6036
ST. LAWRENCE
6035
PROPOSED DRIFT
RAISE TO SURFACE
BULLOCK'S CUT
SURFACE EL. 7900
LINCON
10438
CRYSTAL SOUTH
MAMMOTH WEST
60
55
50
45