MME Form 9
Rev. Nov. 65

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey

OFFICIAL DOCKET FILE Contract No. _____ Docket No. 6798

Application
- [x] Denied
- [ ] Withdrawn

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

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

Folder No. 1:

Left Side

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

Right Side

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

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

- [ ] Field Team Semiannual Report for Certified Project
- [ ] Final Field Team Report (Tab)
- [ ] Operator's Final Report (Tab)
- [ ] Interim Field Team Reports
- [ ] Operator's monthly reports and all attachments
- [x] On-site Exam. Report (Tab) 7/70
- [ ] 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

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
FEDERAL CENTER, DENVER, COLORADO 80225

Office of Minerals Exploration
Building 53 Room 200

June 6, 1969

Memorandum

To: Chief, Office of Minerals Exploration

From: Field Officer, Region III

Subject: Transmittal of an application for financial assistance in minerals exploration by the Cardinal Mining Company, 635 Hawthorn Avenue, Boulder, Colorado 80302

The applicant has been advised to furnish diamond drilling bids, as well as assaying bids, and will submit them to us as soon as possible. The application otherwise is in fairly good order.

J. William Hasler

J. William Hasler,
Field Officer, Region III
Office of Minerals Exploration

OFFICIAL COPY
O. M. E.
RECEIVED
JUN 9 1969

INITIALS	CODE

H. LEON BIRD
Post Office Box 663
Boulder, Colorado 80302
May 28, 1969

Office of Mineral Exploration
U. S. Geological Survey
Building 53, Federal Center
Denver, Colorado

Attention: Mr. J. William Hasler, Field Officer, Region 3

Gentlemen:

Enclosed herewith is an application by Cardinal Mining Company, a partnership, for government assistance in exploration for gold and silver in the Treasure Key mining property near Central City, Colorado.

If additional information is needed please notify H. L. Bird, Post Office Box 663, Boulder, Colorado 80302 or M. J. Kraft, 635 Hawthorn Avenue, Boulder, Colorado 80302.

Thanking you for your consideration of this matter, I remain,

Sincerely yours,

H. Leon Bird - Partner

H. Leon Bird

HLB/lcf

Enclosure

MME Form 40
(Revised Nov. 68)

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OFFICIAL COPY M. E. RECEIVED JUN 9 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.*)

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER 6798

DATE RECEIVED 6-9-69

REGION ~~III~~

DIVISION CODE

BUSINESS ORGANIZATION (*Check one*)

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

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
H. L. Bird	P. O. Box 663, Boulder, Colo. 80302	Partner
Duane A. Kraft	Magnolia Star Route, Nederland, Colo. 80466	"
Melvin J. Kraft	635 Hawthorn Ave., Boulder, Colo. 80302	"

STATE IN WHICH FIRM IS ORGANIZED **Colorado**

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE **Gold and Silver**

ESTIMATED COST OF PROJECT **$92,604.65**

PROPERTY NAME	LOCATION COUNTY	STATE
Treasure Key Tunnel	Gilpin	Colorado

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 5 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 5(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.

May 28 1969
DATED

Duane A. Kraft H. L. Bird
M. J. Kraft
BY (*Signature*)

Partners
TITLE

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

INFORMATION REQUIRED WITH THIS APPLICATION

1. Financial Eligibility:

(a) Submit evidence of efforts made within 90 days preceding the filing of this application to obtain credit from your bank of account and at least one other banking institution or other private source of credit. Such evidence shall include (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.)]

APPLICATION FOR EXPLORATION LOAN

CARDINAL MINING COMPANY

TREASURE KEY MINE, GILPIN COUNTY, COLORADO

1. Financial Eligibility:

Enclosed herewith is Exhibit "A", true copies of correspondence with commercial banks concerning requested loans.

Cardinal Mining Company plans to furnish labor, equipment and funds as required to furnish their share of the exploration work.

2. Applicant's Rights in Land:

Cardinal Mining Company owns outright all land and mineral rights on the property except those rights on unpatented mining claims reserved by the government under the Multiple Use Act

Patented Claims -	East Williams	588	Claims lie mainly in the
	Intermediate	786	N. E. 1/4 of Section 18,
	Williams	488	Township 3 South, Range 72
	Williams	295	West, Gilpin County, Colorado.
	Mingo	15824	
	Mingo No. 2	15824	

Unpatented Claims, recorded in Central City, Colorado -

Justice East Extension	Book 186 - Page 580
West Williams	Book 257 - Page 375-376
South Williams	Book 262 - Page 153-154

3. Physical Description:

(a) See Exhibit "B", Page 1, History.
(b) See Exhibit "B", Page 1, History.
(c) The production of the Williams Mine is unknown. It is believed to have produced at least several hundred thousand dollars. The production out of the small ore shoot discovered on the "Vertical" vein by the present owners ~~not~~ including ore mined and in storage is estimated as at least $ 6,000.00.
See settlement sheets, Exhibit "C" herewith.
(d) The property has no known ore reserves.
(e) See Exhibit "B", Page 2, Geology.
(f) Since it is believed that surface weathering and oxidation have leached some of the vein, no surface samples were taken for assay.
(g) The only report available at the present time is our Exhibit "B".

4. Accessibility of Property:

(a) H. L. Bird, Post Office Box 663, Boulder, Colorado 80302, telephone 828-3548, Erie, Colorado, will meet the O.M.E. representative.
The property is reached via Clear Creek Canyon highway to the Central City turn-off to the right. Proceed along this highway to Gold Dust Village, from where the property lies about 3/4 miles up the canyon. Proceed along the highway from Gold Dust Village to an access road that leaves the highway from the left side at the point where a road sign marks the city limit of Blackhawk and gives the elevation (not correct). Follow this road about 1,000 feet to a bridge. The mine is visible as this road is traversed toward the bridge. A grizzly and ore chute are on the eastern face of the dump. The mine is about one mile below Blackhawk.
The mine property at the tunnel is in good condition and all workings are accessible but boots are needed for the last 500 feet of the main tunnel.

(b) Shipping points are Rollinsville, Colorado, 14 miles, and Golden, Colorado, 17 miles.

5. Exploration Work:

(a) See Exhibit "B", Page 3, and supporting maps.

(b) Not applicable.

(c) If the O.M.E. Contract is executed, work at the property will begin within two weeks. The anticipated average monthly rate of progress in drifting is (4 weeks) 109 feet. The drifting is expected to occupy 48 weeks and drilling six weeks. Progress in long holing is expected to be twenty 50 foot long holes per month using heavy drifter equipment adapted to the work. Diamond core-drilling is expected to occupy four to five weeks depending on conditions encountered in drilling. Daily progress is expected to be between 20 and 25 feet.
The whole project should be completed in 12 months and two weeks. This will be reduced if possible.

6. Experience:

M. J. Kraft and Duane A. Kraft are experienced contractors and miners. They have conducted mining work over a period of forty years (M. J. Kraft). Besides work at several Boulder County, Gilpin County and Gunnison County properties mining for gold, silver, and tungsten, M. J. and Duane A. Kraft had an active part in the exploration and development of the Wright Mine at Idledale, Colorado, having done the diamond core-drilling from surface that resulted in the discovery of commercial uranium ore and participated in the tunnel work under D.M.E.A. Contract No. Idm-#866, Docket No. D.M.E.A. 3830.

6. Experience (continued)

H. L. Bird is an experienced mining geologist having been engaged in this work over a period of about thirty-three years. Reconnaissance directed by him resulted in the discovery of the Wright Mine referred to above in the resume of Kraft's mining experience. Mr. Bird was geologist for Foothills Mining Company which was formed to explore and develop this occurrence, and as vice-president of that company prepared the application for the D.M.E.A. loan that made the exploration of the property a success. In addition to the Wright Mine, Mr. Bird has conducted and supervised exploration on several other properties in addition to making many examinations of Colorado mines in San Juan, Ouray, Gunnison, Chaffee, Clear Creek, Gilpin and Boulder counties.

7. Estimate of Costs: Short Form Basis

Development of Unit Costs for Drifting

Labor (without F.I.C.A.)	$ 26.60
Explosives	3.40
Fues and Ignitacord	.62
Caps, Igniters and Spitter	.38
Track	2.00
Pipe-Water	.08
Pipe-Air	.45
Fuel, Oil, and Gasoline	1.70
Electricity	.30
Hoses	.15
Ventline	.60
Compressor	4.00
Drills	2.00
Steel	2.00
Hand Tools	.65
Tramming - Mule and feed	.40
	$ 45.33

Long Hole Drilling Estimated	$ 2.00 foot
Diamond Core-Drilling based on Estimated bid by Boyles Bros. Drilling Company	8.00 foot
Timber Allowance Estimated	12.00 foot

It is assumed that the information required by Item 7. is covered by that given in Exhibit B, Pages 4 and 5.

OUTLINE OF GEOLOGIC CONDITIONS

AND PROPOSED EXPLORATION

TREASURE KEY MINE, GILPIN COUNTY, COLORADO

Exhibit "B"

Property:

The Treasure Key property comprises six patented mining claims, namely:

East Williams	588
Intermediate	786
Williams	488
Mingo	15824
Mingo No. 2	15824
Williams	295

In addition there are three unpatented lode claims, as follows:

Justice East Extension
West Williams
South Williams

Location:

These claims, largely in the N.E. 1/4 of Section 18, T-35, R-72-W, extend southwesterly along the general course of the Treasure Key Tunnel, an adit, the portal of which is located about one mile southeast of Black Hawk, Colorado on North Clear Creek. State Highway 119, an excellent paved road, passes close to the portal, making access to the mine quite satisfactory. Work can be carried on at this location throughout the year.

History:

In the early 1860's, placer miners working in Lake Gulch southeast of Central City discovered the Williams vein. Subsequent exploration of this occurrence resulted in the production of gold, silver and lead ore worth at least several hundred thousand dollars. On the northeastern part of the property early miners began a tunnel development on North Clear Creek designed to explore the Williams vein in that area. This work did not reach the Williams vein. Only sporadic pods of ore were found and the work was discontinued.

In 1955, work on the tunnel was resumed and had as its objective the exploration and development not only of the Williams vein but adjacent properties as well. The tunnel was extended from about 850 feet to about 2,500 feet. Although core drilling was done by the operators which disclosed mineralization the occurrence was not explored and operations ceased before any of the objectives had been accomplished.

After May, 1967, the present owners, after preliminary examination and surveying, carried on core-drilling to explore specific target areas during the winter months of 1967-68. This drilling discovered an occurrence of silver, gold, lead, and zinc ore. Crosscutting disclosed that the vein in which the discovery was made is probably the vein which outcrops about 135 feet northwest of the Williams vein at the surface 700 feet above. This vein, called the "Vertical", has produced about 300 tons of milling ore with an average gross value excluding zinc of about $22.00 per ton.

Core-drilling to the northwest of the "Vertical" vein has disclosed mineralization similar to that in the "Vertical" vein. This discovery should be explored by crosscutting and drifting.

Exploration of the "Vertical" vein about 300 feet northeast of the stope by core-drilling did not find ore but disclosed strongly altered rock. Another core drill hole which intercepts the "Vertical" vein about 80 feet southwest of the southwest drift face cut altered rock with lead-zinc mineralization sufficiently strong to give an assay of $7.00 in gold, silver, lead and zinc over a width of more than five feet. This should encourage exploratory drifting southwestward along the vein from the present breast.

During February, March and April, 1969, geologic surveying and bulldozing on the surface along the Williams (488) Claim demonstrated that the Williams vein zone continues northeasterly from the area previously mined to a point several hundred feet beyond the present breast of the Treasure Key tunnel.

Geology:

Throughout the property the host rocks comprise interlayed biotite gneisses and pegmatite, which has been intruded into the gneisses. It has been emplaced in large bodies in part concordant with the gneisses, and also has migmatized substantial portions of the layered rocks.

In the northeastern part of the property the gneisses have been strongly folded. In general they strike about N-30°-E and dip southeastward at high angles. Within a few hundred feet of the present breast of the Treasure Key tunnel however, the foliation trends more northerly and the dip is moderate. This attitude should prove to have been more favorable for the formation and maintenance of openings along the northeasterly faults which were later mineralized to form the veins. The proposed drifting on the Williams vein should be through rocks having this more favorable attitude.

To date the only important fault observed is on the Williams Crossing claim. Its strike is about northwest and its dip is 80°-85° northeasterly. Its coincidence in attitude and alignment with the position of the northwesterly end of the Floyd Hill fault as mapped by the U.S. Geological Survey suggests that it is a northwesterly contination of that structure.

There is evidence that this fault has been influential in the localization of ore because a substantial body of ore is reported to have been mined near the intersection of the fault and the Clay County vein which lies a short distance west of the Williams vein. In addition, ore has been mined from the Williams vein in proximity to its intersection with the fault. The fault is a zone of fracture several feet wide and some of the brecciated material is distinctly similar to breccia occurring along other northwesterly faults of the "breccia reef" type in the Front Range area. The fault has been mineralized in places with sulfides, now oxidized at the surface, but to date no ore is known to have occurred in the fault itself.

The ore bearing veins on the property have a northeasterly strike which locally swings to a more easterly course and dip steeply northwest of the whole. The mineralization is of the galena-sphalerite type typical of the veins in the peripheral zone of the Central City district, but includes significant amounts of gold. Galena and sphalerite are the most abundant ore minerals in the ore mined from the small shoot discovered in 1968 on the "Vertical" vein. The nature of the ore on the Williams vein must be similar judging by fragments of ore found on the main shaft dump. The "Vertical" vein where mined varied from a few inches with small seams of sulfides to three or four feet with massive veinlets of solid sulfides as much as 18" thick. Ore in the Williams vein is reported to have been of good width and extent. In 1968, an examination of the shaft by the owners disclosed that the shaft is caved at a depth of 90 feet, but old stopes at that level were four to six feet wide.

The ores are fairly simple mineralogically. The valuable ore minerals are galena, sphalerite, and minor chalcopyrite, with small but significant quantities of gray copper and ruby silver. Pyrite is present in all the veins but is not abundant. Gold is present also, but its distribution in the ore has not been determined. In the Central City area ore is known to occur in shoots that tend to be elongated in a direction that is parallel to the intersection of the wall rock foliation and the vein fracture.

Proposed Exploration:

After due consideration of alternative plans, the following seems to best meet the conditions of economy and completeness of exploration.

Since the "Vertical" vein has produced significant quantities of silver, gold, lead and zinc ore, as evidenced by copies of smelter returns included in exhibits herewith, and core-drilling has disclosed similar mineralization in the vein about 80 feet southwest of the present breast, it is proposed to continue this southwest drift along the "Vertical" vein until its junction with the Williams vein is reached. From this point the exploratory drift would follow the Williams vein to its intersection with the Williams Crossing fault, which marks the southwestern extremity of unexplored ground along the Williams vein. The portion of drift along the "Vertical" vein would be about 350 feet. This could vary somewhat wihtout materially changing the total length of drifting under the contract. The portion of the work along the Williams vein would be about 950 feet, making

the total length of drifting under the contract 1,300 feet. By keeping the work on vein structures that have potential for production, no rehabilatory work will be required and all funds used to accomplish exploration. After the drift leaves the "Vertical" vein it can be explored at minimum cost by long holing and core-drilling as justified.

Objectives of this work are:

1. Exploration of the "Vertical" vein in an area where additional ore can reasonably be expected.

2. Exploration of the Williams-Vertical vein junction which offers an attractive target since such structural environment has proven to be favorable in the Central City district.

3. Exploration of the Williams vein between its junction with the "Vertical" vein and the Williams Crossing fault. This portion of the vein lies between known occurrences of silver, gold, lead and zinc mineralization on the "Vertical" vein to the northeast and on the Williams vein to the southwest.

In addition, since the plunge of known ore-shoots on the southeast side of the Central City anticline is dominantly down and to the northeast in the veins, it is possible that ore will be found in the Williams vein in proximity to the Williams Crossing fault with such structural control.

To enhance the effectiveness of the exploration it would be advisable to drill crosscutting long holes into the vein walls at intervals of 100 feet to explore the possibility of the occurrence of ore in parallel structures.

It is further recommended that two exploratory holes be drilled into the footwall of the Williams vein zone at the southwest end of the drifting to explore the northerly extension of the east branch of the Williams vein as shown on the accompanying map.

Cost of Proposed Exploration:

Tunnel Work

1,300 lineal feet of 6' x 8' drift at $45.33 per foot	$ 58,929.00
325 lineal feet of timbering at $12.00 per foot	3,900.00
Total Drifting Cost	$ 62,829.00

Exploratory Drilling

24 - 50 foot long-holes at $2.00 per foot	$ 2,400.00
2 - 250 foot core-drill holes at $10.00 per foot	5,000.00
Total Direct Exploratory Expense	$ 70,229.00

Direct Exploratory Expense (Forward)		$ 70,229.00
General Expense		
Superintendent - $900.00 per month - 12 months		$ 10,800.00
Geologist - $75.00 per day 2 days per month	$150.00	
Per diem expense @ $16.00 per day - 2 days	32.00	
Travel Allowance @ 12¢ per mile - 160 miles per month	19.20	
Total Per Month	$201.20	
12 Months		2,414.40
F.I.C.A. Tax - 12 Months		1,722.50
Workmen's Compensation - 12 Months		1,722.50
Assaying		
2 samples per round - 260 rounds (5 metals, Au, Ag, Cu, Pb, Zn at $7.00 per complete assay)		3,640.00
Employee's Liability Insurance		1,476.25
Accounting at $50.00 per month - 12 months		600.00
Total General Expense		$ 22,375.65
Add Direct Exploratory Expense		70,229.00
TOTAL EXPLORATION CONTRACT		$ 92,604.65

Exhibit "A"

M. J. KRAFT
DUANE KRAFT

443-1836

KRAFT BUILDING CONTRACTORS

635 Hawthorn
Boulder, Colorado 80302

May 16, 1969

First National Bank
Attn: Mr. Willoughby
Boulder, Colorado 80302

Dear Mr. Willoughby,

On be half of the Cardinal Mining Company we are making a request for a loan of $92,604.65 for use in exploratory work at our Treasure Key mining property near Blackhawk in Gilpin, County, Colorado.

Thank you for considering this request.

Sincerely,

Cardinal Mining Company
M. J. Kraft

FIRST NATIONAL BANK
IN BOULDER

BOULDER, COLORADO

May 16, 1969

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Attention M. J. Kraft

Gentlemen:

The First National Bank in Boulder has considerd the loan request of Mr. M. J. Kraft, doing business as Cardinal Mining Company, and have found it necessary to decline this request.

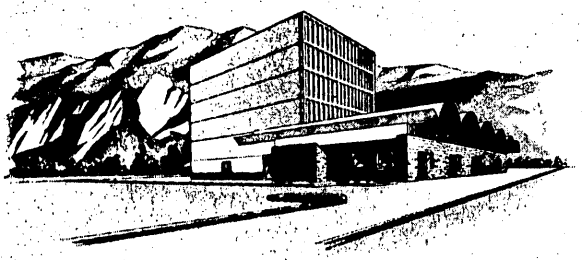
If you have any questions, please feel free to contact us.

Very truly yours,

T. G. Willoughby

T. G. Willoughby
Vice President

TGW:hrm



AMERICAN SMELTING AND REFINING COMPANY

GLOBE ~~EL PASO SMELTING WORKS~~ PLANT

Denver, Colo.

~~EL PASO, TEXAS~~ December 16, 19~~68~~

BOUGHT OF: Kraft Building Contractors

ADDRESS: 635 Hawthorne St., Boulder, Colo.80303

SHIPPING POINT: Black Hawk, Colo.

NAME OF MINE: Williams

SMELTER LOT: 35-

SHIPPERS LOT: 1

CLASSIFICATION: Concentrates

PURCHASE TERMS: Globe-Open

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

Mix	Arrival Date	Car Number	Car RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H_2O	Dry Weight
	10/11/68	Truck					10,710	7.5	9,907

Exhibit "C"

Quotations		
Coinage Silver		¢ per oz.
Foreign "	203.80	¢ per oz.
Lead $	12.50	per cwt.
Copper	41.705	¢ per lb.
Gold	39.32/oz	
B/L Date:		

Assays	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO_2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al_2O_3 %	As %	Sb %	Bi %	%
Smelter	1.33	18.1	21.9	0.7												
Shipper	1.39	17.66	22.1	2.10												
Umpire	—	—	—	1.4												
Metallics																
Settle	1.36	17.88	22.0	1.4												

It was agreed between Mr. Kraft & Mr. Coats to waive splitting limits and settle on averages, except for Copper.

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
Gold 92.57%	1.25895 oz	39.32	49 50	49 50
Silver, Less 5 % Min. 1	16.88	2.013	33 98	33 98
Lead, Less 1.5 @ 90 %	369.0	.099	36 53	16 24
Copper, Less 20# @ 100 %	8.0	.32405	2 59	38
Gross Value			122 60	100 10
Less Deductions (Net Charge)			12 00	12 00
Freight Value			x x x	88 10
Net Value			110 60	@ 4.9535

Deductions	Charge	Credit
Base, Incl. Labor Adj.	12 00	
Excess Value Over $		
¢ per Unit Pb + − %		
Lead—Copper Price Escalator		
Bullion Freight Tax		
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	12 00	

= 81.49 Wet Ton

Dry Tons

	Debits	Credits
Less Freight: 5.355 Wet Tons @ 11.18 P.T.		
Tax	59 87	
Less Switching		
Reset		
Less Hauling		
Less Representation $ Umpire $ 4.00 Sampling $ 25.00	29 00	
Amount Withheld Pending Receipt of Silver Affidavit		
Less Royalty		
Balance Due Shipper	458 99	
	547 86	547 86

Checked J. E. H. Correct [illegible] Approved

100M-1-54-HLL

AMERICAN SMELTING AND REFINING COMPANY

GLOBE ~~EL PASO SMELTING WORKS~~ PLANT

BOUGHT OF Kraft Building Contractors

ADDRESS 635 Hawthorne St., Boulder, Colo. 80303

SHIPPING POINT Black Hawk, Colo.

NAME OF MINE Williams

~~EL PASO, TEXAS~~ December 23, 1968

SMELTER LOT 43

SHIPPERS LOT 2

CLASSIFICATION Concentrates

PURCHASE TERMS Globe-Open

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE

Mix	Arrival Date	Car Number	Car RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H2O	Dry Weight
	10/25/68						19,170	11.3	17,004

QUOTATIONS

Coinage Silver		¢ per oz
Foreign "	188.00	¢ per oz
Lead $	13.00	per cwt
Copper	41.718	¢ per lb
Gold	39.14/oz.	

B/L Date:

Assays	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al2O3 %	As %	Sb %	Bi %	%
Smelter	1.05	16.1	18.6	1.7												
Shipper	1.20	15.3	18.36	1.0												
Umpire	1.067	16.19														
Metallics																
Settle	1.067	16.1	18.48	1.1												

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
Gold 97.57%	.9877719	39.14	38 66	38 66
Silver, Less 5% Min. 1	15.1	1.855	28 01	28 01
Lead, Less 1.5 @ 90%	305.640	.104	31 79	13 45
Copper, Less 2 @ 100%	7.0	.37418	65	09
Gross Value			99 11	80 21
Less Deductions (Net Charge)			17 00	17 00
Freight Value			x x x	68 21
Net Value			87 11	@ 8.502

= 60.50 Wet Ton

Dry Tons

Deductions	Charge	Credit
Base, Incl. Labor Adj.	17 00	
Excess Value Over $		
¢ Per Unit Pb + — %		
Lead—Copper Price Escalator		
Bullion Freight Tax		
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	17 00	

	Debits	Credits
Dry Tons		740 61
Tax	107 16	
Less Representation $ — Umpire $ 14.00 — Sampling $ 75.00	39 00	
Balance Due Shipper	594 45	
	740 61	740 61

Less Freight: 9.585 Wet Tons @ 11.18 P.T.

Less Switching — Reset

Less Hauling

Less Representation $ — Umpire $ 14.00 — Sampling $ 75.00

Amount Withheld Pending Receipt of Silver Affidavit

Less Royalty

Checked J. E. H. — Correct Hood — Approved

100M—1-54—MIL

AMERICAN SMELTING AND REFINING COMPANY

GLOBE ~~EL PASO SMELTING WORKS~~ PLANT Denver, Colo.

BOUGHT OF Kraft Building Contractors ~~EL PASO, TEXAS~~ March 17, 1969

ADDRESS 635 Hawthorne St., Boulder, Colo. 80303 SMELTER LOT 55

SHIPPING POINT Central City, Colo. SHIPPERS LOT 3

NAME OF MINE Williams CLASSIFICATION Concentrates

RATES, EXCEPT ON CONTRACTS, SUBJECT TO CHANGE WITHOUT NOTICE PURCHASE TERMS Globe-Open

Mix	Arrival Date	Car Number	Car RR	Gross Weight	Containers No.	Containers Weight	Wet Weight	% H_2O	Dry Weight
	2/12/69	Truck					31,830	12.7	27,788

Quotations		
Coinage Silver	¢	per oz.
Foreign "	180.525	per oz.
Lead $	14.08	per cwt.
Copper	43.824	¢ per lb.
Gold	42.52	/oz.
B/L Date:		

Assays	Oz. per Ton Gold	Oz. per Ton Silver	Wet Lead %	Copper %	Insol %	SiO2 %	Iron %	Mn %	Lime %	Zinc %	S %	Al_2O_3 %	As %	Sb %	Bi %	%
Smelter	1.01	16.1	20.7	1.1												
Shipper	1.04	16.0	21.7	1.5												
Umpire	—	—	21.35	1.36												
Metallics																
Settle	1.025	16.05	21.35	1.36												

Values Per Ton

Payment	Pay Content	Price	Amount	Freight (Fixed)
Gold 92.57 %	.94884 oz	42.52	40 34	40 34
Silver, Less 5 % Min. 1	15.05	1.780 oz	26 79	26 79
Lead, Less 1.5 @ 90 %	357.3	.114	40 73	15 72
Copper, Less 20# @ 100 %	7.2	.34524	2 49	.34
Gross Value			110 35	83 19
Less Deductions (Net Charge)			12 00	12 00
Freight Value			x x x	71 19
Net Value			98 35	@ 13.894

Deductions	Charge	Credit
Base, Incl. Labor Adj.	12 00	
Excess Value Over $		
¢ Per Unit Pb + − %		
Lead—Copper Price Escalator		
Bullion Freight Tax		
Insol—Silica		
Iron—Lime		
Zinc		
As: Sb: Bi:		
Net Charge	12 00	
=62.15 Wet Ton		
Dry Tons		

	Debits	Credits
Dry Tons		136 47
Less Freight: 15.915 Wet Tons @ 11.18		
P.T. Tax	177 93	
Reset		
Less Switching		
Less Hauling		
Less Representation $ Umpire $ Sampling $ 25.00	25 00	
Amount Withheld Pending Receipt of Silver Affidavit		
Less Royalty		
Balance Due Shipper	1163 54	
Approved	136 47	136 47

Checked [illegible] Correct [illegible]

Exhibit "A"

Post Office Box 663
Boulder, Colorado 80302
May 29, 1969

Mercantile Bank and Trust Company
13th and Walnut Street
Boulder, Colorado 80302

Gentlemen:

On behalf of Cardinal Mining Company, a partnership in which I am associated with M. J. Kraft and Duane A. Kraft, building contractors in Boulder, I wish to negotiate a loan with your bank for exploratory funds to be used at our Treasure Key Mine at Blackhawk, Colorado.

The amount required will approximate $92,604.65.

Sincerely yours,

H. Leon Bird

HLB/lcf

Mercantile Bank and Trust Co. • 13th & Walnut Streets • Boulder, Colorado 80302 • 442-3734

May 16, 1969

Cardinal Mining Company
635 H awthorn Ave.
Boulder, Colorado 80302

Attention: H.L. Bird

Dear Mr. Bird:

Your request for the extension of credit for the development of your company's mining interests does not meet our credit requirements. The application is therefore denied.

If you have any questions or if we can offer assistance in any other way on this matter, please do not hesitate to call on us.

Very truly yours,

Roland J. Newton
Assistant Vice President

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
9/17/70	Emerick	120
9/17/70	Kirkemo	120
9/17	Linnden	
		220

SEP 18 1970

AIRMAIL

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Re: OME-6798 (Gold-Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

Gentlemen:

A careful review of your application for financial assistance to explore the subject property and other information available to us indicate that the probability of disclosing significant reserves of gold and silver on your property is not sufficiently promising to justify Government participation in the proposed exploration. Accordingly, we regret to inform you that your application for assistance is denied.

We wish to thank you for your interest in the minerals exploration program and for bringing your property to our attention.

Sincerely yours,

Harold Kirkemo (bsl)

Harold Kirkemo
Chief, Office of
Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
Mr. Emerick
OME Region III
130

WLEmerick/bsl 9/17/70

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
9/17/70	Emerick	120
9/17/70	Kirkham	120
		220

September 17, 1970

Memorandum

To: The File

From: William L. Emerick
Office of Minerals Exploration

Subject: OME-6798 (Gold-Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

Justification for Denial of Application

The Applicant proposed to explore for gold and silver-bearing ore shoots within and near two merging veins by drifting and long-hole drilling followed by core drilling from the completed drift to test a parallel vein. Total estimated cost of the project amounted to about $92,605.

The production history of the property is not impressive. The ore bodies that occur in the veins of the property are principally a galena-sphalerite type ore shoot which Survey geologists indicate are typical of the mineralized zone surrounding a central area of pyritic gold veins in the Central City district. These galena-sphalerite type ore shoots carry significant amounts of silver and gold at times but mostly are small and low grade. One such small ore shoot was mined out by the Applicant and smelter returns included with the application show that the net return on the concentrates amounted to about $2,200. Considerable core drilling has been done in testing the veins of the property but none of the results of the drilling are included with the application.

The Field Examiner recommends denial of the application because the results of his examination indicate little chance of finding gold and silver-bearing galena-sphalerite ore bodies of significant size and grade in the two veins on the property. His

recommendation is based on the following reasons: (1) both veins have been well prospected on the surface and do not disclose much evidence of valuable mineralization, (2) the erratically trending tight fractures of one vein indicate horizontal splitting into branches that are too small and too widely-spaced to be very productive, (3) the probability of encountering a significant quantity of ore along a conjectural trace of an intersection or junction of the two veins is not believed to be great enough to justify the cost of exploration by core drilling from the surface or by raising from the tunnel level to find it, (4) sufficient core drilling has been done to demonstrate the apparent absence of any nearby parallel vein structures, and (5) all geological evidence points to the probability that continued drifting to the southwest would not discover ore bodies any larger or more valuable than the one already mined.

After reviewing the application and the Field Examiner's report of examination I concur that the application be denied.

William L. Emerick

William L. Emerick

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
Mr. Emerick

WLEmerick/bsl 9/17/70

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
FEDERAL CENTER, DENVER, COLORADO 80225

Office of Minerals Exploration
Building 53 Room 200

August 28, 1970

Memorandum

To: Chief, Office of Minerals Exploration

From: Field Officer, Region III

Subject: OME-6798 (Gold-Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

Transmitted herewith is a report of examination on the Cardinal Mining Company's Treasure Key Tunnel, examined and written by Philip B. Mudgett, Mining Engineer, U. S. Geological Survey.

Mr. Mudgett concludes that the chances of discovering significant new and undiscovered reserves of gold and silver of ore grade with the exploration program proposed by the applicant are not good and therefore recommends that the application be denied. I have reviewed the report and concur with the conclusions and recommendations of Mr. Mudgett.

J. William Hasler

J. William Hasler,
Field Officer, Region III
Office of Minerals Exploration

Enclosure

Office of Minerals Exploration
Building 53 Room 200

August 26, 1970

Memorandum

To: J. William Hasler, Field Officer, Region III, OME

From: Philip B. Mudgett, Mining Engineer

Subject: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Tunnel Property
Gilpin County, Colorado

Attached is my report covering the field examination of the above mining property.

Denial of the subject application is recommended because the chance of finding ore bodies of significant size and grade are not good.

Philip B. Mudgett

Philip B. Mudgett,
Mining Engineer

cc: OME-6798
OME chron
Mr. Hasler
Mr. Mudgett

UNITED STATES

DEPARTMENT OF THE INTERIOR

WALTER J. HICKEL, SECRETARY

GEOLOGICAL SURVEY

OFFICE OF MINERALS EXPLORATION

REPORT OF EXAMINATION

REGION III

On-Site Exam Report

OME-6798 (GOLD AND SILVER)

CARDINAL MINING COMPANY

TREASURE KEY TUNNEL

GILPIN COUNTY, COLORADO

By

PHILIP B. MUDGETT

MINING ENGINEER

JULY 1970

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OME-6798 (Gold and Silver)

CARDINAL MINING COMPANY

TREASURE KEY TUNNEL

GILPIN COUNTY, COLORADO

SUMMARY

The Cardinal Mining Company applied for federal assistance to explore for gold and silver on the Treasure Key Tunnel property near Central City and Blackhawk, Colorado, on May 28, 1969. The applicant proposed to explore for ore shoots within and near two merging veins on the tunnel level by drifting and long hole drilling followed by core drilling from the completed drift to test a parallel vein at a cost of $92,604.65. The application was referred to the field on March 30, 1970, and an examination was made by Philip B. Mudgett on May 20, 1970.

The property is comprised of six patented and three unpatented lode mining claims situated in the Lake Gulch area of the Central City Mining District in Gilpin County, Colorado. The applicant holds tax title to the patented claims, and possessory rights to the unpatented claims, without emcumbrances of any kind.

The early history of the property is not known, but lateral development of the veins on the tunnel level by two companies since 1954, resulted in the total production of an estimated 300 tons of hand-sorted ore in 1968, worth an estimated $22.00 per ton. Concentration of this ore, and the subsequent shipment of about 27 tons of concentrates to the Globe smelter

in Denver netted $2,654.94.

Other sizable, but caved and inaccessible workings on the property include those in the Williams mine and the Mingo shaft for which no published records are available. However, the Justice mine, located on the same vein as the nearby Williams mine, yielded ore worth nearly $96,000.00 at present prices during the period 1904-1954. This compares with the applicant's reported total production of ore from the mine since 1860 as being worth several hundred thousand dollars.

The short Treasure Key, or Williams tunnel provides access to the so-called Williams vein drift, about 2,400 feet long, and a short crosscut at 1,900 feet connects it with a drift on the parallel Vertical vein nearly 120 feet long. A 100 foot long crosscut into the hanging wall of the Vertical vein, and one small stope above the drift includes all other development of any significance. The nature of the other underground workings extending from the caved Williams mine and Mingo shafts elsewhere on the property is not known.

The geology of the Central City district has been described by Sims, Drake and Tooker (1963). In the Lake Gulch area, biotite schist and granite pegmatite of pre-Cambrian age are cut by bostonite dikes of Tertiary age. The ores are typical of the galena-sphalerite zone that surrounds a central area of pyritic gold veins in the Central City district. Northeasterly trending and steeply dipping fissures have been filled by veins that contain galena, sphalerite, chalcopyrite, silver and gold, in a gangue of quartz.

On the property, drifting on the two parallel, northeasterly trending and steeply dipping narrow quartz-filled veins in altered biotite gneiss and pegmatite wallrocks has resulted in the discovery of only

one small ore shoot on the Vertical vein containing galena, sphalerite, chalcopyrite, gold and silver. On the surface, the Williams vein has split into tight fractures in altered biotite and pegmatite over much of its exposed length. Near its northeast end, however, both the Williams veins and the parallel Vertical vein are in similar wallrocks but they are quartz-filled and from 4 inches to 18 inches wide.

The absence of sampling and drillhole data leaves all stated mineral values open to question including that of $22.00 per ton for the reserve estimate of 300 tons of broken ore remaining in the mined out stope on the Vertical vein.

The applicant believes that a southwesterly extension of the drift on the Vertical vein would encounter substantial ore bodies where core drilling indicated mineral values, also at the vein's vertical intersection with the Williams vein, and from that point thence on the Williams vein to the Williams mine because of known mineral occurrences near each point; supplementary long hole and core drilling in the walls of the Williams vein could also be expected to encounter ore.

Although the applicant's cost estimate of $92,604.65 is reasonable, inclusion of maintenance costs for his operating equipment would increase this total. Also, necessary delay in commencing core drilling would increase total time for project completion from 12 months to 14 months.

The results of the examination, however, indicate little chance of finding galena-sphalerite ore bodies of significant size and grade in the two veins, and, therefore, it is recommended that the application be denied.

Introduction

The Chief, Office of Minerals Exploration, in his memorandum of March 30, 1970, referred the subject application, Docket No. OME-6798 (gold and silver) Cardinal Mining Company, Treasure Key Tunnel, Gilpin County, Colorado, to the Field Officer, Region III, for further study, a field examination, if warranted, and recommendations.

Subsequently, the application was reviewed and studied by Philip B. Mudgett who made an on-site examination of the property on May 20, 1970, accompanied by the applicant's representative, H. Leon Bird, Mining Geologist from Erie, Colorado, and a partner in the applicant company.

Location and Accessibility

The Treasure Key Tunnel property is located about one mile southwest of Black Hawk, Colorado (pop. 166), in the NE-1/4 section 18, T. 3 S., R. 72 W., Gilpin County, Colorado, within the lower Lake Gulch area of the Central City Mining district.

The tunnel portal is located about one mile southwest of Blackhawk, Colorado, on the south bank of North Clear Creek across the stream from paved State Highway 119 at an altitude of 7900 feet above sea level. Access to the portal from the highway is had over a short connecting road and bridge spanning the stream.

Property

History and Production

A fairly comprehensive history of mining and many mineral production data for the Central City Mining District are contained in U. S.

Geological Survey Professional Paper 359, Economic Geology of the Central City Mining District, Gilpin County, Colorado, by Sims, Drake and Tooker (1963), and the writer has drawn freely upon this source of information. However, very little of such information is to be found anywhere about the subject property. The above authors state that the early history of the property, then named the Williams Tunnel, is not known, but that it was reopened and rehabilitated in 1954, and, in 1955, the tunnel was being extended southwest toward Justice Hill. "The mine is a drift tunnel, about 945 feet long that bears about S. 35° W. The vein developed by the tunnel is correlated by the property owners with the ore developed by the Williams mine in Lake Gulch; although these two veins line up fairly well in strike, their correlation is tenative at best." A stope 10 feet high on a narrow cross vein at 270 feet reportedly yielded 325 ounces of silver. Otherwise, the entire main vein was found to be barren.

In the applicant's historical account of the property, it is stated that in 1955, the tunnel was extended to about 2,500 feet by the Consolidated Gold and Uranium Company which also conducted a core drilling program that disclosed some mineralization that was not explored when its operations ceased. After acquiring the property in 1967, the applicant did an unspecified amount of core drilling which resulted in the discovery of the mineralized Vertical vein about 135 feet northwest from the tunnel drift at a point 1,900 feet in from the portal. Subsequent crosscutting, and drifting on the vein developed a small ore shoot from which an estimated 600 tons of ore having a gross value, excluding zinc, of about $22.00 per ton were mined. In late 1968, 300 tons of this ore was hand-sorted and concentrated in

the company-owned "Boodle" mill of 40 tons per day capacity located 1/2 mile west of Central City. Shipment of the concentrates to the Globe smelter in Denver, Colorado, resulted in a net smelter return of $2,654.94 for a total of 27.3495 dry tons containing 1.15 oz. gold, 16.67 oz. silver, 20.61% lead and 1.28% copper per ton. The remaining tons of mined ore was left in the stope.

Other sizable underground workings on the property are the Williams mine and the Mingo shaft (see figure 1), but no historical or production information about them is available. However, the following information from Professional Paper 359 about the Justice mine on the same vein structure as the Williams mine might be indicative of the production for the Williams mine and of the potential production possibilities for the applicant's northeasterly projection of the Williams vein as well. "The Justice vein, one of the most persistent in the district, can be traced from Justice Hill across Lake Gulch, where one branch of it was worked in the Williams mine." The total production from the Justice mine during the period 1902 - 1954 is tabulated as follows:

Crude ore shipped (tons)	Concentrate shipped (tons)	Gold (ounces)	Silver (ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)
4,030	320	1,453.54	8,434	36,180	28,238	26,065

At present day prices, the above quantities of metals have a total value of $95,806.00. The applicant claims a reported production of "at least several hundred thousand dollars" for the Williams mine since 1860.

Although nothing is known about the history of the Mingo shaft,

the absence of mineralized vein material on the adjacent dump suggests that no ore was found in it.

Ownership

The property consists of 6 patented and 3 unpatented lode mining claims. The patented claims are owned by the applicant, the Cardinal Mining Company (a three-man partnership), under a tax title from the county commissioners of Gilpin County, Colorado. The unpatented claims are recorded as having been located for the company. The applicant's statement about certain rights on the unpatented claims being "reserved by the Government under the Multiple Use Act" refers to the Government's right to manage and dispose of the vegetative and mineral material (common varieties of sand, gravel, pumicite, cinders, etc.) resources on all unpatented mineral locations since the enactment of Public Law 167, July 23, 1955, as amended.

Both patented and unpatented claims are free from encumbrances of any kind.

All of the claims are situated in the NE-1/4 of section 18, T. 3 S., R. 72 W., Gilpin County, Colorado, and are identified on the county records as follows:

Patented Claims

Claim Name	Patent Number
Williams	295
Williams	488
East Williams	588

Patented Claims

(Continued)

Claim Name	Patent Number
Intermediate	786
Mingo	15824
Mingo No. 2	15824

Unpatented Claims

Claim Name	Book	Page
Justice East Extension	186	580
West Williams	257	375-376
South Williams	262	153-154

Development

The 6' x 8' Williams tunnel is 120 feet long and it provides the only means of entrance and ventilation to the connecting underground workings. The workings consist of only two parallel drifts, 2,380 feet and 120 feet long, on the tunnel level linked by a crosscut 135 feet long.

Ore and waste is hauled by mule to the outside in trains of coupled hand-tramming type cars of one ton capacity over 18 inch gauge track equipped with 16 pound rail. An electrically powered portable air compressor (210 cu. feet per minute at 100 lbs. PSI) parked near the portal furnishes compressed air for drilling through a 2-inch overhead pipe line to the drift faces. Natural ventilation is supplemented by air forced through 12 inch diameter plastic tubing from a small centrifugal type fan at the portal. A crudely constructed grizzly

and open-topped inclined chute on the side of the waste dump serve as a loading facility for ore haulage by truck.

The nature of the underground workings extending from the caved 720 foot (?) deep Williams shaft and the caved 350 foot (?) Mingo shaft elsewhere on the property is not known.

Geology

Geologic Setting

The geology of the Central City district is described in U. S. Geological Survey Professional Paper 359 by Sims, Drake, and Tooker (1963).

The Treasure Key Tunnel property is situated in the Lake Gulch area in the northeastern part of the Central City mining district. "The district is on the east slope of the Front Range, near the east edge of a rugged glaciated area that extends westward to the crest of the range. It lies within a terrain of Precambrian crystalline rocks which constitute the core of the Front Range. These rocks are intruded by many small dikes and irregular bodies of porphyritic igneous rocks of early Tertiary age and are cut by abundant, steep faults which contain the ore deposits of the district."

"The ore deposits are mostly veins that were formed principally as fissure fillings. They consist mainly of pyrite, sphalerite, chalcopyrite, tennantite and galena in a quartz gangue, and are chiefly valuable for their gold content. They are similar in structure, mineralogy, and texture to the deposits classified by Lindgren as mesothermal. The veins are distributed according to a well-defined,

concentric zonal arrangement. A core of pyrite veins (central zone) is surrounded by a peripheral zone of galena-sphalerite veins; an intermediate zone contains transitional veins that consist of minerals characteristic of both the central and peripheral zones. Most of the important mines are in the intermediate zone. The ores were formed during the Laramide orogeny and were derived from the magmas that consolidated to form the porphyries of the district."

"The veins range from simple, well defined fissure fillings to complex branching lodes. The simple veins consist of a single filled fissure that generally has smooth, sharp walls bounded by a narrow, persistent zone of altered wallrock. They commonly range from 1 to 3 feet in width."

"Although the ore bodies were localized by several types of structural controls, most of them formed at vein intersections or junctions. Many others were localized by the lithologic character and structure of the wallrocks. These ore bodies commonly plunge nearly parallel to the trace of the intersection of the vein fissures and the foliation of the wallrocks."

"The upper parts of the sulfide veins have been subject to supergene alteration. Gold was enriched on the upper oxidized parts of the veins, commonly to depths ranging from 50 to 75 feet, and silver and copper were locally enriched below the oxidized zone."

The Treasure Key Tunnel property is in the zone of galena-sphalerite veins. The rocks are biotite gneiss and pegmatite. Two veins have been laterally developed by the tunnel, the so-called Williams vein and the

parallel vertical vein to the northwest (figure 1).

As exposed on the tunnel level, the Williams (?) vein is a weak, substantially barren quartz-filled fissure that is never more than a few inches in width with many thin branches passing into the walls. It strikes about N. 35° E. and in dipping steeply to the southeast seems to be unrelated to the recognized Williams vein exposed near the Williams mine.

On the surface 8,600 feet above sea level, the recognized Williams vein is exposed about 465 feet northeast of the Williams mine shaft in a pit-like opening where a raise was holed through at the vein's intersection with the Williams Crossing fault. At this point the barren appearing, quartz-filled vein is about 2 feet wide, strikes N. 40° E. and dips 70° to the northwest. The fault strikes about N. 49° W. and dips 85° northeasterly, but its intersection with the vein is obscured by sloughing of the pit walls. The applicant has attempted to find the faulted vein northeast of the intersection by trenching across its projected strike line as much as 70 feet on each side for a distance of nearly 300 feet.

The trenching, and several old prospecting pits, have exposed several discontinuous and erratically trending tight fractures within narrow zones of altered biotite gneiss and pegmatite. Following the projected trend of the strongest appearing fracture, it has apparently been exposed in several widely spaced trenches along a recurving strike line for 600 feet where it seems to roughly assume the projected strike line of the Williams vein. A quartz-filled vein 8 inches wide

showing in a trench at this point, can be traced for 85 feet along the projected strike line before it disappears beneath the thin mantle of alluvium. A small, nearly-filled vertical shaft has been sunk where the vein is about 18 inches wide to an estimated depth of 74 to 100 feet as indicated by the size of the adjacent barren appearing waste dump. The applicant's continued northeasterly projection of the vein is based on the presence of several old caved pits in line with the exposure of several thin quartz veinlets in a trench some 360 feet away. The "Branch" vein shown on the map (figure 1) as striking N. 25° E. and dipping 70° appears in an old pit as a tight fracture within a narrow zone of altered biotite gneiss about 12 inches wide.

The parallel Vertical vein is exposed in a drift 120 feet long on the tunnel level as a nearly vertical, quartz-filled vein about 4 inches wide striking N. 35° E. The wallrock is altered biotite gneiss and the vein is unmineralized except for about 55 feet near the northeast end of the drift where it contains small quantities of galena, sphalerite, and chalcopyrite. A shrinkage stope above this showing was inaccessible.

On the surface, a nearly vertical vein has been exposed in several old pits and shafts that aligns reasonably well with the Vertical vein on the tunnel level. It is a barren, quartz-filled vein about 12 to 18 inches wide in altered biotite, gneiss striking N. 42° E. From its initial northeastern exposure in a shallow pit, it can be observed in two old shafts along a southwesterly strike distance of about 170 feet. Continuation of the vein to the caved Mingo shaft

is suggested by the presence of two old caved pits and the exposure of a few quartz veinlets in altered biotite gneiss within a nearby trench. But the steeply dipping veinlets are striking N. 23° E. and their connection with the Vertical vein is obscured by alluvium.

Ore Deposits

Ore occurs in shoots within the vein structures as indicated by the small, mined-out stope in the Vertical vein above the tunnel level. Galena and sphalerite were the most abundant ore minerals and the shoot varied from a few inches to as much as 36 inches in width. Other dimensions of the northeasterly plunging shoot were not available but the small showing of primary sulphides in the drift back suggest a horizontal length of about 50 to 60 feet. The weakly argillized and and silicified wallrocks of biotite gneiss and pegmatite contain no obvious evidence of structural or chemical control of ore deposition.

Small pods of ore may also occur, such as the one mined out on a cross vein near the tunnel portal.

Sampling and Ore Reserves

Although much core drilling has been done along the hanging wall of both veins on the tunnel level, no core, drill hole logs, or analytical results were available and very little general information about it could be obtained. Mineralization supposedly encountered at 100 feet in one of several holes drilled into the hanging wall of the Vertical vein (see figure 1) was not found in a subsequently driven crosscut that does not appear on the map. Another hole shown as cutting the Vertical vein about 80 feet southwest of the present southwest drift face was reported as penetrating more than 5 feet

of altered rock containing $7.00 worth of gold, silver, lead and zinc. However, close questioning disclosed that the mineralized sample submitted for analysis consisted of a composite collection of core fragments and sludge of questionable representation.

Apparently little, if any, other kind of sampling was done anywhere in or about the mine.

Ore reserves appear to consist of 300 tons of broken ore remaining in the mined out shrinkage stope on the Vertical vein. The reliability of both the tonnage figure and the reported value of $22.00 per ton for this ore is questionable.

Exploration

Applicants' Proposal

At an estimated cost of $92,604.00, the applicant proposes to explore for gold and silver-bearing galena-sphalerite type ore shoots in the Vertical and Williams (?) veins by drifting on the tunnel level supplemented by long hole and core drilling for possibly mineralized structures parallel to the Williams (?) vein. Drifting would commence at the southwest face of the tunnel level drift on the Vertical vein and proceed southwesterly to the presumed junction with the Williams (?) vein and thence on the Williams (?) vein to its intersection with the Williams crossing fault. The walls of the Williams (?) vein would also be explored for parallel veins at 100 foot intervals by long hole drilling, and two holes would be core drilled in the footwall near the fault to test the northerly extension of the east branch of the nearly parallel, recognized Williams vein.

The total of 1,300 feet drifting would be completed in 48 weeks at the rate of 109 feet every 4 weeks. Long hole drilling would require 6 weeks at 1,000 feet per month and core drilling 4 to 5 weeks at 20 to 25 feet per day. Total time required is estimated at 12 months even though the core drilling could not be accomplished until the drifting was completed. A more realistic estimate would probably be about 14 months.

The applicant supports his proposal with the following objectives and reasons.

"1. Exploration of the Vertical vein in an area where additional ore can reasonably be expected.

2. Exploration of the Williams-Vertical vein junction which offers an attractive target since such structural environment has proven to be favorable in the Central City district.

3. Exploration of the Williams vein between its junction with the Vertical vein and the Williams Crossing fault. This portion of the vein lies between known occurrences of silver, gold, lead and zinc mineralization on the Vertical vein to the northeast and on the Williams vein to the southwest."

"In addition, since the plunge of known ore shoots on the southeast side of the Central City anticline is dominantly down and to the northeast in the veins, it is possible that ore will be found in the Williams vein in proximity to the Williams crossing fault with such structural control."

"To enhance the effectiveness of the exploration it would be

advisable to drill crosscutting long holes into the vein walls at intervals of 100 feet to explore the possibility of the occurrence of ore in parallel structures."

"It is further recommended that two exploratory holes be drilled into the footwall of the Williams vein zone at the southwest end of the drifting to explore the northerly extension of the east branch of the Williams vein as shown on the accompanying map."

Development of Unit Costs for Drifting

Labor (without F.I.C.A.)	$26.60
Explosives	3.40
Fuse and Ignitacord	.62
Caps, Igniters and Spitter	.38
Track	2.00
Pipe-water	.08
Pipe-air	.45
Fuel, oil and gasoline	1.70
Electricity	.30
Hoses	.15
Ventline	.60
Compressor	4.00
Drills	2.00
Steel	2.00
Hand tools	.65
Tramming -- mule and feed	.40
	$45.33

Long Hole Drilling estimated	$2.00
Diamond Core Drilling based on estimated bid by Boyles Bros. Drilling Company	8.00
Timber allowance estimated	12.00

Cost of Proposed Exploration

Tunnel Work

1,300 lineal feet of 6'x6' drift at $45.33 per foot		$58,929.00
325 lineal feet of timbering at $12.00 per foot		3,900.00
Total drifting cost		$62,829.00

Exploratory Drilling:

24 50-foot long-holes at $2.00 per foot		$2,400.00
2 250-foot core drill holes at $10.00 per foot		$5,000.00
Total Direct Exploratory Expense		$70,229.00

General Expense

Superintendent -- $900.00 per month 12 months		$10,800.00
Geologist -- $75.00 per day 2 days per month	$150.00	
Per diem expense at $16.00 per day 2 days	32.00	
Travel allowance at 12¢ per mile 160 miles per month	19.20	
Total per month	$201.20	
12 months		$2,414.40
F.I.C.A. Tax -- 12 months		$1,722.50
Workman's Compensation -- 12 months		$1,722.50

Assaying	
2 samples per round 260 rounds	
5 metals: Au, Ag, Cu, Pb, Zn at $7.00 per assay	$3,640.00
Employee's Liability Insurance	$1,476.25
Accounting at $50.00 per month -- 12 months	600.00
Total General Expense	$22,375.65
Add Direct Exploratory Expense	$70,229.00
Total Exploration Contract	$92,604.65

Although the foregoing cost estimate appears to be a reasonable one as far as it goes, the applicant has not provided a list, described the condition, evaluated, or included an estimate of maintainance costs of the operating equipment to be supplied by him; nor has he supplied sufficient information about costs of mine labor and supplies to allow for a comparison with other similar data. The inclusion of costs for maintaining operating equipment would probably increase the estimated total contract cost by about $1,000.00.

Conclusions and Recommendations

The results of the field examination and much study of the pertinent literature indicates that the chances of finding galena-sphalerite type ore bodies of significant size and grade in the two veins on the applicant's property are not good, and it is, therefore, recommended that the application be denied.

This opinion is based on the following reasons. Both veins have been well prospected on the surface without disclosing much evidence of valuable mineralization. Also, regardless of the unknown effect

of the Williams Crossing fault on the recognized Williams vein, the erratically trending tight fractures continuing to the northeast indicate horizontal splitting of the vein into branches that are too small and too widely spaced to be very productive. The northeasterly parallel outcrops of the Williams (?) and Vertical vein display greater widths that suggest a better potential for exploration on the tunnel level. However, a projection of these two veins at depth seems to place their intersection or junction well above the tunnel level, thus eliminating this target from the proposed drifting program. The probability of encountering a significant quantity of ore along the conjectural trace of this intersection or junction is not believed to be great enough to justify the cost of exploration by core drilling from the surface or by raising on the Vertical vein from the tunnel level to find it.

One small body of ore has been found in the Vertical vein on the tunnel level in 120 feet of drifting that was too small and too low grade to be mined at a profit. Ore shoots in the galena-sphalerite veins are commonly small and low grade, and it is expected that continued southwesterly drifting might encounter no more than one or two such bodies at best.

The significance of the questionable analytical data from the cored drill hole 80 feet in advance of the southwest face of the tunnel level drift on the Vertical vein is debatable. But at the modest cost of less than $5,000.00, the applicant could well afford to extend the drift to determine its import.

Sufficient core drilling has been done to demonstrate the apparent absence of any nearby vein structures parallel to the Vertical vein

on the tunnel level, and all geological evidence points to the possibility that continued drifting to the southwest might encounter no more than oneoor two ore bodies no larger or more valuable than the one already mined.

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
3/30/70	Peterson	120
		120
		220
		120M

MAR 30 1970

AIRMAIL

Memorandum

To: Field Officer, Region III

From: Chief, Office of Minerals Exploration

Subject: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

In response to the Applicant's request of March 24, we are resuming the processing of the subject application for exploration assistance, and are referring it to you for further study, a field examination if warranted when you are in the vicinity of the property on other field work of the program, and recommendations.

If a contract is contemplated, the extent of the Applicant's interest in the unpatented claims should be clarified. His statement under Item 2 of the application, Applicant's Right in Land, is confusing. Bids to support the cost estimate are also needed.

Harold Kirkemo (gla)

Harold Kirkemo

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
Mr. Peterson
130

ECPeterson/bsl 3/30/70

MME Form 7
(2/63)

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Date	Surname	Code
3/30/70	Peterson	120
	20 cc	120
		220
		120M

MAR 30 1970

AIRMAIL

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Re: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

Gentlemen:

This will acknowledge receipt of your letter of March 24 requesting that we keep your application for exploration assistance in an active status.

Accordingly, the application is now being referred to Mr. J. William Hasler, Field Officer, Region III, Office of Minerals Exploration, Room 203, Building 53, Denver Federal Center, Denver, Colorado 80225.

Mr. Hasler will notify you if he requires additional information concerning the application. The processing of the application will follow the action outlined in our letter to you dated December 19, 1969.

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 III
Mr. Peterson

ECPeterson/bsl 3/30/70

CARDINAL MINING CO.
635 Hawthorn Ave.
Boulder, Colo. 80302
March 24, 1970

Harold Kirkemo, Chief,
Office of Mineral Exploration,
U.S. Geological Survey
Room 4460, Interior Bldg.
Washington, D. C. 20242

RE: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

Gentlemen:

In response to your airmail letter of March 17, 1970 in which you inquired concerning our interest in our application for O.M.E. exploration assistance we want you to know that we are definitely interested in keeping our application current.

It is our hope that funds for exploration under the O.M.E. program will be available and we will welcome the opportunity to go over the property with Mr. J. William Hasler of the Denver office at that time.

Sincerely yours,

H. L. Bird

Cardinal Mining Co.
By H. L. Bird, Partner

CMC/mc
cc Mr. J. William Hasler
Office of Mineral Exploration
Building 53
Federal Center
Denver, Colorado

COPY
O. M. E.
RECEIVED
MAR 26 1970
INITIAL | DATE

MME Form 7
(2/63)

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Date	Surname	Code
3/17/70	Peterson	120
		120
3/17	CAC	220
		120M

MAR 17 1970

AIRMAIL

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Re: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Tunnel
Gilpin County, Colorado

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 (gh)

Harold Kirkemo
Chief, Office of
Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region III
Mr. Peterson

ECPeterson/bsl 3/17/70

Form 7
53)

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Date	Surname	Code
12/18/69	Peterson	120
		120
12/19	Cal	220
		120M

DEC 19 1969

AIRMAIL

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Re: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Mine
Gilpin County, Colorado

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 Treasure Key mine. 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 (gfa)

Harold Kirkemo
Chief, Office of
Minerals Exploration

: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
OME Region III
Mr. Peterson

Peterson/bsl 12/18/69

MME Form 7
(2/63)

OFFICIAL FILE COPY

Date	Surname	Code
7/17/69	Peterson	120
		120
7/22	cc	220
		120M

JUL 18 1969

AIRMAIL

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Re: OME-6798 (Gold and Silver)
Cardinal Mining Company
Treasure Key Mine
Gilpin County, Colorado

Gentlemen:

Reference is made to your application for exploration assistance dated May 28, 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 (glc)

Harold Kirkemo, Chief
Office of Minerals Exploration

cc: Director's Reading File
Mineral Resources File
OME Docket
OME Reading File
Region III
Mr. Peterson

ECPeterson/bsl 7/17/69

H. LEON BIRD

OME Region III
RECEIVED
JUL 2 - 1969
Denver, Colorado

P.O.Box 663
Boulder, Colo.
July 1, 1969

OFFICIAL COPY
O. M. E.
RECEIVED
JUL 7 1969

INITIALS	CODE
	~~130~~
bsl	120
	120

unassigned

Office of Mineral Exploration
U.S. Geological Survey,
Building 53, Federal Center,
Denver, Colorado

Attention: Mr. J. William Hasler, Field Officer, Region 3

Gentlemen:

Herewith you will find bids from independent contractors on the core-drilling and assaying portions of our application given Docket No. 6798. These bids are sent in response to a request by Mr. Hasler for such substantiation of our estimates of the cost of these items.

At this time I want to correct a typographical error in the application. On page 3 of the " Outline of Geologic Conditions and Proposed Exploration" please change the word " of " in line 2 of paragraph 2 to " on ".

Hoping that you will find this material satisfactory, I am,

Sincerely yours
H. Leon Bird
H. Leon Bird

For:
Cardinal Mining Company,
635 Hawthorn Ave.
Boulder, Colorado, 80302

TELEPHONE MAIN 3-1852
2114 CURTIS STREET
DENVER 5, COLORADO

June 23, 1969.

Cardinal Mining Co.,
c/o H. L. Bird,
P. O. Box 663,
Boulder, Colorado. 80301

Gentlemen:

I am pleased to quote a charge of $7.00 per sample to be run for gold, silver, copper, lead, and zinc, on an estimated 520 samples. The $7.00 figure is arrived at by $2.50 for gold and silver on the same sample, and $1.50 each for the copper, lead, and zinc. So long as there are two determinations on each sample, there is no charge for sample preparation.

Thank you for the opportunity to quote on this work, I am

Very truly yours,

Charles O Parker

CP-a

Raymond P. Heon, Inc.

CORE & ROTARY DRILLING | EXCAVATING & TUNNEL DRIVING | CONSULTING GEOLOGISTS & ENGINEERS | SURVEYS: LAND AND MINE

Main Office:
P. O. Box 280, 1547 Miner St.
Idaho Springs, Colo. 80452
Area Code: 303
Ph: 567-2403 or 567-2135

Branch:
P. O. Box 1158,
Evergreen, Colo. 80439
Ph: 674-5911

June 14, 1969

H. Leon Bird, Geologist
Cardinal Mining Co.
P. O. Box 663
Boulder, Colorado 81302

Dear Mr. Bird:

With reference to your letter of June 10, 1969, and the preceeding telephone conversation, the following is our bid on the two proposed AX size holes to be drilled; culminative drilling to be to a depth of 500 feet. We will drill the two holes as outlined with either a new Boyles Brothers model BBU2, or a new Joy model H15, for $7.50 per foot, with you supplying air and water. We have all the necessary pumps, collection apparatus, etc.

According to your letter, the ground is unkown and therefore, the cost of the bits will be billed to you minus salvage.

The usual down-time provisions will apply as outlined below:

1. Cementing, reaming, setting casing, move in and set up--- $14.00 per hour per shift.

2. Down-time incurred for engineering, geologic studies or in general any down-time incurred for your convenience, will be at the standard rate of $14.00 per hour per shift.

Other costs, i.e., casing, cement, etc. used will be our total cost-- purchase price of the material plus delivery, etc.

In general, it is extremely difficult, if not impossible, to cover all aspects of a proposed drilling program; however, we have found that in doing our utmost to do the best job possible, it is unnecessary to have an extensive drilling contract; and therefore, I am not in the least reluctant to have the above be considered a letter of intent covering your proposed drilling program.

Thank you for allowing us to bid on this job.

Yours truly,

Raymond P. Heon

Raymond P. Heon
President

RPH/dr

EDMUND E. PHILLIPS, VICE-PRES. - GEN. M

M. E. PHILLIPS, SECRETARY

THE COLORADO ASSAYING COMPANY

(Incorporated)

ASSAYERS AND CHEMISTS

2244 BROADWAY

DENVER, COLO. 80201

OUR MOTTO: – *"What there is in it, no more, no less."*

June 1, 1969

Cardinal Mining Company
c/o Mr. H. L. Bird
Box #663
Boulder, Colo.

Gentlemen:

In reply to your recent request for rates on assay work, we quote as follows:

The charges to determine Gold, Silver, Copper, Lead and Zinc on a sample are the flat rate of $10.00 when weight of sample does not exceed 5 pounds. Samples over 5 pounds are 10 cents per pound additional and wet samples are 50¢ per sample additional.

The total charges to assay 10 samples per week for a period of 52 weeks for the five above listed metals, totals $5,200.00 for the 520 samples.

Remittance to cover assay cost should accompany each group of samples submitted.

Thank you for the inquiry. We look forward to serving you.

Yours very truly,

THE COLORADO ASSAYING COMPANY

BY Ed Phillips

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
15865 West 5th Avenue
GOLDEN, COLORADO 80401
Phone (303) 279-7913

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 12, 1969

COPY

Cardinal Mining Company
P.O. Box 663
Boulder, Colorado 80302

Attention: Mr. M.L. Bird

Gentlemen:

The following schedule of items is presented for your consideration as our proposal for drilling holes underground on your property in the vicinity of Central City, Colorado.

ITEMS:

1. Mobilization and demobilization: $200.00

2. Diamond core drilling: AX size - 0.0 to 250', per foot. $7.50

3. Reaming for casing, if required: $3.50 per foot.

4. Cementing and drilling out cement: $17.50 per hour, plus cost of cement or cement substitutes.

5. Delays for your convenience, waiting for cement to set during a regular drill shift, etc.: $14.50 per hour.

6. The following is to be furnished at no cost to Boyles Bros. Drilling Company: Drill stations of suitable size to permit the set up of column mounted drilling equipment with space for handling ten foot long drill rods, compressed air and water in sufficient quantities for drilling at the drill stations.

7. Boyles Bros. will furnish a drill of suitable design and capacity with all fittings, supplies and accessories to perform the work. The drill will be operated a minimum of forty eight hours per week.

Your interest in Boyles Bros. Drilling Company's services is sincerely appreciated. Should there be any question regarding this or any other project, please call on us at your convenience.

Very truly yours,

BOYLES BROS. DRILLING COMPANY

E.G. Tucker, District Manager

EGT/jr

COPY

June 9, 1969

Cardinal Mining Company
635 Hawthorn Avenue
Boulder, Colorado 80302

Subject: OME-6798

Gentlemen:

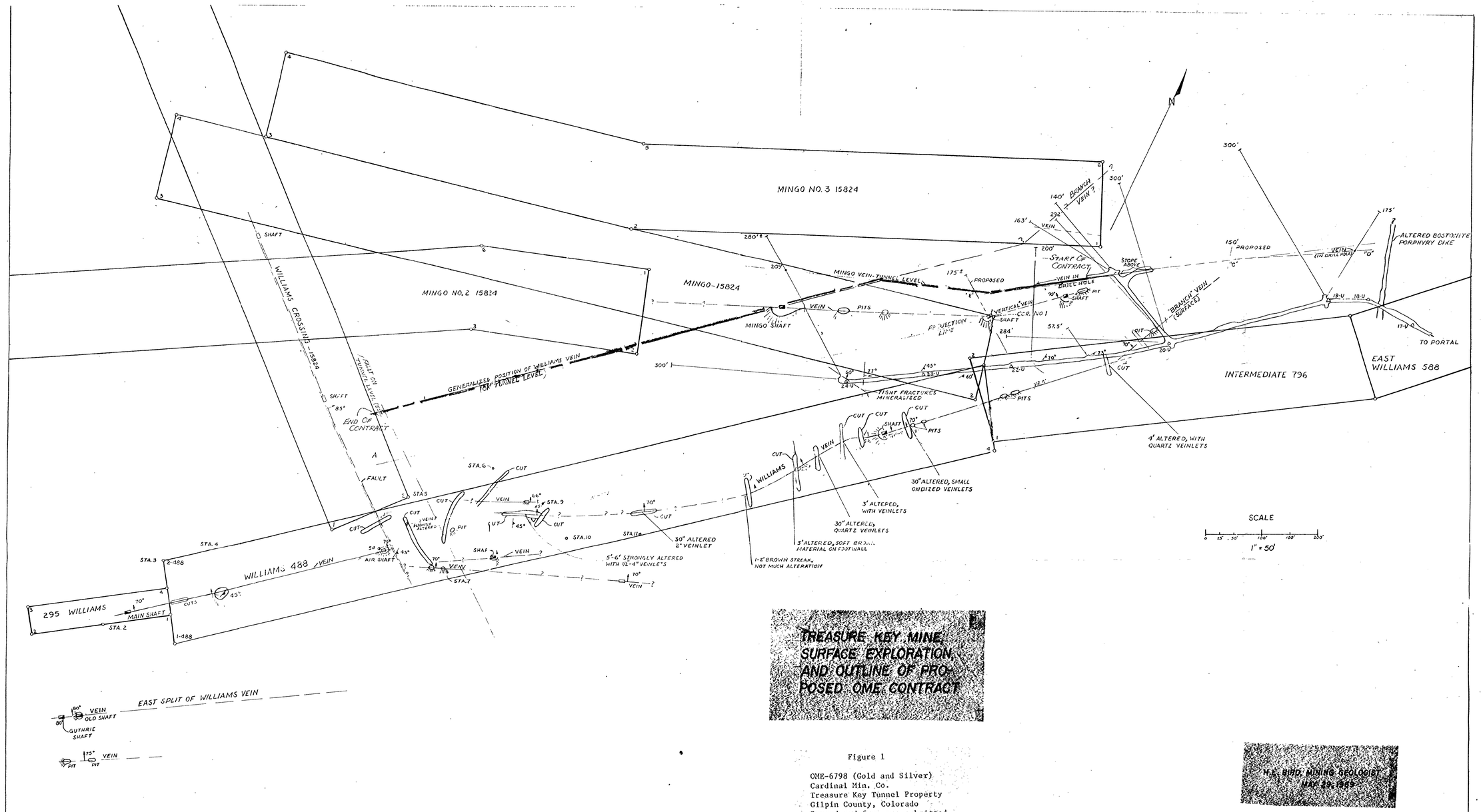
Your application for exploration assistance, dated May 28, 1969, submitted to our office at Denver, Colorado, has been assigned Docket No. OME-6798.

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 III



TREASURE KEY MINE, SURFACE EXPLORATION, AND OUTLINE OF PROPOSED OME CONTRACT

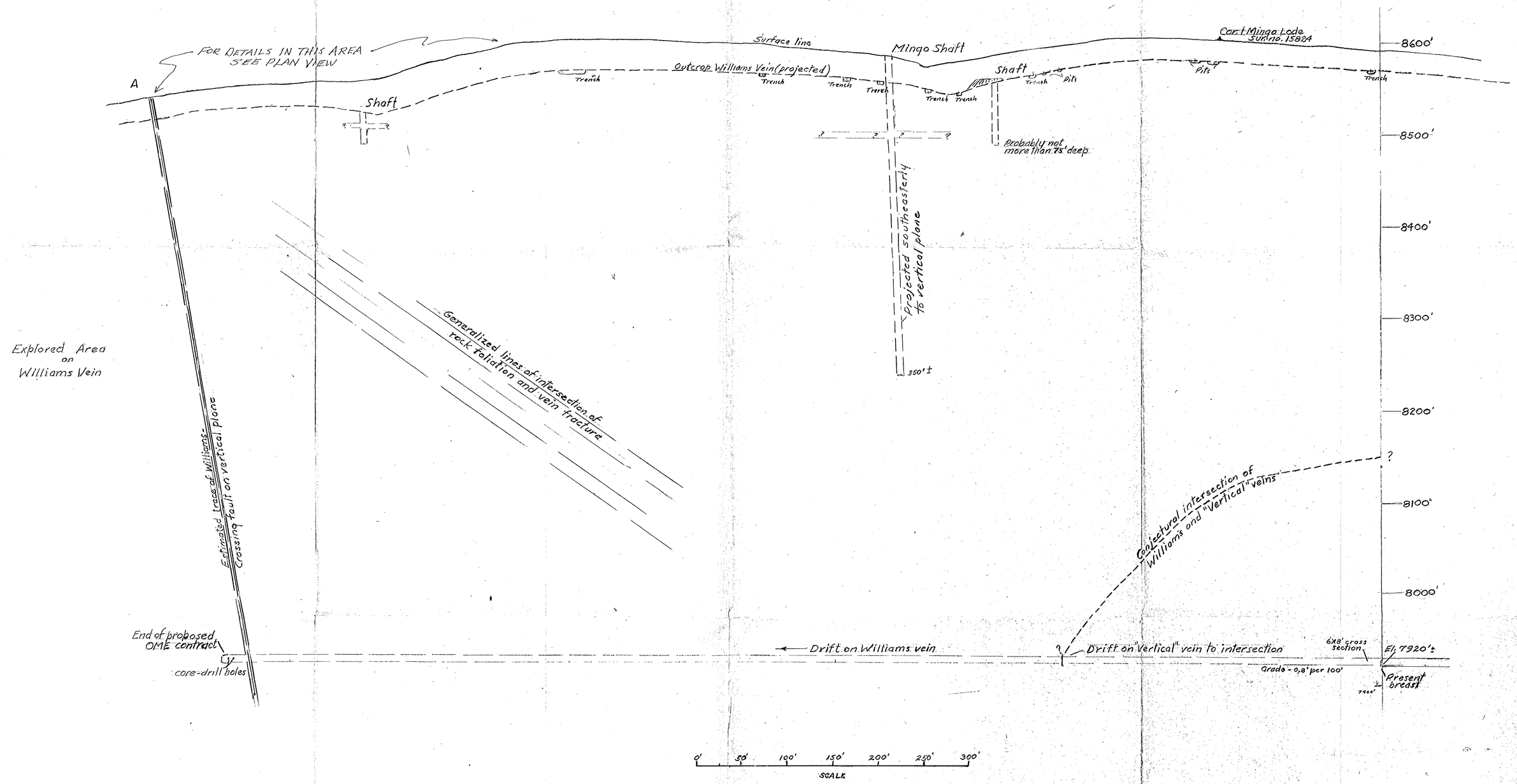
H.E. BIRD, MINING GEOLOGIST
MAY 19, 1969

Figure 1

OME-6798 (Gold and Silver)
Cardinal Min. Co.
Treasure Key Tunnel Property
Gilpin County, Colorado
Reproduced from map submitted by applicant

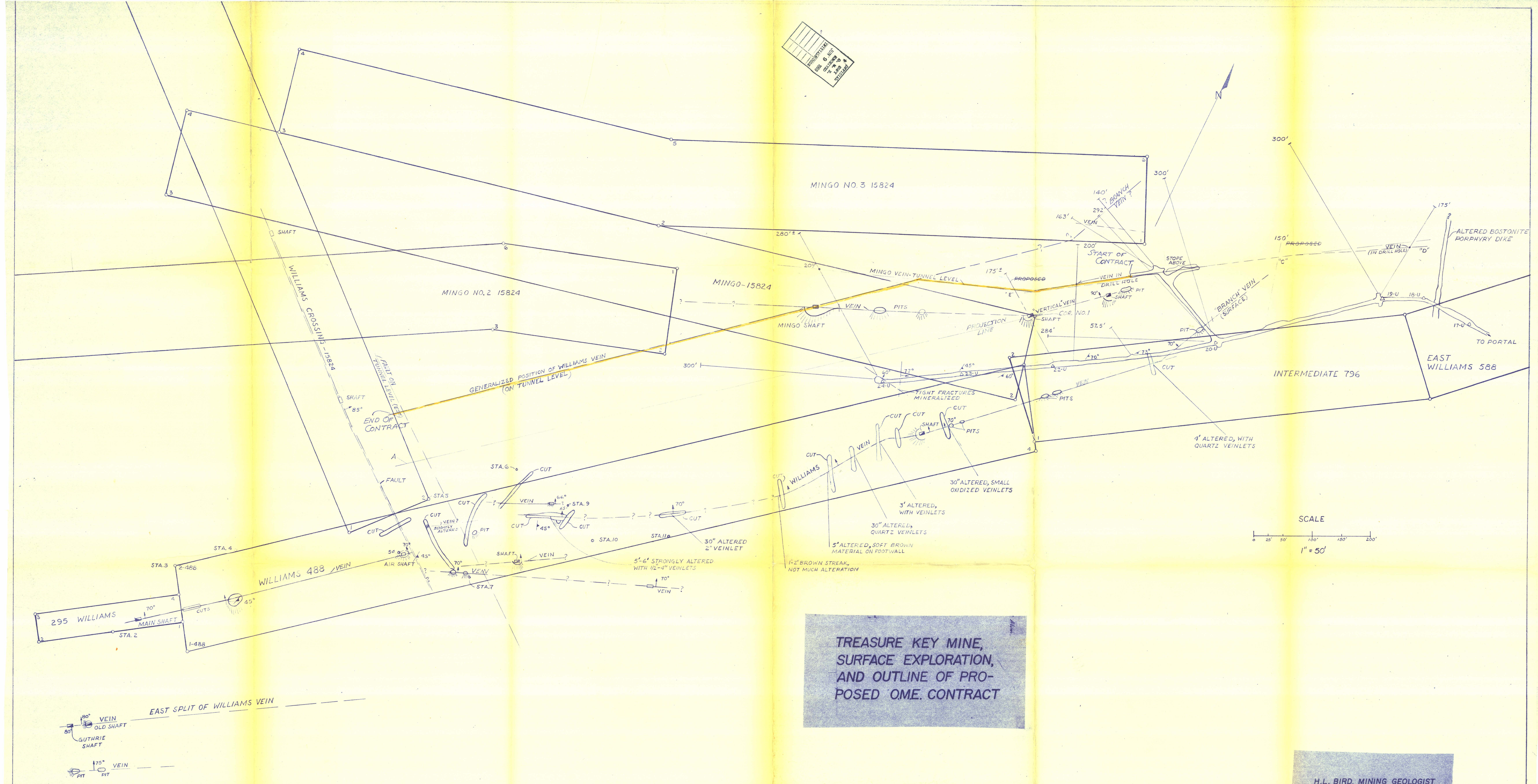
PROPOSED EXPLORATION
TREASURE KEY MINE

LONGITUDINAL PROJECTION TO A
VERTICAL PLANE BEARING N-51°-E
PASSING THRU COR. 1, MINGO LODE
U.S. SURVEY NO. 15824



H.L. BIRD, MINING GEOLOGIST

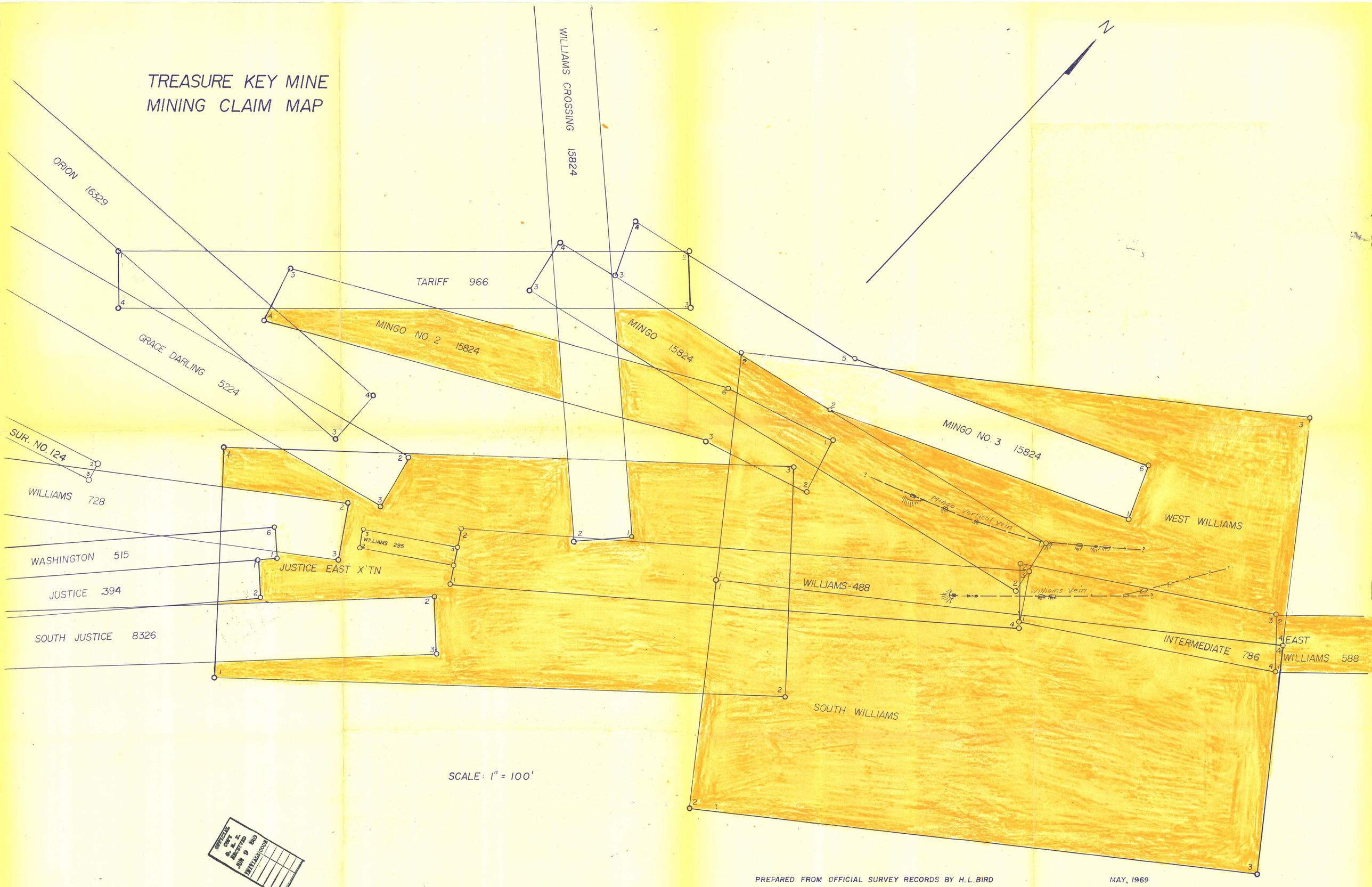
MAY 24, 1969



TREASURE KEY MINE, SURFACE EXPLORATION, AND OUTLINE OF PROPOSED OME. CONTRACT

H.L. BIRD, MINING GEOLOGIST
MAY 29, 1969

TREASURE KEY MINE
MINING CLAIM MAP



SCALE: 1" = 100'

OFFICIAL
DEPT.
O. L. I.
RECEIVED
JUN 9 1969
INTERIM (OOA)

PREPARED FROM OFFICIAL SURVEY RECORDS BY H.L.BIRD

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