FILE COPY
SURNAME:
500

Keating
Miller

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

AUG 13 1952

Mr. L. E. Stein, President
Cardiff Mining and Milling Company
704 Newhouse Building
Salt Lake City, Utah

Re: Docket No. DMEA-2175 (Lead-Zinc-Copper)

Dear Mr. Stein:

This will acknowledge receipt of a letter from your Board of Directors, addressed to the office of the Bureau of Mines in Salt Lake City, in which you advise that your company is unable to enter into a contract with the Government for aid in your exploration project. We understand that your inability to proceed is due to the refusal of smelting companies to accept your ore under present conditions.

Pursuant to your request, your application will be considered withdrawn and your file closed. If it should develop later that you again wish to proceed with an exploration program, it will be necessary for you to make a new application which we will be pleased to consider at that time.

Sincerely yours,

C. O. Mittendorf (for) D.N. 8-13-52

Acting Administrator

AGKeating
August 12, 1952
cc to: Docket
Adm. Reading File
Operating Committee
Mr. Keller (2)
Mr. Keating
Mr. Bishop
Mr. McKnight
Region IV (2)
Chron

DMA Form 1

DEFENSE MINERALS ADMINISTRATION
Control Slip

CONTROLLED DOCUMENT

DMA Docket No. 2175

DO NOT DETACH THIS SLIP

Action on this document is recorded and controlled in Reports and Records Branch. Any movement of this document between divisions or offices of DMA or movement outside DMA must be reported to the Reports and Records Branch. Actions taken that affect status of the case must also be reported.

This document has been recorded as

EXPLORATION LOAN

Any action taken to change the type of request for assistance must be promptly reported to the Reports and Records Branch. Use DMA Form 2 for submitting these reports.

Routing Slip
CODE 350

To:	Lead-Zinc Br.	Date	10-18-51
To:	CODE 500-Rm. 2614	Date	2-4-52
To:	Op Com	Date	8-13-52
To:		Date	
To:		Date	
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DO NOT DETACH

CONTROLLED DOCUMENT

2175 - Cardiff Mining and Milling Co., Salt Lake City. Utah. February 21, 1952
Examination of the applicant's property has been made by USBM and USGS.
Reports are in preparation.

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

DEPARTMENT OF THE INTERIOR
Minerals Administration
RECEIVED
AUG 11 1952

224 New Customhouse
Denver 2, Colorado

August 7, 1952

Memorandum

To: C. O. Mittendorf, Acting Administrator, Defense Minerals Exploration Administration

From: Executive Officer, Field Team, Region IV

Subject: DMEA-2175, Cardiff Mining & Milling Company (Lead, Zinc, Copper)

Enclosed are two copies of a letter from the Cardiff Mining & Milling Company in which they request that their application for exploration assistance be cancelled.

The application has been placed in our inactive file.

W. H. King

W. H. King

Enclosures

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
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AUG 11 1952

224 New Customhouse
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W. H. King
W. H. King

Enclosures

C O P Y

CARDIFF MINING & MILLING COMPANY

704 Newhouse Building

Salt Lake City 1, Utah

July 29, 1952

Bureau of Mines
1600 East 1st South
Salt Lake City, Utah

Attention: Mr. Wilson

Dear Mr. Wilson:

With further reference our telephone conversation yesterday, relative DMA 2175 Exploration Loan, please be advised that at a Board of Directors meeting, it was passed upon the Cardiff Mining and Milling Company should not at this time enter into any contract with the United States Government pertaining to this loan.

The reason for this is the season is too short this year, and due to the smelting company refusing to accept any more of our oxide-zinc ores, it would be impossible to raise the necessary funds to meet our fifty per cent of expenses covering the project work.

We want to thank the Department for recognition in the granting of this exploration loan, and should, within the near future, the smelting companies again start purchasing our oxide-zinc ores, we would then be in a position to carry out our part of the Government contract on this exploration loan. If such should be the case, we will immediately communicate with you for this aid.

Yours very truly,

Board of Directors of the

CARDIFF MINING & MILLING COMPANY

By /s/ R. A. Glenny, Secretary

C O P Y

CARDIFF MINING & MILLING COMPANY

704 Newhouse Building

Salt Lake City 1, Utah

July 29, 1952

Bureau of Mines
1600 East 1st South
Salt Lake City, Utah

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Yours very truly,

Board of Directors of the

CARDIFF MINING & MILLING COMPANY

By /s/ R. A. Glenny, Secretary

7/23 Cardiff Mining & Milling DMEA 2175

This contract drawn in the Field Office should first be returned to Mails & Files for a contract number - then to legal - then to audit & a copy to Base Metals Div.

Check later to see if copy of contract has been received

8/11/51. Letter from applicant - application withdrawn K

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

224 New Customhouse
Denver 2, Colorado

July 9, 1952

Memorandum

To: Secretary to the Operating Committee
Defense Minerals Exploration Administration

From: Executive Officer, DMEA Field Team, Region IV

Subject: Final Report, DMEA Docket 2175, (Lead-Zinc), Cardiff Mining & Milling Company, Salt Lake County, Utah

Enclosed is one copy of the Final Report on DMEA Docket 2175, Cardiff Mining & MIlling Company. In our letter dated July 2, 1952, to the Acting Administrator, Attention: Code 210, we stated that four copies of the report would be forwarded when the contract was signed. However, three copies of the final report were included with the letter. The contract covering this docket is being prepared in this office.

Please distribute all four copies of this final report.

W. H. King

W. H. King

Enclosure

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

224 New Customhouse
Denver 2, Colorado

July 9, 1952

Memorandum

To: Secretary to the Operating Committee
Defense Minerals Exploration Administration

From: Executive Officer, DMEA Field Team, Region IV

Subject: Final Report, DMEA Docket 2175, (Lead-Zinc), Cardiff Mining & Milling Company, Salt Lake County, Utah

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Please distribute all four copies of this final report.

W. H. King
W. H. King

Enclosure

JTS:ld

cc: Docket, chron.
Koschmann

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
Denver
JUL 14 1952

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

224 New Customhouse
Denver 2, Colorado

July 2, 1952

Memorandum

To: Acting Administrator, Defense Minerals Exploration Administration
Attention: 210

From: Field Team, Region IV

Subject: Final Report, DMEA Docket 2175, (Lead-Zinc) Cardiff Mining & Milling Co., Salt Lake County, Utah

The application for Government assistance in exploration work estimated to cost $25,094, has been approved by us and a contract is being prepared.

Government participation will be 50 percent, or $12,547.

Four copies of the Final Report will be forwarded when the contract is processed.

The original and one copy of Form 3b is attached.

W. H. King
W. H. King

A. H. Koschmann
A. H. Koschmann

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 7 - 1952

Mining Division
Region IV

July 2, 1952

Memorandum

To: Field Team, Region IV

From: Acting Chief, Mining Division, Region IV

Subject: Final Report, DMEA Docket 2175, (Lead-Zinc) Cardiff Mining & Milling Co., Salt Lake County, Utah

Enclosed are nine copies of a joint engineering and geologic report on DMEA-2175, by M. H. Howes and J. W. Hassler.

The company wished to revise the original project proposals which they had estimated to cost $53,200. The requested revisions were made and the field examiners recommend 7 of the 9 revised proposals at a cost of $25,094, Government share $12,547. The proposed work will consist of diamond drilling, drifting and crosscutting and is estimated to require 5 months to complete.

We concur in the recommendation of the field examiners.

W. H. King

W. H. King

Mining Division
Date Rec'd
JUN 23 1952
BUREAU OF MINES
Denver, Colorado

June 20, 1952

Memorandum

To: W. H. King, Acting Chief, Mining Division, Region IV

From: Chief, Utah-Wyoming Branch, Mining Division

Subject: DMEA-2175, Cardiff Mining and Milling Co., Salt Lake County, Utah

Enclosed are the original and 8 copies of a joint engineering and geologic report prepared by M. H. Howes and J. W. Hasler. A Summary, Conclusions and Recommendations section is also attached.

The original brochure was reviewed by the Survey and Bureau of Mines in Washington and virtual approval of the exploration proposals was given. Discussions with representatives of the applicant company after receipt of the brochure by this office revealed that the company wished to revise the original project proposals. Accordingly, the revisions were made and examination of the property conducted by Bureau of Mines and Survey field men.

Seven of the 9 revised proposals are recommended for approval. One proposal has been rejected because of proximity to property not under control of the applicant company. The company was unable to obtain a working agreement with the property owner. A second proposal is not believed to be feasible, as it involves search for the Alta overthrust to the southwest of the productive area along the Cardiff fissure. It is probable that the thrust zone has been completely removed; thus an extension of the Cardiff ore body could not be expected in this direction.

Operating costs on the Cardiff property are much higher than average because of the rugged terrain, deep snows and heavy water during the runoff period. Transportation of waste to the surface and maintenance of equipment are also items of high cost.

Administration of a contract on the Cardiff property on the basis of the long form, MF-200, will be somewhat involved. If a contract is to be drawn, the short form, MF-200-A, should be used,

if possible. The proposed exploration includes diamond drilling, drifting and crosscutting, and shaft rehabilitation. The shaft rehabilitation probably could be established on a lump-sum basis or included in the cost of drifting.

The Cardiff property was examined and the report virtually completed before information was received concerning the new short-form contract. Costs in the report have been estimated on the basis of the old type MF-200 form. If the operator were to perform the proposed work, I believe a lower contract cost per foot of diamond drilling and per foot of drifting and crosscutting than shown in the report could be negotiated with the operator. Discussions with the operator will be arranged and supplemental information transmitted concerning willingness of the operator to perform the work for a lower figure than shown in the report.

The brochure and related data are enclosed.

Stephen R. Wilson

Stephen R. Wilson

Enclosures

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By M. H. Howes and J. W. Hasler

Cardiff Mining and Milling Co., Salt Lake County, Utah, has made application for a loan of $53,200 for exploration of lead-zinc deposits under docket DMA-2175. The property was examined by DMEA field men during February and April 1952. Proposals contained in the original application were revised by the applicant previous to the examination. The engineering and geologic report includes the new proposals.

Sedimentary rocks near the Cardiff property are the Tintic quartzite and Ophir shale of Cambrian age, and the Deseret limestone of Mississippian age. Two faults, the East Superior and West Superior, cut through the formations in the western part of the area. East of the East Superior fault, the Tintic quartzite has been thrust over the younger Deseret limestone. This is the Alta thrust fault, which dips approximately 25° to the east.

Ores on the Cardiff property are associated with steeply dipping fissures both above and below the Alta overthrust. The greater part of the ores extend out from the fissures below the overthrust, replacing brecciated limestone in the thrust zone. The largest ore body is associated with the Cardiff fissure, which strikes N. 50° E. and dips steeply to the northwest.

Estimated reserves are 1,000 tons of measured ores assaying 30 percent zinc in oxide form, and 500 tons of indicated ores assaying 18 percent lead and 22 percent zinc. The indicated ores are mixed sulfide and oxide. It is inferred that 5,000 tons of additional ores will be found by the proposed exploration.

The applicant has presented 9 proposals, revised from those submitted in the original application. Seven of the 9 are believed to have sufficient merit to warrant loan approval. Accordingly, it is recommended that a loan of $25,094 be granted to the Cardiff Mining and Milling Co. to conduct exploration as outlined in the engineering and geologic report.

CARDIFF MINING AND MILLING COMPANY
SALT LAKE COUNTY, UTAH
DMA-2175
Lead-zinc

Engineering and Geologic Report

By M. H. Howes
Mining engineer
Bureau of Mines

and

J. W. Hasler
Geologist
Geological Survey

CARDIFF MINING AND MILLING COMPANY
SALT LAKE COUNTY, UTAH

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Conclusions and recommendations	20

ILLUSTRATIONS

Fig. 1 Location map.
Fig. 2 Property map, showing proposals.
Fig. 3 Geologic plan map.

INTRODUCTION

Cardiff Mining and Milling Co., Salt Lake County, Utah, has made application under docket DMA-2175, for Government aid on an exploratory project consisting of 500 feet of diamond drilling and 670 feet of drifting. It is estimated by the applicant that the proposed project will cost $53,200.

A field examination was made to determine the engineering feasibility of the project and to clarify certain points regarding property description and costs.

ACKNOWLEDGMENTS

Company officials were cooperative in supplying information necessary for the completion of this report.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The Cardiff mine is located in the Big Cottonwood district, Alta area, in Sections 31 and 32, T. 2 S., R. 3 E., S.L.B.& M., Salt Lake County, Utah (fig. 1). The property lies on the north side of the divide between Big Cottonwood and Little Cottonwood Canyons, high on the rugged west slope of the Wasatch Range, at altitudes ranging from 8,700 to 10,000 feet.

The climate of the area is ordinarily cool in summers and severely cold during long winters. Heavy annual precipitation comes chiefly as snow, which accumulates to considerable depths between the time of the first storms of fall and the spring thaw.

The mine is situated 25 miles southeast of Salt Lake City, 21 miles east of the U. S. Smelting, Refining and Mining Company's smelter at Midvale, Utah, and 55 miles east of the zinc smelter of International Smelting Co. at Tooele, Utah. The 3 miles of average 10-percent grade, graveled, access road which connects the mine with the Big Cottonwood highway is in fair condition, and the main roads serving the area are all hard-surfaced, including roads in Big Cottonwood and Little Cottonwood Canyons. Ski resorts are located at Brighton and at Alta near the heads of the canyons, and both canyon roads are kept open throughout the winter. Maintenance of the access road will be necessary if the mine is to produce ore during the winter.

HISTORY AND PRODUCTION

The Cardiff Mining and Milling Co. was incorporated in 1906. Lead-copper-silver ore was discovered during 1910 in a fissure on the 300 level. This was named the Cardiff fissure. In 1912, an adit, the main tunnel, was driven on the 600 level to intersect and develop the ore at a lower elevation. An inclined winze was sunk from this level to develop and mine the ore below. The ore body dips 25° to the northeast and attains a known inclined length in excess of 1,600 feet. Production started in 1910 and has been virtually continuous to April 1951, except for 1945 and 1946, when operations were temporarily suspended. The tonnage of ores mined

per year has fluctuated over a wide range. The minimum for any one year was 31 dry tons in 1931 and maximum 18,781 dry tons during 1916. A total of 139,125 dry tons of ores has been produced through 1950, from which 6,612.47 ounces of gold, 2,347,372 ounces of silver, 2,706,401 pounds of copper, 65,199,030 pounds of lead, and 3,567,542 pounds of zinc have been recovered. About $675,000 in dividends has been paid.

OWNERSHIP AND EXTENT

The Cardiff Mining and Milling Company owns the following patented lode mining claims:

Claim	Lot or Survey No.
Union Pacific	82
H. F. Samson	142
Mountin Cheaf	5332
Mountain Yueen	5748
Barnegat No. 2	5749
Barnegat No. 3	5749
Barnegat No. 4	5749
Barnegat No. 5	5749
General Lafayette	5749
Mountain Chief Extension No. 1	5749
Mountain Chief Fraction	5749
Lillie	5967
Cardiff	6188

Claim	Lot or Survey No.
Bottle Point	6189
Barnegat No. 1	6313
Gus	6314

The Kennebec Consolidated Mining Co. deeded its right to the unpatented Ruby lode mining claim, Survey No. 5581, to the Cardiff Mining and Milling Co. in exchange for the right of ingress and egress through the Cardiff main tunnel.

An agreement has been made between Columbus-Rexall Consolidated Mines Co. and Cardiff Mining and Milling Co., establishing a "joint operating area" along the southeast boundary between the two properties, for the purpose of mutual operating benefits. This area is shown on the accompanying property map (fig. 2). A photostatic copy of the agreement is attached to the report.

The Cardiff Company has a lease, a copy of which is attached to this report, to mine on the Kennebec property to the east of the Cardiff property. An attempt was made to obtain under lease the Milt Orr lode mining claim, Lot No. 120, owned by the Hirschman Estate, but agreement was not reached with the owners.

GEOLOGY

Sedimentary rocks in the Cardiff mine area include the Tintic quartzite and Ophir shale of Cambrian age, and the Deseret limestone of Mississippian age. Two steeply dipping to vertical faults striking roughly north-south, the West Superior and East Superior faults, cut

the rocks in the western part of the area (fig. 3). East of the East Superior fault the Tintic quartzite has been brought over the Deseret limestone by the Alta thrust fault, which dips about 25° E. The Alta thrust is cut off by the East Superior fault, and between the East Superior and West Superior faults the Deseret limestone is exposed in the footwall of the thrust.

The hanging wall of the Alta overthrust in the Cardiff mine consists mainly of Tintic quartzite; the footwall consists mainly of the Deseret limestone. The ore is associated with fissures that strike northwestward and have steep dips (fig. 2). Lead-zinc veins have been formed in these fissures both below and above the overthrust, but the greater part of the ores extend out from the fissures below the overthrust and have replaced brecciated limestone in the thrust zone.

ORE DEPOSITS

The Cardiff fissure, which strikes N. 50° E. and dips steeply to the northwest, influenced the location of the main Cardiff ore body. This replacement body has a thickness of 10 to 20 feet, a width of 30 to 200 feet, and an inclined length in excess of 1,600 feet. Several other fissures to the southeast of the Cardiff fissure are associated with important ore bodies. Among these are the No. 10, No. 11, D winze and 500 fissures.

The ores are largely oxidized above the 600 level, but below this level contain an increasing proportion of sulfides, mainly galena,

pyrite, sphalerite, and tetrahedrite. The chief gangue minerals are residual limestone, quartz, and carbonates.

The Cardiff Mining and Milling Company has estimated measured reserves to be about 1,000 tons of oxidized ores assaying 30 percent zinc. At present prices, ore of this grade has a value of approximately $40.00 per ton. In addition, 500 tons of mixed oxide and sulfide ore assaying 18 percent lead and 22 percent zinc is indicated. This ore is valued at approximately $60.00 per ton.

In addition to these reserves, which are in extensions of known ore bodies, it is inferred that additional ore will be found during the exploratory work. There is no way to calculate this tonnage, but 5,000 tons or more comparable in grade to the known ore reserves may be expected.

PRESENT STATUS

The principal entry to the Cardiff mine is the 600 or main tunnel level. A 200-foot, vertical winze extending from the 600 winze to the 800 level is 2,300 feet from the portal. A 700-foot, 25° inclined winze, driven along the Alta overthrust from the 800 level, reaches the deepest mine workings. Approximately 5,000 feet of drifts and crosscuts, 4,000 feet of adits, and 2,000 feet of raises and winzes have been driven on the property. No exploration or development work is being conducted at present.

Access to the Cardiff mine may also be had through the Columbus-Rexall tunnel which portal opens in Little Cottonwood Canyon at Alta. It is approximately 1½ miles from this portal to the Cardiff mine workings. The Columbus-Rexall tunnel connects with the Cardiff 7½ level at an elevation several feet higher. Facilities for transporting equipment and supplies to the Cardiff workings through the Columbus-Rexall tunnel are inadequate at the present time. It is therefore considered necessary to conduct the transportation through the Cardiff main tunnel, even though it may be necessary to clear snow from the access road from Big Cottonwood highway to the tunnel.

Influx of water in the Cardiff mine from surface runoff seepage starts about the middle of June, increases until it reaches its peak about September 1, and then decreases to a minimum about the middle of the following June. Unless pumping operations are conducted, this water fills the lower workings and rises to the Columbus-Rexall tunnel level, where it discharges for approximately a month during the maximum influx, or from about the middle of August to the middle of September. During the dry season the water recedes to about the 1,000 level.

The Cardiff mine is completely equipped for immediate mining. Facilities and equipment that can be used for the exploration project consist of the following:

Boarding house
Cabin
Trailer house
Ore bin
Blacksmith, carpenter and machine shops
Compressor house
Transformers and electrical equipment
Compressors
Pumps
Shaft hoists
Diamond drill machine
Drill machines
Mine cars

PROJECT PROPOSALS

Since the Cardiff Mining and Milling Co. submitted its application for a Government loan, additional information has been acquired from recent diamond drilling and geological studies. As a result of this new information, the company wishes to revise its original project proposals.

The original proposals, shown in yellow color on figure 2, are as follows:

Proposal 1

A 150-foot diamond drill hole drilled southwesterly at plus 15° from the main inclined winze at the 1,000 level to explore for ore along the Cardiff fissure zone under the old stopes.

Proposal 2

A 100-foot diamond drill hole drilled easterly at minus 45° from the same location as proposal 1 to explore for ore along the Cardiff fissure zone under the old stopes.

Proposal 3

A 250-foot diamond drill hole drilled easterly at minus 30° from the main inclined winze at the 1,400 level to explore for the downward extension of the main Cardiff fissure ore body under the Alta overthrust.

Proposal 4

A 120-foot drift southwesterly from the 800 S. drift to intersect the downward extension of the No. 11 ore body mined from the 7½ level.

Proposal 5

A 200-foot drift driven southeasterly from the 800 S. drift in the limestone under the Alta overthrust, to explore for ore bodies at the intersections of the No. 10, No. 11, and D winze fissures with the Alta overthrust. These fissures have all made sizable ore bodies at higher elevations in the mine.

Proposal 6

A 350-foot drift driven southeasterly from the 1,000 level in the limestone under the Alta overthrust to explore for ores at the intersections of the No. 10, No. 11, and D winze fissures with the Alta overthrust.

The revised proposals, shown by pink color on figure 2, are described as follows:

Proposal 1

It is proposed to drill a 350-foot diamond drill hole in substitution for the drift of original proposal 6 because it is believed the same information can be obtained by drilling, at lower cost. This proposal warrants approval, as it will include exploration of fissures productive elsewhere in the mine.

Proposal 2

It is proposed to drill a 100-foot diamond drill hole westerly at minus 20° from the main inclined winze at the 900 level to explore for ores along the Cardiff fissure zone under the old stopes.

Proposal 3

It is proposed to drill a 100-foot diamond drill hole southerly at minus 20° from the same location as described in proposal 2, to explore for ores along the Cardiff fissure zone under the old stopes. It is believed revised proposals 2 and 3 are more strategically located for ore discovery than original proposals 1 and 2 and thus replace the original proposals. New proposals 2 and 3 will test a block of ground not previously explored adequately.

Proposal 4

It is proposed to drill a 200-foot diamond drill hole southerly at plus 15° from the 800 level to explore for ore in lower limestone beds at the intersection of the Cardiff fissure zone and a zone of brecciation extending northwesterly from the No. 11 ore body. In the

area of intersection of this breccia zone and No. 11 ore body, excellent ore was found to a depth of 90 feet below the Alta overthrust. It is considered possible that similar ore will be found at the intersection of the breccia zone with the Cardiff fissure zone.

Proposal 5

It is proposed to drill a 150-foot diamond drill hole in substitution for the drift of original proposal 5, because of the lower cost.

Proposal 6

It is proposed to drive a 100-foot crosscut southeasterly from the 800 level to explore for possible deeper ore along the Cardiff fissure zone below the old stopes. A recent diamond drill hole driven northwesterly under the old stopes from the 7½ level cut 7 feet of ore averaging 24.8 percent zinc. The proposed crosscut will encounter the mineralized zone about 35 feet lower than the drill hole.

Proposal 7

It is proposed that a drift be driven approximately 120 feet southwesterly from the 800 S. drift to intersect the downward extension of the No. 11 ore body mined from the 7½ level. This proposal is the same as original proposal 4.

To make proposals 6 and 7 accessible for operation, the vertical shaft from the Cardiff tunnel (600 level) to the 800 level must be rehabilitated. The timber from the collar of the shaft to the sheave wheel is so badly decayed that replacement is necessary.

Proposal 7 has merit, as the ore on the 7½ level was of good grade, and the controlling structure should continue downward.

Proposal 8

It is proposed to drive a 30-foot crosscut southeasterly from the 500 South 2 drift to explore for ores along the 500 fissure in a block of virgin ground in the Boundary stope. A diamond drill hole drilled easterly and upward from about the same location on the 500 level cut what was believed to be the 500 fissure. A poorly-recovered sludge sample, representing 2 feet of mineralization, assayed 14 percent zinc. The Boundary stope has yielded ores with a net value in excess of $1,000,000.

Proposal 9

It is proposed to drive a 140-foot crosscut southwesterly from the 450 W. drift to explore the possibilities of finding the upward extension of the main Cardiff fissure ore body to the southwest. The ore body apparently terminates against the Mountain Chief fault.

A considerable amount of rehabilitation work will be necessary to make the 450 W. drift accessible for driving the proposed crosscut. First, the small opening from the 475 level to the 450 level must be enlarged to a working raise size. Second, the edge of the old stope between the top of the raise and the 450 W. drift, a distance of 50 feet, must be cleaned out and timbered. Third, the 450 W. drift must be cleaned out for a distance of 70 feet. Fourth, track and

air and water pipe must be laid from the top of the raise to the point of beginning the proposed crosscut in the 450 W. drift.

Original proposal 3 has been dropped by the company because of the high cost of lowering the mine water from the 1000 to the 1400 levels.

Revised proposal 5 has been abandoned because the work will penetrate the Milt Orr claim, owned by the Herschmann estate. The Cardiff Mining and Milling Company was unable to complete an agreement to lease this claim.

Revised proposal 9 is difficult to evaluate. Calkins states in U.S.G.S. Professional Paper 201 that the zinc ore in the Cardiff mine appears to be zonally arranged around a core of lead ore. The ore in the southwest end of the Cardiff ore body near the 450 level is high-grade zinc oxide and may grade downward into low-grade or barren material. Also, it is possible that the Mountain Chief fault may be the continuation of the East Superior fault. If this is true, the Alta overthrust has been cut out completely and no chance exists for presence of the Cardiff ore body in the hanging wall of the East Superior fault. Proposal 9 accordingly should not be considered at this time.

Time Schedule

Diamond drilling (Holes to be drilled simultaneously with drifting and crosscutting)

Proposal	Length Hole	Level
1	350 feet	1,000
2	100 "	900
3	100 "	900
4	200 "	800

750 feet at 10 feet per day - 75 days (3 months)

Drifting and crosscutting

Proposals 6 and 7 on the 800 level are to be driven consecutively and simultaneously with proposal 8 on the 500 level.

Proposal 6, 100 feet

Proposal 7, 120 "

Total 220 feet at 2 feet per day - 110 days

Shaft rehabilitation ———————— 15 "

125 days total (5 months)

Proposal 8, 30 feet at 2 feet per day — 15 days (½ month)

Costs

Depreciation

1 Laidlaw 600-cfm. compressor, water-cooled, driven by 150 h.p. induction motor
New price, $9,500.00
Present value, 50 percent of new price, or $4,750.00
5 months' depreciation at $79.17 per month ———————— $ 395.85
45 percent depreciation charged to D.D. ——— $ 178.13
55 percent depreciation charged to drifting— $ 217.72

1 Steamhoist, 3-foot diameter drum, 3,150 pounds rope pull, air operated
New price, $4,000.00
Present value, 50 percent of new price, or $2,000.00
5 months' depreciation at $33.33 per month ———— $166.65
All depreciation charged to drifting.

1 Chicago Pneumatic #55 diamond drill machine, new	$1,300.00	
300 feet AX and EX rods, new	600.00	
Fairbanks-Morse piston, air-driven pump for drill water, new	200.00	
Column, air and water hoses, drill tools	400.00	
Core barrel, reaming shell, fittings	150.00	
New cost	$2,650.00	
3 months' depreciation at $44.17 per month		$132.51

All depreciation charged to D. D.

3 75-kva, 11,000-to 440-volt transformers, cut-out switches, insulators, etc.
New cost, $3,000.00
Present value, 75 percent of new cost, or $2,250.00
5 months' depreciation at $37.50 per month ———— $187.50
45 percent depreciatinn charged to D.D. ——— $ 84.37
55 percent depreciation charged to drifting— $ 103.13

1 I-R Motorpump, 2 MRV, 250 GPM, total head 475 feet
New value, $997.26
2 months' depreciation at $16.62 per month ———— $ 33.24
90 percent depreciation charged to D.D. $ 29.92
10 percent depreciation charged to drifting $ 3.32

6 mine cars (16 cu. ft. capacity)
Present value, $100.00 each, or $600.00
5 months' depreciation at $10.00 per month ———— $ 50.00
All depreciation charged to drifting

Power (electric)

Compressor, 5 months at $350.00 per month—— $1,750.00
45 percent charged to D.D. —— $787.50
55 percent charged to drifting— $962.50

Pumping, 2 months at $300 per month, —— $600.00 $2,350.00
90 percent charged to D.D. ——— $540.00
10 percent charged to drifting — $ 60.00

Maintenance

Compressor, hoist, diamond drill machine ———— $1,000.00
and accessories, electrical equipment,
pump and mine cars
45 percent charged to D.D. ——— $450.00
55 percent charged to drifting — $550.00

Labor (The daily rate is increased 20 percent to cover overtime and payroll taxes)

1 compressorman, 125 days at $12.05 per day ——— $1,807.50
45 percent charged to D.D. —— $813.38
55 percent charged to drifting- $994.12

1 hoistman, 125 days at $15.00 per day ———— $2,250.00
All charged to drifting

1 trammer, 125 days at $14.00 per day ———— $2,100.00
All charged to drifting

1 pumpman, 52 days at $15.00 per day ———— $ 936.00
90 percent charged to D.D. —— $842.40
10 percent charged to drifting- $ 93.60

3 timbermen, 15 days at $15.00 per day each ——— $ 810.00
All charged to drifting (Rehabilitation)

Total ———— $7,903.50

Supervision and engineering

5 months at $350.00 per month ———— $1,750.00
25 percent charged to D.D. —— $ 437.50
75 percent charged to drifting- $1,312.50

Clerical

5 months at $100.00 per month ———— $ 500.00
25 percent charged to D.D. —— $125.00
75 percent charged to drifting- $375.00

Materials for rehabilitation (all charged to drifting)

Shaft rehabilitation (Proposals 6 and 7)

10,000 bd. ft. timber at $100.00 M ———— $1,000.00

Subcontracts

Diamond drilling

The company will furnish and maintain diamond drill machine and accessories and power.

The subcontractor will furnish labor and materials (bits, reaming shells and core lifters) at $4.50 per foot.

750 feet drilling at $4.50 per foot ———— $3,375.00

Drifting

The company will furnish and maintain mine cars, hoist, and power.

The subcontractor will furnish labor, drill machines and accessories, and materials (explosives, timber, air and water pipe, drill steel and bits, track, and miscellaneous) at $25.00 per foot.

250 feet of drifting at $25.00 per foot ——— $6,250.00

COST SUMMARY

Diamond drilling (750 feet, included in Proposals 1, 2, 3 and 4)

Depreciation

Compressor	$178.13		
D.D. machine and accessories	132.51		
Transformers, etc.	84.37		
Motorpump	29.92	———	$ 424.93

Power (electric)

Compressor	$787.50	
Pumping	540.00	$1,327.50

Maintenance ---------- $ 450.00

Labor

Compressorman	$813.38	
Pumpman	842.40	$1,655.78

Supervision and engineering ---------- $ 437.50

Clerical ---------- $ 125.00

Subcontract, 750 ft. at $4.50 ft. ---------- $3,375.00

Total cost diamond drilling ---------- $7,795.71

Cost per foot of diamond drilling ---------- $ 10.39

Drifting and crosscutting (250 feet included in Proposals 6, 7, and 8, together with necessary rehabilitation work)

Depreciation

Compressor	$217.72	
Hoist	166.65	
Transformers, etc.	103.13	
Motorpump	3.32	
Mine cars	50.00	$ 540.82

Power (electric)

Compressor	$962.50	
Pumping	60.00	$1,022.50

Maintenance ---------- $ 550.00

Labor

Compressorman	$ 994.12	
Hoistman	2,250.00	
Trammer	2,100.00	
Pumpman	93.60	
Timbermen	810.00	$6,247.72

Supervision and engineering	$1,312.50
Clerical	$ 375.00
Materials	
Timber	$1,000.00
Subcontract, 250 feet at $25.00 per foot	$6,250.00
Total cost drifting and crosscutting	$17,298.54
Cost per foot of drifting and crosscutting	$ 69.19
Total cost diamond drilling	$7,795.71
Total cost drifting and crosscutting	$17,298.54
Total cost, all proposals	$25,094.25

PROPOSED FINANCING

In accordance with the regulations on Government participation, as stated in section 7 of DMEA Order 1, the applicant reports he is prepared to spend $12,547 on the proposed project, which is 50 percent of the total estimated cost of the project, $25,094.

CONCLUSIONS AND RECOMMENDATIONS

The production history of the Cardiff mine is impressive. Operating costs at the mine are high because of location in the rugged Wasatch Range, the long, cold winters with deep snows, and the heavy water influx during the thaw runoff period. However, the high-grade ores have made the mine a profitable operation in the past. The probabilities of discovering new ore bodies by means of the carefully-planned, revised

exploration proposals 1, 2, 3, 4, 6, 7, and 8 are favorable. Therefore, recommendation is made that the Government loan be approved in an amount of $25,094.

Mining Division
Region IV

July 2, 1952

Memorandum

To: Field Team, Region IV

From: Acting Chief, Mining Division, Region IV

Subject: Final Report, DMEA Docket 2175, (Lead-Zinc) Cardiff Mining & Milling Co., Salt Lake County, Utah

Enclosed are nine copies of a joint engineering and geologic report on DMEA-2175, by M. H. Bowen and J. W. Hassler.

The company wished to revise the original project proposals which they had estimated to cost $53,200. The requested revisions were made and the field examiners recommend 7 of the 9 revised proposals at a cost of $25,094, Government share $12,547. The proposed work will consist of diamond drilling, drifting and crosscutting and is estimated to require 5 months to complete.

We concur in the recommendation of the field examiners.

W. H. King

W. H. King

June 20, 1952

Memorandum

To: W. H. King, Acting Chief, Mining Division, Region IV

From: Chief, Utah-Wyoming Branch, Mining Division

Subject: DMA-2175, Cardiff Mining and Milling Co., Salt Lake County, Utah

Enclosed are the original and 8 copies of a joint engineering and geologic report prepared by M. H. Howes and J. W. Lasler. A Summary, Conclusions and Recommendations section is also attached.

The original brochure was reviewed by the Survey and Bureau of Mines in Washington and virtual approval of the exploration proposals was given. Discussions with representatives of the applicant company after receipt of the brochure by this office revealed that the company wished to revise the original project proposals. Accordingly, the revisions were made and examination of the property conducted by Bureau of Mines and Survey field men.

Seven of the 9 revised proposals are recommended for approval. One proposal has been rejected because of proximity to property not under control of the applicant company. The company was unable to obtain a working agreement with the property owner. A second proposal is not believed to be feasible, as it involves search for the Alta overthrust to the southeast of the productive area along the Cardiff fissure. It is probable that the thrust zone has been completely removed; thus an extension of the Cardiff ore body could not be expected in this direction.

Operating costs on the Cardiff property are much higher than average because of the rugged terrain, deep snows and heavy water during the runoff period. Transportation of waste to the surface and maintenance of equipment are also items of high cost.

Administration of a contract on the Cardiff property on the basis of the long form, MF-200, will be somewhat involved. If a contract is to be drawn, the short form, MF-200-A, should be used,

if possible. The proposed exploration includes diamond drilling, drifting and crosscutting, and shaft rehabilitation. The shaft rehabilitation probably could be established on a lump-sum basis or included in the cost of drifting.

The Cardiff property was examined and the report virtually completed before information was received concerning the new short-form contract. Costs in the report have been estimated on the basis of the old type 14-200 form. If the operator were to perform the proposed work, I believe a lower contract cost per foot of diamond drilling and per foot of drifting and crosscutting than shown in the report could be negotiated with the operator. Discussions with the operator will be arranged and supplemental information transmitted concerning willingness of the operator to perform the work for a lower figure than shown in the report.

The brochure and related data are enclosed.

Stephen R. Wilson

Stephen R. Wilson

Enclosures

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By M. H. Howes and J. W. Hasler

Cardiff Mining and Milling Co., Salt Lake County, Utah, has made application for a loan of $53,200 for exploration of lead-zinc deposits under docket DMA-2175. The property was examined by DMEA field men during February and April 1952. Proposals contained in the original application were revised by the applicant previous to the examination. The engineering and geologic report includes the new proposals.

Sedimentary rocks near the Cardiff property are the Tintic quartzite and Ophir shale of Cambrian age, and the Deseret limestone of Mississippian age. Two faults, the East Superior and West Superior, cut through the formations in the western part of the area. East of the East Superior fault, the Tintic quartzite has been thrust over the younger Deseret limestone. This is the Alta thrust fault, which dips approximately 25° to the east.

Ores on the Cardiff property are associated with steeply dipping fissures both above and below the Alta overthrust. The greater part of the ores extend out from the fissures below the overthrust, replacing brecciated limestone in the thrust zone. The largest ore body is associated with the Cardiff fissure, which strikes N. 50° E. and dips steeply to the northwest.

Estimated reserves are 1,000 tons of measured ores assaying 30 percent zinc in oxide form, and 500 tons of indicated ores assaying 18 percent lead and 22 percent zinc. The indicated ores are mixed sulfide and oxide. It is inferred that 5,000 tons of additional ores will be found by the proposed exploration.

The applicant has presented 9 proposals, revised from those submitted in the original application. Seven of the 9 are believed to have sufficient merit to warrant loan approval. Accordingly, it is recommended that a loan of $25,094 be granted to the Cardiff Mining and Milling Co. to conduct exploration as outlined in the engineering and geologic report.

CARDIFF MINING AND MILLING COMPANY
SALT LAKE COUNTY, UTAH
DMA-2175
Lead-zinc

Engineering and Geologic Report

By M. H. Hayes
Mining engineer
Bureau of Mines

and

J. W. Hasler
Geologist
Geological Survey

CARDIFF MINING AND MILLING COMPANY
SALT LAKE COUNTY, UTAH

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ILLUSTRATIONS

Fig. 1 Location map.
Fig. 2 Property map, showing proposals.
Fig. 3 Geologic plan map.

INTRODUCTION

Cardiff Mining and Milling Co., Salt Lake County, Utah, has made application under docket DMA-2175, for Government aid on an exploratory project consisting of 500 feet of diamond drilling and 670 feet of drifting. It is estimated by the applicant that the proposed project will cost $53,200.

A field examination was made to determine the engineering feasibility of the project and to clarify certain points regarding property description and costs.

ACKNOWLEDGMENTS

Company officials were cooperative in supplying information necessary for the completion of this report.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The Cardiff mine is located in the Big Cottonwood district, Alta area, in Sections 31 and 32, T. 2 S., R. 3 E., S.L.B.& M., Salt Lake County, Utah (fig. 1). The property lies on the north side of the divide between Big Cottonwood and Little Cottonwood Canyons, high on the rugged west slope of the Wasatch Range, at altitudes ranging from 8,700 to 10,000 feet.

The climate of the area is ordinarily cool in summers and severely cold during long winters. Heavy annual precipitation comes chiefly as snow, which accumulates to considerable depths between the time of the first storms of fall and the spring thaw.

The mine is situated 25 miles southeast of Salt Lake City, 21 miles east of the U. S. Smelting, Refining and Mining Company's smelter at Midvale, Utah, and 55 miles east of the zinc smelter of International Smelting Co. at Tooele, Utah. The 3 miles of average 10-percent grade, graveled, access road which connects the mine with the Big Cottonwood highway is in fair condition, and the main roads serving the area are all hard-surfaced, including roads in Big Cottonwood and Little Cottonwood Canyons. Ski resorts are located at Brighton and at Alta near the heads of the canyons, and both canyon roads are kept open throughout the winter. Maintenance of the access road will be necessary if the mine is to produce ore during the winter.

HISTORY AND PRODUCTION

The Cardiff Mining and Milling Co. was incorporated in 1906. Lead-copper-silver ore was discovered during 1910 in a fissure on the 300 level. This was named the Cardiff fissure. In 1912, an adit, the main tunnel, was driven on the 600 level to intersect and develop the ore at a lower elevation. An inclined winze was sunk from this level to develop and mine the ore below. The ore body dips 25° to the northeast and attains a known inclined length in excess of 1,600 feet. Production started in 1910 and has been virtually continuous to April 1951, except for 1945 and 1946, when operations were temporarily suspended. The tonnage of ores mined

per year has fluctuated over a wide range. The minimum for any one year was 31 dry tons in 1931 and maximum 18,781 dry tons during 1916. A total of 139,125 dry tons of ores has been produced through 1950, from which 6,612.47 ounces of gold, 2,347,372 ounces of silver, 2,706,401 pounds of copper, 65,199,030 pounds of lead, and 3,567,542 pounds of zinc have been recovered. About $675,000 in dividends has been paid.

OWNERSHIP AND EXTENT

The Cardiff Mining and Milling Company owns the following patented lode mining claims:

Claim	Lot or Survey No.
Union Pacific	82
H. F. Sampson	142
Mountin Chief	5332
Mountain Queen	5748
Barnegat No. 2	5749
Barnegat No. 3	5749
Barnegat No. 4	5749
Barnegat No. 5	5749
General Lafayette	5749
Mountain Chief Extension No. 1	5749
Mountain Chief Fraction	5749
Lillie	5967
Cardiff	6188

Claim	Lot or Survey No.
Bottle Point	6189
Barnegat No. 1	6313
Gus	6314

The Kennebec Consolidated Mining Co. deeded its right to the unpatented Ruby lode mining claim, Survey No. 5581, to the Cardiff Mining and Milling Co. in exchange for the right of ingress and egress through the Cardiff main tunnel.

An agreement has been made between Columbus-Rexall Consolidated Mines Co. and Cardiff Mining and Milling Co., establishing a "joint operating area" along the southeast boundary between the two properties, for the purpose of mutual operating benefits. This area is shown on the accompanying property map (fig. 2). A photostatic copy of the agreement is attached to the report.

The Cardiff Company has a lease, a copy of which is attached to this report, to mine on the Kennebec property to the east of the Cardiff property. An attempt was made to obtain under lease the Milt Orr lode mining claim, Lot No. 120, owned by the Hirschman Estate, but agreement was not reached with the owners.

GEOLOGY

Sedimentary rocks in the Cardiff mine area include the Tintic quartzite and Ophir shale of Cambrian age, and the Deseret limestone of Mississippian age. Two steeply dipping to vertical faults striking roughly north-south, the West Superior and East Superior faults, cut

the rocks in the western part of the area (fig. 3). East of the East Superior fault the Tintic quartzite has been brought over the Deseret limestone by the Alta thrust fault, which dips about 25° E. The Alta thrust is cut off by the East Superior fault, and between the East Superior and West Superior faults the Deseret limestone is exposed in the footwall of the thrust.

The hanging wall of the Alta overthrust in the Cardiff mine consists mainly of Tintic quartzite; the footwall consists mainly of the Deseret limestone. The ore is associated with fissures that strike northwestward and have steep dips (fig. 2). Lead-zinc veins have been formed in these fissures both below and above the overthrust, but the greater part of the ores extend out from the fissures below the overthrust and have replaced brecciated limestone in the thrust zone.

ORE DEPOSITS

The Cardiff fissure, which strikes N. 50° E. and dips steeply to the northwest, influenced the location of the main Cardiff ore body. This replacement body has a thickness of 10 to 20 feet, a width of 30 to 200 feet, and an inclined length in excess of 1,600 feet. Several other fissures to the southeast of the Cardiff fissure are associated with important ore bodies. Among these are the No. 10, No. 11, D winze and 500 fissures.

The ores are largely oxidized above the 600 level, but below this level contain an increasing proportion of sulfides, mainly galena,

pyrite, sphalerite, and tetrahedrite. The chief gangue minerals are residual limestone, quartz, and carbonates.

The Cardiff Mining and Milling Company has estimated measured reserves to be about 1,000 tons of oxidized ores assaying 30 percent zinc. At present prices, ore of this grade has a value of approximately $40.00 per ton. In addition, 500 tons of mixed oxide and sulfide ore assaying 18 percent lead and 22 percent zinc is indicated. This ore is valued at approximately $60.00 per ton.

In addition to these reserves, which are in extensions of known ore bodies, it is inferred that additional ore will be found during the exploratory work. There is no way to calculate this tonnage, but 5,000 tons or more comparable in grade to the known ore reserves may be expected.

PRESENT STATUS

The principal entry to the Cardiff mine is the 600 or main tunnel level. A 200-foot, vertical winze extending from the 600 winze to the 800 level is 2,300 feet from the portal. A 700-foot, 25° inclined winze, driven along the Alta overthrust from the 800 level, reaches the deepest mine workings. Approximately 5,000 feet of drifts and crosscuts, 4,000 feet of adits, and 2,000 feet of raises and winzes have been driven on the property. No exploration or development work is being conducted at present.

Access to the Cardiff mine may also be had through the Columbus-Rexall tunnel which portal opens in Little Cottonwood Canyon at Alta. It is approximately 1½ miles from this portal to the Cardiff mine workings. The Columbus-Rexall tunnel connects with the Cardiff 7½ level at an elevation several feet higher. Facilities for transporting equipment and supplies to the Cardiff workings through the Columbus-Rexall tunnel are inadequate at the present time. It is therefore considered necessary to conduct the transportation through the Cardiff main tunnel, even though it may be necessary to clear snow from the access road from Big Cottonwood highway to the tunnel.

Influx of water in the Cardiff mine from surface runoff seepage starts about the middle of June, increases until it reaches its peak about September 1, and then decreases to a minimum about the middle of the following June. Unless pumping operations are conducted, this water fills the lower workings and rises to the Columbus-Rexall tunnel level, where it discharges for approximately a month during the maximum influx, or from about the middle of August to the middle of September. During the dry season the water recedes to about the 1,000 level.

The Cardiff mine is completely equipped for immediate mining. Facilities and equipment that can be used for the exploration project consist of the following:

Boarding house
Cabin
Trailer house
Ore bin
Blacksmith, carpenter and machine shops
Compressor house
Transformers and electrical equipment
Compressors
Pumps
Shaft hoists
Diamond drill machine
Drill machines
Mine cars

PROJECT PROPOSALS

Since the Cardiff Mining and Milling Co. submitted its application for a Government loan, additional information has been acquired from recent diamond drilling and geological studies. As a result of this new information, the company wishes to revise its original project proposals.

The original proposals, shown in yellow color on figure 2, are as follows:

Proposal 1

A 150-foot diamond drill hole drilled southeasterly at plus 15° from the main inclined winze at the 1,000 level to explore for ore along the Cardiff fissure zone under the old stopes.

Proposal 2

A 100-foot diamond drill hole drilled easterly at minus 45° from the same location as proposal 1 to explore for ore along the Cardiff fissure zone under the old stopes.

Proposal 3

A 250-foot diamond drill hole drilled easterly at minus 30° from the main inclined winze at the 1,400 level to explore for the downward extension of the main Cardiff fissure ore body under the Alta overthrust.

Proposal 4

A 130-foot drift southwesterly from the 800 S. drift to intersect the downward extension of the No. 11 ore body mined from the 7½ level.

Proposal 5

A 200-foot drift driven southeasterly from the 800 S. drift in the limestone under the Alta overthrust, to explore for ore bodies at the intersections of the No. 10, No. 11, and D winze fissures with the Alta overthrust. These fissures have all made sizable ore bodies at higher elevations in the mine.

Proposal 6

A 350-foot drift driven southeasterly from the 1,000 level in the limestone under the Alta overthrust to explore for ores at the intersections of the No. 10, No. 11, and D winze fissures with the Alta overthrust.

The revised proposals, shown by pink color on figure 2, are described as follows:

Proposal 1

It is proposed to drill a 350-foot diamond drill hole in substitution for the drift of original proposal 6 because it is believed the same information can be obtained by drilling, at lower cost. This proposal warrants approval, as it will include exploration of fissures productive elsewhere in the mine.

Proposal 2

It is proposed to drill a 100-foot diamond drill hole westerly at minus 20° from the main inclined winze at the 900 level to explore for ores along the Cardiff fissure zone under the old stopes.

Proposal 3

It is proposed to drill a 100-foot diamond drill hole southerly at minus 20° from the same location as described in proposal 2, to explore for ores along the Cardiff fissure zone under the old stopes. It is believed revised proposals 2 and 3 are more strategically located for ore discovery than original proposals 1 and 2 and thus replace the original proposals. New proposals 2 and 3 will test a block of ground not previously explored adequately.

Proposal 4

It is proposed to drill a 200-foot diamond drill hole southerly at plus 15° from the 800 level to explore for ore in lower limestone beds at the intersection of the Cardiff fissure zone and a zone of brecciation extending northwesterly from the No. 11 ore body. In the

area of intersection of this breccia zone and No. 11 ore body, excellent ore was found to a depth of 90 feet below the Alta overthrust. It is considered possible that similar ore will be found at the intersection of the breccia zone with the Cardiff fissure zone.

Proposal 5

It is proposed to drill a 150-foot diamond drill hole in substitution for the drift of original proposal 5, because of the lower cost.

Proposal 6

It is proposed to drive a 100-foot crosscut southeasterly from the 800 level to explore for possible deeper ore along the Cardiff fissure zone below the old stopes. A recent diamond drill hole driven northwesterly under the old stopes from the 7½ level cut 7 feet of ore averaging 24.8 percent zinc. The proposed crosscut will encounter the mineralized zone about 35 feet lower than the drill hole.

Proposal 7

It is proposed that a drift be driven approximately 120 feet southwesterly from the 800 S. drift to intersect the downward extension of the No. 11 ore body mined from the 7½ level. This proposal is the same as original proposal 4.

To make proposals 6 and 7 accessible for operation, the vertical shaft from the Cardiff tunnel (600 level) to the 800 level must be rehabilitated. The timber from the collar of the shaft to the sheave wheel is so badly decayed that replacement is necessary.

Proposal 7 has merit, as the ore on the 7½ level was of good grade, and the controlling structure should continue downward.

Proposal 8

It is proposed to drive a 30-foot crosscut southeasterly from the 500 South 2 drift to explore for ores along the 500 fissure in a block of virgin ground in the Boundary stope. A diamond drill hole drilled easterly and upward from about the same location on the 500 level cut what was believed to be the 500 fissure. A poorly-recovered sludge sample, representing 2 feet of mineralization, assayed 14 percent zinc. The Boundary stope has yielded ores with a net value in excess of $1,000,000.

Proposal 9

It is proposed to drive a 140-foot crosscut southeasterly from the 450 W. drift to explore the possibilities of finding the upward extension of the main Cardiff fissure ore body to the southeast. The ore body apparently terminates against the Mountain Chief fault.

A considerable amount of rehabilitation work will be necessary to make the 450 W. drift accessible for driving the proposed crosscut. First, the small opening from the 475 level to the 450 level must be enlarged to a working raise size. Second, the edge of the old stope between the top of the raise and the 450 W. drift, a distance of 50 feet, must be cleaned out and timbered. Third, the 450 W. drift must be cleaned out for a distance of 70 feet. Fourth, track and

air and water pipe must be laid from the top of the raise to the point of beginning the proposed crosscut in the 450 E. drift.

Original proposal 3 has been dropped by the company because of the high cost of lowering the mine water from the 1000 to the 1400 levels.

Revised proposal 5 has been abandoned because the work will penetrate the Milt Orr claim, owned by the Hereshman estate. The Cardiff Mining and Milling Company was unable to complete an agreement to lease this claim.

Revised proposal 9 is difficult to evaluate. Calkins states in U.S.G.S. Professional Paper 201 that the zinc ore in the Cardiff mine appears to be zonally arranged around a core of lead ore. The ore in the southeast end of the Cardiff ore body near the 450 level is high-grade zinc oxide and may grade downward into low-grade or barren material. Also, it is possible that the Mountain Chief fault may be the continuation of the East Superior fault. If this is true, the Alta overthrust has been cut out completely and no chance exists for presence of the Cardiff ore body in the hanging wall of the East Superior fault. Proposal 9 accordingly should not be considered at this time.

Time Schedule

Diamond drilling (Holes to be drilled simultaneously with drifting and crosscutting)

Proposal	Length Hole	Level
1	350 feet	1,000
2	100 "	900
3	100 "	900
4	200 "	800

750 feet at 10 feet per day - 75 days (3 months)

Drifting and crosscutting

Proposals 6 and 7 on the 800 level are to be driven consecutively and simultaneously with proposal 8 on the 500 level.

Proposal 6, 100 feet

Proposal 7, 120 "

Total 220 feet at 2 feet per day - 110 days

Shaft rehabilitation ———————— 15 "

125 days total (5 months)

Proposal 8, 30 feet at 2 feet per day — 15 days (½ month)

Costs

Depreciation

1 Laidlaw 600-cfm. compressor, water-cooled, driven by 150 h.p. induction motor
New price, $9,500.00
Present value, 50 percent of new price, or $4,750.00
5 months' depreciation at $79.17 per month ———————— $ 395.85
45 percent depreciation charged to D.D. ——— $ 178.13
55 percent depreciation charged to drifting- $ 217.72

1 Steamhoist, 3-foot diameter drum, 3,150 pounds rope pull, air operated
New price, $4,000.00
Present value, 50 percent of new price, or $2,000.00
5 months' depreciation at $33.33 per month ———— $166.65
All depreciation charged to drifting.

1 Chicago Pneumatic #55 diamond drill machine, new ——— $1,300.00
300 feet AX and BX rods, new ———— 600.00
Fairbanks-Morse piston, air-driven pump for drill water, new —— 200.00
Column, air and water hoses, drill tools — 400.00
Core barrel, reaming shell, fittings ——— 150.00

New cost ———— $2,650.00

3 months' depreciation at $44.17 per month ———— $132.51

All depreciation charged to D. D.

3 75-kva, 11,000-to 440-volt transformers, cut-out switches, insulators, etc.
New cost, $3,000.00
Present value, 75 percent of new cost, or $2,250.00
5 months' depreciation at $37.50 per month ———— $187.50
45 percent depreciation charged to D.D. ——$ 84.37
55 percent depreciation charged to drifting—$ 103.13

1 I-R Motorpump, 2 MKV, 250 GPM, total head 475 feet
New value, $997.26
2 months' depreciation at $16.62 per month ———— $ 33.24
90 percent depreciation charged to D.D. $ 29.92
10 percent depreciation charged to drifting $ 3.32

6 mine cars (16 cu. ft. capacity)
Present value, $100.00 each, or $600.00
5 months' depreciation at $10.00 per month ———— $ 50.00
All depreciation charged to drifting

Power (electric)

Compressor, 5 months at $350.00 per month—— $1,750.00
45 percent charged to D.D. —— $787.50
55 percent charged to drifting— $962.50

Pumping, 2 months at $300 per month, —— $600.00 $2,350.00
90 percent charged to D.D. —— $540.00
10 percent charged to drifting — $ 60.00

Maintenance

Compressor, hoist, diamond drill machine —————— $1,000.00
and accessories, electrical equipment,
pump and mine cars
45 percent charged to D.D. —— $450.00
55 percent charged to drifting — $550.00

Labor (The daily rate is increased 20 percent to cover overtime and payroll taxes)

1 compressorman, 125 days at $12.05 per day —————— $1,807.50
45 percent charged to D.D. —— $813.38
55 percent charged to drifting- $994.12

1 hoistman, 125 days at $15.00 per day —————— $2,250.00
All charged to drifting

1 trammer, 125 days at $14.00 per day —————— $2,100.00
All charged to drifting

1 pumpman, 52 days at $15.00 per day —————— $ 936.00
90 percent charged to D.D. —— $842.40
10 percent charged to drifting- $ 93.60

3 timbermen, 15 days at $15.00 per day each —————— $ 810.00
All charged to drifting (Rehabilitation)

Total —————————————————————— $7,903.50

Supervision and engineering

5 months at $350.00 per month —————————— $1,750.00
25 percent charged to D.D. —— $ 437.50
75 percent charged to drifting- $1,312.50

Clerical

5 months at $100.00 per month —————————— $ 500.00
25 percent charged to D.D. —— $125.00
75 percent charged to drifting- $375.00

Materials for rehabilitation (all charged to drifting)

Shaft rehabilitation (Proposals 6 and 7)

10,000 bd. ft. timber at $100.00 M ———— $1,000.00

Subcontracts

Diamond drilling

The company will furnish and maintain diamond drill machine and accessories and power.

The subcontractor will furnish labor and materials (bits, reaming shells and core lifters) at $4.50 per foot.

750 feet drilling at $4.50 per foot ———— $3,375.00

Drifting

The company will furnish and maintain mine cars, hoist, and power.

The subcontractor will furnish labor, drill machines and accessories, and materials (explosives, timber, air and water pipe, drill steel and bits, track, and miscellaneous) at $25.00 per foot.

250 feet of drifting at $25.00 per foot ——— $6,250.00

COST SUMMARY

Diamond drilling (750 feet, included in Proposals 1, 2, 3 and 4)

Depreciation

Compressor	$178.13	
D.D. machine and accessories	132.51	
Transformers, etc.	84.37	
Motorpump	29.92 ———	$ 424.93

Power (electric)

Compressor	$787.50	
Pumping	540.00	$1,327.50

Maintenance ——— $ 450.00

Labor

Compressorman	$813.38	
Pumpman	842.40	$1,655.78

Supervision and engineering ——— $ 437.50

Clerical ——— $ 125.00

Subcontract, 750 ft. at $4.50 ft. ——— $3,375.00

Total cost diamond drilling ——— $7,795.72

Cost per foot of diamond drilling ——— $ 10.39

Drifting and crosscutting (250 feet included in Proposals 6, 7, and 8, together with necessary rehabilitation work)

Depreciation

Compressor	$217.72	
Hoist	166.65	
Transformers, etc.	103.13	
Motorpump	3.32	
Mine cars	50.00	$ 540.82

Power (electric)

Compressor	$962.50	
Pumping	60.00	$1,022.50

Maintenance ——— $ 550.00

Labor

Compressorman	$ 994.12	
Hoistman	2,252.00	
Trammer	2,100.00	
Pumpman	93.60	
Timberman	810.00	$6,247.72

Supervision and engineering	$1,312.50
Clerical	$ 375.00
Materials	
Timber	$1,000.00
Subcontract, 250 feet at $25.00 per foot	$6,250.00
Total cost drifting and crosscutting	$17,298.54
Cost per foot of drifting and crosscutting	$ 69.19
Total cost diamond drilling	$7,795.71
Total cost drifting and crosscutting	$17,298.54
Total cost, all proposals	$25,094.25

PROPOSED FINANCING

In accordance with the regulations on Government participation, as stated in section 7 of DMEA Order 1, the applicant reports he is prepared to spend $12,547 on the proposed project, which is 50 percent of the total estimated cost of the project, $25,094.

CONCLUSIONS AND RECOMMENDATIONS

The production history of the Cardiff mine is impressive. Operating costs at the mine are high because of location in the rugged Wasatch Range, the long, cold winters with deep snows, and the heavy water influx during the thaw runoff period. However, the high-grade ores have made the mine a profitable operation in the past. The probabilities of discovering new ore bodies by means of the carefully-planned, revised

exploration proposals 1, 2, 3, 4, 6, 7, and 8 are favorable. Therefore, recommendation is made that the Government loan be approved in an amount of $25,094.

Docket File Copy

FILE COPY
500
SURNAME:

Moulds

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

FEB 1 1952

Mr. J. H. East, Jr.
Executive Officer, Region IV
DMEA Field Team
224 New Customhouse Building
Denver 2, Colorado

Re: Docket 2175 - Lead-Zinc
Cardiff Mining and Milling Co.
Salt Lake City, Utah

Dear Mr. East:

The Cardiff Mining and Milling Company filed the subject exploration application directly with this office. As indicated by the attached review the project has been given preliminary approval by the commodity specialists. We believe, however, that you should be advised of the project prior to formulating a contract in order that your comments may be incorporated into the contract provisions.

In addition the following points require clarification which we believe can be accomplished with greater reliability by field contract.

(1) The property is stated to consist of 16 patented lode mining claims embracing 236 acres.

A listing of the claims and survey numbers with a property map, if available, is required to accurately delineate the property. A fractional claim to be explored by the proposed 200 foot drift on the 800 level is designated on the map as "Joint-Area". The property rights involved require clarification and subordination if not entirely owned by applicant.

(2) The work is to be done on a contract basis of $6 per foot for drilling and $40 per foot for drifting. Contract price to include overall cost, (labor, plus supplies.)

The contract rate for drifting appears high although it is not definite as to what is to be included. Equipment is not mentioned in the application as a depreciation cost but 600 feet of 2 inch pipe and a

jackhammer unit is to be purchased. The contract proposed rate requires clarification as to amount and what is included.

(3) The mine is stated to be flooded below the 1000 foot level and that 200 gpm will be the pumping load to unwater to the 1400 level and 300 gpm to hold water below the 1400.

The pumping load appears to be reversed in the above statement. It is also evident that the only exploration work to be done requiring unwatering below the 1000 level is one drill hole from the 1400 level station. The necessity for this exploration in relation to expense should be considered.

(4) Power and labor expense in addition to the amount estimated on unit prices for drilling and drifting amounts to $15,000.

Aside from the necessity for the work on the 1400 level there appears to be a possibility of production being carried on concurrently with exploration. In such event these costs, if of benefit to both exploration and production will require pro-rating on some basis satisfactory for accounting purposes. Clarification of the costs and basis for pro-rating should be made prior to approval of a contract.

A copy of Form MF-100, MF-103, geologic report and map are enclosed along with the review of application. Please return this material along with your comment on the project and the points requiring clarification, at your earliest convenience.

Sincerely yours,

(signed) FRANK E. JOHNSON

F.E.J. 2-1-52

Chairman, Operating Committee
Defense Minerals Exploration
Administration.

Enclosures

APPROVED:
J. H. Hedges
Member, Bureau of Mines

/s/ Dwight M. Lemmon
Member, Geological Survey

DEMoulds/hmj
1-31-52
cc to: Adm. R. File
Docket File Copy
Region IV
Mr. Bishop
Mr. McKnight
Mr. Moulds

Docket file copy

FILE COPY
SURNAME:

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

Moulds
F. Johnson

FEB 1 1952

Mr. R. A. Glenny, Secretary-Treasurer,
Cardiff Mining and Milling Company
704 Newhouse Building
Salt Lake City, Utah

Re: Docket No. 2175 - Lead-Zinc
Exploration Project Contract

Dear Sir:

Your application for assistance in exploring the Cardiff Mine, Big Cottonwood Mining District, Alta Area in Salt Lake City, Utah, Docket No. DMEA 2175, has been reviewed by the Base Metals Division of the Defense Minerals Exploration Administration and has been referred to Mr. J. H. East, Jr., Executive Officer, Region IV, DMEA Field Team, 224 New Customhouse Building, Denver 2, Colorado, for a field examination.

The Region Office will contact you at the earliest opportunity in regard to your project.

Sincerely yours,

D. E. Moulds mest

D. E. Moulds, Acting Chief
Base Metals Division
Defense Minerals Exploration
Administration

DEMoulds/hmj
1-31-52

J.H. 2-1-52

cc to: Adm. R. File
Docket File Copy 2
Region IV
Mr. Bishop
Mr. McKnight
Mr. Moulds

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

January 31, 1952

Memorandum

To: Chairman, Operating Committee

From: Base Metals Division

Subject: Field Referral of application for exploration assistance, Docket No. 2175, Cardiff Mining & Milling Company, Salt Lake City, Utah.

The commodity sections have recommended that a contract be approved for the subject exploration project and that a field examination is not necessary as the information concerning equipment depreciation can be obtained directly from the applicant.

In reviewing the application preparatory to formulating a contract, several points appear to require clarification. These points, as set forth in the attached letter, can undoubtedly be clarified by correspondence with the applicant. From experience in previous attempts, however, it is believed that the information secured by personal contact in the field will be of greater reliability. It is also believed that the Field should be familiar with the project prior to formulating a contract so that any information presently available may be incorporated into the contract provisions.

D E Moulds

D. E. Moulds

Docket File Copy

FILE COPY 500
SURNAME:

Moulds

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

January 31, 1952

retyped in R.R.

Memorandum

To: Chairman, Operating Committee

From: Base Metals Division

Subject: Field Referral of application for exploration assistance, Docket No. 2175, Cardiff Mining & Milling Company, Salt Lake City, Utah.

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D. E. Moulds

DEMoulds/hmj
1-31-52

cc to: Adm. R. File
Docket File Copy
Mr. Moulds
Mr. Bishop
Mr. McKnight

Defense Minerals Administration

Review of Application for Exploration Assistance

Docket No. DMA-2175

To: Mr. C. O. Mittendorf

Commodity Lead, zinc

Total Amount $53,200

Govt. Participation 50%, $26,600

1. Name and Address of Applicant R. A. Glenny, Secretary-Treasurer, Cardiff Mining and Milling Company, 704 Newhouse Building, Salt Lake City, Utah

2. Location of Property Cardiff Mine, Big Cottonwood Mining District, Alta Area, Salt Lake County, Utah (Sec. 31, 32, T. 2 S., R 3 E.)

3. Mineral or metal Lead, zinc, silver Is it listed in Section 9 of MO-5? Yes

If not, application will be rejected.

4. Geologic probability of discovery--based on data in application (question #16, 17, 18, 20 and 22)*

Mines or Survey reports, etc., do you rate chances:

a) Good Yes, see attached drafts

b) Poor

c) None

d) Don't know--needs field examination

e) Is there an alternative and favorable project?
(If so, attach an explanation)

5. Is the applicant's right to the property clearly stated? Yes, owner
(question 5, 6, 7)*

6. If applicant is a lessee, is a copy of the lease attached?

Does the lease have sufficient time to run to cover a future

productive period?

*question numbers are those of MF-103

4. (a) The Cardiff mine is located in the Big Cottonwood Mining District, Salt Lake County, Utah. It is contiguous on the southeast with the Columbus-Rexall mine (DMA-187). Both of these properties have the same manager.

The subject property lies along the NW-SE trend of the Alta overthrust fault zone which is one of the important structural features in the district. This fault has thrust impervious Cambrian quartzite to the southwest over younger Mississippian limestone. A group of parallel fissures occurs transverse to the strike of the thrust zone. The intersections of these fissures with the Alta overthrust and the younger limestone have served as favorable loci for mineralization. The pattern of these fissures has been established by the operator in his mining of the Cardiff, No. 11, and No. 10 orebodies. They strike northeast-southwest, dip steeply to the northwest, and orebodies on them plunge northeast as replacement orebodies beneath the quartzite hanging wall of the Alta overthrust.

The proposed work will explore several fissure intersections near and to the southeast of the Cardiff and No. 11, fissures. Five diamond drill holes totaling 900 feet will be drilled from the 600, 1000, and 1400 levels. The operator expected to start Holes 1 and 2 in November 1951, on the 600 level and complete them at his own expense. In addition to the drilling, three drifts totaling 670 feet are proposed to explore ground southeast of the Cardiff fissure from the 800 and 1000 levels.

The Cardiff mine has been the biggest producer in the district and has been productive as recently as February, 1951.

Ore in the mine, according to F. C. Calkins, U.S.G.S. Prof. Paper 201, 1943, is largely oxidized above the 600 level. Downward from this level it contains an increasing proportion of galena, pyrite, sphalerite, and tetrahedrite.

The proposal submitted by the operator indicates a good understanding of the structural controls of mineralization in the district. His project has definite merit and based upon published geological data it has a reasonable chance to be successful. An approval of the application is recommended.

E. L. Newcomb
E.L. Newcomb
Geologist

7. Are subordination agreements necessary? No

a) MF-201? _____

b) MF-202? _____

8. From the data presented, does the proposed project appear feasible from the point of view of:

a) Available manpower Yes

b) Equipment and supplies Yes
(question 14 plus general knowledge of availability)*

c) Accessibility (question 12)* Yes

d) Water (question 13)* Yes

e) Power (question 13)* Yes

Is a field check needed on any of these points? No

9. Does the experience of the applicant appear to be adequate to assure that he can properly conduct the proposed project? (question 4)* Yes

_____

Is a field check needed on this point? No

10. Exhibit A. (question 21 and 22)*

a) Is the project adequately described? Yes

If not, are there sufficient data given so that you can describe the project? _____ If so, attach a draft.

b) Is there an adequate map or sketch of the proposed work? Yes

_____

c) Is the proposed work "exploration" under the definition of Section 8, MO-5? Yes

If not, what part of it is? _____

_____

_____

_____

Is this part a worthwhile exploration project?_____

d) Are the cost estimates detailed? Yes

Can they be summarized, as on page 2 of Procedural Instruction 5-A, from the available data? Yes If so, attach a draft. See MF-103

e) Are the cost estimates reasonable? Seem high, but applicant competent to judge.

f) Should more information be requested from applicant? No

g) Is a field examination necessary to complete Exhibit A? No

11. Exhibit B (question 23-d)*

a) Is it applicable? No

b) If so, are sufficient data furnished?_____ If so, attach a draft.

c) Is a field check needed?_____

12. Exhibit C (question 23-e, f and g)*

a) Is it applicable? Yes

b) Sufficient data? Yes If so, attach a draft. See MF-103

c) Are rents and charges reasonable? Value and depreciation allowance on equipment ~~furnished by applicant not shown~~ in application.

d) Is a field check needed? No - Above can be obtained from applicant

13. Exhibit D (question 23-a, b)*

a) Are there sufficient data? Yes

b) Is the schedule adequate for the work proposed? Yes

c) Is the schedule excessive for the work proposed? No

d) Are the proposed wages and salaries reasonable? Yes

e) Is a field check needed? No

14. Exhibit E (question 23-c)*

a) Is it applicable? No

b) Sufficient data?

c) Reasonable?

d) Field check needed?

15. In your judgment, can the proposed work be done in the proposed time? Yes

(All exploration must be completed within two years)

16. If field examination is not needed, attach your recommendation.
Recommended geologically - E.L.N.

17. If field examination is needed, do you have any special instructions for the field team not indicated by your answers to the foregoing question?

*Property is contiguous on South with Columbus-Rexall Mine which has applied for Direct Loan (DMA-187). Also, Mgr. of Columbus-Rexall Mine Manages Cardiff property.

Reviewed by: C. L. Newcomb
E. L. Newcomb, GS 10-26-51
O. M. Bishop
O. M. Bishop, BM
L. L. Farnham
L. L. Farnham

Date 1-28-52

17. Recommendations

This docket is, no doubt, one of the more worthy exploration projects. The information submitted in the application was well presented and complete with the exception of the data necessary for including the depreciation allowances on the equipment to be furnished by the applicant. This information can be readily obtained from the applicant without necessitating a field examination.

The management of the proposed project will be in the hands of a competent and experienced engineer.

The geologic probabilities of finding additional worth-while orebodies by the proposed exploration program appear very favorable. Thus, it is recommended that the application for the loan be approved.

L. L. Farnham BM

O. M. Bishop BM

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA
FOR USE UNDER THE
DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMA-2175

Date received 10-18-51

RECEIVED OCT 18 1951

Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah.

Name and address of applicant

Date October 15, 1951.

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production since 1910

   If not in production or operation, estimated date when production will begin November 15, 1951.
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
L. E. Stein, Salt Lake	Pres. & D.	4,200		100		none	
R. A. Glenny, " "	Sec-T. & D	3,000		100		none	
M. R. Richards, Bountiful, Utah	V.P. & D	600		100		none	
Stockholders:							
Dan B. Shields, S.L.				15,000		none	
Dr. Scott Smith, S. L.				27,000		none	
Mrs. Loraine Stefan Milwaukee, Wis.				13,000		none	
Simon B. Eggertson Salt Lake City, Ut.				25,000		none	
Walter M & Walter T. Harris, Salt Lake				17,100		none	
	Total	7800	x x x x x	97,300		x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$ 500,000	$ 500,000	$ 1.00	500,000	1½ cents 1948.
Preferred stock	$	$	$		

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

Cardiff Mining and Milling Company.

Form-MF-100. Supplementary Data Sheet No.1.

1. (a) zinc and lead ores.
(b) copper and silver ores.

2. Cardiff mining property consists of 16 patented lode mining claims embracing 236 acres, developed as follows:
(a) 200 foot, vertical shaft serves lower mines workings at a point 2300 in from the portal of the main adit tunnel. An inclined winze goes down from the bottom of the shaft (25 degrees incline) for an added distance of 700 feet.
(b) About 5,000 feet of drifts and crosscuts in the property.
(c) 4,000 feet of tunnels and adits.
(d) Small winzes, sub-level raises, small drifts and crosscuts in and around stopes aggregate about 2,000 feet in length.

At the present time, levels below the 1000 are flooded because the mine has been in-operative for about 6 months. Experience has shown that about 200 gallons per minute will be required to be pumped in un-watering between the 1000 and 1400 levels, below the 1400, it will be necessary to pump 300 g.p.m. to keep the mine un-watered.

3. The Cardiff property is situated in the Big Cottonwood Mining district, Alta area, Salt Lake County, Utah. Distance to Midvale smelter, U. S. Smelting company, is about 21 miles. Zinc smelter of International Smelting company at Tooele, Utah, is about 55 miles distant.

(c) Township 2 South, Sections 31 and 32, Range 3 E., S. L. B. & M.

(d) Salt Lake County, Utah.

4. (a) Property temporarily shut down because of finances.
(b) Operating the property as owner.

5. In production since 1910. Production temporarily suspended in April, 1951, when International Smelting company was unable to take any more high-grade zinc for smelting at their zinc plant at Tooele, Utah. In April, 1951, some lead-zinc-silver ores were being shipped from the joint area shared by Cardiff company and Columbus Rexall mine, but this operation ceased when spring run-offs flooded the ore body and insufficient money was had to carry on pumping operations. With some financial assistance production of high-grade oxidized, zinc ores and also lead-zinc ores of good grade, both oxidized and sulfide, could begin immediately.

6. Cardiff Mining & Milling company was incorporated in 1906 and has operated continuously since that time. Persons who now head the company have had wide experience in mining throughout western United States. John Kestelor, who will manage operations at the

mine, is manager of the adjoining Columbus Rexall mine and has spent many years in the Alta district, first as an engineer for the Bureau of Mines, then as an independent leaser and mine operator, then as a mine manager. He has also spent much time with F. C. Calkins of the U. S. Geological Survey studing the geology of the district. In addition, from 1935 to 1941, he was in charge of U. S. Smelting's operations in the near-by Park City district.

7. The Cardiff property was incorporated as the Cardiff Mining & Milling company in 1906. During the year 1910, the Cardiff fissure was discovered and some mining work performed. In 1912, the present adit-tunnel was driven to intersect the downward extension of the Cardiff fissure. At a distance of 2400 feet in from the portal, the intersection of this fissure with the Alta overthrust fault was found. This fault is a reverse fault wherein Cambrian quartzite has been thrust over Mississippian limestone. The impervious quartzite hanging wall has served as a barrier to mineralizing solutions so that large replacement ore bodies have been formed in the underlying limestone. The main Cardiff orebody has been one continuous ore shoot over an inclined length of 2500 feet. Throughout this distance the ore has been 10 to 20 feet thick and from 30 to 200 feet wide. As a result of finding this large, orebody at the intersection of the Cardiff fissure with the thrust fault, the mine has yielded a production of over 200,000 tons of ore having a net smelter value slightly over $30.00 per ton.

Up to 1919 the mine produced 70,847 tons of dry ore having an average assay of 15.51 ounces silver, 0.82 percent copper and 26.61 percent lead per ton. The dividends to 1919 were $675,000. Later, the upward extension of the Columbus Rexall No. 10 orebody was found several hundred feet south of the main Cardiff ore body. This orebody assayed about 25% zinc and 20% lead per ton and was mined over an inclined distance of 300 feet. Later, the boundary stope was discovered in the south end of the company's property. This one stope produced over $1,000,000. in returns from the ore, and Cardiff company's share was about $800000.00. This orebody was exceptionally high in zinc.

The downward extension of the No. 11 ore zone was cut in 1948, in joint-area shared by the Columbus Rexall mine. From 1948 to the present, this zone has produced about $200,000 net smelter return.

Since the price of zinc turned upward in 1950, considerable activity resulted in the mining of oxidized zinc ores left around the edges of the main Cardiff stope. These ores were left in the early days because the penalty involved. From 1949 to April, 1951, 1700 dry tons of zinc ore averaging 30% zinc per ton were shipped

Cardiff Mining & Milling Company

Form MF-100 Supplementary Data Sheet No. 3.

7. (continued) from these areas. Several hundred tons ofthis orestill lies in the mine because International Smelting was unable to take more of it after April, 1951.

In April zinc mining operations were suspended pending the location of a market for the zinc ore. Shortly thereafter, water conditions forced a suspension of mining the No. 11 orebody in the joint-area, and the mine has been idle ever since. The water has now subsided and a development program is planned that will again put the property on a producing basis.

(B) The Cardiff mine is situated on the north flank of the Alta mining district, from which has come a production exceeding $40,000,000. The adjoing Columbus Rexall mine has produced about $1,500,000. from deposits similar to the Cardiff. To the northeast is the Flagstaff mine that has produced $6,000,000. from large bedded ore bodies. It is believed that the Cardiff's production, between $7,000,000 and $8,000,000, is the largest in the Alta district.

(c) Included herewith.

8,9,10. Filled in on Form.

11. Estimated production from several sources is 50 tons per day or 1,250 tons per month.

12. All Cardiff mineral deposits are closely associated with the Alta overthrust fault zone. This zone trends N. 35 degrees West and dips 25 to 30 degrees to the northeast and consists of an upthrust block of Cambrian quartzite overlying a soluble Mississippian limestone. The fissure-veins trend N. 30 to 60 E. and dip steeply to the northwest. Under certain favorable conditions, especially where the fissures are traversed by northwest fracture-zones, large replacement ore bodies have been formed in the limestone immediately beneath the quartzite. The enclosed report shows the well-defined trend of the mineral zones that has resulted in a total production from the property exceeding $7,000,000.00 in net smelter returns. The geology of the property is quite simple and is dominated by the two factors mentioned above. The abundance of available ore in the early days of mining resulted in leaving many faces of ore that were high in zinc value or that contained less than 15 percent lead. Also, work performed since 1948 has shown that the ore zones go into the footwall limestone much deeper than mining operations were carried out. As almost the entire footwall of the Cardiff stope, as previously mined, is mineralized, it is planned to explore this footwall over a length of 2,000 feet. In the mining of No. 11 stope it was found that 25% of its production came from fissure ore beneath the large

Cardiff Mining & Milling Company.

Form MF-100 Supplementary Data Sheet No.4.

12. (continued)
replacement bodies just beneath the contact. These same conditions have never been prospected in the main, Cardiff stope, and in several other areas in the mine.

(b) (1) submitted in 'Geologic Report and Proposed Development Program'
(2) " " " " " " "

13. The Cardiff mine is located in Salt Lake county, about 25 miles southeast of Salt Lake City. Except for the last three miles of road, the entire distance from Salt Lake is hard-surfaced. The Midvale smelter of U. S. Smelting & Refining Company is 21 miles distant. The last three miles of the road is a good, graveled road but is quite steep.

14. Ample water is had both in the mine and in the canyon stream near the tunnel portal.

15. The Utah Power & Light company 11,000 volt transmission line connets to transformers at the tunnel portal. The power bill to run a 700 cubic foot, Ingersoll Rand electric compressor, 100 HP motor, is $350.00 per month.

16. On a one-shift per day basis: Compressor man-1, trammer-1, muckers-4, miners-4, with an output of 40 tons of zinc ore per day. When the lower levels are worked the following men are required: Hoistman-1, pumpmen-3, cager and trammer-1.

17. The mine is completely equipped for immediate mining. However, to increase the efficiency of operation, there are a few items that should be purchased. The company has a large boarding house on the property, also, one cabin and one trailer house. The compressor house contains two, Ingersoll Rand, Imperial Type 10, 700-cubic foot compressors. Several Ingersoll Rand, 2MRV-50 Motorpumps of 250 GPM capacity. The main haulage tunnel is laid with 30-lb rail. A 440-volt cable transmits power from the portal to the pumping site. Air lines of 4 and 2 inch diameter are laid to most working places. Ample mine cars are had at the property. A horse is used in tramming. Complete drilling equipment is available but it is recommended that a jackhammer with a jacklag be purchased because of its maneuverability. A small amount of 2 inch pipe (about 600-feet) should also be purchased for the proposed development drifts.

18. During February, March, and the first part of April, snow conditions will make shipment of ore difficult but it has been the practice to stockpile during these months and ship during May.

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)	1,000	oxidized 30% Zn			
Indicated (probable)	500	18% lead 22% zn.			

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power:

State amount of power used, rate per hour, and source thereof.

16. Labor:

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Cardiff Mining & Milling Company.
(Name of company)

By R. A. Glenny
(Signature of authorized official)

October 15, 1951.
(Date)

R. A. Glenny
Sec-Treasurer
(Title)

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—63792-1

Geologic Report and Proposed Development Program.

Cardiff Mine.

Salt Lake County, Utah.

General Geology.

The property of the Cardiff Mining company lies wholly along the course of the Alta overthrust fault-zone. This zone is one of the dominant structural features of the Alta mining district and consists of a well-defined contact wherein impervious, Cambrian quartzite has been thrust up over younger, Mississippian lime beds. The fault-zone trends N. 30 to 40 degrees W. and dips 25 to 30 degrees to the northeast.

Transverse to the trend of this zone are the various fissures of the district. These strike northeast-southwest and generally dip steeply to the northwest.

Most of the orebodies in the vicinity of the Cardiff property are found as limestone replacement-lenses just beneath the quartzite hanging-wall. The largest deposits are found at the intersection of several fissures and usually extend for some distance beneath the lime-quartzite contact.

Description of the Deposits.

The most northerly ore body in the Cardiff mine is the largest, and was formed along the course of the intersection of the Cardiff fissure with the overthrust contact. Plunging to the northeast at an average dip of 25 degrees, this intersection has formed one, continuous stope about 2500' long, 10 to 20 feet thick and 30 to 200 feet wide. In the upper levels the ore was principally a mixture of cerussite ($PbCo_3$) and manganese carrying residual boulders of galena and surrounded (on the edges of the stopes) by a casing of zinc silicates and carbonates. On the 1200 level the ore was practically all sulfide. The orebody is said to be still continuing below the 1500 level but water conditions are such that at that point it has been seen only by a few persons. The zinc content has increased with added depths.

No. 11 fissure is found about 300 feet south of the Cardiff fissure. At its contact with the overthrust fault this fissure has only been explored in two places, and both yielded lenses of ore totaling $400,000 in net smelter returns. The upward and downward extension

of this zone offers possibilities for finding added ore bodies.

The 'south one' fissure, as it is known in the Cardiff property, or No. 10, as known in Columbus Rexall ground, lies a few hundred feet south of No. 11 fissure. This is another long ore shoot that had a large production--at a time when metal prices were quite low. At depth (around the Cardiff 1000 level) this fissure should intersect No. 11 fissure as well as Columbus Rexall's 'D' winze fissure. These intersections are almost certain to yield ore bodies.

South of No. 10 ore zone is found the large boundary stope that was formed by the intersection of several fissures. This was a large mass of ore yielding almost $1,000,000 in smelter returns.

The aggregate production of these ore zones was between $7,000,000 and $8,000,000.

During 1949 and 1950, by carefully mining No. 11 stope it was found by removing the lower grade usually left on the bottom of the stopes that fissure ore penetrated the footwall limestone much deeper than was formerly admitted. As a result it is planned to explore the main Cardiff stope-footwall, especially where crossed by northwest fracture zone.

Much sulfide ore remains on stope walls from the 1200 to 1400 levels of the inclined winze. During 1949, 1950, and to February, 1951, 3,340 tons of ore, averaging 10 ounces silver, 20 percent lead and 6 percent zinc per ton was mined here.

Similarly, considerable zinc ore ($ZnSiO$, $ZnCO_3$) remains in the stopes on the upper levels. During 1950 and to April, 1951, 1700 dry tons of ore, assaying 30% zinc per ton was mined from these areas.

It is difficult to submit a sample map of the mine because there are innumerable faces of ore, of every size possible, scattered throughout the mine. For instance on the map above No. 11 stope there is a zone marked 'Block 1'. Along this drift there is 4 feet of ore from which 73 dry tons of zonc were shipped in driving the drift. This assayed 28% zinc per ton.

Because of the high grade lead-zinc ore found along No. 11 fissure, it is recommended that the first exploratory work be done to pick up the upward extension of this zone. This can be done conveniently with a 200 foot drill hole from the 600 level, as shown on the map.

Cardiff Mine.

Ore is still continuing downward in the lower lense found along the course of No. 11 fissure. The last shipment was made from the 70' winze off the Columbus Rexall tunnel level just before the spring water run-off flooded the winze. This assayed 18% lead and 22% zinc per ton. This ore can be tapped very easily with a 120 foot drift from the Cardiff 800 level south drift, as shown on the map.

A 200 foot drift is also recommended of the 800 level at the point where, as seen on the map, the 800 level left the contact and penetrated the footwall of the overthrust. This drift should pick up the downward extension of the large ore shoot mined along the strike of 'D' winze fissure. The Columbus Rexall company cuit this ore body when it reached their lower boundary limits.

The most important piece of exploratory work, however, is off the 1000 level of the Cardiff inclined winze. At this point, the workings are above the contact. It is recommended that the 1000 level be driven south a distance of 350 feet to cut the Cardiff ore zone, then be extended to cut the downward extension of the No. 10, No. 11 and D. winze fissures, and their possible intersections.

At the same time it is advised that a diamond drill be set up at, or about, the 1000 level and one hole drilled upward to about the 850 level, and, in the footwall of the winze, and that one hole be drilled downward in the footwall of the winze to about the 1150 level.

Later, when the water is pumped down to the 1400 level, it is considered advisable to probe for the downward extension of the main Cardiff ore shoot. This will determine whether or not it will be feasible to deepen the incline for future operations.

Submitted by:

John Kasteler

John Kasteler.

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
INTERNATIONAL SMELTING & REFINING CO., TOOELE PLANT, SALT LAKE CITY, UTAH

	DRY TONS	LEAD	ZINC	NET SETTLEMENT FOR LOT	CARDIFF SHARE
5/28/48	50.6	21.7	19.0	$3,398.16	$779.89
6/ 3/48	57.4	18.1	23.7	3,312.91	742.55
6/11/48	47.0	18.7	21.1	2,761.04	606.29
10/26/48	57.4	12.8	19.6	2,751.52	305.38
12/ 8/48	49.9	12.9	16.8	3,365.90	376.39
11/11/48	46.3	12.8	19.6	2,988.24	331.98
11/22/48	65.8	11.1	19.9	2,846.82	250.57
12/21/48	64.9	17.1	16.8	4,304.82	493.26
12/21/48	62.1	16.6	15.4	3,922.21	449.06
1/10/49	58.2	18.6	18.1	4,364.35	500.89
1/10/49	64.7	19.2	20.6	5,037.75	586.79
1/20/49	62.2	19.8	20.6	4,951.88	576.99
2/ 2/49	62.3	18.0	18.0	4,412.98	509.61
2/8/ 49	72.6	15.4	25.9	4,592.21	525.16
3/14/49	47.8	12.9	18.2	1,919.89	165.33
3/17/49	53.3	16.3	15.5	3,261.51	371.95
3/24/49	48.4	13.5	15.5	2,310.54	258.52
3/30/49	57.1	13.5	18.0	2,600.48	285.87
3/30/49	53.9	13.0	16.1	2,249.32	196.33
4/ 1/49	47.8	12.1	19.7	1,919.89	165.33
4/20/49	57.2	12.6	21.0	2,114.84	181.40
4/27/49	51.5	14.0	22.5	1,959.80	164.97
4/27/49	50.5	13.5	20.9	1,824.65	156.61
5/17/49	54.9	13.0	18.7	1,774.20	112.34
6/ 7/49	55.1	14.4	24.0	1,935.76	123.30
6/16/49	60.1	15.3	25.4	1,819.85	115.72
6/23/49	52.8	21.0	22.6	3,395.62	789.66
7/ 6/49	80.7	10.6	23.7	1,498.20	75.79
7/18/49	45.8	11.4	22.4	877.89	43.93
7/29/49	58.0	14.0	10.0	1,445.03	81.37
11/15/49	29.4	14.8	24.6	891.97	51.20
12/15/49	30.8	14.1	26.1	876.06	49.70
SHIPMENTS FROM BOUNDARY STOPE AREA					
12/23/49	34.9	16.6	26.1	1,264.56	-----
4/5/50	15.9	17.1	27.4	466.09	53.05
6/24/50	26.0	17.5	24.5	991.61	204.76
8/14/50	34.5	9.4	5.1	466.69	24.83

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
UNITED STATES SMELTING REFINING & MINING CO., MIDVALE, UTAH

4/28/48	64.2	26.3	14.0	4,787.60	1,188.17
5/ 1/48	35.8	28.0	12.0	2,884.28	825.84
8/10/48	208.4	14.9	16.9	10,645.84	7,214.46
8/30/48	91.8	17.4	6.9	5,511.40	649.02
9/ 3/48	61.7	16.6	8.5	3,651.67	424.69
9/17/48	58.7	13.0	10.9	2,424.76	277.71
9/16/48	60.2	15.5	16.1	3,220.70	370.55
9/27/48	59.2	16.9	22.6	3,788.64	442.55
SHIPMENTS FROM AREA OF BOUNDARY STOPE					
8/ 9/48	27.7	9.4	1.5	731.68	101.26

SDIT[illegible]ITS FROM AREA OF BOUNDARY STOP[illegible] (Continued)

10/ 5/49	26.8	1.2	2.5	366.67	82.63
6/17/50	8.0	1.2	3.1	302.02	60.98
8/25/50	7.2	---	---	754.77	119.92
8/26/50	22.4	12.2	2.8		

October 19, 1951

Mr. R. A. Glenny, Secretary-Treasurer
Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah

Subject: DMA-2175
Re: Exploration Loan

My dear Mr. Glenny:

This will acknowledge receipt of your application dated October 15, 1951 for a loan under the Defense Production Act of 1950.

Your application was assigned Docket Number DMA- 2175 and referred to the Lead-Zinc Branch.

Kindly refer to DMA-2175 in any future correspondence relating to your application.

Sincerely yours,

Robert E. Adams

Robert E. Adams, Chief
Reports and Records Unit

2463

OCT 22 1951

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMA-2178
Metal or Mineral
Date Received 10-18-51
Amount $
Participation (Government %)

Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah.

Name and address of applicant

Date October 15, 1951.

If you have already filed MF-100, give date filed concurrent, type of assistance requested 50% zinc-lead exploration loan.

DMA Docket Number (if available) 2178

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Cardiff Mining & Milling Company.
(Name of company)

By R. A. Glenny
(Signature of authorized official)

R. A. Glenny.

October 15, 1951.
(Date)

Sec-Treasurer.
(Title)

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—64067-2

Cardiff Mining & Milling Company

Form MF-103 Supplementary Data Sheet No. 1.

1. (a) The Cardiff Mining & Milling property embraces 236 acres of patented lode mining claims in the Big Cottonwood mining district, Alta area, Salt Lake County, Utah. The property is developed by several thousand feet of haulage tunnels, shafts, winzes, raises, and drifts and crosscuts. Living facilities are available at the property. Complete equipment and facilities for mining operations are at the mine.

(b) applicant is owner.

(c) Section 31, Township 2 South, Range 3 East, Salt Lake Base & M.
(1) both areas are the same.

2. (a) zinc ores dominate with lead ores a close second. Some areas produce fair amounts of copper. Silver is present in varying amounts. Production heretofore has been mainly lead ore as zinc areas were largely bypassed.

(b) The geology of the Cardiff mine is quite simple in that two features control the ore deposition and make prospecting for deposits relatively easy. All ore bodies are formed at the intersection of near, vertical, northeast-southwest fissure-veins and the Alta overthrust fault. This fault trends N. 35 W and dips 25 to 30 degrees to the northeast, and consists of impervious Cambrian quartzite overlying a fairly soft Mississippian limestone.

At the intersection of this contact with the Cardiff fissure, there has been formed a large replacement ore body 10 to 20 feet thick, 30 to 200 feetlong and has been followed for an inclined distance of 2500 feet and is still going downward.

Similarly, with a very little amount of development work performed, there has been found along the course of No. 11 fissure two lenses of ore that have each yielded over $200,000 in net smelter returns.

Another such ore body has formed along the course of a fissure call 'south one' fissure in Cardiff ground and called No. 10 fissure in Columbus Rexall ground that has produced $700,000 in smelter returns in Rexall ground and $100,000 in Cardiff ground.

There are numerous other such ore zones in the property. The 'boundary stope', resulting from the intersection of several fissures, produced approximately $1,000,000 from one large lense of ore.

Thus, the pattern of fissures has been definitely established. More development work is required to find other lenses of ore. In addition to ore in sight, it is planned to explore several fissure-intersections that should yield substantial ore bodies.

Cardiff Mining & Milling Company.

Form MF-103 Supplementary Data Sheet No. 2.

3. (a) On the 1st of November, 1951, the Cardiff company proposes to undertake some diamond drilling work. Because of limited finances, assistance is necessary to carry out the program of exploration. It is believed that sufficient ore will be found to pay back the cost of the project.

On the enclosed map are shown diamond drill holes No. 3,4 & 5., aggregating 500 feet. Also shown are two proposed drifts to be driven off the 800 level South drift. These total 320 feet. A proposed exploration drift is also shown on the 1000 level that is 350 feet long.

This is the amount of work requested in the project. Cardiff company will drill holes no. 1 and 2 shortly, on its own account.
Itemized Project Summary:

Exploration	Length	Level	Unit cost	Total.	
1. Drill Hole 3.	150'	1000	6.00/ft	$ 900.00	
2. Drill Hole 4	100'	1000	6.00	600.00	
3. Drill Hole 5	250'	1400	6.00	1500.00	3,000.
120' long drift	800 lv south		40.00 (total)	4,800.00	
200' long drift	800 lv south		40.00	8,000.00	
350' long drift	1000 lv.		40.00	14,000.00	
640					26,800.

All above work will be contracted for the net total costs shown above.

4. Power bill for pumping.	$300.00	per mo.,	6 months	1,800.	
5. Power bill, compressor.	350.00	"	6 months	2,100.	
6. Wages, compressor men.	250.00	"	6 months	1,500.	
7. Pump man, 3 shifts/day for each shift equals	350.00 1050.00	" "(3 men)	6 mo.	6,300.	
8. Hoist man, day shift,	350.00	"	6 months	2,100.	
9. Trammer, day shift,	350.00	"	6 months	2,100.	
					15,900.

Purchase 1100 feet, No. 2,3conductor cable. available in a shaft at Park City.....	2,000.
Supervision, and engineering, 350.00/mo, 6 months	2,100.
Accounting, office work, 200.00/mo. 6 months	1,200.
Purchase jackhammer with jackleg, 3 sets steel,	700.
Allowance for electrical work, compressor repairs	1,500.
Total cost of project	53,200.00

Objectives:

1,2, above. In the vicinity of the 1000 level of the inclined winze, this working has passed over the top of the ore

Cardiff Mining & Milling Company.

Form MF-103 Supplementary Data Sheet No. 3

3. (a) horizon. A little ore was extracted underneath the winze at this level, but nothing compared to the stopes immediately above and below. Difficulty of extracting the ore because of the position of the winze resulted in leaving an area about 150 feet long partially explored. It is planned to explore up from the 1000 level (and in the footwall of the winze) with Hole No. 3 and explore downward in the footwall from the 1000 level with Hole No. 4.

3. above. Hole No. 5 will drill down into the water zone to see how much ore is going down along the Cardiff fissure below the lowest workings.

The 120' drift proposed (as shown on the map) from the 500 level South drift will contrate known ore and give an idea as to its downward extension. This ore is the No. 11 ore shoot that was formerly mined from a 70-foot inclined winze from the Columbus Rexall tunnel level. This winze was flooded last spring and still has ore in the face of it. The last shipment from this area (35ton) assayed 18 percent lead and 22 percent zinc per ton. By driving this drift, this ore will become easy to mine and the drift will afford an excellent working to continue following this ore.

In the 200 foot drift to be driven from the 500 level south drift, the immediate objective (as seen from glancing on the map) is to get back along the contact of the Alta overthrust fault and intersect the downward extension of the No. 11 and 'D' winze fissures. These fissures were highly productive in upper workings. This is considered to be one of the best development projects in the entire district.

A glance at the map shows that the lower workings of the Cardiff Inclined Winze (in the vicinity of the 1000 level) has passed over the contact (and ore horizon). It is planned to drift south along the overthrust contact at this point to explore the Cardiff fissure and to continue this drift to pick up No. 10, 11, and 'D' winze fissures.

(b) Project is ready to begin. Will require 6 months for completion.

(4) Enclosed.

(5) 2 compressors, 6 pumps, hoists, boarding house, cabins, track and pipe are available for immediate mining work. It is advisable to purchase a small jackhammer and jackleg for drilling work and also 1100 feet of No. 2 electric cable to overcome the voltage drop now experienced when the pumps operate.

(6) Only the jackhammer and cable are required. Cost of powder, etc., to be used in drifting is included in cost estimates. Drifts will be contracted, with contractor furnishing everything except power. Company will hire hoistman, trammer, pumpmen, etc.

Cardiff Mining & Milling Company.

Form Af-103 Supplementary Data Sheet No.4.

7. (a) none.
(b) 1100 feet No.2, 3-conductor electric cable, cost $2,000.00
1 jackhammer, jackleg, 3 sets steel carbide tipped-- 700.00
(c) all other equipment required for completion of project.

8. Diamond drilling and drifting operations will be contracted out with footage prices mentioned above. Footage cost will be overall cost quoted, labor charge plus supplies used.
The following will be hired by the company.

1- trammer, day shift only, $350.00 per month wages.
1- hoist man, " " 350.00 " "
1- compressor man " 250.00 " "
3- pump men, work all three shifts, at 350.00 per month each.
1- supervisor and engineer, 350.00 per month.
1- office man 200.00 per month

9. Overall contract price per foot of drift advanced is $40.00
Overall " " " drilling " is 6.00
Compressor power bill per month is 350.00
Pumping " " " is 300.00

10. (a) $26,600.

(b) yes.

11. None except that shipment of ore will probably be impossible during February, March and part of April, but ore will be (as in past) stockpiled during these months.

Geologic Report and Proposed Development Program.

Cardiff Mine.

Salt Lake County, Utah.

General Geology.

The property of the Cardiff Mining company lies wholly along the course of the Alta overthrust fault-zone. This zone is one of the dominant structural features of the Alta mining district and consists of a well-defined contact wherein impervious, Cambrian quartzite has been thrust up over younger, Mississippian lime beds. The fault-zone trends N. 30 to 40 degrees W. and dips 25 to 30 degrees to the northeast.

Transverse to the trend of this zone are the various fissures of the district. These strike northeast-southwest and generally dip steeply to the northwest.

Most of the orebodies in the vicinity of the Cardiff property are found as limestone replacement-lenses just beneath the quartzite hanging-wall. The largest deposits are found at the intersection of several fissures and usually extend for some distance beneath the lime-quartzite contact.

Description of the Deposits.

The most northerly ore body in the Cardiff mine is the largest, and was formed along the course of the intersection of the Cardiff fissure with the overthrust contact. Plunging to the northeast at an average dip of 25 degrees, this intersection has formed one, continuous stope about 2500' long, 10 to 20 feet thick and 30 to 200 feet wide. In the upper levels the ore was principally a mixture of cerussite ($PbCo_3$) and manganese carrying residual boulders of galena and surrounded (on the edges of the stopes) by a casing of zinc silicates and carbonates. On the 1200 level the ore was practically all sulfide. The orebody is said to be still continuing below the 1500 level but water conditions are such that at that point it has been seen only by a few persons. The zinc content has increased with added depths.

No. 11 fissure is found about 300 feet south of the Cardiff fissure. At its contact with the overthrust fault this fissure has only been explored in two places, and both yielded lenses of ore totaling $400,000 in net smelter returns. The upward and downward extension

of this zone offers possibilities for finding added ore bodies.

The 'south one' fissure, as it is known in the Cardiff property, or No. 10, as known in Columbus Rexall ground, lies a few hundred feet south of No. 11 fissure. This is another long ore shoot that had a large production--at a time when metal prices were quite low. At depth (around the Cardiff 1000 level) this fissure should intersect No. 11 fissure as well as Columbus Rexall's 'D' winze fissure. These intersections are almost certain to yield ore bodies.

South of No. 10 ore zone is found the large boundary stope that was formed by the intersection of several fissures. This was a large mass of ore yielding almost $1,000,000 in smelter returns.

The aggregate production of these ore zones was between $7,000,000 and $8,000,000.

During 1949 and 1950, by carefully mining No. 11 stope it was found by removing the lower grade ore usually left on the bottoms of the stopes that fissure ore penetrated the footwall limestone much deeper than was formerly admitted. As a result it is planned to explore the main Cardiff stope-footwall, especially where crossed by northwest fracture zone.

Much sulfide ore remains on stope walls from the 1200 to 1400 levels of the inclined winze. During 1949, 1950, and to February, 1951, 3,340 tons of ore, averaging 10 ounces silver, 20 percent lead and 6 percent zinc per ton was mined here.

Similarly, considerable zinc ore ($ZnSiO$, $ZnCo_3$) remains in the stopes on the upper levels. During 1950 and to April, 1951, 1700 dry tons of ore, assaying 30% zinc per ton was mined from these areas.

It is difficult to submit a sample map of the mine becuase there are innumerable faces of ore, of every size possible, scattered throughout the mine. For instance on the map above No. 11 stope there is a zone marked 'Block L'. Along this drift there is 4 feet of ore from which 73 dry tons of zonc were shipped in driving the drift. This assayed 28% zinc per ton.

Because of the high grade lead-zinc ore found along No. 11 fissure, it is recommended that the first exploratory work be done to pick up the upward extension of this zone. This can be done conveniently with a 200 foot drill hole from the 600 level, as shown on the map.

Cardiff Mine.

Ore is still continuing downward in the lower lense found along the course of No. 11 fissure. The last shipment was made from the 70' winze off the Columbus Rexall tunnel level just before the spring water run-off flooded the winze. This assayed 18% lead and 22% zinc per ton. This ore can be tapped very easily with a 120 foot drift from the Cardiff 800 level south drift, as shown on the map.

A 200 foot drift is also recommended of the 800 level at the point where, as seen on the map, the 800 level left the contact and penetrated the footwall of the overthrust. This drift should pick up the downward extension of the large ore shoot mined along the strike of 'D' winze fissure. The Columbus Rexall company quit this ore body when it reached their lower boundary limits.

The most important piece of exploratory work, however, is off the 1000 level of the Cardiff inclined winze. At this point, the workings are above the contact. It is recommended that the 1000 level be driven south a distance of 350 feet to cut the Cardiff ore zone, then be extended to cut the downward extension of the No. 10, No. 11 and D. winze fissures, and their possible intersections.

At the same time it is advised that a diamond drill be set up at, or about, the 1000 level and one hole drilled upward to about the 850 level, and, in the footwall of the winze, and that one hole be drilled downward in the footwall of the winze to about the 1150 level.

Later, when the water is pumped down to the 1400 level, it is considered advisable to probe for the downward extension of the main Cardiff ore shoot. This will determine whether or not it will be feasible to deepen the incline for future operations.

Submitted by:

John Kasteler

John Kasteler.

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
INTERNATIONAL SMELTING & REFINING CO., TOOELE PLANT, SALT LAKE CITY, UTAH

	DRY TONS	LEAD	ZINC	NET SETTLEMENT FOR LOT	CARDIFF SHARE
5/28/48	50.6	21.7	19.0	$3,398.16	$779.89
6/ 3/48	57.4	18.1	23.7	3,312.91	742.55
6/11/48	47.0	18.7	21.1	2,781.04	606.29
10/26/48	57.4	12.8	19.6	2,731.52	305.38
12/ 8/48	49.9	12.9	16.8	3,365.90	376.39
11/11/48	46.3	12.8	19.6	2,988.24	331.98
11/22/48	65.8	11.1	19.9	2,846.82	250.87
12/21/48	64.9	17.1	16.8	4,304.82	493.26
12/21/48	62.1	16.6	15.4	3,922.21	449.06
1/10/49	58.2	18.6	18.1	4,364.35	500.89
1/10/49	64.7	19.2	20.6	5,037.75	586.79
1/20/49	62.2	19.8	20.6	4,951.86	576.99
2/ 2/49	62.3	18.0	18.0	4,412.98	509.61
2/8/ 49	72.6	15.4	23.9	4,592.21	525.16
3/14/49	47.8	12.9	18.2	1,919.89	165.33
3/17/49	53.3	16.3	15.6	3,261.51	371.95
3/24/49	48.4	13.5	15.5	2,310.54	258.52
3/30/49	57.1	13.5	18.0	2,600.45	285.87
3/30/49	53.9	13.0	16.1	2,249.32	195.33
4/ 1/49	47.8	12.1	19.7	1,919.89	165.33
4/20/49	57.2	12.6	21.0	2,114.64	181.40
4/27/49	51.3	14.0	22.5	1,959.80	164.97
4/27/49	50.5	13.5	20.9	1,824.65	156.61
5/17/49	54.9	13.0	18.7	1,774.20	112.34
6/ 7/49	55.1	14.4	24.0	1,935.76	123.30
6/16/49	60.1	15.3	25.4	1,819.85	115.72
6/23/49	52.8	21.0	22.6	3,393.62	789.66
7/ 6/49	80.7	10.6	23.7	1,498.20	75.79
7/18/49	45.8	11.4	22.4	877.89	43.93
7/29/49	58.0	14.0	10.0	1,445.03	81.37
11/15/49	29.4	14.8	24.6	891.97	51.20
12/15/49	30.8	14.1	26.1	876.06	49.70
		SHIPMENTS FROM BOUNDARY STOPE AREA			
12/23/49	34.9	18.6	25.1	1,264.56	———
4/5/50	15.9	17.1	27.4	466.09	53.05
6/24/50	26.0	17.5	24.5	991.61	204.76
8/14/50	34.5	9.4	5.1	466.69	24.83

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
UNITED STATES SMELTING REFINING & MINING CO., MIDVALE, UTAH

4/28/48	64.2	26.3	14.0	4,787.80	1,138.17
5/ 1/48	35.8	28.0	12.0	2,884.28	825.84
8/10/48	208.4	14.9	16.9	10,645.84	7,214.46
8/30/48	91.8	17.4	6.9	5,511.40	649.02
9/ 3/48	61.7	16.6	8.5	3,651.67	424.69
9/17/48	58.7	13.0	10.9	2,424.76	277.71
9/16/48	60.2	15.5	16.1	3,220.70	370.55
9/27/48	59.2	16.9	22.6	3,788.64	442.55
		SHIPMENTS FROM AREA OF BOUNDARY STOPE			
8/ 9/48	27.7	9.4	1.5	731.68	101.26

SHIPMENTS FROM AREA OF BOUNDARY STOPE (Continued)

10/ 3/49	28.8	1.2	2.5	386.67	82.63
6/17/50	8.0	1.2	3.1	302.02	60.98
8/25/50	7.2	---	---	734.77	119.92
8/25/50	22.4	12.2	2.8		

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA

FOR USE UNDER THE

DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMA-2195

Date received 10-18-51

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT 18 1951

Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah.

Name and address of applicant

Date October 15, 1951.

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production since 1910

   If not in production or operation, estimated date when production will begin November 15, 1951.
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
L. E. Stein, Salt Lake	Pres. & D.					none	
R. A. Glenny, " "	Sec-T. & D	4,200				none	
M. R. Richards, Bountiful, Utah	V.P. & D	3,000				none	
Stockholders:							
Dan B. Shields, S.L.		600		15,000		none	
Dr. Scott Smith, S. L.				27,000		none	
Mrs. Loraine Stefan Milwaukee, Wis.				13,000		none	
Simon B. Eggertson Salt Lake City, Ut.				25,000		none	
Walter H & Walter T. Harris, Salt Lake				17,100		none	
	Total	7800	x x x x x	97,300		x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$500,000	$500,000	$1.00	500,000	1½ cents 1948.
Preferred stock	$	$	$		

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

Cardiff Mining and Milling Company.

Form-MF-100. Supplementary Data Sheet N.1.

1. (a) zinc and lead ores.
(b) copper and silver ores.

2. Cardiff mining property consists of 16 patented lode mining claims embracing 236 acres, developed as follows:
(a) 200 foot, vertical shaft serves lower mines workings at a point 2300 in from the portal of the main adit tunnel. An inclined winze goes down from the bottom of the shaft (25 degrees incline) for an added distance of 700 feet.
(b) About 5,000 feet of drifts and crosscuts in the property.
(c) 4,000 feet of tunnels and adits.
(d) Small winzes, subwlevel raises, small drifts and crosscuts in and around stopes aggregate about 2,000 feet in length.

At the present time, levels below the 1000 are flooded because the mine has been in-operative for about 6 months. Experience has shown that about 200 gallons per minute will be required to be pumped in un-watering between the 1000 and 1400 levels, below the 1400, it will be necessary to pump 300 g.p.m. to keep the mine un-watered.

3. The Cardiff property is situated in the Big Cottonwood Mining district, Alta area, Salt Lake County, Utah. Distance to Midvale smelter, U. S. Smelting company, is about 21 miles. Zinc smelter of International Smelting company at Tooele, Utah, is about 55 miles distant.

(c) Township 2 South, Sections 31 and 32, Range 3 E., S. L. B. & M.

(d) Salt Lake County, Utah.

4. (a) Property temporarily shut down because of finances.
(b) Operating the property as owner.

5. In production since 1910. Production temporarily suspended in April, 1951, When International smelting company was unable to take any more high-grade zinc for smelting at their zinc plant at Tooele, Utah. In April, 1951, some lead-zinc-silver ores were being shipped from the joint area shared by Cardiff company and Columbus Rexall mine, but this operation ceased when spring run-offs flooded the ore body and insufficient money was had to carry on pumping operations. With some financial assistance production of high-grade oxidized, zinc ores and also lead-zinc ores of good grade, both oxidized and sulfide, could begin immediately.

6. Cardiff Mining & Milling company was incorporated in 1906 and has operated continuously since that time. Persons who now head the company have had wide experience in mining throughout western United States. John Kasteler, who will manage operations at the

Cardiff Mining & Milling Company

Form MF-100 Supplementary Data Sheet No. 3.

7. (continued) from these areas. Several hundred tons ofthis orestill lies in the mine because International Smelting was unable to take more of it after April, 1951.

In April zinc mining operations were suspended pending the location of a market for the zinc ore. Shortly thereafter, water conditions forced a suspension of mining the No. 11 orebody in the joint-area, and the mine has been idle ever since. The water has now subsided and a development program is planned that will again put the property on a producing basis.

(B) The Cardiff mine is situated on the north flank of the Alta mining district in from which has come a production exceeding $40,000,000. The adjoing Columbus Rexall mine has produced about $1,500,000. from deposits similar to the Cardiff. To the northeast is the Flagstaff mine that has produced $6,000,000. from large bedded ore bodies. It is believed that the Cardiff's production, between $7,000,000 and $8,000,000, is the largest in the Alta district.

(c) Included herewith.

8,9,10. Filled in on Form.

11. Estimated production from several sources is 50 tons per day or 1,250 tons per month.

12. All Cardiff mineral deposits are closely associated with the Alta overthrust fault zone. This zone trends N. 35 degrees West and dips 25 to 30 degrees to the northeast and consists of an upthrust block of Cambrian quartzite overlying a soluable Mississippian limestone. The fissure-veins trend N. 30 to 60 E. and dip steeply to the north. Under certain favorable conditions, especially where the fissures are traversed by northwest fracture-zones, large replacement ore bodies have been formed in the limestone immediately beneath the quartzite. The enclosed report shows the well-defined trend of the mineral zones that has resulted in a total production from the property exceeding $7,000,000.00 in net smelter returns. The geology of the property is quite simple and is dominated by the two factors mentioned above. The abundance of available ore in the early days of mining resulted in leaving many faces of ore that were high in zinc value or that contained less than 15 percent lead. Also, work performed since 1948 has shown that the ore zones go into the footwall limestone much deeper than mining operations were carried out. As almost the entire footwall of the Cardiff stope, as previously mined, is mineralized, it is planned to explore this footwall over a length of 2,000 feet. In the mining of No. 11 stope it was found that 25% of its production came from fissure ore beneath the larg er

Cardiff Mining & Milling Company.

Form Mf-100 Supplementary Data Sheet No.4.

12. (continued)
replacement bodies just beneath the contact. These same conditions have never been prospected in the main, Cardiff stope, and in several other areas in the mine.

(b) (1) submitted in 'Geologic Report and Proposed Development Program'
(2) " " " " " " "

13. The Cardiff mine is located in Salt Lake county, about 25 miles southeast of Salt Lake City. Except for the last three miles of road, the entire distance from Salt Lake is hard-surfaced. The Midvale smelter of U. S. Smelting & Refining Company is 21 miles distant. The last three miles of the road is a good, graveled road but is quite steep.

14. Ample water is had both in the mine and in the canyon stream near the tunnel portal.

15. The Utah Power & Light company 11,000 volt transmission line connets to transformers at the tunnel portal. The power bill to run a 700 cubic foot, Ingersoll Rand electric compressor, 100 HP motor, is $350.00 per month.

16. On a one-shift per day basis: Compressor man-1, trammer-1, muckers-4, miners-4, with an output of 40 tons of zinc ore per day. When the lower levels are worked the following men are required: Hoistman-1, pumpmen-3, cager and trammer-1.

17. The mine is completely equipped for immediate mining. However, to increase the efficiency of operation, there are a few items that should be purchased. The company has a large boarding house on the property, also, one cabin and one trailer house. The compressor house contains two, Ingersoll Rand, Imperial Type 10, 700-cubic foot compressors. Several Ingersoll Rand, 2MRV-50 Motorpumps of 250 GPM capacity. The main haulage tunnel is laid with 30-lb rail. A 440-volt cable transmits power from the portal to the pumping site. Air lines of 4 and 2 inch diamter are laid to most working places. Ample mine cars are had at the property. A horse is used in tramming. Complete drilling equipment is available but it is recommended that a jackhammer with a jackleg be purchased because of its maneuverability. A small amount of 2 inch pipe (about 600 feet) should also be purchased for the proposed development drifts.

18. During February, March, and the first part of April, snow conditions will make shipment of ore difficult but it has been the practice to stockpile during these months and ship during May.

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)	1,000	oxidized 30% zn			
Indicated (probable)	500	18% lead 22% zn.			

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power:

State amount of power used, rate per hour, and source thereof.

16. Labor:

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Cardiff Mining & Milling Company. (Name of company)

By R. A. Glenny (Signature of authorized official)

R. A. Glenny

October 15, 1951. (Date)

Sec-Treasurer (Title)

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—63792-1

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMA-217
Metal or Mineral
Date Received 10-18-51
Amount $
Participation (Government %)

Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah.

Name and address of applicant

Date October 15, 1951.

If you have already filed MF-100, give date filed concurrent, type of assistance requested 50% zinc-lead exploration loan.

DMA Docket Number (if available) 217

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Cardiff Mining & Milling Company. By R. A. Glenny
(Name of company) (Signature of authorized official)

R. A. Glenny.

October 15, 1951. Sec-Treasurer.
(Date) (Title)

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—64067-2

Cardiff Mining & Milling Company

Form MF-103 Supplementary Data Sheet No. 1.

1. (a) The Cardiff Mining & Milling property embraces 236 acres of patented lode mining claims in the Big Cottonwood mining district, Alta area, Salt Lake County, Utah. The property is developed by several thousand feet of haulage tunnels, shafts, winzes, raises, and drifts and crosscuts. Living facilities are available at the property. Complete equipment and facilities for mining operations are at the mine.

(b) applicant is owner.

(c) Section 31, Township 2 South, Range 3 East, Salt Lake Base & M.
(1) both areas are the same.

2. (a) zinc ores dominate with lead ores a close second. Some areas produce fair amounts of copper. Silver is present in varying amounts. Production heretofore has been mainly lead ore as zinc areas were largely bypassed.

(b) The geology of the Cardiff mine is quite simple in that two features control the ore deposition and make prospecting for deposits relatively easy. All ore bodies are formed at the intersection of near, vertical, northeast-southwest fissure-veins and the Alta overthrust fault. This fault trends N. 35 W and dips 25 to 30 degrees to the northeast, and consists of impervious Cambrian quartzite overlying a fairly soft Mississippian limestone.

At the intersection of this contact with the Cardiff fissure, there has been formed a large replacement ore body 10 to 20 feet thick, 30 to 200 feetlong and has been followed for an inclined distance of 2500 feet and is still going downward.

Similarly, with a very little amount of development work performed, there has been found along the course of No. 11 fissure two lenses of ore that have each yielded over $200,000 in net smelter returns.

Another such ore body has formed along the course of a fissure call 'south one' fissure in Cardiff ground and called No. 10 fissure in Columbus Rexall ground that has produced $700,000 in smelter returns in Rexall ground and $100,000 in Cardiff ground.

There are numerous other such ore zones in the property. The 'boundary stope', resulting from the intersection of several fissures, produced approximately $1,000,000 from one large lense of ore.

Thus, the pattern of fissures has been definitely established. More development work is required to find other lenses of ore. In addition to ore in sight, it is planned to explore several fissure-intersections that should yield substantial ore bodies.

Cardiff Mining & Milling Company.

Form MF-103 Supplementary Data Sheet No. 2.

3. (a) On the 1st of November, 1951, the Cardiff company proposes to undertake some diamond drilling work. Because of limited finances, assistance is necessary to carry out the program of exploration. It is believed that sufficient ore will be found to pay back the cost of the project.

On the enclosed map are shown diamond drill holes No. 3,4 & 5., aggregating 500 feet. Also shown are two proposed drifts to be driven off the 800 level South drift. These total 320 feet. A proposed exploration drift is also shown on the 1000 level that is 350 feet long.

This is the amount of work requested in the project. Cardiff company will drill holes no. 1 and 2 shortly, on its own account.
Itemized Project Summary:

Exploration	Length	Level	Unit cost	Total.	
1. Drill Hole 3.	150'	1000	6.00/ft	$ 900.00	
2. Drill Hole 4	100'	1000	6.00	600.00	
3. Drill Hole 5	250'	1400	6.00	1500.00	3,000
120' long drift	800 lv south		40.00 (total)	4,800.00	
200' long drift	800 lv south		40.00	8,000.00	
350' long drift	1000 lv.		40.00	14,000.00	
					26,800

All above work will be contracted for the net total costs shown above.

4. Power bill for pumping.	$300.00 per mo.,	6 months	1,800.	
5. Power bill, compressor.	350.00 "	,6 months	2,100.	
6. Wages, compressor man.	250.00 "	6 months	1,500.	
7. Pump man, 3 shifts/day	350.00 "			
for each shift equals	1050.00	"(3 men) 6 mo.	6,300.	
8. Hoist man, day shift,	350.00 "	6 months	2,100.	
9. Trammer, day shift,	350.00 "	6 months	2,100.	
				15,900

Purchase 1100 feet, No. 2,3conductor cable. available in a shaft at Park City.....	2,000
Supervision, and engineering, 350.00/mo, 6 months	2,100
Accounting, office work, 200.00/mo. 6 months	1,200
Purchase jackhammer with jackleg, 3 sets steel,	700
Allowance for electrical work, compressor repairs	1,500
Total cost of project	53,200.00

Objectives:

1,2, above. In the vicinity of the 1000 level of the inclined winze, this working has passed over the top of the ore

3. (a) horizon. A little ore was extracted underneath the winze at this level, but nothing compared to the stopes immediately above and below. Difficulty of extracting the ore because of the position of the winze resulted in leaving an area about 150 feet long partially explored. It is planned to explore up from the 1000 level (and in the footwall of the winze) with Hole No. 3 and explore downward in the footwall from the 1000 level with Hole No. 4.

3. above. Hole No. 5 will drill down into the water zone to see how much ore is going down along the Cardiff fissure below the lowest workings.

The 120' drift proposed (as shown on the map) from the 800 level South drift will pentrate known ore and give an idea as to its downward extension. This ore is the No. 11 ore shoot that was formerly mined from a 70-foot inclined winze from the Columbus Rexall tunnel level. This winze was flooded last spring and still has ore in the face of it. The last shipment from this area (35ton) assayed 18 percent lead and 22 percent zinc per ton. By driving this drift, this ore will become easy to mine and the drift will afford an excellent working to continue following this ore.

In the 200 foot drift to be driven from the 800 level south drift, the immediate objective (as seen from glancing on the map) is to get back along the contact of the Alta overthrust fault and intersect the downward extension of the No. 11 and 'D' winze fissures. These fissures were highly productive in upper workings. This is considered to be one of the best development projects in the entire district.

A glance at the map shows that the lower workings of the Cardiff Inclined Winze (in the vicinity of the 1000 level) has passed over the contact (and ore horizon). It is planned to drift south along the overthrust contact at this point to explore the Cardiff fissure and to continue this drift to pick up No. 10, 11, and 'D' winze fissures.

(b) Project is ready to begin. Will require 6 months for completion.

(4) Enclosed.

(5) 2 compressors, 6 pumps, hoists, boarding house, cabins, track and pipe are available for immediate mining work. It is advisable to purchase a small jackhammer and jackleg for drilling work and also 1100 feet of No. 2 electric cable to overcome the voltage drop now experienced when the pumps operate.

(6) Only the jackhammer and cable are required. Cost of poweder, etc., to be used in drifting is included in cost estimates. Drifts will be contracted, with contractor furnishing everything except power. Company will hire hoistman, trammer, pumpmen, etc.

Cardiff Mining & Milling Company.

Form Mf-103 Supplementary Data Sheet No.4.

7. (a) none.
(b) 1100 feet No.2, 3-conductor electric cable, cost $2,000.00
1 jackhammer, jackleg, 3 sets steel carbide tipped-- 700.00
(c) all other equipment required for completion of project.

8. Diamond drilling and drifting operations will be contracted out with footage prices mentioned above. Footage cost will be overall cost quoted, labor charge plus supplies used.
the following will be hired by the company.

1- trammer, day shift only, $350.00 per month wages.
1- hoist man, " " 350.00 " "
1- compressor man " 250.00 " "
3- pump men, work all three shifts, at 350.00 per month each.
1- supervisor and engineer, 350.00 per month.
1- office man 200.00 per month

9. Overall contract price per foot of drift advanced is $40.00
Overall " " " drilling " is 6.00
Compressor power bill per month is 350.00
Pumping " " " is 300.00

10. (a) $26,600.

(b) yes.

11. None except that shipment of ore will probably be impossible during February, March and part of April, but ore will be (as in past) stockpiled during these months.

Geologic Report and Proposed Development Program.

Cardiff Mine.

Salt Lake County, Utah.

General Geology.

The property of the Cardiff Mining company lies wholly along the course of the Alta overthrust fault-zone. This zone is one of the dominant structural features of the Alta mining district and consists of a well-defined contact wherein impervious, Cambrian quartzite has been thrust up over younger, Mississippian lime beds. The fault-zone trends N. 30 to 40 degrees W. and dips 25 to 30 degrees to the northeast.

Transverse to the trend of this zone are the various fissures of the district. These strike northeast-southwest and generally dip steeply to the northwest.

Most of the orebodies in the vicinity of the Cardiff property are found as limestone replacement-lenses just beneath the quartzite hanging-wall. The largest deposits are found at the intersection of several fissures and usually extend for some distance beneath the lime-quartzite contact.

Description of the Deposits.

The most northerly ore body in the Cardiff mine is the largest, and was formed along the course of the intersection of the Cardiff fissure with the overthrust contact. Plunging to the northeast at an average dip of 25 degrees, this intersection has formed one continuous stope about 2500' long, 10 to 20 feet thick and 30 to 200 feet wide. In the upper levels the ore was principally a mixture of cerussite ($PbCO_3$) and manganese carrying residual boulders of galena and surrounded (on the edges of the stopes) by a casing of zinc silicates and carbonates. On the 1200 level the ore was practically all sulfide. The orebody is said to be still continuing below the 1500 level but water conditions are such that at that point it has been seen only by a few persons. The zinc content has increased with added depths.

No. 11 fissure is found about 300 feet south of the Cardiff fissure. At its contact with the overthrust fault this fissure has only been explored in two places, and both yielded lenses of ore totaling $400,000 in net smelter returns. The upward and downward extension

of this zone offers possibilities for finding added ore bodies.

The 'south one' fissure, as it is known in the Cardiff property, or No. 10, as known in Columbus Rexall ground, lies a few hundred feet south of No. 11 fissure. This is another long ore shoot that had a large production--at a time when metal prices were quite low. At depth (around the Cardiff 1000 level) this fissure should intersect No. 11 fissure as well as Columbus Rexall's 'D' winze fissure. These intersections are almost certain to yield ore bodies.

South of No. 10 ore zone is found the large boundary stope that was formed by the intersection of several fissures. This was a large mass of ore yielding almost $1,000,000 in smelter returns.

The aggregate production of these ore zones was between $7,000,000 and $8,000,000.

During 1949 and 1950, by carefully mining No. 11 stope it was found by removing the lower grade ore usually left on the bottoms of the stopes that fissure ore penetrated the footwall limestone much deeper than was formerly admitted. As a result it is planned to explore the main Cardiff stope-footwall, especially where crossed by northwest fracture zone.

Much sulfide ore remains on stope walls from the 1200 to 1400 levels of the inclined winze. During 1949, 1950, and to February, 1951, 3,340 tons of ore, averaging 10 ounces silver, 20 percent lead and 6 percent zinc per ton was mined here.

Similarly, considerable zinc ore ($ZnSiO$, $ZnCo_3$) remains in the stopes on the upper levels. During 1950 and to April, 1951, 1700 dry tons of ore, assaying 30% zinc per ton was mined from these areas.

It is difficult to submit a sample map of the mine becuase there are innumerable faces of ore, of every size possible, scattered throughout the mine. For instance on the map above No. 11 stope there is a zone marked 'Block L'. Along this drift there is 4 feet of ore from which 73 dry tons of zonc were shipped in driving the drift. This assayed 28% zinc per ton.

Because of the high grade lead-zinc ore found along No. 11 fissure, it is recommended that the first exploratory work be done to pick up the upward extension of this zone. This can be done conveniently with a 200 foot drill hole from the 600 level, as shown on the map.

Cardiff Mine.

Ore is still continuing downward in the lower lense found along the course of No. 11 fissure. The last shipment was made from the 70' winze off the Columbus Rexall tunnel level just before the spring water run-off flooded the winze. This assayed 18% lead and 22% zinc per ton. This ore can be tapped very easily with a 120 foot drift from the Cardiff 800 level south drift, as shown on the map.

A 200 foot drift is also recommended of the 800 level at the point where, as seen on the map, the 800 level left the contact and penetrated the footwall of the overthrust. This drift should pick up the downward extension of the large ore shoot mined along the strike of 'D' winze fissure. The Columbus Rexall company quit this ore body when it reached their lower boundary limits.

The most important piece of exploratory work, however, is off the 1000 level of the Cardiff inclined winze. At this point, the workings are above the contact. It is recommended that the 1000 level be driven south a distance of 350 feet to cut the Cardiff ore zone, then be extended to cut the downward extension of the No. 10, No. 11 and D. winze fissures, and their possible intersections.

At the same time it is advised that a diamond drill be set up at, or about, the 1000 level and one hole drilled upward to about the 850 level, and, in the footwall of the winze, and that one hole be drilled downward in the footwall of the winze to about the 1150 level.

Later, when the water is pumped down to the 1400 level, it is considered advisable to probe for the downward extension of the main Cardiff ore shoot. This will determine whether or not it will be feasible to deepen the incline for future operations.

Submitted by:

John Kasteler

John Kasteler.

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
INTERNATIONAL SMELTING & REFINING CO., TOOELE PLANT, SALT LAKE CITY, UTAH

	DRY TONS	LEAD	ZINC	NET SETTLEMENT FOR LOT	CARDIFF SHARE
5/29/48	50.6	21.7	19.0	$3,398.16	$779.89
6/ 3/48	57.4	18.1	23.7	3,312.91	742.55
6/11/48	47.0	18.7	21.1	2,781.04	606.29
10/26/48	57.4	12.8	19.6	2,751.52	305.38
12/ 8/48	49.9	12.9	16.8	3,365.90	376.39
11/11/48	46.3	12.6	19.6	2,988.24	351.95
11/22/48	55.8	11.1	19.9	2,546.92	250.87
12/21/48	64.9	17.1	16.8	4,304.82	495.26
12/21/48	62.1	16.6	15.4	3,922.21	449.06
1/10/49	58.2	18.6	18.1	4,364.35	500.69
1/10/49	64.7	19.2	20.6	5,037.75	586.79
1/20/49	62.2	19.6	20.6	4,951.86	576.99
2/ 2/49	62.3	18.0	18.0	4,412.95	509.61
2/8/ 49	72.6	15.4	23.9	4,592.21	525.16
3/14/49	47.8	12.9	18.2	1,919.89	165.35
3/17/49	55.3	16.3	15.6	3,261.51	371.95
3/24/49	46.4	13.5	15.5	2,310.54	258.52
3/30/49	57.1	13.5	15.0	2,600.45	286.57
3/30/49	55.8	13.0	16.1	2,249.32	196.33
4/ 1/49	47.6	12.1	19.7	1,919.89	165.35
4/20/49	57.2	12.6	21.0	2,114.64	181.40
4/27/49	51.3	14.0	22.5	1,959.50	164.97
4/27/49	50.5	13.5	20.9	1,824.65	156.61
5/17/49	54.9	13.0	18.7	1,774.20	112.34
6/ 7/49	55.1	14.4	24.0	1,935.76	123.30
6/16/49	60.1	15.3	25.4	1,819.85	115.72
6/23/49	52.8	21.0	22.6	3,395.62	789.66
7/ 6/49	50.7	10.6	23.7	1,498.20	75.79
7/18/49	45.8	11.4	22.4	877.89	42.93
7/29/49	58.0	14.0	10.0	1,445.05	81.37
11/15/49	29.4	14.8	24.6	891.97	51.20
12/15/49	30.8	14.1	26.1	876.06	49.70
TOTALS	[illegible]				
SHIPMENTS FROM BOUNDARY STOPE AREA					
12/23/49	34.9	18.6	25.1	1,264.56	-----
4/5/50	15.9	17.1	27.4	466.09	53.08
6/24/50	26.0	17.5	24.5	991.61	204.76
8/14/50	34.5	9.4	5.1	466.69	24.83

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
UNITED STATES SMELTING REFINING & MINING CO., MIDVALE, UTAH

4/28/48	64.2	26.3	14.0	4,787.80	1,138.17
5/ 1/48	35.8	28.0	12.0	2,884.28	825.84
8/10/48	208.4	14.9	16.9	10,648.84	7,214.46
8/30/48	91.8	17.4	6.9	5,511.40	649.02
9/ 3/48	61.7	16.6	8.5	3,651.67	424.69
9/17/48	68.7	13.0	10.9	2,424.76	277.71
9/18/48	60.2	16.6	16.1	3,220.70	370.55
9/27/48	59.2	16.9	22.6	3,788.64	442.55
SHIPMENTS FROM AREA OF BOUNDARY STOPE					
8/ 9/48	27.7	9.4	1.5	731.68	101.26

SHIPMENTS FROM AREA OF BOUNDARY STOPE (Continued)

10/ 5/49	28.6	1.2	2.5	386.67	82.65
6/17/50	3.0	1.2	3.1	802.02	60.98
8/25/50	7.2	---	---	734.77	119.92
8/25/50	22.4	12.2	2.8		

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA
FOR USE UNDER THE
DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMA-2175

Date received 10-18-51

RECEIVED
OCT 18 1951
Defense Minerals Administration
DEPARTMENT OF THE INTERIOR

Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah.

Name and address of applicant

Date October 15, 1951.

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced:
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry(ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following:
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following:
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated.
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production since 1910

   If not in production or operation, estimated date when production will begin ~~November 15, 1951.~~
6. Experience of operators:

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History:
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
L. E. Stein, Salt Lake	Pres. & D.	4200		100		none	
R. A. Glenny, " "	Sec-T. & D	3000		100		none	
M. R. Richards, Bountiful, Utah	V.P. & D	600		100		none	
Stockholders:							
Dan B. Shields, S.L.				15,000		none	
Dr. Scott Smith, S. L.				27,000		none	
Mrs. Loraine Stefan Milwaukee, Wis.				13,000		none	
Simon B. Eggertson Salt Lake City, Ut.				25,000		none	
Walter M & Walter T. Harris, Salt Lake				17,100		none	
	Total	7800	x x x x x	97300		x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$500,000	$500,000	$1.00	500,000	1½ cents 1948.
Preferred stock	$	$	$		

*Indicate period covered.

10. Production:

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.

12. Ore or Mineral Reserves:

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

Cardiff Mining and Milling Company.

Form-MF-100. Supplementary Data Sheet N.1.

1. (a) zinc and lead ores.
(b) copper and silver ores.

2. Cardiff mining property consists of 16 patented lode mining claims embracing 236 acres, developed as follows:
(a) 200 foot, vertical shaft serves lower mines workings at a point 2300 in from the portal of the main adit tunnel. An inclined winze goes down from the bottom of the shaft (25 degrees incline) for an added distance of 700 feet.
(b) About 5,000 feet of drifts and crosscuts in the property.
(c) 4,000 feet of tunnels and adits.
(d) Small winzes, sub-level raises, small drifts and crosscuts in and around stopes aggregate about 2,000 feet in length.

At the present time, levels below the 1000 are flooded because the mine has been in-operative for about 6 months. Experience has shown that about 200 gallons per minute will be required to be pumped in un-watering between the 1000 and 1400 levels, below the 1400, it will be necessary to pump 300 g.p.m. to keep the mine un-watered.

3. The Cardiff property is situated in the Big Cottonwood Mining district, Alta area, Salt Lake County, Utah. Distance to Midvale smelter, U. S. Smelting company, is about 21 miles. Zinc smelter of International Smelting company at Tooele, Utah, is about 55 miles distant.

(c) Township 2 South, Sections 31 and 32, Range 3 E., S. L. B. & M.

(d) Salt Lake County, Utah.

4. (a) Property temporarily shut down because of finances.
(b) Operating the property as owner.

5. In production since 1910. Production temporarily suspended in April, 1951, When International smelting company was unable to take any more high-grade zinc for smelting at their zinc plant at Tooele, Utah. In April, 1951, some lead-zinc-silver ores were being shipped from the joint area shared by Cardiff company and Columbus Rexall mine, but this operation ceased when spring run-offs flooded the ore body and insufficient money was had to carry on pumping operations. With some financial assistance production of high-grade oxidized, zinc ores and also lead-zinc ores of good grade, both oxidized and sulfide, could begin immediately.

6. Cardiff Mining & Milling company was incorporated in 1906 and has operated continuously since that time. Persons who now head the company have had wide experience in mining throughout western United States. John Kasteler, who will manage operations at the

mine, is manager of the adjoining Columbus Rexall mine and has spent many years in the Alta district, first as an engineer for the Bureau of Mines, then as an independent leaser and mine operator, then as a mine manager. He has also spent much time with F. C. Calkins of the U. S. Geological Survey studing the geology of the district. In addition, from 1935 to 1941, he was in charge of U. S. Smelting's operations in the near-by Park City district.

7. The Cardiff property was incorporated as the Cardiff Mining & Milling company in 1906. During the year 1910, the Cardiff fissure was discovered and some mining work performed. In 1912, the present adit-tunnel was driven to intersect the downward extension of the Cardiff fissure. At a distance of 2400 feet in from the portal, the intersection of this fissure with the Alta overthrust fault was found. This fault is a reverse fault wherein Cambrian quartzite has been thrust over Mississippian limestone. The impervious quartzite hanging wall has served as a barrier to mineralizing solutions so that large replacement ore bodies have been formed in the underlying limestone. The main Cardiff orebody has been one continuous ore shoot over an inclined length of 2500 feet. Throughout this distance the ore has been 10 to 20 feet thick and from 30 to 200 feet wide. As a result of finding this large, orebody at the intersection of the Cardiff fissure with the thrust fault, the mine has yielded a production of over 200,000 tons of ore having a net smelter value slightly over $30.00 per ton.

Up to 1919 the mine produced 70,847 tons of dry ore having an average assay of 15.51 ounces silver, .0.82 percent copper and 26.61 percent lead per ton. The dividends to 1919 were $675,000. Later, the upward extension of the Columbus Rexall No. 10 orebody was found several hundred feet south of the main Cardiff ore body. This orebody assayed about 25% zinc and 20% lead per ton and was mined over an inclined distance of 300 feet. Later, the boundary stope was discovered in the south end of the company's property. This one stope produced over $1,000,000. in returns from the ore, and Cardiff company's share was about $800000.00. This orebody was exceptionally high in zinc.

The downward extension of the No. 11 ore zone was cut in 1948, in joint-area shared by the Columbus Rexall mine. From 1948 to the present, this zone has produced about $200,000 net smelter return.

Since the price of zinc turned upward in 1950, considerable activity resulted in the mining of oxidized zinc ores left around the edges of the main Cardiff stope. These ores were left in the early days because the penalty involved. From 1949 to April, 1951, 1700 dry tons of zinc ore averaging 30% zinc per ton were shipped

Cardiff Mining & Milling Company

Form MF-100 Supplementary Data Sheet No. 3.

7. (continued) from these areas. Several hundred tons ofthis orestill lies in the mine because International Smelting was unable to take more of it after April, 1951.

In April zinc mining operations were suspended pending the location of a market for the zinc ore. Shortly thereafter, water conditions forced a suspension of mining the No. 11 orebody in the joint-area, and the mine has been idle ever since. The water has now subsided and a development program is planned that will again put the property on a producing basis.

(B) The Cardiff mine is situated on the north flank of the Alta mining district in from which has come a production exceeding $40,000,000. The adjoing Columbus Rexall mine has produced about $1,500,000. from deposits similar to the Cardiff. To the northeast is the Flagstaff mine that has produced $6,000,000. from large bedded ore bodies. It is believed that the Cardiff's production, between $7,000,000 and $8,000,000, is the largest in the Alta district.

(c) Included herewith.

8,9,10. Filled in on Form.

11. Estimated production from several sources is 50 tons per day or 1,250 tons per month.

12. All Cardiff mineral deposits are closely associated with the Alta overthrust fault zone. This zone trends N. 35 degrees West and dips 25 to 30 degrees to the northeast and consists of an upthrust block of Cambrian quartzite overlying a soluable Mississippian limestone. The fissure-veins trend N. 30 to 60 E. and dip steeply to the north. Under certain favorable conditions, especially where the fissures are traversed by northwest fracture-zones, large replacement ore bodies have been formed in the limestone immediately beneath the quartzite. The enclosed report shows the well-defined trend of the mineral zones that has resulted in a total production from the property exceeding $7,000,000.00 in net smelter returns. The geology of the property is quite simple and is dominated by the two factors mentioned above. The abundance of available ore in the early days of mining resulted in leaving many faces of ore that were high in zinc value or that contained less than 15 percent lead. Also, work performed since 1948 has shown that the ore zones go into the footwall limestone much deeper than mining operations were carried out. As almost the entire footwall of the Cardiff stope, as previously mined, is mineralized, it is planned to explore this footwall over a length of 2,000 feet. In the mining of No. 11 stope it was found that 25% of its production came from fissure ore beneath the larger

Cardiff Mining & Milling Company.

Form Mf-100 Supplementary Data Sheet No.4.

12. (continued)
replacement bodies just beneath the contact. These same conditions have never been prospected in the main, Cardiff stope, and in several other areas in the mine.

(b) (1) submitted in 'Geologic Report and Proposed Development Program'
(2) " " " " " " "

13. The Cardiff mine is located in Salt Lake county, about 25 miles southeast of Salt Lake City. Except for the last three miles of road, the entire distance from Salt Lake is hard-surfaced. The Midvale smelter of U. S. Smelting & Refining Company is 21 miles distant. The last three miles of the road is a good, graveled road but is quite steep.

14. Ample water is had both in the mine and in the canyon stream near the tunnel portal.

15. The Utah Power & Light company 11,000 volt transmission line connets to transformers at the tunnel portal. The power bill to run a 700 cubic foot, Ingersoll Rand electric compressor, 100 HP motor, is $350.00 per month.

16. On a one-shift per day basis: Compressor man-1, trammer-1, muckers-4, miners-4, with an output of 40 tons of zinc ore per day. When the lower levels are worked the following men are required: Hoistman-1, pumpmen-3, cager and trammer-1.

17. The mine is completely equipped for immediate mining. However, to increase the efficiency of operation, there are a few items that should be purchased. The company has a large boarding house on the property, also, one cabin and one trailer house. The compressor house contains two, Ingersoll Rand, Imperial Type 10, 700-cubic foot compressors. Several Ingersoll Rand, 2MRV-50 Motorpumps of 250 GPM capacity. The main haulage tunnel is laid with 30-lb rail. A 440-volt cable transmits power from the portal to the pumping site. Air lines of 4 and 2 inch diamter are laid to most working places. Ample mine cars are had at the property. A horse is used in tramming. Complete drilling equipment is available but it is recommended that a jackhammer with a jackleg be purchased because of its maneuverability. A small amount of 2 inch pipe (about 600 feet) should also be purchased for the proposed development drifts.

18. During February, March, and the first part of April, snow conditions will make shipment of ore difficult but it has been the practice to stockpile during these months and ship during May.

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)	1,000	oxidized 30% Zn			
Indicated (probable)	500	18% lead 22% zn.			

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads:

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply:

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power:

State amount of power used, rate per hour, and source thereof.

16. Labor:

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities:

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Cardiff Mining & Milling Company. (Name of company)

By R. A. Glenny (Signature of authorized official)

R. A. Glenny

October 15, 1951. (Date)

Sec-Treasurer (Title)

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—63792-1

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DM 9-2195
Metal or Mineral
Date Received 10-18-51
Amount $
Participation (Government %)

Cardiff Mining & Milling Company
704 Newhouse Building
Salt Lake City, Utah.

Name and address of applicant

Date October 15, 1951.

If you have already filed MF-100, give date filed concurrent, type of assistance requested 50% zinc-lead exploration loan.

DMA Docket Number (if available) 2195

MF-103

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find?

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

Cardiff Mining & Milling Company. By R. A. Glenny
(Name of company) (Signature of authorized official)

R. A. Glenny.

October 15, 1951. Sec-Treasurer.
(Date) (Title)

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—64067-2

Cardiff Mining & Milling Company

Form MF-103 Supplementary Data Sheet No. 1.

1. (a) The Cardiff Mining & Milling property embraces 236 acres of patented lode mining claims in the Big Cottonwood mining district, Alta area, Salt Lake County, Utah. The property is developed by several thousand feet of haulage tunnels, shafts, winzes, raises, and drifts and crosscuts. Living facilities are available at the property. Complete equipment and facilities for mining operations are at the mine.

(b) applicant is owner.

(c) Section 31, Township 2 South, Range 3 East, Salt Lake Base & M.
(1) both areas are the same.

2. (a) zinc ores dominate with lead ores a close second. Some areas produce fair amounts of copper. Silver is present in varying amounts. Production heretofore has been mainly lead ore as zinc areas were largely bypassed.

(b) The geology of the Cardiff mine is quite simple in that two features control the ore deposition and make prospecting for deposits relatively easy. All ore bodies are formed at the intersection of near, vertical, northeast-southwest fissure-veins and the Alta overthrust fault. This fault trends N. 35 W and dips 25 to 30 degrees to the northeast, and consists of impervious Cambrian quartzite overlying a fairly soft Mississippian limestone.

At the intersection of this contact with the Cardiff fissure, there has been formed a large replacement ore body 10 to 20 feet thick, 30 to 200 feetlong and has been followed for an inclined distance of 2500 feet and is still going downward.

Similarly, with a very little amount of development work performed, there has been found along the course of No. 11 fissure two lenses of ore that have each yielded over $200,000 in net smelter returns.

Another such ore body has formed along the course of a fissure call 'south one' fissure in Cardiff ground and called No. 10 fissure in Columbus Rexall ground that has produced $700,000 in smelter returns in Rexall ground and $100,000 in Cardiff ground.

There are numerous other such ore zones in the property. The 'boundary stope', resulting from the intersection of several fissures, produced approximately $1,000,000 from one large lense of ore.

Thus, the pattern of fissures has been definitely established. More development work is required to find other lenses of ore. In addition to ore in sight, it is planned to explore several fissure-intersections that should yield substantial ore bodies.

Cardiff Mining & Milling Company.

Form MF-103 Supplementary Data Sheet No. 2.

3. (a) On the 1st of November, 1951, the Cardiff company proposes to undertake some diamond drilling work. Because of limited finances, assistance is necessary to carry out the program of exploration. It is believed that sufficient ore will be found to pay back the cost of the project.

On the enclosed map are shown diamond drill holes No. 3,4 & 5., aggregating 500 feet. Also shown are two proposed drifts to be driven off the 800 level South drift. These total 320 feet. A proposed exploration drift is also shown on the 1000 level that is 350 feet long.

This is the amount of work requested in the project. Cardiff company will drill holes no. 1 and 2 shortly, on its own account.
Itemized Project Summary:

Exploration	Length	Level	UNit cost	Total.
1. Drill Hole 3.	150'	1000	6.00/ft	$ 900.00
2. Drill Hole 4	100'	1000	6.00	600.00
3. Drill Hole 5	250'	1400	6.00	1500.00 3,000.
120' long drift	800 lv south		40.00 (total)	4,800.00
200' long drift	800 lv south		40.00	8,000.00
350' long drift	1000 lv.		40.00	14,000.00
				26,800.

All above work will be contracted for the net total costs shown above.

4. Power bill for pumping.	$300.00	per mo.,	6 months	1,800.
5. Power bill, compressor.	350.00	"	,6 months	2,100.
6. Wages, compressor man.	250.00	"	6 months	1,500.
7. Pump man, 3 shifts/day	350.00	"		
for each shift equals	1050.00	"	(3 men) 6 mo.	6,300.
8. Hoist man, day shift,	350.00	"	6 months	2,100.
9. Trammer, day shift,	350.00	"	6 months	2,100.
				15,900.

Purchase 1100 feet, No. 2,3conductor cable. available in a shaft at Park City.....	2,000.
Supervision, and engineering, 350.00/mo, 6 months	2,100.
Accounting, office work, 200.00/mo. 6 months	1,200.
Purchase jackhammer with jackleg, 3 sets steel,	700.
Allowance for electrical work, compressor repairs	1,500.
Total cost of project	53,200.00

Objectives:

1,2, above. In the vicinity of the 1000 level of the inclined winze, this working has passed over the top of the ore

3. (a) horizon. A little ore was extracted underneath the winze at this level, but nothing compared to the stopes immediately above and below. Difficulty of extracting the ore because of the position of the winze resulted in leaving an area about 150 feet long partially explored. It is planned to explore up from the 1000 level (and in the footwall of the winze) with Hole No. 3 and explore downward in the footwall from the 1000 level with Hole No. 4.

3. above. Hole No. 5 will drill down into the water zone to see how much ore is going down along the Cardiff fissure below the lowest workings.

The 120' drift proposed (as shown on the map) from the 800 level South drift will pentrate known ore and give an idea as to its downward extension. This ore is the No. 11 ore shoot that was formerly mined from a 70-foot inclined winze from the Columbus Rexall tunnel level. This winze was flooded last spring and still has ore in the face of it. The last shipment from this area (35ton) assayed 18 percent lead and 22 percent zinc per ton. By driving this drift, this ore will become easy to mine and the drift will afford an excellent working to continue following this ore.

In the 200 foot drift to be driven from the 800 level south drift, the immediate objective (as seen from glancing on the map) is to get back along the contact of the Alta overthrust fault and intersect the downward extension of the No. 11 and 'D' winze fissures. These fissures were highly productive in upper workings. This is considered to be one of the best development projects in the entire district.

A glance at the map shows that the lower workings of the Cardiff Inclined Winze (in the vicinity of the 1000 level) has passed over the contact (and ore horizon). It is planned to drift south along the overthrust contact at this point to explore the Cardiff fissure and to continue this drift to pick up No. 10, 11, and 'D' winze fissures.

(b) Project is ready to begin. Will require 6 months for completion.

(4) Enclosed.

(5) 2 compressors, 6 pumps, hoists, boarding house, cabins, track and pipe are available for immediate mining work. It is advisable to purchase a small jackhammer and jackleg for drilling work and also 1100 feet of No. 2 electric cable to overcome the voltage drop now experienced when the pumps operate.

(6) Only the jackhammer and cable are required. Cost of poweder, etc., to be used in drifting is included in cost estimates. Drifts will be contracted, with contractor furnishing everything except power. Company will hire hoistman, trammer, pumpmen, etc.

Cardiff Mining & Milling Company.

Form Mf-103 Supplementary Data Sheet No.4.

7. (a) none.
(b) 1100 feet No.2, 3-conductor electric cable, cost $2,000.00
1 jackhammer, jackleg, 3 sets steel carbide tipped-- 700.00
(c) all other equipment required for completion of project.

8. Diamond drilling and drifting operations will be contracted out with footage prices mentioned above. Footage cost will be over-all cost quoted, labor charge plus supplies used.
the following will be hired by the company.

1- tramser, day shift only, $350.00 per month wages.
1- hoist man, " " 350.00 " "
1- compressor man " 250.00 " "
3- pump men, work all three shifts, at 350.00 per month each.
1- supervisor and engineer, 350.00 per month.
1- office man 200.00 per month

9. Overall contract price per foot of drift advanced is $40.00
Overall " " " drilling " is 6.00
Compressor power bill per month is 350.00
Pumping " " " is 300.00

10. (a) $26,600.

(b) yes.

11. None except that shipment of ore will probably be impossible during February, March and part of April, but ore will be (as in past) stockpiled during these months.

Geologic Report and Proposed Development Program.

Cardiff Mine.

Salt Lake County, Utah.

General Geology.

The property of the Cardiff Mining company lies wholly along the course of the Alta overthrust fault-zone. This zone is one of the dominant structural features of the Alta mining district and consists of a well-defined contact wherein impervious, Cambrian Quartzite has been thrust up over younger, Mississippian lime beds. The fault-zone trends N. 30 to 40 degrees W. and dips 25 to 30 degrees to the northeast.

Transverse to the trend of this zone are the various fissures of the district. These strike northeast-southwest and generally dip steeply to the northwest.

Most of the orebodies in the vicinity of the Cardiff property are found as limestone replacement-lenses just beneath the quartzite hanging-wall. The largest deposits are found at the intersection of several fissures and usually extend for some distance beneath the lime-quartzite contact.

Description of the Deposits.

The most northerly ore body in the Cardiff mine is the largest and was formed along the course of the intersection of the Cardiff fissure with the overthrust contact. Plunging to the northeast at an average dip of 25 degrees, this intersection has formed one, continuous stope about 2500' long, 10 to 20 feet thick and 30 to 200 feet wide. In the upper levels the ore was principally a mixture of cerussite ($PbCO_3$) and manganese carrying residual boulders of galena and surrounded (on the edges of the stopes) by a casing of zinc silicates and carbonates. On the 1200 level the ore was practically all sulfide. The orebody is said to be still continuing below the 1500 level but water conditions are such that at that point it has been seen only by a few persons. The zinc content has increased with added depths.

No. 11 fissure is found about 300 feet south of the Cardiff fissure. At its contact with the overthrust fault this fissure has only been explored in two places, and both yielded lenses of ore totaling $400,000 in net smelter returns. The upward and downward extension

of this zone offers possibilities for finding added ore bodies.

The 'south one' fissure, as it is known in the Cardiff property, or No. 10, as known in Columbus Rexall ground, lies a few hundred feet south of No. 11 fissure. This is another long ore shoot that had a large production--at a time when metal prices were quite low. At depth (around the Cardiff 1000 level) this fissure should intersect No. 11 fissure as well as Columbus Rexall's 'D' winze fissure. These intersections are almost certain to yield ore bodies.

South of No. 10 ore zone is found the large boundary stope that was formed by the intersection of several fissures. This was a large mass of ore yielding almost $1,000,000 in smelter returns.

The aggregate production of these ore zones was between $7,000,000 and $8,000,000.

During 1949 and 1950, by carefully mining No. 11 stope it was found by removing the lower grade usually left on the bottom of the stopes that fissure ore penetrated the footwall limestone much deeper than was formerly admitted. As a result it is planned to explore the main Cardiff stope-footwall, especially where crossed by northwest fracture zone.

Much sulfide ore remains on stope walls from the 1200 to 1400 levels of the inclined winze. During 1949, 1950, and to February, 1951, 3,340 tons of ore, averaging 10 ounces silver, 20 percent lead and 6 percent zinc per ton was mined here.

Similarly, considerable zinc ore (ZnS10, ZnCO3) remains in the stopes on the upper levels. During 1950 and to April, 1951, 1700 dry tons of ore, assaying 30% zinc per ton was mined from these areas.

It is difficult to submit a sample map of the mine because there are innumerable faces of ore, of every size possible, scattered throughout the mine. For instance on the map above No. 11 stope there is a zone marked 'Block 1'. Along this drift there is 4 feet of ore from which 73 dry tons of zone were shipped in driving the drift. This assayed 28% zinc per ton.

Because of the high grade lead-zinc ore found along No. 11 fissure, it is recommended that the first exploratory work be done to pick up the upward extension of this zone. This can be done conveniently with a 200 foot drill hole from the 600 level, as shown on the map.

Cardiff Mine.

Ore is still continuing downward in the lower lense found along the course of No. 11 fissure. The last shipment was made from the 70' winze off the Columbus Rexall tunnel level just before the spring water run-off flooded the winze. This assayed 18% lead and 22% zinc per ton. This ore can be tapped very easily with a 120 foot drift from the Cardiff 800 level south drift, as shown on the map.

A 200 foot drift is also recommended of the 800 level at the point where, as seen on the map, the 800 level left the contact and penetrated the footwall of the overthrust. This drift should pick up the downward extension of the large ore shoot mined along the strike of 'D' winze fissure. The Columbus Rexall company quit this ore body when it reached their lower boundary limits.

The most important piece of exploratory work, however, is off the 1000 level of the Cardiff inclined winze. At this point, the workings are above the contact. It is recommended that the 1000 level be driven south a distance of 350 feet to cut the Cardiff ore zone, then be extended to cut the downward extension of the No. 10, No. 11 and B. winze fissures, and their possible intersections.

At the same time it is advised that a diamond drill be set up at, or about, the 1000 level and one hole drilled upward to about the 850 level, and, in the footwall of the winze, and that one hole be drilled downward in the footwall of the winze to about the 1150 level.

Later, when the water is pumped down to the 1400 level, it is considered advisable to probe for the downward extension of the main Cardiff ore shoot. This will determine whether or not it will be feasible to deepen the incline for future operations.

Submitted by:

John Kosteler.

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 1[illegible] ORE BODY
INTERNATIONAL SMELTING & REFINING CO., TOOELE PLANT, SALT LAKE CITY, UTAH

	DRY TONS	LEAD	ZINC	NET SETTLEMENT FOR LOT	CARDIFF SHARE
5/28/48	50.6	21.7	19.0	$3,298.16	$779.89
6/ 3/48	57.4	18.1	23.7	3,312.91	742.85
6/11/48	47.0	18.7	21.1	2,781.04	806.29
10/26/48	57.4	12.8	19.6	2,781.52	305.38
12/ 6/48	49.9	12.9	16.3	3,365.90	576.59
11/11/48	46.3	12.8	19.6	2,988.24	351.98
11/22/48	65.8	11.1	19.9	2,646.82	250.87
12/21/48	64.9	17.1	16.3	4,304.82	495.26
12/21/48	62.1	16.6	15.4	3,928.21	449.06
1/10/49	68.3	16.6	18.1	4,364.35	500.89
1/10/49	64.7	19.2	20.6	5,057.75	586.79
1/20/49	62.2	19.8	20.6	4,951.88	576.99
2/ 2/49	62.3	18.0	18.0	4,412.95	509.61
2/8/ 49	72.6	15.4	23.9	4,892.21	525.16
3/14/49	47.8	12.9	18.2	1,919.89	188.38
3/17/49	55.5	16.3	15.6	3,281.51	371.95
3/24/49	48.4	13.5	15.5	2,310.54	268.52
3/30/49	57.1	13.5	15.0	2,600.45	285.87
3/30/49	58.9	13.0	16.1	2,249.32	195.33
4/ 1/49	47.6	12.1	19.7	1,919.89	168.35
4/20/49	57.2	12.6	21.0	2,114.64	181.40
4/27/49	51.8	14.0	22.5	1,959.60	164.97
4/27/49	50.5	13.5	20.9	1,824.68	156.61
5/17/49	54.9	13.0	18.7	1,774.20	112.34
6/ 7/49	55.1	14.4	24.0	1,938.76	123.20
6/16/49	60.1	15.3	23.4	1,819.85	115.72
6/23/49	52.8	21.0	22.6	3,598.68	789.66
7/ 6/49	60.7	10.6	23.7	1,498.20	75.79
7/18/49	45.6	11.4	22.4	877.59	43.98
7/29/49	58.0	14.0	10.0	1,445.03	81.37
11/15/49	29.4	14.8	24.6	891.97	51.20
12/15/49	30.8	14.1	26.1	875.06	49.70
SHIPMENTS FROM BOUNDARY STOPE AREA					
12/23/49	34.9	18.6	25.1	1,264.56	------
4/5/50	15.9	17.1	27.4	466.09	53.05
6/24/50	26.0	17.5	24.5	991.61	204.76
8/14/50	34.5	9.4	5.1	486.89	24.55

CARDIFF MINING COMPANY
SUMMARY OF SETTLEMENT SHEETS NO. 11 ORE BODY
UNITED STATES SMELTING REFINING & MINING CO., MIDVALE, UTAH

4/28/48	84.2	26.3	14.0	4,787.50	1,138.17
5/ 1/48	33.8	28.0	12.0	2,884.28	825.84
8/10/48	208.4	14.9	16.9	10,645.84	7,214.46
8/30/48	91.8	17.4	6.9	5,511.40	649.02
9/ 3/48	61.7	16.6	8.6	3,651.67	424.69
9/17/48	58.7	12.0	10.9	2,424.76	277.71
9/16/48	60.2	15.6	16.1	3,220.70	370.55
9/27/48	59.2	16.9	22.6	3,788.84	442.55
SHIPMENTS FROM AREA OF BOUNDARY STOPE					
8/ 9/48	27.7	9.4	1.5	731.66	101.26

SH[illegible]ENTS FROM AREA OF BOUNDARY STO[illegible] (Continued)

10/ 3/49	28.8	1.2	2.5	386.67	82.63
6/17/50	8.0	1.2	3.1	302.02	60.98
8/25/50	7.2	---	---	734.77	119.92
8/25/50	22.4	12.2	2.6		

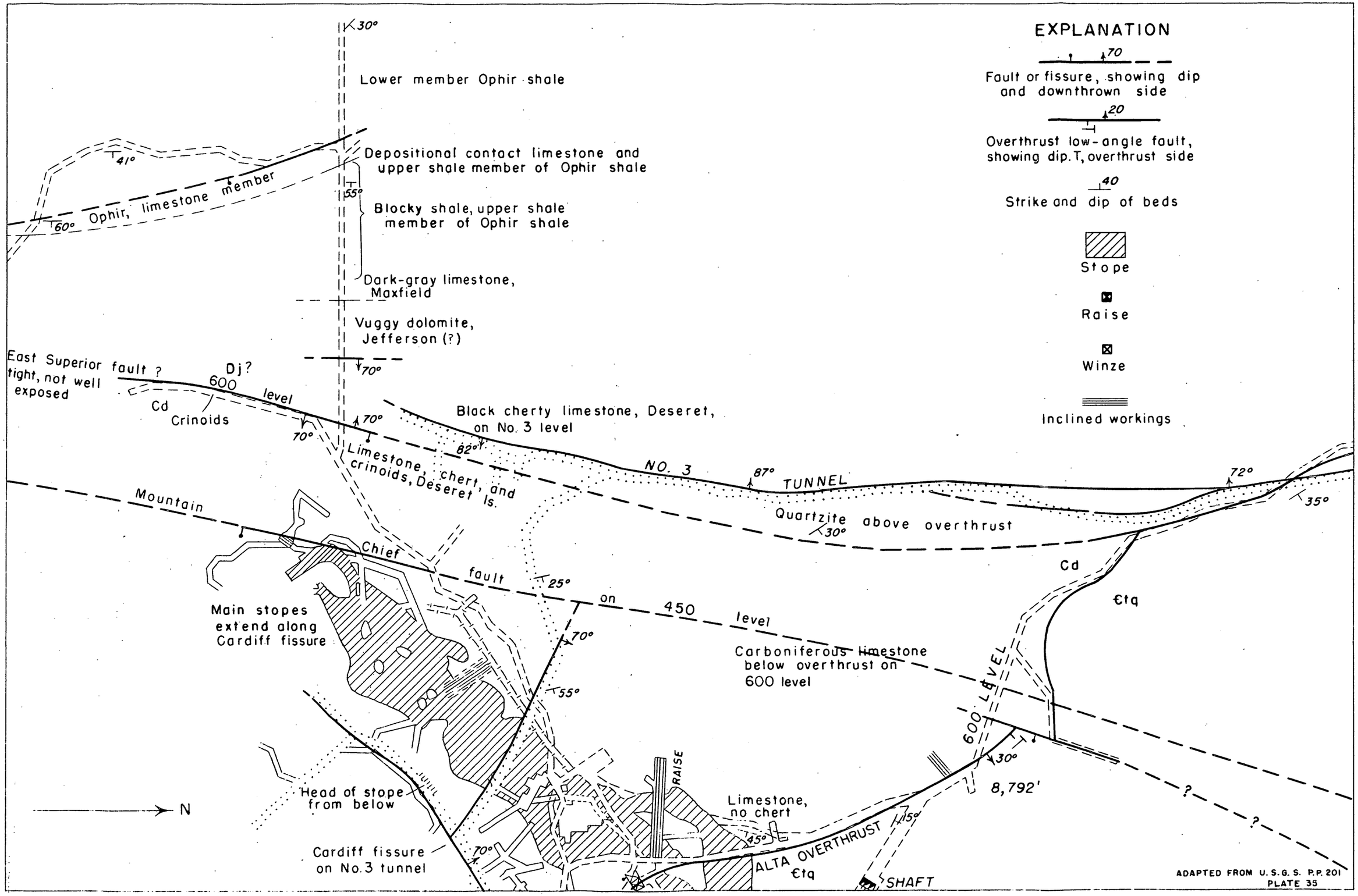


FIG. 3. SOUTHWEST PORTION OF CARDIFF MINE SHOWING RELATIONSHIP BETWEEN MOUNTAIN CHIEF FAULT AND EAST SUPERIOR FAULT TERMINATING CARDIFF ORE BODY

0 100 200 300 400 500 FEET
Scale

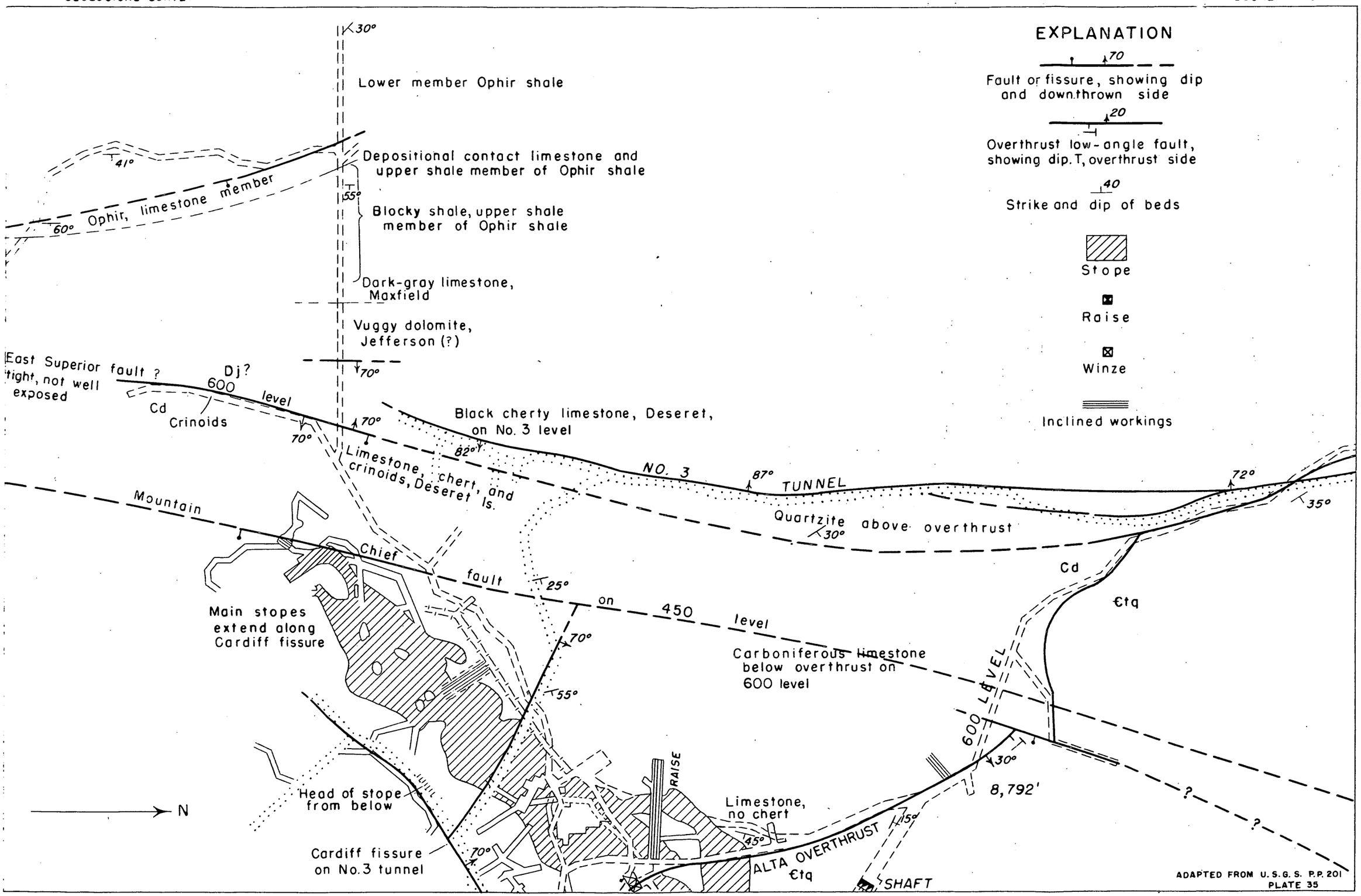
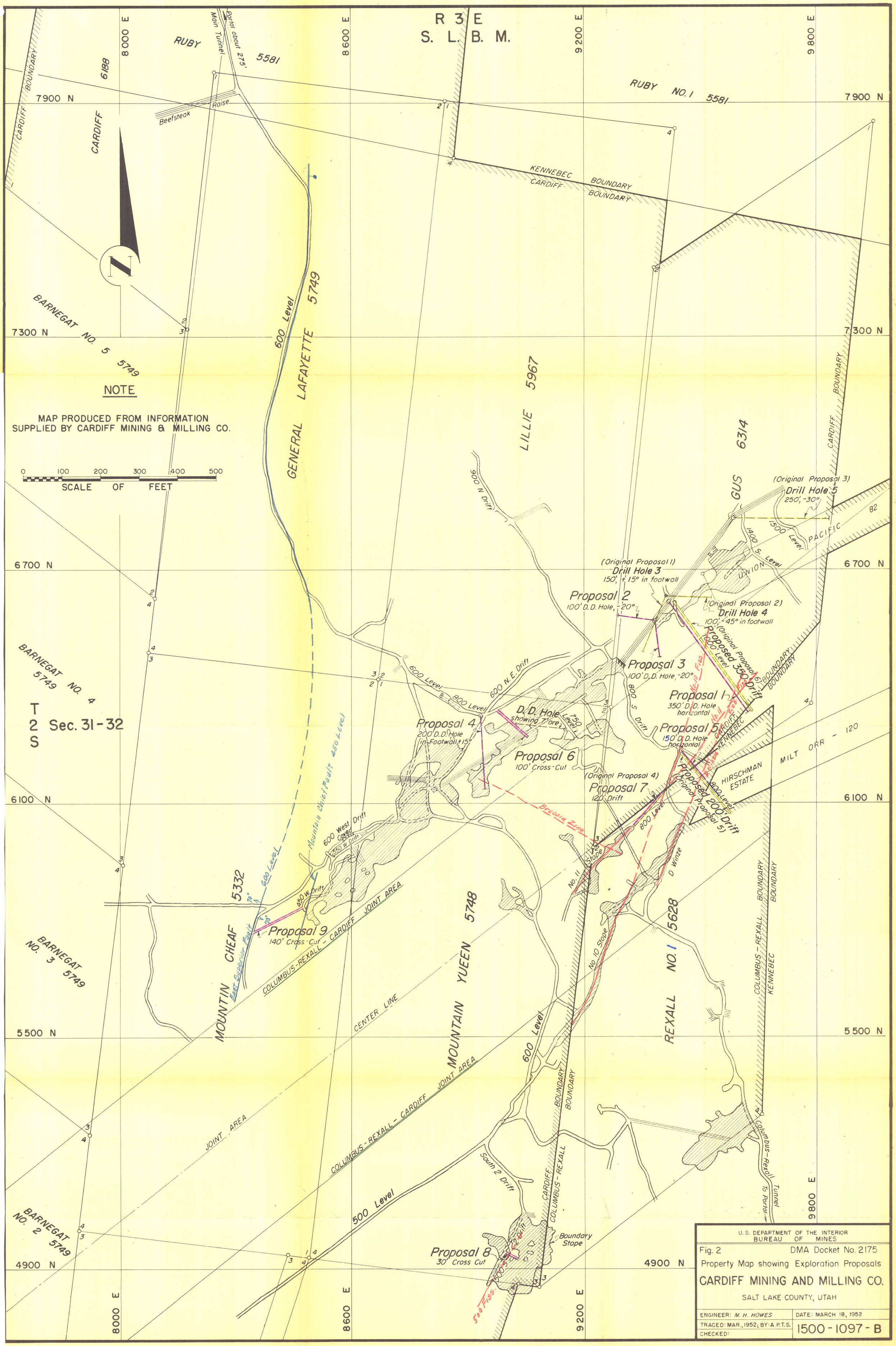


FIG. 3. SOUTHWEST PORTION OF CARDIFF MINE SHOWING RELATIONSHIP BETWEEN MOUNTAIN CHIEF FAULT AND EAST SUPERIOR FAULT TERMINATING CARDIFF ORE BODY



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

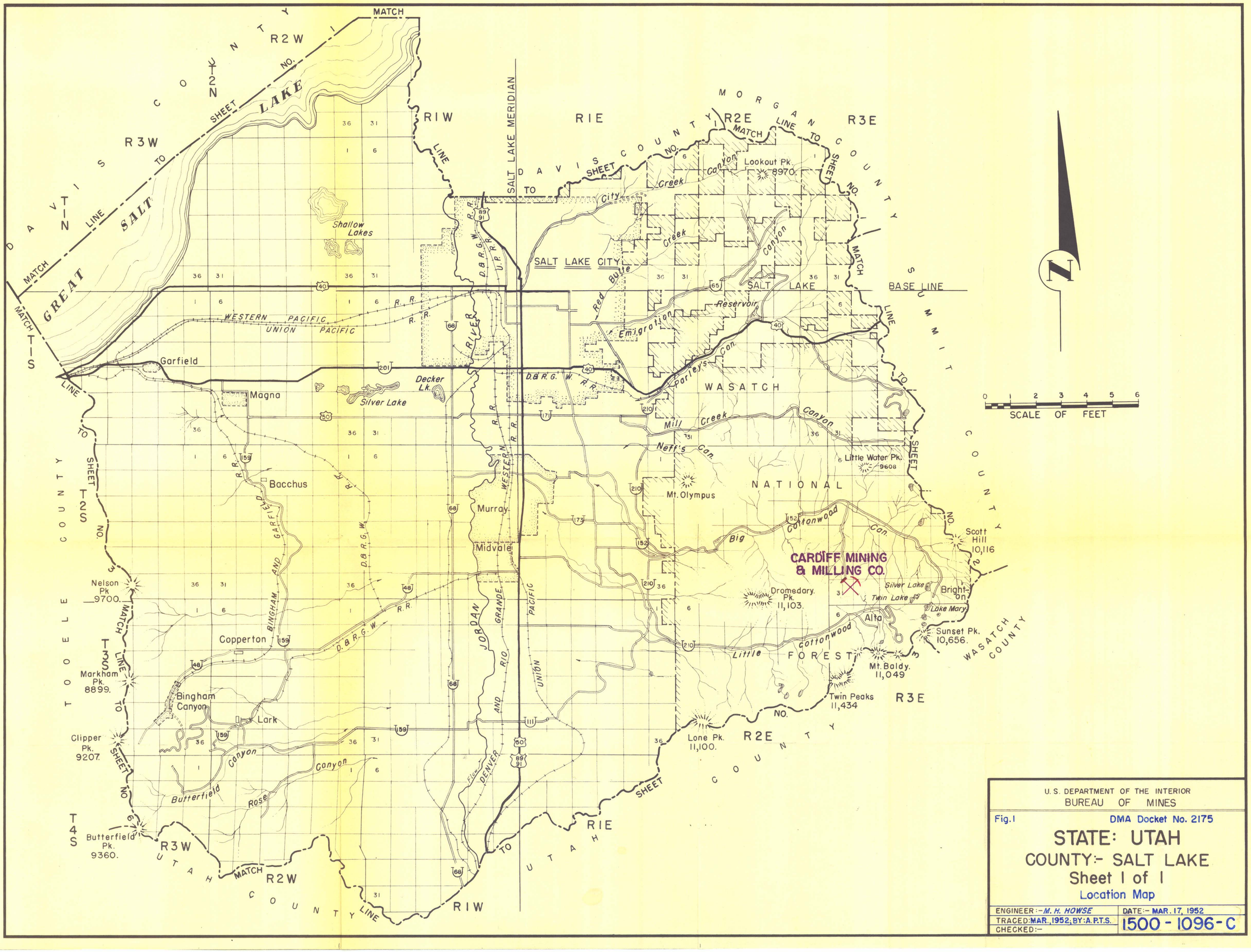
Fig. 2 DMA Docket No. 2175

Property Map showing Exploration Proposals

CARDIFF MINING AND MILLING CO.

SALT LAKE COUNTY, UTAH

ENGINEER: M. H. HOWES	DATE: MARCH 18, 1952
TRACED: MAR., 1952; BY: A.P.T.S.	1500-1097-B
CHECKED:	



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

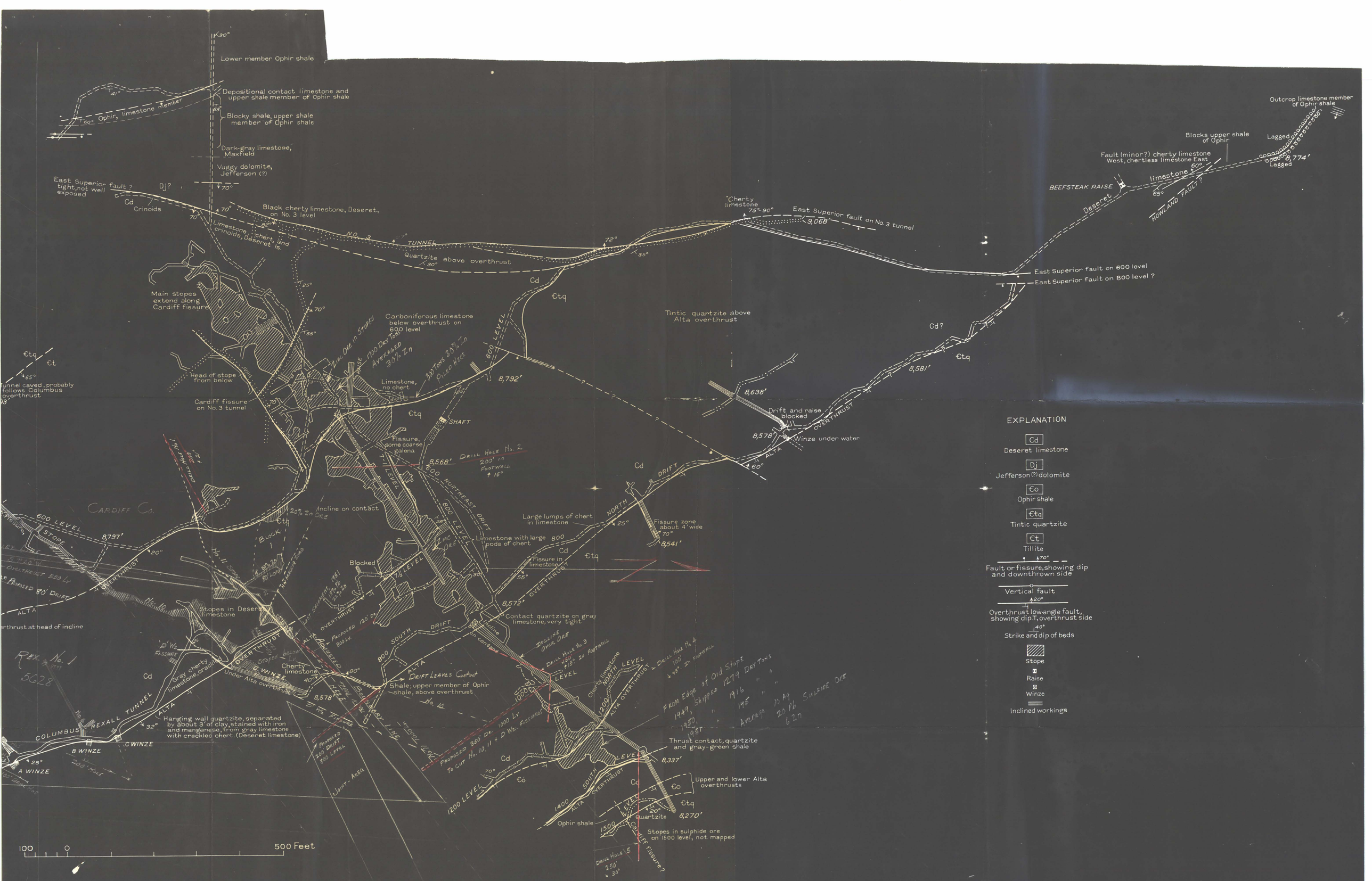
Fig. 1 DMA Docket No. 2175

STATE: UTAH
COUNTY:- SALT LAKE
Sheet 1 of 1
Location Map

ENGINEER:- M. H. HOWSE	DATE:- MAR. 17, 1952
TRACED: MAR., 1952; BY: A.P.T.S.	1500 - 1096 - C
CHECKED:-	

GEOLOGIC MAP OF CARDIFF MINE AND PART OF COLUMBUS-REXALL TUNNEL

(Overlaps Plate 38)



GEOLOGIC MAP OF CARDIFF MINE AND PART OF COLUMBUS-REXALL TUNNEL

(Overlaps Plate 38)

GEOLOGIC MAP OF CARDIFF MINE AND PART OF COLUMBUS-REXALL TUNNEL

(Overlaps Plate 38)