DMEA Form 9
Rev. 6/57

UNITED STATES
DEPARTMENT OF THE INTERIOR
Defense Minerals Exploration Administration

OFFICIAL DOCKET FILE Idm-E NO._____ DMEA NO. 4776

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- [x] Withdrawn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
- [ ] Owner's Consent to Lien and Subordination Agreement
- [x] Application and attachments

Right Side

- [ ] Project summary (final)
- [ ] Work Completed analysis (final)

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

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

Additional Folders:

Left Side

Folders No._____: Reports

- [ ] Analysis of Semi-Annual Inspection Reports
- [ ] Project Summary (Interim) by DMEA Engineers

Right Side

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

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

Folders No._____: Settlement Sheets

Folders No._____: Drill Logs

Folders No._____: Royalty material

17963

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
So. 157 Howard Street
Spokane 4, Washington

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DMEA
RECEIVED JUL 1 1957

DATE	INITIALS	CODE

June 28, 1957

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

Re: Transmittal of new application (Lead)
GeoChem Development Co.
Santa Anita Mine
Broadwater County, Montana

Dear Mr. Selfridge:

Enclosed are the original and two copies of an application received from the GeoChem Development Co., a Montana Corporation, Butte, Montana, to explore for lead at the Santa Anita mine, Broadwater County, Montana.

Sincerely yours,

Donald R. MacLaren

Donald R. MacLaren
Alternate Acting Executive Officer

Enclosures
cc: USBM(2)
Geologist

GEOCHEM DEVELOPMENT COMPANY

8 FIRST NATIONAL BANK BUILDING
BUTTE, MONTANA

EXPLORATION, DEVELOPMENT
AND MINING

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[illegible]

MP-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

RECEIVED JUL 1 1957 D.M.E.A.

RECEIVED Certified Mail JUN 28 1957 U. S. G. S. SPOKANE, WASH.

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 4776
Metal or Mineral Lead
Date Received 7-1-57
Estimated Cost $46,936.00
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: GeoChem Development Co., a Montana Corporation; 8 First National Bank Bldg. Butte, Montana. Officers: Forbes S. Robertson, President, P. O. Box 91, Seattle 5, Wash. E. Eugene Hamilton, Vice President, 2909 State Street, Butte, Montana L. P. Johnson, Secretary-Treasurer, 2718 Edwards Street, Butte, Montana

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners.

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract Santa Anita patented claim, Sur. No. 9585, Broadwater County, Montana, loc. N cen. part sec. 33, T. 5 N., R. 1 W. Property controlled and from which exploration will be initiated: Dandy group of 4 patented claims, Sur. No. 10650 as shown in copy of Mineral Survey.

(*b*) State any mine name by which the property is known. Santa Anita mine

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Lessee, with option to purchase

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. Copy of lease attached

(*e*) If you own the land, describe any liens or encumbrances on it

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice.

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes.

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades.

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you.

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points.

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power.

16—66551-1

Items under 4 on separate, attached sheets

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore .....

.....

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc.

(*c*) The work will start within ..... days and be completed within ..... months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations.

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.).

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants.

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel.

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be.

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project.

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project.

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes.

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

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

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)?

(*b*) How do you propose to furnish your share of the costs?

[X] Money [X] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper. see 6.

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.

Dated June 26, 1957

GeoChem Development Co.
(Applicant)

By Harbes Robertson
President

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

4. Physical Description

a. Mining and Exploration in Progress

No mining or exploration work is presently in progress at the mine, however it is expected that leasers will be working is a short time. Oscar Hoveland, one of the partners of the lessor shipped a few tons in 1956 and operated the property in his spare time. Lead ores are exposed in the winze and are immediately minable.

Existing Mine Workings

The mine was mapped by Mason W. Rankin in 1949. A copy of his map, which includes plan and section, accompanies this proposal. The amount of additional development has been little and has been sketched in, notably the deepening of the winze.

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Production Facilities

A small compressor, hoist and drill, mine cars and track are available and adequate for a small scale prospecting or mining program from the winze.

Accessibility of Mine Workings

The adit, all drifts, winzes, raises and stopes are open and most are accessible for examination. There is almost no timber in the mine.

With regard to accessibility of the underground workings at the Dandy mine from which underground exploration of the Santa Anita is proposed, the Dandy shaft is under about 100 feet of water at the 500 foot level. The shaft will be dewatered and available for access before this application can be completely processed.

b. Past and Current Production

The total production of the Santa Anita to 1948, according to Reed (1951 p. 16) is as follows:

720,017	pounds	lead	8,886	ounces	silver
17,010	"	zinc	40	"	gold
1,738	"	copper			

More recent production records are available but have not been turned over to GeoChem Development Company. The amounts are relatively small. Small scale production is anticipated in the very near future from the winze. All of the easily accessible ores above the adit level have been mined out.

Ore Reserves

There are no developed reserves above the adit level. Ores are indicated below the adit level and accessible from the winze, but no estimate is available.

4c. Description of Geologic Features of Property

The development at the Santa Anita mine is along a steeply dipping fracture zone which cuts the Quadrant formation (Pennsylvanian). The quartzite and dolomite beds of the formation dip about 45° east and strike nearly north. The fracture zone strikes about N. 75° W. and dips 75° - 80° south. The hangingwall moved about 90 feet west, relative to the footwall.

There are two modes of occurrence of the mineralization.

1. Narrow seams of mineralization, 4 to 18 inches wide, in the fractures.

2. Replacement bodies in certain dominantly dolomitic beds, adjacent to the fracture zone. This constitutes the important mineralization which occurs in irregularly shaped pipes as much as 40 feet along the strike, and rarely more than 20 feet wide, persistent to undetermined depths. Persistence from the surface to the deepest workings along the line of dip is about 250 feet.

   Similar structures at the Dandy mine are mineralized about 900 feet along the dip and are not known to be bottomed. Pardee and Schrader (1933 p. 308) state: "Their depth limits have not been determined. . . The persistence of the lodes encourages the belief that much ore remains to be found in their unexplored parts." At the Montana Silver mine about 3½ miles south along the same zone, similar mineralization is persistent to 600 feet along the line of dip and not bottomed.

   Thus by analogy to more extensively developed structures along the same mineralized trend, mineralization at depth below the adit level of the Santa Anita is considered a reasonable probability.

   The mineralization above the adit level consists of limonite, cerussite and minor amounts of pyrolusite and smithsonite in a siliceous gangue. In the winze, the ores contain much galena and some pyrite, but dominantly the ores are oxidized. Below the zone of oxidation, galena, sphalerite, minor chalcopyrite and quartz should predominate. The average metal content of the ores shipped to 1948 was 23 per cent lead, 5.7 ounces of silver and 0.02 ounces gold, according to Reed. (1951 p. 28)

Reasc Reasons for Wishing to Explore

The primary purpose is to attempt to discover minable lead ores in the Santa Anita structure below the adit level. The reasons for the specific proposal are as follows:

1. The similarity of the mineralization in the Santa Anita structure to the mineralization in the Dandy and other similarly situated mines, encourages the belief that the mineralization is persistent to depths of at least 600 feet (vertically).

2. The fact that the Santa Anita mineralized structure is larger than that at the Dandy mine encourages the belief that they will be equally large at depth, and may contain an even larger tonnage of valuable ores than at the Dandy.

4c. 3. Geochemical work indicates that a geochemical anomaly exists over the Santa Anita mineralized zone which is similar to that at the Dandy. The width of the anomaly and the intensity are somewhat greater at the Santa Anita than at the Dandy. (See figure from Robertson 1956 pp. 56-58)

4. GeoChem Development Company controls the Dandy mine which has a 600 foot shaft in usable condition. From the 500 foot level, a drift is reported to have been driven about 1200 feet towards the Santa Anita structure. The logical means of exploring the Santa Anita structure at depth is to continue the drift the additional footage (350 feet or more) to the Santa Anita structure and explore the fracture zone at that level. If the structure contains minable ores, a raise to the surface would permit exploration of the full structure over a dip length of about 850 feet.

The exploration program has been outlined by Forbes Robertson, based on field observations, and geologic reports published as follows:

Pardee and Schrader 1933, U. S. G. S. Bull. 842 pp. 306-308 which includes section through the Dandy mine. Photostatic copies of these pages accompany this proposal.

Reed 1951, U. S. B. M. I.C. 7529 on Santa Anita and Dandy mines. Photostatic copies of pertinent pages accompany this proposal.

4d. Accessibility of Project

The Santa Anita mine is located about ¼ mile south of the Dandy mine which is some 7 miles southwest of Radersburg. Graded roads provide access from Radersburg to and up Johnny Gulch. The mines are about 2 miles south of the Jonny Gulch road. A passable mine road, without any steep grades, provides access to the mines. Radersburg is connected with Toston on U. S. Highway 10N with a paved road. The main line of the Northern Pacific Railroad passes through Toston providing excelent rail facilities to the East Helena smelter.

The smelter is about 67 miles from the Dandy mine. Helena (about 65 miles from Radersburg) and Butte (about 90 miles from Radersburg) are the major supply centers, although some supplies are available in Townsend, the County Seat of Broadwater County.

Access to the property may be easily maintained throughout the year.

4e. Availability of Manpower

In his report on the mineral deposits of Broadwater County, Reed (1951 pp. 5-6) makes the following statement with regard to experienced mine labor in the County. "The available supply of experienced labor in Broadwater County appears adequate to meet present and immediately forseeable future demands . . . Mine labor throughout the County is not union-affiliated at present."

A number of experienced miners live in the Radersburg - Toston - Townsend area.

Availability of Materials, Supplies, and Equipment

All equipment, supplies and materials needed for the exploration program are available in Helena and Butte. GeoChem Development Company has at its disposal or is making necessary arrangements for all machinery needed to hoist and provide compressed air to the Dandy shaft.

4e. Water

Water is available at the Dandy mine.

Power

Power for the Dandy mine is available from Montana Power Company lines which pass near the property. The power line has been surveyed and right of way is clear for the installation of the line.

In the initial stage of dewatering and drifting, a diesel power unit may be used.

5. The Exploration Project

a. Mineral for which proposal is prepared Lead minerals

b. Proposed Work

Three stages are proposed, only one of which is covered by this proposal.

1. Deatering of Dandy shaft from the present level at about 400 feet to the 500 level to examine and survey the exploration drift toward the Santa Anita structure.

   This work to be done by GeoChem Development Co. without benefit of DMEA.

2. Extension of drift to the Santa Anita structure, 350 or more feet. (500 level of Dandy is about 580 level of Santa Anita, considering the adit level as the zero point)

   Application for DMEA assistance is purpose of this proposal.

3. If the Santa Anita structure proves favorable, a raise to the surface with exploration drifts at appropriate levels is contemplated for the full exploration of the structure above the drift level.

   DMEA assistance to be requested.

Specifications for drift are 7' x 5' in the clear.

c. Work Schedule

The crosscut or drift would be started as soon as dewatering is complete and needed facilities can be installed, possibly pending DMEA approval.

Estimated rate of progress, 4 feet per day, or about 7 months to drive drift if maximum distance provided herein (700 feet) is required.

Raise to surface on Santa Anita to be dtermined after Santa Anita structure encountered in drift.

d. Operating Experience and Background of Applicant

GeoChem Development Company is a new company which has no history of mining operation. Personnel has been assembled which does have exploration and operating experience which is considered well qualified to conduct and supervise the operation.

Mining Engineer - Alan D. Brown, a Director of GeoChem Development Company, has had 12 years underground experience as miner and supervisor. He has 5 years experience as shift boss, one year assistant foreman, and one year as foreman; is an experienced underground surveyor, sampler and geologist. He is a graduate mining engineer from University of Minnesota. He will supervise program on weekly basis.

Geologist - Forbes Robertson, President of GeoChem Development Company, PhD in Geology, 15 years experience in exploration, teaching, research and consulting, will direct the general program and handle the geologic mapping.

On-the-spot geological assistance may be provided by experienced mining geologists.

6. Estimated Costs (Based on 700 feet of drifting)

a. Independent Contracts - Labor

It is intended to put the exploration work on the project on a contract basis in the hands of experienced miners, under the supervision of the mining engineer.

Contract on 700 feet of drifting 7' x 5' in the clear @ $25.00 per foot for labor.

Cost of labor contract, estimated	$17,500.00

b. Supervision and Consultants

Weekly supervision by engineer, 7 months @$35.00/day, $20.00 transportation expenses	1,540.00
Monthly examination by geologist, mapping, etc.@$50.00/day $20.00 transportation expenses est. 10 days	700.00

c. Operating Materials and Supplies

Pipe - 700' 1" @ 22¢/ft. 700' 2" @ 40¢/ft.	434.00
Rails - 1400 ft 25# rail @65¢/ft	910.00
Powder - 300 boxes @$8.00	2,400.00
Fuses and caps	730.00
140 ties 4" x 8" x 3' @ 80¢ each	112.00
2 Tongue switches @ $20.00 each	40.00
1000 Rock bolts @ $1.10 each	1,100.00
3 - 25 cu. ft. mine cars @$150.00 each	450.00
Miscellaneous tools, supplies, including axes, picks, shovels, wrenches, and other hand tools	800.00

d. Operating Equipment

Hoist, proposed rental @$200.00 month (GeoChem Dev. Co.)	1,400.00
2 - Ingersall Rand Jackleg machines rental $40.00 month (GCDC)	280.00
Compressor @ $250.00 month	1,750.00
Power, estimated $350.00 per month	2,450.00

e. Rehabilitation and Repairs

Rehabilitation of the Dandy shaft and drift not included herein.

Reinstallation of ventillation system estimated	$3,000.00

f. New Buildings, Improvements, Installations

None included in this proposal on Santa Anita.

g. Miscellaneous

Cost of repairs and maintainance of operating equipment, est. $100.00 per month	700.00
Analytical Work and sampling ,est.	400.00
Accounting and Office Expenses, est. $200. per month	1,400.00
Workmens Compensation, Payrool taxes, Unemployment, etc. (If all contract work, none of this) Possible cost	1,750.00
Employers' liability insurance	90.00

h. Contingencies

Estimate	7,000.00
Total estimate	$46,936.00

are from 1 to 6 feet wide and contain ore in streaks from 6 to 10 inches thick that is valuable for silver and contains cerusite, wolframite, quartz, calcite, and iron oxides.

The Parker group, 8 miles west of Radersburg in Johnny Gulch, contains pockets and shoots of ore composed chiefly of silver-bearing galena in a gangue of carbonate, quartz, and iron manganese oxides.

On the Rowell group, 4 miles south of Radersburg, ore shoots 2 to 5 feet thick contain pyrite, chalcopyrite, arsenopyrite, malachite, and chrysocolla at the places where a main vein is joined by stringers. The country rock is a white, partly bleached andesite.

Winchell observes that the ores of the Radersburg district are closely associated geographically with intrusions and extrusions of andesite, that the most valuable deposits are in fissure veins cutting the andesite, and that less productive deposits are found along contacts between the intrusive rock and earlier sedimentary rocks or in the sediments not far from such contacts. This mode of occurrence, he believes, indicates that the ores are genetically related to the andesite. As an alternative hypothesis the writers of the present paper suggest that the lodes are related in origin to unexposed bodies of intrusive quartz monzonite. There are several small areas of quartz monzonite in the western and northern parts of the district (pl. 2) at no great distance from the lodes. It is a reasonable speculation that others would come to view if the surface were lowered and that some or all of them represent an underground extension or an offshoot of the Boulder batholith. Under this view the Radersburg deposits would be classified with the group of the general region called "older lodes" (p. 193), which they resemble in composition.

JO DANDY MINE

In June, 1929, the Jo Dandy mine was being operated by the Butte Copper Consolidated Mines Co. under the direction of Col. A. P. Peake. This mine is relatively new and is situated in the foothills of the Elkhorn Range about 5 miles southwest of Radersburg. Most of its development workings, aggregating about 2,500 feet, have been opened since 1925.

The net smelter returns for ore shipped from July, 1927, to June, 1929, amount to more than $108,000. The total assay content of the ore was in round figures 40,000 ounces of silver and 2,700,000 pounds of lead, the value of which was about $178,000, the difference of $70,000 representing smelter charges and disallowances.

The rocks exposed are chiefly quartzite belonging to the Quadrant formation (Pennsylvanian). The beds strike north and dip about 50° E. They form part of the east limb of a large anticline (fig. 36)

that includes the underlying Madison limestone (Mississippian) and the overlying Phosphoria (Permian) and Ellis (Jurassic) formations, which are composed of limestone, sandstone, and shale. The only igneous rock observed is a dike or sill of andesite 20 feet thick that crops out a short distance south of the new shaft and is intruded near the boundary between the Quadrant and the Phosphoria.

Development workings include the new shaft, a vertical entry 600 feet deep, with drifts at different levels that aggregate 2,000 feet or more in length. These and other workings expose several lodes formed along bedding planes in the quartzite. To distinguish these from other lodes found along cross fractures they are called bedding lodes. Most of the drifts are run on one of the bedding lodes that

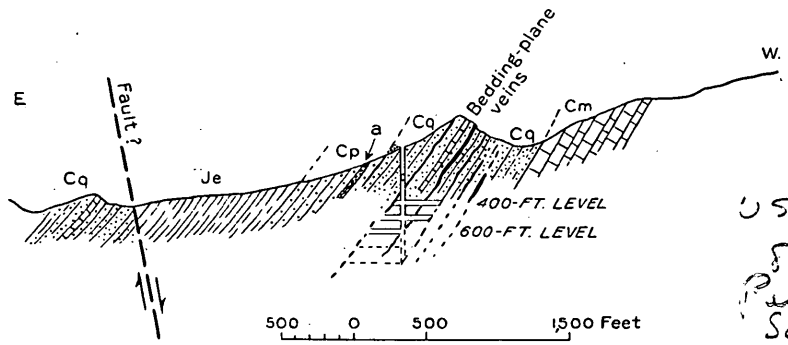

FIGURE 36.—Cross section of Jo Dandy mine. a, Andesite dike or sill; Je, Ellis formation; Cp, Phosuhoria formation; Cq, Quadrant formation; Cm, Madison limestone

USGS Bull. 542 — Pardee & Schrader 1933.

lies on the upper side of the particular quartzite beds that form the most prominent of the Quadrant outcrops. This lode is exposed continuously on the 500-foot level for a distance of 800 feet. Surface workings show it, or at least the group of which it is a member, to persist horizontally for half a mile or more. A similar lode on the under side of the quartzite beds mentioned is developed underground for a short distance, and three or four other lodes beneath that one are penetrated by a crosscut.

So far as shown the bedding lodes are regular and persistent. They range from an inch or two to a foot in width and consist mainly of iron and manganese oxides and fragments of crushed quartzite. Streaks of white secondary carbonate, mostly calcite, occur in them throughout, and they are said to assay small to moderate amounts of lead and a little silver.

At irregular intervals cross fractures occur, each of which displaces the bedding lodes slightly to the right (that is, to the east as one goes north or to the west as one goes south). Practically all the ore produced to date has come from bodies found along these cross frac-

tures where they intersect the bedding lodes. These ore bodies are mostly shaped like flattened cylinders and are generally called "pipes" by the miners. Their shorter diameters range from 1 to 4 or 5 feet, and the longer from a few feet to 15 feet or more. They extend for considerable distances parallel to the dip of the cross fractures, and in fact their depth limits have not been determined. The ore is composed mostly of cerusite with more or less iron and manganese oxides and a little calcite. Vein quartz was not observed, but silica is present in the form of fragments of quartzite. In places there remain streaks and bunches of galena which have escaped oxidation. Specimens from one of the surface workings contain yellow translucent crystals of pyromorphite. Smelter returns from different lots of the ore shipped show the silver content to range from 10 to 25 ounces to the ton and the lead from 34 to 64 per cent. The ratio of silver to lead is generally about 1 ounce to 3 per cent. As a rule the ore contains 25 per cent of insoluble matter (quartzite), 10 per cent of iron, less than 2 per cent of sulphur, and about 1 per cent of zinc. The outcrop of the lode shows a little copper stain in places.

The workings described do not extend below the oxidized zone, but the residual galena found in the lodes indicates that sulphides were the original ore minerals. They were deposited partly as a breccia filling but mostly as a replacement of quartzite. Some of the quartzitic beds are calcareous, but the ore bodies do not seem to show any marked preference for such beds. The deposits are of deep-seated origin, but there is no exposure near by of an igneous rock to which they might be genetically related except the andesite dike. Other than its nearness there is no evidence that this dike was the source of the lodes. The persistence of the lodes encourages the belief that much ore remains to be found in their unexplored parts.

PARK (HASSEL) DISTRICT

The Park or Hassel district occupies an area on the east side of the Elkhorn Mountains between the Winston and Radersburg districts. It is drained by Indian Creek and branches of Crow Creek and is reached by a road that goes west from Townsend. This district was examined in 1910 by Stone,[61] from whose report the following description is condensed.

The Park mines, on Indian Creek about 5 miles northwest of Hassel, were idle in 1910 and apparently had not been operated for several years. A mill and cyanide plant were once built there, but the recovery of precious metals was not successful. The ore is mostly pyrite with some arsenopyrite and galena and is valuable

[61] Stone, R. W., Geologic relation of ore deposits in the Elkhorn Mountains, Mont.: U. S. Geol. Survey Bull. 470, pp. 89–91, 1911.

chiefly for gold. The Little Anna, half a mile east of the Park mines, contains, as indicated by the size of the dump, several hundred feet of underground workings. This mine has been idle since 1904. The ore is quartz carrying arsenopyrite and pyrite. The Iron Mask mine has a vertical shaft probably more than 200 feet deep on a quartz ledge containing iron oxides and galena. The Silver Wave mine is on a lode that trends N. 60° W., dips 80° N., and contains pyrite and galena. The ore is said to net $35 a ton, chiefly in gold, with some silver and lead. The shaft is 350 feet deep, and 24 men were employed in September, 1910. Other mines in the neighborhood of the Silver Wave are the New Year group and the Crosscut mine.

In the vicinity of Hassel are two intrusions of granite, which probably were the cause of extensive mineralization. This district first began to produce about 1870, when the placer deposits along Indian Creek were mined. Later on veins were discovered that carried gold. Open-pit mining and long tunnels on some rich mineralized bodies produced about $500,000 in gold. One tunnel 2,800 feet long is said to be in ore assaying from 80 cents to $2.50 a ton. Three stamp mills were built, and one of them is reported to have operated when water could be obtained. Open cuts on the Little Giant vein show mineralized country rock along a fracture. It is reported that this mine produced nearly $300,000, of which the present operator has smelter returns of about $200,000. Much of the gold is said to have been lost in the tailings. In 1910 the Little Giant Co. was driving a tunnel to crosscut the lode. A deep vertical shaft of the Blacksmith mine at Hassel is said to have produced large quantities of ores that were milled unsuccessfully, and the mine has been closed since 1905.

Reports in the annual volumes of Mineral Resources for the period 1908–1928, which probably include but little if any of the amounts given by Stone, show a total production of $49,855 in gold and, in round figures, 25,000 ounces of silver, 80,000 pounds of copper, 433,000 pounds of lead, and 211,000 pounds of zinc. In the same reports the total value of the metals produced from 1910 to 1928 is given as $89,264. The two years before 1910 probably produced $15,000 or more, and the sum total for the district, including Stone's figures and the probable yield of the early-day placer mines, is not less than $1,000,000.

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equipment had been removed. According to local reports, the property has not been operated for many years. Information concerning output is not available.

Two shallow inclined shafts and several small open cuts develop a replacement vein in sheared and pyritized andesite over a horizontal range of 1,600 feet. This structure ranges from 3-1/2 to 5 feet in width at exposures in the open-cuts and stope holings. The mining width, however, appeared to be not more than 3 feet.

The vein curves in strike and is convex to the northwest. At its north extremity the vein strikes N. 55° E. and dips 62° NW. On the south, however, it strikes N. 35° E. and steepens in dip to 72° NW. The predominant vein minerals are pyrite (probably auriferous), limonite, and scant quartz contained in highly altered andesite gangue.

Iron Cross (Fe-Ti)

The Iron Cross mine (fig. 3) is 2-1/2 miles northwest from Radersburg at a altitude of 4,740 feet. In the early 1880's a small tonnage of magnetite taken from this property was used at the Toston smelter for flux. Since 1944 the deposit has been exploited by small-scale open-cut methods. During the spring and summer months of 1948, about 500 tons of intermediate-grade magnetite ore was produced each month. This material was purchased by the Ideal Cement Co. at Trident, Mont., where it is used in the preparation of type V cement. Total ore production to date is estimated at about 4,000 tons.

Cretaceous sandstones arched into a small northward-plunging fold have been replaced by magnetite over widths ranging from 7 to more than 15 feet. The beds strike N. 40° E. and dip 25° SE. at the site of the open-cut operation They extend northward from the open-cut site over a distance of 2,000 feet to the crest of the plunging fold. The central part of this interval, a distance of 1,100 feet, is overlain by valley fill.

A channel sample taken over a width of 3-1/2 feet at the open-cut contained 44.1 percent Fe and 9.6 percent TiO_2. A second sample composited from 150 tons of ore hauled to the Ideal Cement Co. plant contained 43.1 percent Fe and 9.3 percent TiO_2.

The deposit has been mined to a depth of 9 feet over a length of 300 feet. An Ingersoll-Rand 160-cubic foot compressor powers a jackhammer and a small slusher hoist used to scrape the broken material into a truck loading bin.

Jo Dandy (Ag-Pb)

The Jo Dandy group (fig. 3), consisting of five patented claims, is 9-1/2 miles southwest from Radersburg at an altitude of 5,300 feet. Intensive development, starting in 1920 and continuing through 1929, resulted in a substantial metal output. During recent years, however, only a small tonnage is produced annually by hand sorting and screening of the waste dumps.

The property is developed to a depth of 600 feet by a two-compartment vertical shaft with six levels. According to local reports, these levels, aggregating 3,500 feet, have explored the vein over a horizontal range of 1,000 feet. Pardee reports that the structure may be traced by surface prospect cuts for a distance of half a mile or more (2). In 1949 the shaft was flooded to the 50-foot level.

The principal sedimentary rocks exposed in the area are quartzites of the Quadrant formation. These rocks, on the east limb of a large anticline, strike north and dip 50° to 70° eastward. They enclose several persistent bedding replacement veins which range from 1 inch to 1 foot in width. A number of pipe-like ore shoots have been localized at intersections between these bedding veins and a series of eastward-striking cross-fractures. The ore shoots, plunging steeply parallel with the dip of the cross-fractures, persist in depth below the explored area. According to Pardee the ore shoots ranged from 5 to 75 square feet in cross-section area.

The ore minerals are cerussite, wulfenite, and galena in a hematite gangue accompanied by manganese oxides and calcite. Production records show that the recovered metal content of the ore averaged 11.9 ounces silver a ton and 34.0 percent lead (5).

Jo Jo (Ag-Pb)

The Jo Jo prospect (fig. 3) is immediately north of the Jo Dandy group. A shallow incline and one connecting adit have partly explored the northward extension of the Jo Dandy vein system. These workings have a combined length of 2,000 feet and extend over a vertical interval of 100 feet. Although several small ore shoots have been extracted since 1927, recent operations have been sporadic and confined chiefly to small-scale hand methods. In 1949 the property was idle and unequipped.

A single east-trending cross fracture in quartzite has been explored over a horizontal extent of 350 feet. The enclosing beds strike N. 3° E. and dip 30 to 45 SE. Small, eastward-plunging, pipelike ore shoots occur at junctions between the cross-fracture and several weak bedding veinlets. The cross-section area of the ore shoots usually is less than 25 square feet. The central part of the ore shoots commonly contains a core of cerussite and galena ranging from 4 inches to 1 foot in width.

The predominant ore minerals are cerussite, galena, and wulfenite in a gangue containing hematite, limonite, and calcite. The tenor of the ore is similar to that of the Jo Dandy ore.

Keating (Au)

The Keating group (fig. 3) occupies parts of sec. 18, T. 5 N., R. 1 E. and sec. 13, T. 5 N., R. 1 W. The principal workings are 1-1/2 miles west of Radersburg at an altitude of 4,700 feet. Since discovery in 1866, it has ranked among the foremost producers of lode gold in the State of Montana. Peak output was reached in 1938, when 44,500 tons of ore was mined and concentrated.

Santa Anita (Ag-Pb)

The Santa Anita prospect is 1,700 feet south of the Jo Dandy mine (fig. 3). Its sporadic, small-scale operation has contributed relatively minor amounts of lead and silver to the county's metal output since 1910.

The deposit has been explored and developed by a single adit, a shallow winze, and a raise to surface. In 1949 the winze had been advanced to a depth of 30 feet below the adit level. Total underground development is estimated to aggregate about 900 feet, all in good condition. The workings have a horizontal extent of 350 feet and a vertical range of about 150 feet. Equipment includes an Ingersoll-Rand 210-cubic foot compressor powered by a Buda gasoline engine.

The mine workings explore a narrow, persistent, fracture filling vein striking N. 80° W. and dipping 73° SW. This structure, ranging from 4 inches to 18 inches in width, is enclosed by quartzites of the Quadrant formation, which strike N. 35° E. and dip 42° SE. At the Santa Anita, as well as the Jo Dandy and Jo Jo properties, these quartzites are on the east limb of a north-trending anticline.

The predominant vein minerals are limonite, cerussite, pyrolusite, and smithsonite in a siliceous gangue. Galena and sphalerite are found occasionally. According to production records, the recovered metal content of these ores has average 23 percent lead, 0.02 ounce gold, and 5.7 ounces silver a ton. An average of 1.3 percent zinc was recovered from ore shipped since 1946 (5).

Spar (Ag)

The Spar mine (fig. 3) is at the head of Johnny Gulch at an altitude of 6,500 feet. Although the property is just over the border in Jefferson County, the only outlet for ores produced is by way of Radersburg and Toston. A brief description of the deposit, therefore, is included in this report.

The lode was exploited at small scale for several years after its discovery in 1890. Available records show that the property was dormant from 1901 to 1933. Small-scale operation, resumed in 1934, has been carried on sporadically to the present time by a succession of leasing groups. Winter access difficulties have retarded exploitation to a considerable degree.

Development is by a flat-dipping incline enlarged by stoping (fig. 7). A gasoline-driven Ingersoll-Rand 105-cubic foot compressor provides power for rock drills and a small slusher hoist used for loading. A gasoline-powered tugger is used for hoisting in the incline.

The deposit is a bedding replacement in Jefferson limestone apparently localized in part by a steep-dipping fault of small displacement. The enclosing limestone beds, striking about N. 15° W. and dipping 30° NE., are at or near the axis of a north-trending anticline. The ore shoot is a flattened pipe 30 to 60 feet long and 1 foot to 3-1/2 feet wide. This pipe plunges northward with the enclosing limestones.

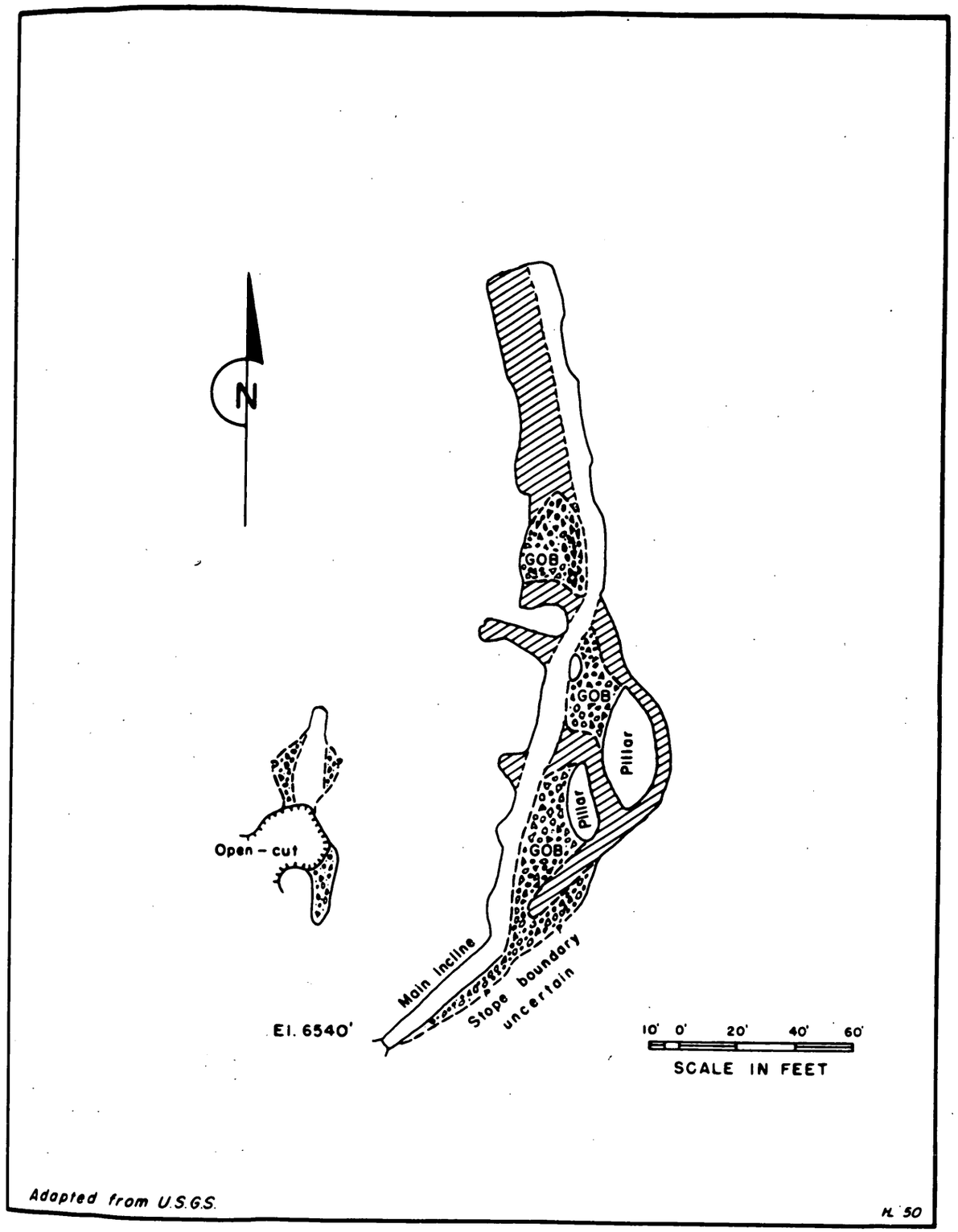

Figure 7. - Plan of Spar mine workings, Radersburg region, Jefferson County, Mont.

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L E A S E AND O P T I O N

THIS AGREEMENT, made and entered into this 15th day of September, 1956, by and between THEODORE UNDERSETH and AGNES S. UNDERSETH, husband and wife, of Helena, Montana, and OSCAR HOVELAND and JENNIE M. HOVELAND, husband and wife, of Townsend, Montana, the Lessors, and GeoChem Development Company, a Montana Corporation, having its principal place of business at Butte, Montana, the Lessee,

W I T N E S S E T H:

(1) That for and in consideration of the sum of Five Hundred Dollars ($500.00) to them in hand paid, the receipt whereof is hereby acknowledged, the Lessors hereby lease to the Lessee for a term of five (5) years, commencing at 12:00 o'clock noon, Mountain Standard Time, on the 15th day of September, 1956, that certain parcel of real property situated in the Cedar Plains Mining District, in Section 28, T5N R1W, M.P.M., in the County of Broadwater, State of Montana, described as follows, to-wit:

The Santa Anita Patented Lode Mining Claim,
Survey No. 9585

Together with any and all water, water rights, ditches and ditch rights appurtenant to said property, or any thereof, owned or used in connection therewith, and the right to use the same either on or off the said property, and together with all buildings and other improvements now on said property or owned or used by Lessors or either thereof, in connection with said property, and any and all ore dumps and tailing dumps situated on said property, and together with all and singular the tenements, hereditaments and appurtenances belonging or in anywise appertaining to said property.

(2) The Lessee shall have a period of six (6) months from and

after the effective date of this lease within which to conduct such exploration and tests as it may deem advisable; after the said six month period and thereafter during the entire term of this lease or any extension hereof, the Lessee shall perform upon the said leased premises not less than forty (40) man shifts of labor during each full calendar month; provided, however, that work and labor performed upon adjacent mining claims, for the benefit of the property hereinabove described, shall be deemed to be upon the said property hereinabove described; and provided, further, that any work or labor in excess of forty (40) man shifts, performed in any calendar month, may be carried over and applied against the work and labor requirement hereunder for any calendar month thereafter.

(3) The Lessee shall pay or cause to be paid to the Lessors, as rental for the said property, a royalty of ten per cent (10%) of the net smelter, mill or mint returns upon any and all ores extracted from the said property, and upon any and all concentrates manufactured by the Lessee from ores extracted from the said property. Net smelter returns shall be defined as the cash proceeds of such ores or concentrates after deduction of transportation, smelter, mill and mint charges only.

The said royalties shall be paid direct to the Lessors by the smelter, mill or other purchaser of ores, minerals or concentrates, and the Lessee shall notify the Lessors in writing of each shipment thereof made from the said property, including dates, approximate weights and name of smelter, mill or other purchaser, and shall deliver to the Lessors copies of all mint, smelter and mill returns.

All such royalties, as well as any other payments to be made to the lessors hereunder, shall be paid as follows:

One-half (½) thereof to Theodore Underseth, 916 Harrison, Helena, Montana;

One-half (½) thereof to Oscar Hoveland, 414 North Cedar Street, Townsend, Montana.

(4) The Lessee shall keep the said 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 property or any part thereof, or which may arise by reason of injury to any person, livestock or other property as the result of any work or operation of the Lessee, or of the Lessee's possession or occupancy of the property.

(5) 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 and to examine the Lessee's books with respect to sampling, assaying, mint, smelter and mill returns and records of shipments.

(6) The Lessee shall pay when due and before delinquent all property taxes levied or assessed against the Lessors' ownership of said mining claims, except that Lessors shall pay said Lessors' share of any and all net proceeds taxes, during the term hereof. The Lessee shall pay when due and before delinquent all taxes upon any and all personal property of whatsoever nature placed upon the said property by the Lessee during the term of this Lease, and Lessee's share of any and all net proceeds taxes.

(7) The Lessee shall carry at all times during the term of this lease affective coverage for all its operations and all employees in said operations under this lease, under one of the authorized plans of the Workmen's Compensation Act of the State of Montana, and such liability and other insurance as shall be required by the laws and mining regulations of the State of Montana.

(8) Time is 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 its part to be kept and performed in accordance withthe terms and provisions hereof shall, at the election of the Lessors, work a forfeiture hereof, and any and all moneyswhich shall have been paid by the Lessee to the Lessors as royalties or otherwise shall be deemed forfeited to the Lessors; provided, however, that in the event of a default on the part of the Lessee and the election of the Lessors as aforesaid to terminate this lease on account thereof, the Lessors shall give to the Lessee a written notice of their intention to declare a forfeiture hereof and to terminate this lease on account of said default, which notice shall specify the particular default or defaults relied upon, and the Lessee shall have thirty days after receipt of such written notice from the Lessors in which to remedy said default or defaults, and if the same shall be so remedied there shall be no forfeiture therefor. 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, nor shall it impair the Lessors' rights resulting from such other breach.

(9) In the event that the Lessee shall be delayed at any time in keeping or performing any agreement on its part to be kept or performed hereunder by any act or neglect of the Lessors, or by strikes, lockouts, unusual delay in transportation, order of duly constituted governmental authority, unavoidable casualty, act of God or any other

cause beyond the control of the Lessee, such delay shall not be deemed a breach of this lease or a default on the part of the Lessee constituting a cause for forfeiture of this lease and option, and during any time said Lessee is so delayed it shall be excused from the performance of the provisions hereof.

(10) Any and all machinery, equipment, implements, devices, rails, pipes, piping, tools, and other property of whatever nature that has been or may hereafter be placed upon the said leased property or any part thereof for any purpose by the Lessee, shall be and remain the property of the Lessee and shall not become a part of the realty or real estate or a fixture or fixtures, and all thereof shall be personal property removable by the Lessee and may be removed from the realty by the Lessee or its successors or assigns at any time prior to the termination of this lease by lapse of time or otherwise, or at any time within six months thereafter; provided, however, that all timbering in place in any shafts, drifts, tunnels or other underground workings shall remain in and upon the premises and become a part thereof and the Lessee shall not remove any thereof.

(11) In further consideration of these premises and of the royalties to be paidand covenants and conditions to be performed thereunder, the Lessors hereby grant to the Lessee the sole and exclusive option to purchase the said property at any time during the entire term of the lease, or any extension hereof, for the sum of Forty Thousand Dollars ($40,000.00); provided, however, that any and all royalties and other payments made hereunder before exercise of this option to purchase shall apply upon and be credited against such purchase price. Upon exercise of this option by the Lessee, and payment by it therefor to the Lessors, the said Lessors shall execute

and deliver to the Lessee a good and sufficient grant deed to the said property, together with all maps, reports and other documents in their possession concerning the same.

(12) The Lessee shall have the right to concel, terminate and surrender this lease and relinquish the property to the Lessors at any time during the term hereof, or any extension thereof, by giving the Lessors written notice of its intention so to do at least thirty days prior to the date when it shall so cancel, terminate and surrender the same.

(13) The Lessee shall have the right, under the terms and subject to all the conditions of this agreement, to remove ores, waste, water and other materials from the said leased property and to carry on general mining operations pertaining thereto by means of shafts and workings on other properties, and to remove ores, waste, water and other materials from other properties and to carry on general mining operations pertaining to such other properties on the surface of or through shafts and workings on the said leased property; but until weighed and sampled, all ores extracted and removed from the said leased property shall be kept separate from ores extracted from any other properties.

(14) In further consideration of these premises and of the royalties to be paid and covenants and conditions to be performed hereunder, the Lessors hereby grant to the Lessee the option to renew this lease for one additional term of five (5) years, upon the same terms and conditions as are herein contained except that no initial payment need be made at the beginning of such additional term, and with the exception that Lessee shall pay a minimum royalty of $4,000.00 during each year of the renewal period; in the event that the Lessee shall elect to exercise this option, it shall notify the Lessors of its intention so to do, at least thirty (30) days before expiration of the then current term hereof.

(15) This lease is and shall be expressly conditioned upon performance by the Lessee of all the terms and conditions of that certain agreement for purchase by the Lessee and sale by the Lessors of mining equipment and machinery therein described; and any failure by the Lessee to perform the terms and conditions of said purchase agreement shall be deemed a violation of this lease.

(16) Any and all notices to be given the Lessors hereunder may be given by sending duplicate notices, one to the Lessors at 916 Harrison Street, Helena, Montana, and one to the Lessors at 414 North Cedar Street, Townsend, Montana. Any and all notices to be given the Lessee hereunder may be sent to the Lessee at 8 First National Bank Building, Butte, Montana. All such notices shall be sent by registered mail from any United States post office, securely sealed in properly addressed envelopes, with full first-class postage prepaid thereon, and any notice or notices so sent shall be deemed given when deposited in the United States Post Office.

(17) Upon termination of this lease by lapse of time or otherwise, the Lessee shall surrender peaceable possession of the said property and every part thereof to the Lessors, and the Lessors may take immediate possession thereof; provided, however, that the Lessee shall have six months after such termination, as hereinabove provided, within which to remove all property of whatever nature by it placed upon the said premises, and not belonging to the Lessors.

(18) This agreement shall extend to and be binding upon, and shall inure to the benefit of the heirs, executors, administrators, successors and assigns of the respective parties hereto.

IN WITNESS WHEREOF, the Lessors have hereunto set their hands and the Lessee has caused these presents to be duly executed the day and year first above written.

THEO UNDERSETH

AGNES UNDERSETH

OSCAR HOVELAND

JENNIE M. HOVELAND

(CORPORATE SEAL)

LESSORS

GeoChem Development Company

By E. EUGENE HAMILTON
As Its Vice-President

ATTEST:

L. P. JOHNSON
As Its Secretary

STATE OF MONTANA)
: ss.
COUNTY OF LEWIS AND CLARK).

On this 15th day of September, 1956, before me, Keith P. Johnson, a Notary Public in and for the State of Montana, personally appeared Theodore Underseth and Agnes S. Underseth, husband and wife, known to me to be the persons whose names are subscribed to the foregoing Lease and Option as Lessors, 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.

KEITH P. JOHNSON
Notary Public for the State of Montana
Residing at Butte, Montana
My commission expires June 25, 1957

(NOTARIAL SEAL)

STATE OF MONTANA)
: ss.
COUNTY OF BROADWATER)

On this 9th day of July, 1956, before me, Fred W. Schmitz, a Notary Public in and for the State of Montana, personally appeared Oscar Hoveland and Jennie M. Hoveland, husband and wife, known to me to be the persons whose names are subscribed to the foregoing Lease and Option as Lessors, 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.

FRED W. SCHMITZ
Notary Public for the State of Montana
Residing at Townsend, Montana
My commission expires Nov. 19, 1958

(NOTARIAL SEAL)

STATE OF MONTANA) ss.
COUNTY OF SILVER BOW)

On this 12thday of September, 1956, before me, Keith P. Johnson, a Notary Public in and for the State of Montana, personally appeared E. Eugene Hamilton and L. P. Johnson, known to me to be the Vice-President and Secretary, respectively, of the corporation that executed the foregoing lease and option as Lessee, and acknowledged to me that such corporation 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.

KEITH P. JOHNSON
Notary Public for the State of Montana
Residing at Butte, Montana
My commission expires June 25, 1957

(NOTARIAL SEAL)

Table 39 —Jo Dandy and Santa Anita Mines, Radersburg

Chemical analyses of grass-root soil samples collected from the Jo Dandy to Santa Anita mines. Mineralization is localized in limestone members of the Quadrant formation on each side of quartzite bed. Table 39a, analyses of soils from limestone member are foot below base of massive quartzite. Table 39b, analyses of soils from limestone member above massive quartzite. Traverse line approximately north, but sample location controlled by stratigraphic position. Sample interval variable. Slope variable. Soils thin. The data are combined in Figure 41.

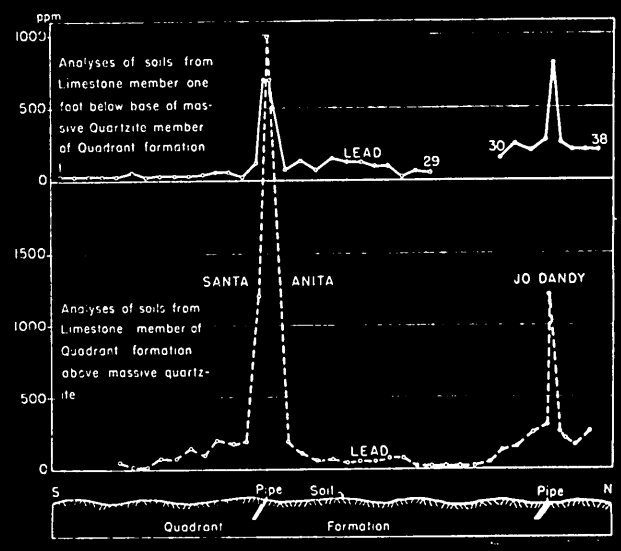

Figure 41 SANTA ANITA - JO DANDY CLAIMS, RADERSBURG

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RECEIVED JUL 1957
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DMEA Form 7
(12-56)

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Date	Surname	Code
1/2/58	Griswold	500
1/3	Selfridge	120
		~~[illegible]~~
		~~[illegible]~~
3	Mittendorf	100
1/3	gbt	220
		225

JAN 3 1958

Mr. Keith P. Johnson, Secretary-Treasurer
GeoChem Development Company
8 First National Bank Building
Butte, Montana

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Claim
Broadwater County, Montana

Dear Mr. Johnson:

In accordance with your December 17, 1957 letter to Mr. Weissenborn, the cited application is being removed from our active file.

This is being done without prejudice and you may re-apply whenever your company is in a position to undertake the project. In such an event, kindly refer to the DMEA number assigned to the present application.

Sincerely yours,

C. O. Mittendorf (gbt)

Administrator

WRGriswold/bjm (1/2/58)

Copy to: Docket
Admr. R. File
Op. Committee
Mr. Kiilsgaard
Mr. Bishop
Chron.

Region I (2)

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code

January 2, 1958

Memorandum

To: Chief, Division of Operation Control & Statistics

From: Director, Division of Base Metals

Subject: Withdrawal of application Docket No. DMEA-4776 (Lead-Zinc), GeoChem Development Company, Santa Anita Claim, Broadwater County, Montana

The cited application is being placed on the inactive list at the Applicant's suggestion.

W. R. Griswold

WRGriswold/bjm (1/2/58)

Copy to: Docket
Chron.

8623

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
So. 157 Howard Street
Spokane 4, Washington

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DMEA
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DATE	INITIALS	CODE
12/27	gb	220
12/27	WB.	500

December 23, 1957

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

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Mine
Broadwater County, Montana

Dear Mr. Selfridge:

Enclosed are two copies of a letter from Keith P. Johnson, Secretary-Treasurer, GeoChem Development Company which is in answer to Field Team letters of October 30 and December 5, 1957. Mr. Johnson requests that his company's DMEA application be withdrawn pending instructions from the company's president, Forbes Robertson. Mr. Johnson told William C. Prinz, geologist, U. S. Geological Survey, on July 29, 1957 that his company was having trouble raising money to finance the project and evidently they still have not been too successful.

We recommend that this application be withdrawn from the active files until such time as the company is ready to proceed.

By Field Team, Region I

for D. R. Mackown
A. E. Weissenborn, Exec. Officer
U. S. Geological Survey

for Thomas E Howard
Wing G. Agnew, Member
U. S. Bureau of Mines

Enclosures

cc: USBM (2)
Prinz

KEITH P. JOHNSON

ATTORNEY AT LAW

BUTTE, MONTANA

D MEA (2)

DMEA RECEIVED DEC 9 1957		
DATE		CODE
12/9	C	220
12/9		500

So. 157 Howard Street
Spokane 4, Washington

December 5, 1957

Mr. Keith P. Johnson
Attorney at Law
8 First National Bank Building
Butte, Montana

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Mine
Broadwater County, Montana

Dear Mr. Johnson:

This is in regard to Mr. William C. Prinz' letter of August 7, 1957, asking you to notify him when the Santa Anita mine would be open for inspection, and to our letter of October 30, 1957, inquiring as to when you expected to have the property accessible. In our letter we suggested that you might wish to withdraw your DMEA application in the event that the property could not be opened for inspection in the near future. To date, we have received no reply.

If we do not hear from you with 30 days, it will be necessary for us to ask DMEA to remove your application from the active file and to close the docket. Should the application be withdrawn from the active file, you may request that it be reinstated at some future date when you are ready to proceed.

By Field Team, Region I

A. E. Weissenborn, Executive Officer
U. S. Geological Survey

Wing G. Agnew, Member
U. S. Bureau of Mines

cc: DMEA(2)
DMM(2)
Prinz

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DMEA
RECEIVED NOV 4 1957

DATE	INITIALS	CODE
11/4	C	220
11/4		500

So. 157 Howard Street
Spokane 4, Washington

October 30, 1957

Mr. Keith P. Johnson
Secretary-Treasurer
GeoChem Development Company
8 First National Bank Bldg.
Butte, Montana

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Mine & Dandy Group
Broadwater County, Montana

Dear Mr. Johnson:

To date we have received no word from you regarding the status of the dewatering project at the Dandy shaft. As Mr. Prinz pointed out in his letter of August 7, 1957, we cannot process your company's application for DMEA exploration assistance until the shaft is dewatered and Government representatives can examine the 1200-foot crosscut south from the shaft.

Please let us know when you expect to have the shaft dewatered and the crosscut open for inspection. If you do not expect to have this work completed in the near future, perhaps you would like to withdraw the DMEA application for the present and resubmit it at a later date when the property is open for inspection.

By Field Team, Region I

A. E. Weissenborn, Exec. Officer
U. S. Geological Survey

Wing G. Agnew, Member
U. S. Bureau of Mines

cc: DMEA (2)
USBM (2)
Prinz

OFFICIAL FILE COPY
DMEA
RECEIVED AUG 12 1957

DATE	INITIALS	CODE
8/12	Q	220
8/12	~~[illegible]~~	500

So. 157 Howard Street
Spokane 4, Washington

August 7, 1957

Mr. Keith P. Johnson
Attorney at Law
8 First National Bank Building
Butte, Montana

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Mine
Broadwater County, Montana

Dear Mr. Johnson:

This is to confirm our telephone conversation of July 29, 1957, regarding the subject DMEA application. Before the application can be processed, it will be necessary for Government representatives to examine the 1,200 foot crosscut south from the Dandy shaft.

When dewatering of the shaft is complete and the crosscut available for examination, please notify me at the above address or Mr. John A. Bowsher, U. S. Bureau of Mines, Montana School of Mines, Butte, Montana, and we will arrange to visit the property as soon as possible.

Sincerely yours,

William C. Prinz
Geologist

cc: DMEA (2)
USBM (2)
Prinz

OFFICIAL FILE COPY
DMEA
RECEIVED AUG 19 1957

DATE	INITIALS	CODE
8/19	O	
8/19	[illegible]	220
		500

So. 157 Howard Street
Spokane 4, Washington

August 5, 1957

MEMORANDUM

To: The Files

From: William C. Prinz, Geologist, U. S. Geological Survey

Subject: Telephone conversation with Keith P. Johnson, re Docket No. DMEA-4776 (Lead-Zinc), GeoChem Development Co., Santa Anita claim and Dandy group, Broadwater County, Montana.

Mr. Keith P. Johnson, Secretary-Treasurer of GeoChem Development Company was contacted by telephone in Butte, Montana on July 29, 1957 regarding his company's DMEA application. The Dandy shaft has not yet been dewatered as the company is having some trouble selling their stock. I told Mr. Johnson that this application couldn't be processed until the shaft had been dewatered so that Government representatives could examine the 1,200 foot crosscut (drift?) to the south.

Mr. Johnson was asked to notify the U. S. Geological Survey office in Spokane or John Bowsher in Butte when dewatering is completed.

Mr. Johnson said that Forbes Robertson, President of the company, could give me more information and that Mr. Robertson, who is now out of the country, would try to contact me in Spokane late in August.

William C. Prinz

cc: DMEA (2)
USBM (2)
Prinz

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
7/15	Griswold	500
7/15	Martin	130
"	Johnson	110
"	Thackeray	104
7/16	C	235
		500

500

JUL 16 1957

Mr. A. E. Weissenborn
Executive Officer
DMEA Field Team, Region I
South 157 Howard Street
Spokane 4, Washington

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Claim
Broadwater County, Montana

Dear Mr. Weissenborn:

The cited application is being referred to your office for consideration, a field examination of the property if warranted, and recommendations. We are enclosing copies of memoranda dated July 3 and July 11, 1957, by N. E. Nelson, Geological Survey, and O. M. Bishop, Bureau of Mines, respectively, relating to the project. We are also enclosing a copy of the application for use of the Field Team.

We note the Applicant's inquiry, in its letter of June 28, concerning a performance bond. Please advise this company that the amount of the bond must be fifty per cent of the estimated project cost (operator's share). We require no commitment in advance as to bond issuance; any proposed contract which might be prepared would be sent to you to be presented for signature after you had been provided with the bond. The bond must, of course, be dated after the contract date.

Sincerely yours,

W. S. Martin

ACTING Chairman, Operating Committee (HB)

Enclosures
APPROVED:

P. F. Yopes (HB)
Member, Bureau of Mines

Thor H. Kiilsgaard (HB)
Member, Geological Survey

WRGriswold/er 7/15/57
Copy to: Docket
Admr R File
Op. Committee
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Chron.

8623

DMEA Form 7
(12-56)

OFFICIAL FILE COPY

Date	Surname	Code
7/15	Friend	500
7/15	Martin	120
7/15	Yopes	130
7/15	Kilsgaard	130
7/15	Johnson	110
"	Stockenberg	100
		225
		500

JUL 16 1957

Mr. Forbes Robertson, President
GeoChem Development Company
8 First National Bank Building
Butte, Montana

Re: Docket No. DMEA-4776 (Lead-Zinc)
GeoChem Development Company
Santa Anita Claim
Broadwater County, Montana

Dear Mr. Robertson:

Your application for Government assistance to explore the cited property has been reviewed by the Division of Base Metals of the Defense Minerals Exploration Administration and is being referred to:

Mr. A. E. Weissenborn
Executive Officer
DMEA Field Team, Region I
South 157 Howard Street
Spokane 4, Washington

If additional information concerning your application is needed, the Field Team will get in touch with you at an early date.

Sincerely yours,

C. O. Mittendorf

C. O. Mittendorf (for)

Administrator

WRGriswold/er 7/15/57
Copy to: Docket
Admr R File
Op. Committee
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Region I, (2)
Chron.

8623

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

OFFICIAL FILE COPY
DMEA
RECEIVED JUL 12 1957

DATE	INITIALS	CODE
7-12	C	220
7-12	WRG.	500

July 11, 1957

Re: DMEA 4776; Lead; $46,936
Geochem Development Co.
Santa Anita Mine
Broadwater County, Montana

Memorandum

To: W. R. Griswold, DMEA

From: O. M. Bishop, USBM

Subject: Review of application, dated June 26, 1957, received July 3, 1957

The Geochemical Development Co. requests assistance in 700 feet of crosscutting-drifting from the face of the existing 1200-foot drift on the 500-foot level, the footage to be used to cut and explore the Santa Anita ore structure some 600 feet below the surface.

The applicant notes that the Santa Anita structure is characterized by narrow seams of mineralization, and replacement ore bodies in certain dolomitic beds adjacent to the fracture zone. Such replacements take the form of pipes of rich lead-silver-zinc ore and have ranged up to 40 feet in strike length, 20 feet in width and extended to the developed depth of the mine which is 250 feet. They note that development in the Dandy mine shows such structures occur along a dip distance of 900 feet and have not yet bottomed.

The relative high grade of the ore, similarities to the nearby Dandy ore structure, and the soundness of existing mine openings combine to warrant field referral and examination despite the limited horizontal dimensions of the ore shoots.

O. M. Bishop

O. M. Bishop

cc: Division of Minerals
Mr. Kiilsgaard
Mr. Lamb
Mr. Bishop
Files

OFFICIAL FILE COPY
DMEA
IN REPLY REFER TO:
RECEIVED JUL 5 1957

DATE	INITIALS	CODE
7/5		220
7/5	WRG	500

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

July 3, 1957
Re: DMEA 4776
GeoChem Development Co.
Santa Anita Mine
Broadwater County, Montana
$46,936.00 - Lead

Memorandum

To: W. R. Griswold, Defense Minerals Exploration Administration

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

Subject: Review of application

The applicant requests assistance in extending a crosscut in search of the downward extension of an ore structure characterized, near surface, by a steep persistant crosscutting fault zone containing short shoots of good grade lead-silver ore. The ore shoots appear to be localized at the intersections of the fault and beds of dolomite, parts of a series of sedimentary rocks, principally quartzite and dolomite.

Mining has been carried to a depth of about 250 feet in the Santa Anita mine and the proposed crosscut would cut the inferred downward extension of the fault zone 600 feet lower. The production of the mine seems to have come largely from two 10 to 40-foot oreshoots and totaled perhaps 1,500 tons to 1948. According to the application the ore shoots are not bottomed, but probably are too small to work from a winze.

If doubtful in 3,000 I don't think [illegible] and I would [illegible]

The definite target offered, in dimensions and tonnages (perhaps 4,000 tons), is small but may warrant the crosscut extension and some drifting. Unless several blind ore shoots are inferred, the proposal lacks attraction.

Referral of the application to the Field Team is recommended.

N. E. Nelson

N. E. Nelson

40 WRD
2 4 0 6 6 m

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

July 2, 1957

Geo Chem Development Company
8 First National Bank Building
Butte, Montana

Subject: DMEA-4776

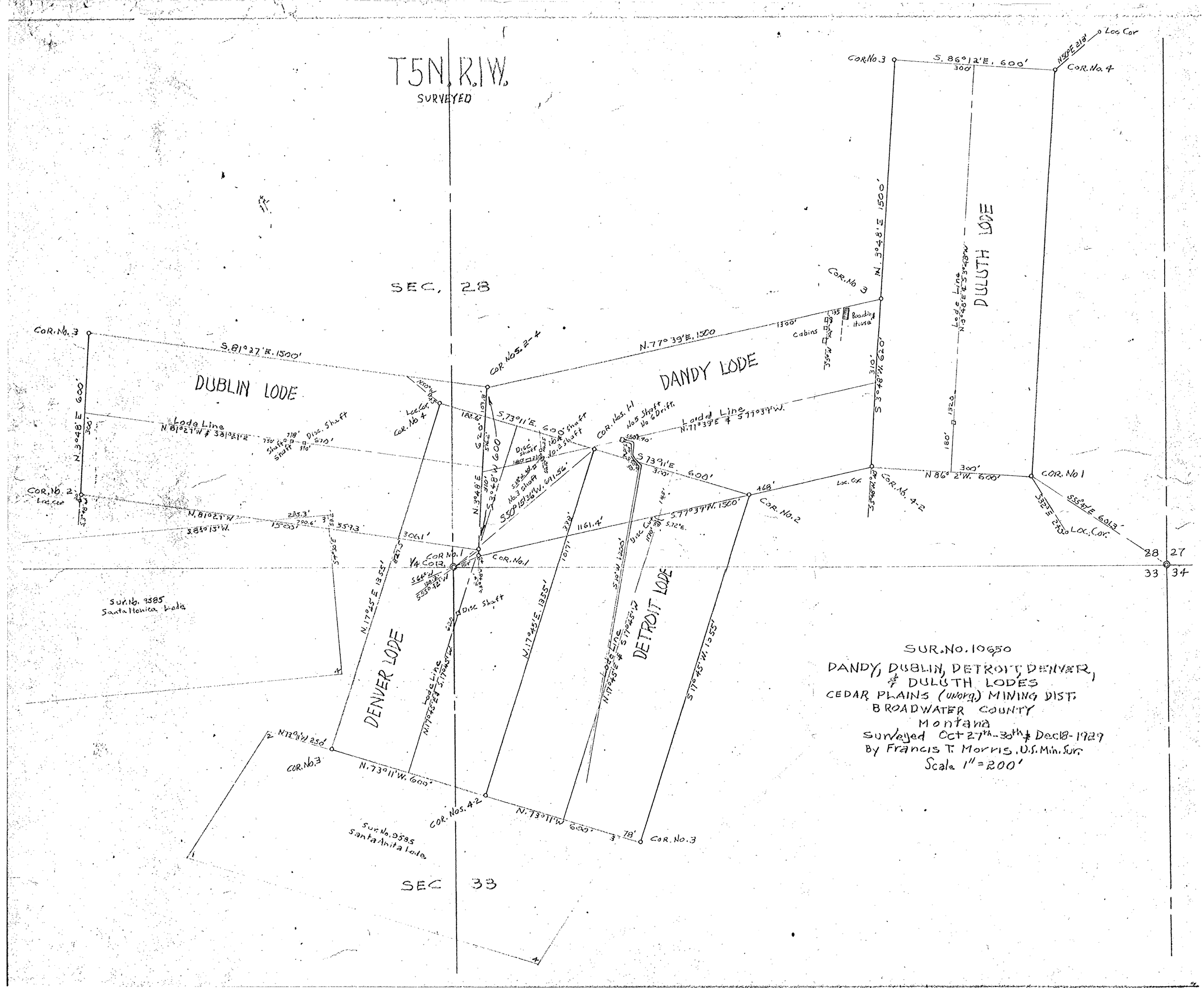
Dear Mr. Robertson:

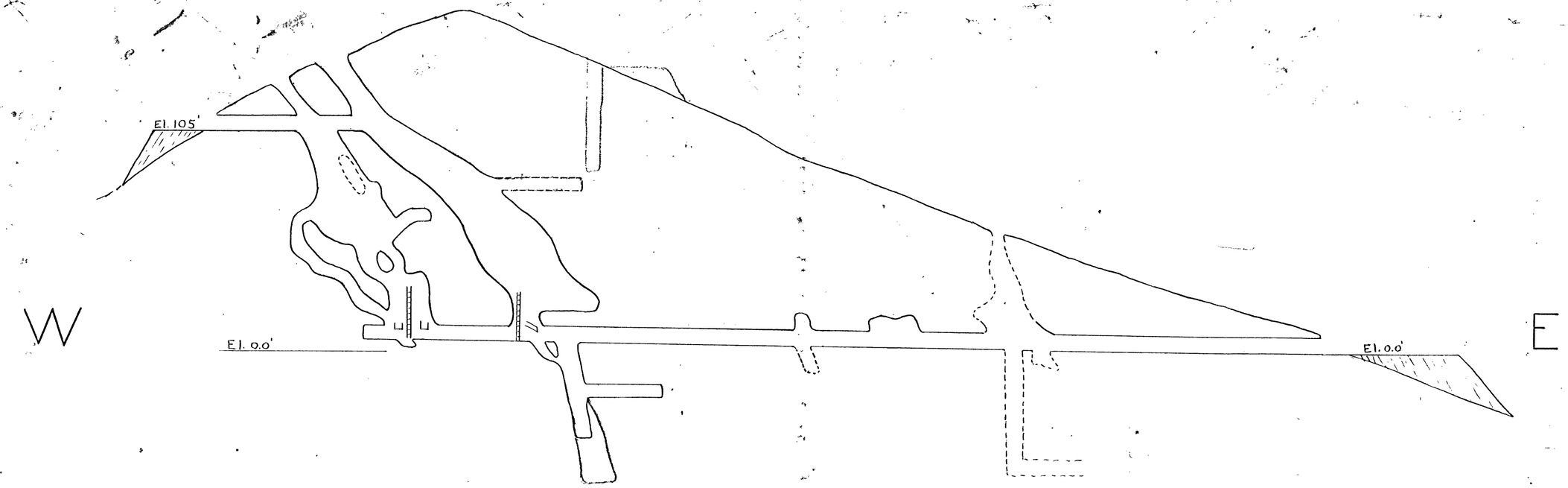
Your application for exploration assistance, dated June 26, 1957 submitted to our office at Spokane, Washington has been assigned Docket Number DMEA-4776 and referred to the Base Metals Division in the Washington office. Kindly identify all future correspondence relating to your application by this Docket Number.

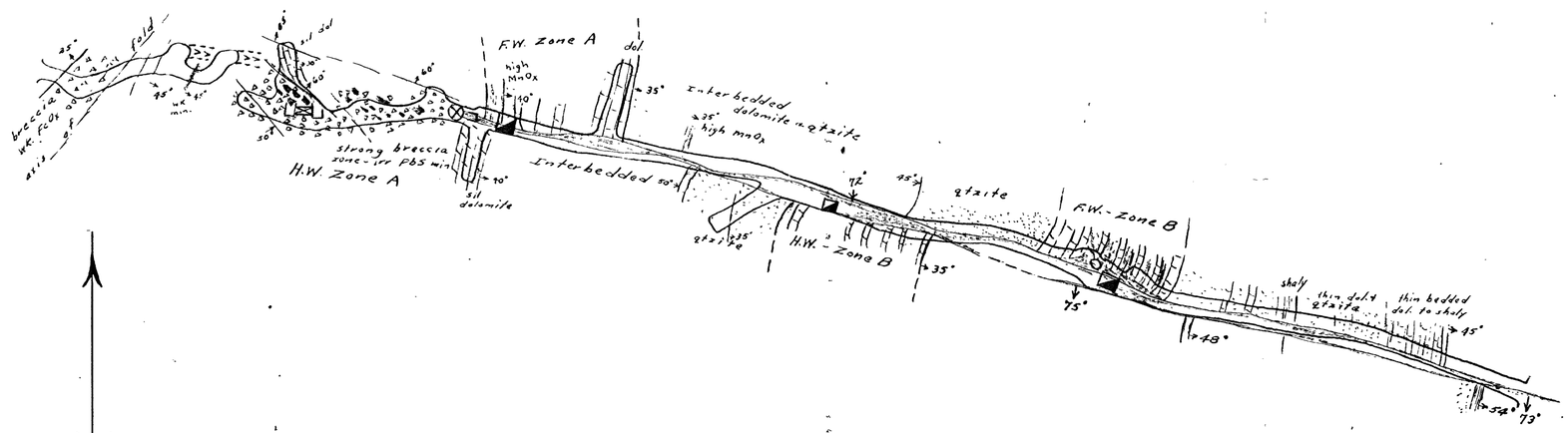
Sincerely yours,

Allen S. Dakan, Director
Operations Control and
Statistics Division

Copy to: Region I N. W.


T5N R1W
SURVEYED
SEC. 28
SEC 33
DUBLIN LODE
DANDY LODE
DULUTH LODE
DENVER LODE
DETROIT LODE
Sur. No. 9585 Santa Monica Lode
Sur. No. 9585 Santa Anita Lode
COR. No. 3
COR. No. 2
COR. No. 1
COR. No. 4
COR. No. 4-2
COR. Nos. 2-4
COR. Nos. 1-1
Loc. Cor.
Lode Line
Disc. Shaft
No. 5 Shaft
No. 6 Drift
No. 3 Shaft
Cabins
Boarding House
S. 81° 27' E. 1500'
N. 77° 39' E. 1500
S. 86° 12' E. 600'
N. 3° 48' E. 1500'
S. 3° 48' W. 620'
N. 86° 2' W. 600'
S. 55° 47' E. 601.3'
S. 73° 11' E. 600'
N. 73° 11' W. 600'
S. 77° 39' W. 1500'
N. 17° 45' E. 1355'
S. 17° 45' W. 1355'
SUR. NO. 10650
DANDY, DUBLIN, DETROIT, DENVER, & DULUTH LODES
CEDAR PLAINS (unorg.) MINING DIST.
BROADWATER COUNTY
Montana
Surveyed Oct 27th-30th & Dec 18-1929
By Francis T. Morris, U.S. Min. Sur.
Scale 1" = 200'





SANTA ANITA MINE
CEDAR PLAINS DIST.
BROADWATER Co., MONT.
1" = 40' Mar. 49 Mason W. Rankin