July 19, 1956

RECEIVED
JUL 19 1956

Memorandum

To: Administrator

From: George C. Selfridge, Special Assistant

Subject: Examination Trip
Docket No. DMEA-3993 (Lead-Zinc)
U. S. Smelting, Refining & Mining Co.
U. S. and Lark Mine, U. S. 1000 Level S.
Salt Lake County, Utah

This proposed project, which was denied by DMEA in a letter of May 4, 1956, to Mr. Oscar A. Glaeser, vice president of the company, was visited May 29, 1956, with Messrs. Traver and Harshman, of the Denver office, Wilson and Osterstock, of the Salt Lake City office, and Thornburg, of the company, among others.

Entrance to the mine was through the Bingham tunnel passing the turnoff to the Lark mine, the Niagara No. 2 shaft, the Niagara No. 3 shaft and beyond to the site of the denied project. (See Figure 4 of the application.) In this area there were some 3- to 5-cap sectioned sets and some circular steel sets. The drift exposed interfingering sediments and porphyry from the Last Chance stock, the latter exhibiting feldspar phenocrysts. Shortly before reaching the face, the drift had intersected a mineralized fissure. Just beyond the fissure the company was driving a raise to do additional work above the Level. From here to the face all of the drift was in porphyry. The face is still north of the land that the company proposed to include in a contract. Near the face roof bolts were being used with headboards. They had been placed in a circular fashion at intervals, with from 7 to 8 bolts in each section. It is highly possible that with relatively short time the bolts will have to be replaced by timber sets. All waste is hauled outside. The company is pumping from 1200 to 1500 gallons of water a minute intermittently from the No. 3 Shaft area. The ditch was nowhere near full. The Level was not making much water. The writer was not impressed by what he saw. The company was not driving the face and apparently had no immediate plans to do so.

The party did not have the opportunity to visit the surface of the proposed exploration area. However, maps were later studied. One map showed that immediately adjacent to the south-southwest side of the Last Chance stock there is a series of northwestward trending cross folds consisting of a syncline, an anticline, and finally a syncline. Possibly, chances for ore bodies might be better in the anticlinal area if the fissures project thatfar.

The denial was discussed with Mr. Thornburg, and he was informed that a denial did not necessarily have to be final but that if new noteworthy information were presented to DMEA it would gladly reconsider the proposal. Mr. Thornburg stated that some drilling had been done on the surface, the last of which apparently was favorable, but was stopped because of an accident. The major difficulties with surface drilling are the shortness of the season and accessibility. The writer received the impression that the company might do some additional work to justify another application to DMEA.

George C. Selfridge e.s.f

George C. Selfridge

GCSelfridge/esf
(7/19/56)
cc to: Docket
Admr. R. File
Mr. Johnson
Mr. Selfridge

File Copy
Surname
Griswold
Nelson
Gephart
Selfridge

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

Mr. Oscar A. Glaeser, Vice President
U. S. Smelting, Refining & Mining Co.
Newhouse Building
Salt Lake City, Utah

MAY 4 1956

Re: Docket No. DMEA-3993 (Lead-Zinc)
U. S. Smelting, Refining & Mining Co.
U. S. and Lark Mine, U.S. 1000 Level S.
Salt Lake County, Utah

Dear Mr. Glaeser:

Your application for aid for an exploration project and other reports available to us in Washington concerning your application have been reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, although noting a small amount of lead-zinc mineralization on the referenced area indicates to us that the probability of disclosing minable ore reserves by your proposed program is not sufficiently promising to justify Government participation. We regret to advise you, under these circumstances, that your application for exploration assistance is denied, though without prejudice on our part. In the event future work in this area discloses new and more favorable evidence, which could materially alter our opinion, you may be assured we would be pleased to consider a new application.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

C. O. Mittendorf

Administrator

WRGriswold/er (5/3 & 4/56)
Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Region III (2)
Chron.

File Copy
Surname
Griswold

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

Mr. Oscar A. Glaeser, Vice President
U. S. Smelting, Refining & Mining Co.
Newhouse Building
Salt Lake City, Utah

Re: Docket No. DMEA-3993 (Lead-Zinc)
U. S. Smelting, Refining & Mining Co.
U. S. and Lark Mine
Salt Lake County, Utah

Dear Mr. Glaeser:

Your application for aid for an exploration project and other reports available to us in Washington concerning your application have been reviewed.

Projects approved by the Defense Minerals Exploration Administration must, in its judgment, show definite promise of yielding materials of acceptable grade in quantities that will significantly improve the mineral supply position for the National Defense Program.

Careful study of all our information, although noting a small amount of lead-zinc mineralization on the referenced area indicates to us that the probability of disclosing minable ore reserves by your proposed program is not sufficiently promising to justify Government participation. We regret to advise you, under these circumstances, that your application for exploration assistance is denied, though without prejudice.

We wish to thank you for your interest in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

Administrator

WRGriswold/er 5/3/56
Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Region III (2)
Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION 500
WASHINGTON 25, D. C.

May 3, 1956

Memorandum

To: The Administrator

From: Chief, Base Metals Division

Subject: Denial of Application for Docket No. DMEA-3993,
U. S. Smelting, Refining & Mining Company,
U. S. and Lark Mine, Salt Lake County, Utah, Lead-Zinc.

Probably, of all the areas in which DMEA has done any degree of work, none has been so barren of results as Utah. I have, for some time, been possessed of an uneasy feeling that our complete lack of success in this region has been due to haphazard or "mule-back" type of geology. Nowhere is this better illustrated than in the present application.

The geological reasoning here is almost unbelievably loose and is largely based upon unsupported premise. The general idea is that certain limestone beds made ore on the north side of the Last Chance stock; hence, they should also make ore on the south side. Incidentally, the position of the beds on the south side is questionable. All of us know of plenty of instances where limestone beds have been replaced by ore minerals and made important mines; yet over other hundreds of square miles the same beds were barren. The mere fact that a bed has shown ore in one location is far from implying that it will show ore at a point several miles distant, and under different conditions.

It is within the realm of possibility that the project may possess inherent merit but the presentation has been made in such a casual and slipshod manner that we are unable to endorse it. Certainly the presentation falls far short of justifying our entering into a project of the magnitude of $242,000.00. We cannot help but concur in the misgivings of the field geologist and the commodity members and recommend denial.

We have already spent a lot of money in this immediate vicinity and found nothing of significance. Our expenditures have been, in round numbers:

DMEA-1098 Combined Metals Reduction Company,
Butterfield Project
Government's share $52,000.00

DMEA-2028 U. S. Smelting, Refining & Mining Company
Government's share $298,000.00

DMEA-2653 U. S. Smelting, Refining & Mining Company
Government's share $73,000.00

In addition to the above, another project, DMEA-3474, U. S. Smelting, Refining & Mining Company, is just getting started. Government expenditures here are expected to be plus $150,000.00.

In view of all of the above, we should refrain from further expenditures in this district, at least until we might receive an application based upon something more tangible than "blue-sky".

W. R. Griswold

W. R. Griswold

File Copy
Surname
Nelson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION 500
WASHINGTON 25, D. C.

May 3, 1956

Memorandum

To: The Administrator

From: Chief, Base Metals Division

Subject: Denial of Application for Docket No. DMEA-3993,
U. S. Smelting, Refining & Mining Company,
U. S. and Lark Mine, Salt Lake County, Utah, Lead-Zinc.

Probably, of all the areas in which DMEA has done any degree of work, none has been so barren of results as Utah. I have, for some time, been possessed of an uneasy feeling that our complete lack of success in this region has been due to haphazard or "mule-back" type of geology. Nowhere is this better illustrated than in the present application.

The geological reasoning here is almost unbelievably loose and is largely based upon unsupported premise. The general idea is that certain limestone beds made ore on the north side of the Last Chance stock; hence, they should also make ore on the south side. Incidentally, the position of the beds on the south side is questionable. All of us know of plenty of instances where limestone beds have been replaced by ore minerals and made important mines; yet over other hundreds of square miles the same beds were barren. The mere fact that a bed has shown ore in one location is far from implying that it will show ore at a point several miles distant, and under different conditions.

It is within the realm of possibility that the project may possess inherent merit but the presentation has been made in such a casual and slipshod manner that we are unable to endorse it. Certainly the presentation falls far short of justifying our entering into a project of the magnitude of $242,000.00. We cannot help but concur in the misgivings of the field geologist and the commodity members and recommend denial.

We have already spent a lot of money in this immediate vicinity and found nothing of significance. Our expenditures have been, in round numbers:

DMEA-1098 Combined Metals Reduction Company,
Butterfield Project
Government's share $52,000.00

DMEA-2028 U. S. Smelting, Refining & Mining Company
Government's share $298,000.00

DMEA-2653 U. S. Smelting, Refining & Mining Company
Government's share $73,000.00

In addition to the above, another project, DMEA-3474, U. S. Smelting, Refining & Mining Company, is just getting started. Government expenditures here are expected to be plus $150,000.00.

In view of all of the above, we should refrain from further expenditures in this district, at least until we might receive an application based upon something more tangible than "blue-sky".

W. R. Griswold

W. R. Griswold

WRG/er

Copy to: Docket
Base Metals
Chron.

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

Griswold

April 30, 1956

Re: DMEA-3993; Lead-Zinc, $242,118
U. S. Smelting, Refining and Mining Company
Area South of Last Chance Stock
Salt Lake County, Utah

Memorandum

To: W. R. Griswold, DMEA

From: O. M. Bishop, Branch of Base Metals

Subject: Review of Field Team Report of April 4, 1956, received April 9, 1956

The applicant Company proposes to explore a block of extensively fissured Pennsylvanian limestones and quartzites to the south of the Last Chance Stock which intrudes these sediments. Somewhat similar fissures in the north edge of the stock and replacements in the limestone just north of the stock have been important sources of ore in the past. It is believed the pre-mineral, post-Last Chance Stock porphyry fissures, the proximity of the porphyry and the favorable limestone, together with highly productive mines adjacent to the stock and the presence of mineralization at points along the fissure outcrops indicate a potential for important mineralization.

The proposed work consists of (1) drifting southwesterly on the Bingham Tunnel level from the northeastern boundry of the project area 950 feet to the footwall of the "B" limestone which forms the first exploration target, such drift to be driven within the Last Chance fissure zone, (2) drifting along the footwall or base of the "B" limestone 500 feet northeast and 1,200 feet to the southwest, (3) driving drift described under (1) above southerwesterly 1,600 feet to the footwall of the "D" limestone, (4) drift northeasterly and southwesterly an approximate total of 700 feet exploring structures in the "D" limestone, and (5) drilling some 9,000 feet of diamond drill holes to explore the "B", "C" and "D" beds at points where possibly cut by known fissures. Drifting is estimated to cost $40.46 a foot and diamond drilling $3.57 a foot. In total, the 4,950 feet of drift, 9,000 feet of diamond drilling, plus four diamond drill stations at $395 each and 6,023 feet of flume enlargement at $1.35 a foot will cost $242,118.

RECEIVED
MAY 1 - 1956

RECEIVED
- 1956

After reviewing the application, and discussing the proposed examination with the applicant's representatives, the mining engineer examiner recommends approval. The geologist examiner, however, notes that the location of target areas and ore potentials are based on geologic inference, and that the three DMEA projects 1098, 2028 and 2653 in the same area have been almost wholly unsuccessful in proving worthwhile ore bodies in the ground south of the Last Chance Stock.

In brief, my study of the application, and the reviews of it leads to the conclusion that although favorable horizons, structures and limited mineralization are present in the area south of the Last Chance Stock, the very considerable expenditures to date have failed to find any ore-shoots of importance, such as were developed in the zone between the Bingham and Last Chance Stocks or in the area still further northeast. This suggests the possibility that metallization may have been almost if not wholly attributed to the Bingham monzonite porphyry.

I recommend the application be denied without prejudice pending subsequent work by the applicant or others that might indicate new supporting evidence.

O. M. Bishop

O. M. Bishop
Branch of Base Metals

Copy to: Division of Minerals
Branch of Base Metals (2)
Mr. Kiilsgaard, Room 5222
Mr. Geehan, Room 3608
Files

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

April 30, 1956

Re: DMEA-3993; Lead-Zinc, $242,11
U. S. Smelting, Refining
and Mining Company
Area South of Last Chance
Stock
Salt Lake County, Utah

Memorandum

To: W. R. Griswold, DMEA

From: O. M. Bishop, Branch of Base Metals

Subject: Review of Field Team Report of April 4, 1956, received April 9, 1956

The applicant Company proposes to explore a block of extensively fissured Pennsylvanian limestones and quartzites to the south of the Last Chance Stock which intrudes these sediments. Somewhat similar fissures in the north edge of the stock and replacements in the limestone just north of the stock have been important sources of ore in the past. It is believed the pre-mineral, post-Last Chance Stock porphyry fissures, the proximity of the porphyry and the favorable limestone, together with highly productive mines adjacent to the stock and the presence of mineralization at points along the fissure outcrops indicate a potential for important mineralization.

The proposed work consists of (1) drifting southwesterly on the Bingham Tunnel level from the northeastern boundry of the project area 950 feet to the footwall of the "B" limestone which forms the first exploration target, such drift to be driven within the Last Chance fissure zone, (2) drifting along the footwall or base of the "B" limestone 500 feet northeast and 1,200 feet to the southwest, (3) driving drift described under (1) above southerwesterly 1,600 feet to the footwall of the "D" limestone, (4) drift northeasterly and southwesterly an approximate total of 700 feet exploring structures in the "D" limestone, and (5) drilling some 9,000 feet of diamond drill holes to explore the "B", "C" and "D" beds at points where possibly cut by known fissures. Drifting is estimated to cost $40.46 a foot and diamond drilling $3.57 a foot. In total, the 4,950 feet of drift, 9,000 feet of diamond drilling, plus four diamond drill stations at $395 each and 6,023 feet of flume enlargement at $1.35 a foot will cost $242,118.

RECEIVED
MAY 1 - 1956

After reviewing the application, and discussing the proposed examination with the applicant's representative, the mining engineer examiner recommends approval. The geologist examiner, however, notes that the location of target areas and ore potentials are based on geologic inferences, and that the three BMM projects 1098, 2028 and 2653 in the same area have been almost wholly unsuccessful in proving worthwhile ore bodies in the ground south of the Last Chance Stock.

In brief, my study of the application, and the review of it leads to the conclusion that although favorable horizons, structures and limited mineralization are present in the area south of the Last Chance Stock, the very considerable expenditures to date have failed to find any ore-shoots of importance, such as were developed in the zone between the Bingham and Last Chance Stocks or in the area still further northeast. This suggests the possibility that mineralization may have been almost if not wholly attributed to the Bingham monzonite porphyry.

I recommend the application be denied without prejudice pending subsequent work by the applicant or others that might indicate new supporting evidence.

O. M. Bishop

O. M. Bishop
Branch of Base Metals

OMBishop:ern

Copy to: Division of Minerals
Branch of Base Metals (2)
Mr. Milsagard, Room 5202
Mr. Sanborn, Room 3648
Files

IN REPLY REFER TO:

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

RECEIVED
APR 13 1956
Griswold

April 13, 1956

Re: DMEA 3993
U. S. Smelting, Refining and Mining Company
South of Last Chance stock
U. S. and Lark mines
Salt Lake Co., Utah
Estimated $242,118.00) Lead-zinc
Recommended ")

Memorandum

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

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

Subject: Review of Field Team report.

The applicant requested assistance in looking for and exploring projected fissures where they cut through favorably regarded limestone beds in the Bingham Tunnel Level extended southwest of No. 3 shaft. The project area is south of the Last Chance stock, and within it are limestone beds, whose probable counterparts on the north side of the stock are the host rocks of large orebodies where cut by NE-SW fissures of the same system as those to be searched for south of the stock.

The footwall of the "B" limestone where supposedly cut by the Last Chance fissure is the first target of the proposed work. The projected position of the footwall and the fissure is 1950 feet southwest of the No. 3 shaft. For 1450 feet, as projected, the extension of the Bingham Tunnel will be in the Last Chance stock and, as sketched in Fig. 4 of the Field Team report, may be so placed as to follow the Last Chance fissure.

The second target area is the relatively thin "C" limestone 750 feet (horizontal measurement) in the footwall of the "B" bed.

The third target area is the footwall of the "D" limestone, some 850 feet in the footwall of the "C" bed. Drifting in the footwall members of the "B" and "D" limestones in search of other fissures is a feature of the project. 9,000 feet of diamond drilling from tentative stations in the crosscut (Tunnel extension) and drifts is proposed.

Work to date at horizons between the Tunnel level (1000) and the surface in the area south of the Lost Chance stock has been outstandingly unproductive of discoveries. The D.M.E.A. has participated in three projects, similar to the one now proposed, the total cost of which has been $885,880.00 and is embarked on a fourth, the estimated cost of which is $301,930.000. As they are set up as separate projects success in any one project does not offset the failures in the other participations.

In this project, like in the others, the reasoning in support of the application is largely conjectural.

If as stated, (p. 17 engineering report) the applicant is driving a drift southerly toward the point of proposed starting, it must feel sure the application will be approved or is prepared to continue the prospecting unassisted. No statement as to the latter possibility is to be expected but such might be assumed and the outcome of the work awaited. Otherwise the Stage-phase program of the geologist-examiner should be adopted.

In order that the intention of the applicant may be better guessed I recommend a) that final judgement of the application be delayed or b) that the application be denied without prejudice.

N. E. Nelson

N. E. Nelson

IN REPLY REFER TO:

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

APR 1 3 1956

April 13, 1956

Re: DMEA 3993
U. S. Smelting, Refining and Mining Company
South of Lost Chance stock
U. S. and Lark mines
Salt Lake Co., Utah
Estimated $242,118.00) Lead-zinc
Recommended ")

Memorandum

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

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

Subject: Review of Field Team report.

The applicant requested assistance in looking for and exploring projected fissures where they cut through favorably regarded limestone beds in the Bingham Tunnel Level extended southwest of No. 3 shaft. The project area is south of the Lost Chance stock, and within it are limestone beds, whose probable counterparts on the north side of the stock are the host rocks of large orebodies where cut by NE-SW fissures of the same system as those to be searched for south of the stock.

The footwall of the "B" limestone where supposedly cut by the Lost Chance fissure is the first target of the proposed work. The projected position of the footwall and the fissure is 1950 feet southwest of the No. 3 shaft. For 1450 feet, as projected, the extension of the Bingham Tunnel will be in the Lost Chance stock and, as sketched in Fig. 4 of the Field Team report, may be so placed as to follow the Lost Chance fissure.

The second target area is the relatively thin "C" limestone 750 feet (horizontal measurement) in the footwall of the "B" bed.

The third target area is the footwall of the "D" limestone, some 850 feet in the footwall of the "C" bed. Drifting in the footwall members of the "B" and "D" limestones in search of other fissures is a feature of the project. 9,000 feet of diamond drilling from tentative stations in the crosscut (Tunnel extension) and drifts is proposed.

Work to date at horizons between the Tunnel level (1000) and the surface in the area south of the Last Chance stock has been outstandingly unproductive of discoveries. The D.M.E.A. has participated in three projects, similar to the one now proposed, the total cost of which has been $885,880.00 and is embarked on a fourth, the estimated cost of which is $301,930.000. As they are set up as separate projects success in any one project does not offset the failures in the other participations.

In this project, like in the others, the reasoning in support of the application is largely conjectural.

If as stated, (p. 17 engineering report) the applicant is driving a drift southerly toward the point of proposed starting, it must feel sure the application will be approved or is prepared to continue the prospecting unassisted. No statement as to the latter possibility is to be expected but such might be assumed and the outcome of the work awaited. Otherwise the Stage-phase program of the geologist-examiner should be adopted.

In order that the intention of the applicant may be better guessed I recommend a) that final judgement of the application be delayed or b) that the application be denied without prejudice.

N. E. Nelson

N. E. Nelson

NENelson:btr
G 4/13/56

cc: O. M. Bishop, Rm. 3617 Interior
Director's reading file (4212)
Branch Reading File (4212)
DMEA (3)
Chron. File
Docket File

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

RECEIVED
APR 9 - 1956

April 5, 1956

Greenwald

224 New Customhouse
Denver 2, Colorado

Docket

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: DMEA Docket 3993 (Lead-Zinc) U. S. Smelting, Refining, and Mining Company (U. S. and Lark Mine), Salt Lake County, Utah

Enclosed are nine copies each of Figures 2, 3, and 4 on the subject Report of Examination for possible use in the contract.

DMEA Field Team, Region III

By W. M. Traver
Executive Officer

Enclosures

See map envelope

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

RECEIVED
APR 9 - 1956

224 New Customhouse
Denver 2, Colorado

April 4, 1956

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: Report of Examination, Docket DMEA-3993 (Lead-Zinc) U. S. Smelting, Refining, and Mining Company, (U. S. and Lark mine), Salt Lake County, Utah

Enclosed are the original and three copies of a geologic and engineering report on the subject docket.

The engineer examiner recommends that the application be approved. The geologist examiner suggests that the proposed work may be a methodical prospecting venture in virgin ground.

Although we feel that this project borders on prospecting, we believe there is enough ore potential to justify a program outlined in stages as shown in the geological report using cost estimates in the engineering report. For reasons given in the engineering report, we recommend a new contract contingent upon the applicant driving, at his expense, to the northeast boundary line of the project area as shown on Figure 4 of the engineering report. We also recommend subordination of all ground without vertical limits. The equipment to be used in this project has been well maintained, and it appears to be just to allow depreciation of this used equipment. It is reasonably expected that the proposed exploratory work will develop as much as 1,000 gallons of water per minute which must be discharged through the Bingham Tunnel flume, and it is recommended that the cost of flume enlargement be allowed.

W. M. Traver
W. M. Traver

E. N. Harshman
E. N. Harshman

Reviewed by
DMEA OPERATING COMMITTEE
4-13-56
(date)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

DMEA
Date Rec'd.
MAR 26 1956

RECEIVED
APR 9 - 1956

BUREAU OF MINES
TRANSMITTED
APR 4 1956

March 22, 1956

Memorandum

To: W. H. Tanner, Executive Officer, DMEA Field Team, Region III

From: Stephen R. Wilson

Subject: Docket No. DMEA-2000 (Lead-Zinc), United States Smelting, Refining and Mining Co., V. K. and Lark mine, Salt Lake County, Utah

Attached are the original and eight copies of an engineering report prepared by H. H. Reeve. The report covers examination of the property of United States Smelting, Refining and Mining Co. for appraisal of a request for assistance under docket No. DMEA-2000. The brochure and a separate section, Summary, Conclusions and Recommendations, will be transmitted with the geologic report prepared by R. W. Osterstock. Nine sets of maps to accompany the engineering report have been mailed under separate cover. Ten prints each of Figures 2, 3 and 4 for possible use in a proposed contract also have been mailed under separate cover.

The applicant has requested a loan of $268,110 to conduct a project consisting of 4,200 feet of drifting and crosscutting and 2,000 feet of diamond drilling. The area to be explored lies south of the Last Chance stock in the lower limestone of the Bingham series. The property was examined by H. H. Reeve and R. W. Osterstock December 8, 1955.

The inspecting engineer considers the proposed project area to have considerable merit because of the favorable limestone beds and important fissures that have been productive in other sections of the district. I am in accord with the engineer's recommendations that the applicant's request for Government assistance be approved.

Stephen R. Wilson
Stephen R. Wilson

Enclosures

cc: J. F. Shaw
J. B. Chenner

Reviewed by
DMEA OPERATING COMMITTEE
4-13-56
(date)

TRANSMITTED

RECEIVED

APR 9 - 1956

APR 4 1956

UNITED STATES SMELTING, REFINING AND MINING CO.
U. S. AND LARK MINE
SALT LAKE COUNTY, UTAH
DMEA-3993
Lead-Zinc

Engineering Report

By M. H. Howes
Mining Engineer
Bureau of Mines

Reviewed by
DMEA OPERATING COMMITTEE
4-13-56
(date)

UNITED STATES SMELTING, REFINING AND MINING CO.
U. S. AND LARK MINE
SALT LAKE COUNTY, UTAH

CONTENTS

	Page
Engineering report	
Introduction	2
Location, topography and physical features	2
History and production	2
Ownership and extent	4
General geology	10
Minable ore reserves	11
Present status	11
Project proposals	13
Estimated costs of project proposals	14
Proposed financing	15
Conclusions and recommendations	15

ILLUSTRATIONS

Fig. 1 Location map, United States Smelting, Refining and Mining Co., Salt Lake County, Utah
Fig. 2 Claim map showing boundaries of proposed project area
Fig. 3 Map of surface
Fig. 4 Map of 1000 level, showing proposed exploratory work

RECEIVED
APR 9 - 1955

INTRODUCTION

An application dated September 7, 1955, for Government aid in an exploration project under docket No. DMEA-3993, was submitted by the United States Smelting, Refining and Mining Co. The proposed program consists of 4,950 feet of drifting and crosscutting and 9,000 feet of diamond drilling to explore for lead-zinc ores south of the Last Chance stock in the lower limestones of the Bingham series. The total estimated cost of the project is $242,118.

A field examination of the property was made December 2, 1955, by R. W. Osterstock, Geological Survey, and M. H. Howes, Bureau of Mines, to determine the feasibility of the proposed exploratory work, and to appraise the estimated costs and the engineering aspects of the job. The field examiners were accompanied on the trip by C. L. Thornburg and Clarence Bingham, representatives of the company.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The U. S. and Lark mine lies on the east slope of the Oquirrh Range, in the Bingham area of the West Mountain mining district, Salt Lake County, Utah, approximately 28 miles southwest of Salt Lake City (fig. 1). The property rises from an elevation of about 4,550 feet above sea level at the portal of the Bingham Tunnel at Lark to more than 7,900 feet at the ridge over the Niagara No. 2 shaft.

HISTORY AND PRODUCTION

The United States Mining Co., organized in 1899, was reorganized in 1906 and named United States Smelting, Refining and Mining Co.

Three groups of claims were originally acquired in the Bingham area, the Jordan and Galena group, the Spanish group and the Telegraph group. Later the company's holdings were expanded to include 5,739 acres of mineral ground fanning out to the north, east and south of Kennecott's Utah Copper mine.

The Bingham district is one of the major mining camps of the world. Although it is particularly famous for its copper production from the Utah Copper mine, it is also one of the country's important sources of lead and zinc. More than 12,000,000 tons of lead-zinc ores have been produced from properties now owned by the U. S. and Lark mine of the United States Smelting, Refining and Mining Co. Production has been practically continuous since 1872. Production and grade of ores from the U. S. and Lark mine for the period 1951 through 1954 follow:

Year	Dry Tons Shipped	Ounces		Percent		
		Au	Ag	Cu	Pb	Zn
1951	330,108	.044	4.283	.390	7.995	6.495
1952	371,964	.044	4.574	.450	8.765	6.760
1953	326,749	.041	4.255	.435	8.800	7.290
1954	307,435	.040	4.609	.435	9.410	7.815

Current production of the mine is approximately 1,200 tons of ores per day, plus an average of about 125 tons of ores per day from lessee operations.

OWNERSHIP AND EXTENT

The U. S. and Lark mine, consisting of 5,739 acres of patented and unpatented mining claims, and including many well-known old operations, such as Old Jordan, Last Chance, Commercial, Galena, Kempton, Telegraph, Niagara, Brooklyn, Yosemite, Lead Mine, Dalton and Lark, Bingham Prospect, Mayflower, Tiewaukee, and Winamuck, is owned by United States Smelting, Refining and Mining Co. There are no claims, liens, or encumbrances against the property.

The real property comprising the project area includes all or portions of patented and unpatented lode mining claims situated in Sections 3, 4, 9 and 10, T. 4 S., R. 3 W., S.L.B. and M., in West Mountain mining district, Salt Lake County, Utah, as shown on figure 2, and listed as follows:

Claims Owned (patented, unless otherwise indicated)	U.S. Lot No. or U.S. Survey No.
Aetna Amd.	7020
Aladin	68
Albino	70
Almeda	73
Armand	4030
Austin	4030
Austin Ray	410
Blizzard	6376
Blizzard Fraction	6375
Boston	3532
Buzzo	3531

Claims Owned (patented, unless otherwise indicated)	U.S. Lot No. or U.S. Survey No.
Contact	5407
Contact Fraction	6373
Dead Thing	4463
Decoration	6971
Detroit	3528
Dandy Fraction (unpatented)	7117
Difficult Amd.	7019
Earl Amd.	7020
Experiment	5319
Fair	3980
First Chance	135
G. H. Amd.	7019
Hard Job Amd.	7020
I Don't Care	4030
Indiana	3779
Josie K.	4030
Klondike No. One	3966
Lilly	4363
Michigan	3529
Michigan Fraction	6377
Mignon	6378
Morton	3940
Ole Bull	76

Claims Owned (patented, unless otherwise indicated)	U.S. Lot No. or U.S. Survey No.
Owyhee	77
Patience	6372
Percival	6374
Rip Van Winkle	3978
Royal	75
Royal Queen	4955
Scotia	3026
Sliver Amd.	7020
Stag	3979
Stella Amd.	7020
Wide West	289
Henrietta	83
Red Cloud	145

Government tie: The point of beginning is corner No. 4 of the Mednight Bell No. 1 lode mining claim, U. S. Survey No. 5609, whence the quarter corner between Sections 3 and 10, T. 4 S., R. 3 W., S.L.B. and M., bears S. 85° 20' W., 813 feet, more or less.

The lateral limits of the property included in this project are as follows:

Beginning at said corner No. 4 of said Mednight Bell No. 1 lode mining claim, U. S. Survey No. 5609, and running thence along line 4-3 of said claim S. 59° 45' E., 125.3 feet, more or less, to intersect the section line between said Sections 3 and 10;

thence along said section line S. 89° 49' W., 918.6 feet, more or less, to the said quarter corner between said Sections 3 and 10;

thence along the east line of the northwest quarter of said Section 10 S. 0° 01' W., 1,315.2 feet, more or less, to intersect the north line of the south half of the said northwest quarter of Section 10;

thence, in part, along said north line of the south half of said northwest quarter, N. 89° 53' 20" W., 3,297.7 feet, more or less, to intersect line 4-3 of the Blizzard Fraction lode mining claim, U. S. Survey No. 6375;

thence along line 4-3 of said Blizzard Fraction lode mining claim N. 9° 33' W., 705 feet, more or less, to corner No. 3 of said claim, identical with corner No. 3 of the Beebe lode mining claim, U. S. Survey No. 5436;

thence along line 3-2 of said Beebe lode mining claim N. 52° 15' W., 300 feet, more or less, to corner No. 2 of the Fred C. lode mining claim, U. S. Survey No. 5436;

thence along line 2-3 of said Fred C. lode mining claim N. 33° 00' E., 1,422.4 feet, to corner No. 3 of said claim;

thence along line 3-4 of said claim N. 53° 15' W., 426 feet, more or less, to intersect line 3-2 of the Silver Chief No. 2 lode mining claim, U. S. Survey No. 4985;

thence along said line 3-2 N. 56° 19' E., 321.4 feet, more or less, to corner No. 2 of said Silver Chief No. 2 lode mining claim, identical

with corner No. 3 of Silver Chief No. 1 lode mining claim, U. S. Survey No. 4985;

thence along line 3-4 of said Silver Chief No. 1 lode mining claim N. 35° 54' E., 395.2 feet, more or less, to intersect line 6-1 of the Armand lode mining claim, U. S. Survey No. 4030;

thence along said line 6-1 of said Armand lode mining claim, N. 7° 30' E., 368.3 feet, more or less, to corner No. 1 of said claim, situated on line 3-4 of the Michigan lode mining claim, U. S. Survey No. 3529;

thence along said line 3-4 of said Michigan lode mining claim N. 52° 58' W., 110.1 feet, more or less, to corner No. 4 of said claim;

thence along line 4-1 of said claim N. 59° 33' E., 112.7 feet, more or less, to corner No. 3 of the Detroit lode mining claim, U. S. Survey No. 3528;

thence along line 3-4 of said Detroit lode mining claim N. 43° 39' W., 150 feet;

thence N. 80° 00' E., 2,494.9 feet;

thence N. 37° 00' E., 1,056.8 feet;

thence S. 72° 00' E., 750 feet;

thence S. 23° 00' W., 460 feet;

thence S. 72° 00' E., 345.8 feet, more or less, to intersect line 10-11 of the Scotia lode mining claim, U. S. Survey No. 3026, said line being also part of the westerly boundary line of Item III of docket No. DMEA-2028, Contract No. Idm-E360, as amended by Amendment No. 4, dated July 2, 1954;

thence along said line 10-11 of said Scotia lode mining claim, and, in part, along said westerly boundary line of said DMEA project, S. 30° 49' W., 752.2 feet, more or less, to intersect line 2-3 of the Silver Star lode mining claim, U. S. Survey No. 4138;

thence along said line 2-3 of said Silver Star lode mining claim S. 0° 51' E., 831.9 feet, more or less, to corner No. 3 of said claim;

thence along line 3-4 of said claim, identical, in part, with line 2-3 of the G. H. Amended lode mining claim, U. S. Survey No. 7019, N. 89° 09' E., 402.9 feet, more or less, to corner No. 3 of said G. H. Amended lode mining claim;

thence along line 3-4 of said claim South, 523.3 feet, more or less, to intersect line 5-4 of said Mednight Bell No. 1 lode mining claim, U. S. Survey No. 5609;

thence along said line 5-4 of said Mednight Bell No. 1 lode mining claim S. 35° 51' W., 711.2 feet, more or less, to corner No. 4 of said claim, the point of beginning.

The vertical limits of the property included in this project are as follows:

The upper vertical limit of the project is 200 feet vertically below bedrock. There is no lower vertical limit.

One unpatented claim included in the proposed project area is entered in the records of the Salt Lake County Recorder at Salt Lake City, Utah, as follows:

Name of Claim	Book	Page
Dandy Fraction	K	387.

GENERAL GEOLOGY

The proposed exploratory block lies almost entirely south of the Last Chance stock, in an area of extensively fissured Pennsylvanian limestones and quartzites. The Commercial and Jordan limestones, correlated respectively as the Yampa and Highland Boy limestones (famous for their production in the Bingham district) outcrop in the project area. Limestone beds, which have been highly productive north of the Last Chance stock, occur below the Commercial and Jordan limestones in this area in similar stratigraphic positions to those occupied by the beds north of the stock. In the project area the beds strike northeasterly and dip northwesterly (figs. 3 and 4).

A wide belt of prominent and persistent northeasterly striking fissures extends southwesterly into the proposed exploration block from the U. S. Section of the U. S. and Lark mine. An important part of the production from the U. S. Section has come from these fissures, both within and north of the Last Chance stock, as fissure deposits and as steeply dipping shoots of ore on bedding structures, and particularly those associated with the "B" and "D" limestones.

The proposed project includes a plan to drive south of the Last Chance stock on the Bingham Tunnel level to explore, within a prominent fissure zone, the series of limestone beds which have been productive north of the Last Chance stock.

MINABLE ORE RESERVES

The applicant reports an estimated minable reserve of 210,000 tons of ores containing 15 to 17 percent combined lead and zinc.

PRESENT STATUS

The proposed exploratory project will be conducted from a drift driven southwesterly from the No. 3 shaft on the Bingham Tunnel level (U. S. Section 1000 level).

The existing usable facilities, equipment, buildings, and structures, owned by the company, that will be devoted entirely or in part to the exploration work, consist of the following:

All of the surface facilities of the U. S. and Lark mine, which include:

- Machine and electrical shops and equipment
- Blacksmith and steel shops and equipment
- Framing mill and equipment
- General offices
- Warehouses
- Engineering and geological offices

Rock drills, mucking machines, jumbos, haulage locomotives, mine cars, pumps and hoisting equipment.

Minimum clearance of untimbered sections of drifts and crosscuts is 7-1/2 feet high and 6-1/2 feet wide, and of timbered sections is 7 feet high and 6 feet wide. Track gauge to be used on the proposed drifting will be 24 inches. Waste and ores from the project will be

dumped from 24-inch-gauge cars into skip pockets at the No. 3 shaft and then hoisted up the shaft to loading bins, from which 36-inch-gauge cars will transport it through the Bingham Tunnel to the surface. Diamond drill stations will be 12 feet long and drift size.

Ores discovered in the project area, after being mined and transported through the Bingham Tunnel to the Lark surface plant, will be shipped via standard-gauge railroad to the United States Smelting, Refining and Mining Co. mill at Midvale, Utah, a distance of approximately 12 miles.

Ample labor is available in the Salt Lake Valley area.

Materials, supplies, and equipment not now on hand at the mine can be readily obtained in Salt Lake City.

An adequate water supply is available from the mine workings.

Power is purchased from the Utah Power and Light Co., whose main generating plants for the area are known as Olmsted, Hale, and Jordan. The power company has connecting lines with its generating plants in Utah and Idaho. Power is delivered to Bingham Canyon over three separate, 44,000-volt transmission lines designated as Bacchus, Jordan Narrows No. 1, and Jordan Narrows No. 2. There are two feeder lines to the mine. It is estimated that the project will consume approximately 46,000 kw.-hr. per month at a cost of 1 cent per kw.-hr.

PROJECT PROPOSALS

The proposed exploratory work is described as follows:

1. Drive southwesterly on the Bingham Tunnel level from the northeast boundary of the proposed project area in the zone of the Last Chance fissure approximately 950 feet to the footwall of the "B" limestone. Short diamond drill holes from systematically spaced stub crosscuts may be advisable to cut the main Last Chance fissure, one of the chief productive fissures of the U. S. Section of the mine.

2. Drive northeast about 500 feet and southwest about 1,200 feet on the "B" limestone footwall bedding. From systematically spaced diamond drill bases, drill the "B" limestone roughly fanwise as shown on figure 4.

3. From near the start of the "B" limestone drift, drive southerly about 1,600 feet to the "D" limestone footwall.

4. Drive northeasterly and southwesterly an approximate total distance of 700 feet on one or more structures in the "D" limestone, presumably near the footwall.

5. The project will require approximately 9,000 feet of diamond drilling to be carried out in conjunction with the above exploration work. The individual holes cannot be planned before a substantial part of the drifting has been done, but the general plan of the proposed drilling will be in part as illustrated on figure 4.

It is estimated that the proposed exploratory work will develop an increase of 1,000 gallons of waterflow per minute. In order to

handle the anticipated increase of waterflow, it will be necessary to enlarge 6,023 feet of the present Bingham Tunnel flume.

It is considered necessary to excavate and construct four diamond drill stations to facilitate the proposed diamond drilling.

Summary of Proposed Work

Drifting	4,950 feet
Diamond drilling	9,000 feet
Diamond drill stations	4
Flume enlargement	6,023-foot length.

ESTIMATED COSTS OF PROJECT PROPOSALS

The application contains a detailed and complete set of estimated costs. These figures have been carefully studied and compared with actual costs of similar work in current company DMEA projects. Since the basic costs are found to be fair and accurate, it is not considered necessary to tabulate all of the detailed costs in this report, but instead to summarize the estimated costs of the proposed project as follows:

	Drifting 4,950 Feet		Diamond Drilling 9,000 Feet	
	Total Cost	Cost per Foot	Total Cost	Cost per Foot
Labor	$69,110.86	$13.96	$15,226.92	$1.69
Supervision	5,627.30	1.14	1,319.98	.15
Materials and Supplies	67,662.20	13.67	10,350.00	1.15
Power	8,167.50	1.65	2,880.00	.32
Operating equipment (depreciation)	12,039.66	2.43	1,388.09	.15
Equipment repairs	6,336.00	1.28	0.00	0.00
Hoisting	14,355.00	2.90	0.00	0.00
Tramming in Bingham Tunnel	11,979.00	2.42	0.00	0.00
Handling waste at surface	910.73	.18	0.00	0.00

	Drifting 4,950 Feet		Diamond Drilling 9,000 Feet	
	Total Cost	Cost per Foot	Total Cost	Cost per Foot
Engineer and geologist--	$ 1,386.24	$ .28	$ 346.56	$ .04
Sampling and analysis---	1,745.89	.35	381.10	.04
Accounting ----------	968.83	.20	242.21	.03
	$200,289.21	$40.46	$32,134.86	$3.57

Summary of Estimated Costs

Drifting - 4,950 feet at $40.46 per foot ----------	$200,277.00
Diamond drilling - 9,000 feet at $3.57 per foot --------	32,130.00
Diamond drill stations - 4 at $395 each ----------	1,580.00
Flume enlargement - 6,023-foot length at $1.35 per foot-	8,131.00
Total estimated cost of proposed project----------	$242,118.00
Government participation at 50 percent ----------	$121,059.00

PROPOSED FINANCING

The applicant is prepared to invest $121,059 in the proposed exploratory project, which is 50 percent of the total estimated cost of $242,118, in accordance with the regulations on Government participation, as stated in Section 7, DMEA Order 1, Amended.

CONCLUSIONS AND RECOMMENDATIONS

An attempt will herewith be made to answer satisfactorily the specific questions asked by the Washington DMEA representatives.

Mr. Frank E. Johnson requests that comments and recommendations be given on the following:

1. If a project is recommended, the desirability should be considered of combining the proposed project with one of the

previous projects of this operation by including it under an amendment to a previous contract.

2. The first part of the proposed work would not be through an area subject to the contract. As you know, all work under a DMEA project must be done in areas subject to the contract. If your report is favorable, you should endeavor to obtain the applicant's agreement to the inclusion of additional land covering all of the proposed work.

3. Depreciation of operator's equipment to be used on the proposed project is included in the cost. Has not most of this equipment already been depreciated 100 percent or more?

4. An item of cost covering enlargement of flume is also included. Is this item necessary for the exploration project? If enlargement of the flume is required, should the entire amount be charged to the exploration project?

Comments and recommendations on Mr. Johnson's questions are as follows:

1. Even though the present proposed project area is adjacent to the Item III area of Contract Idm-E360, the proposed exploratory work will be done in an entirely different series of limestone beds approximately 1,760 feet below the Item III workings. Since there is no relationship between the two exploratory target areas, it is recommended that a new contract be processed for the subject proposed project.

2. The target area is located principally south of the Last Chance stock. The applicant proposes to start the exploratory work, in which the Government will participate, at the north boundary of the project block as shown on figure 4. At present the applicant is driving a drift southerly toward the point of proposed starting. This drift is entirely within the Last Chance stock. The project block, as outlined in the application and described in this report, is believed to include all of the company's property necessary to adequately explore the proposed target area, and that the block is of ample size to contain ore bodies more than sufficient to repay the Government loan. It is therefore recommended that the outline of the proposed block be unchanged.

3. Most of the equipment used by the applicant on the proposed project is not new, but it is maintained in first-class operating condition. It is believed that a fair depreciated value for each used piece of equipment has been established. Since the equipment does have value and a probable life of more than 5 years, the depreciation period of 5 years or 60 months, as set up in the application, appears to be just. It is recommended that the depreciation of used equipment be allowed.

4. The capacity of the Bingham Tunnel flume has been practically reached. Any appreciable increase of water will necessitate the enlargement of the flume. It is reasonably expected

that the proposed exploratory work will develop as much as 1,000 gallons of water per minute, which must be discharged through the Bingham Tunnel flume. If such is the case, it is recommended that the cost of flume enlargement, as listed in the cost estimate, be allowed.

Mr. George C. Selfridge asked that the item of "hoisting," as it appears in the cost outline in the application, be clarified, and that the term "rubber money" be explained. Answers to the above questions follow:

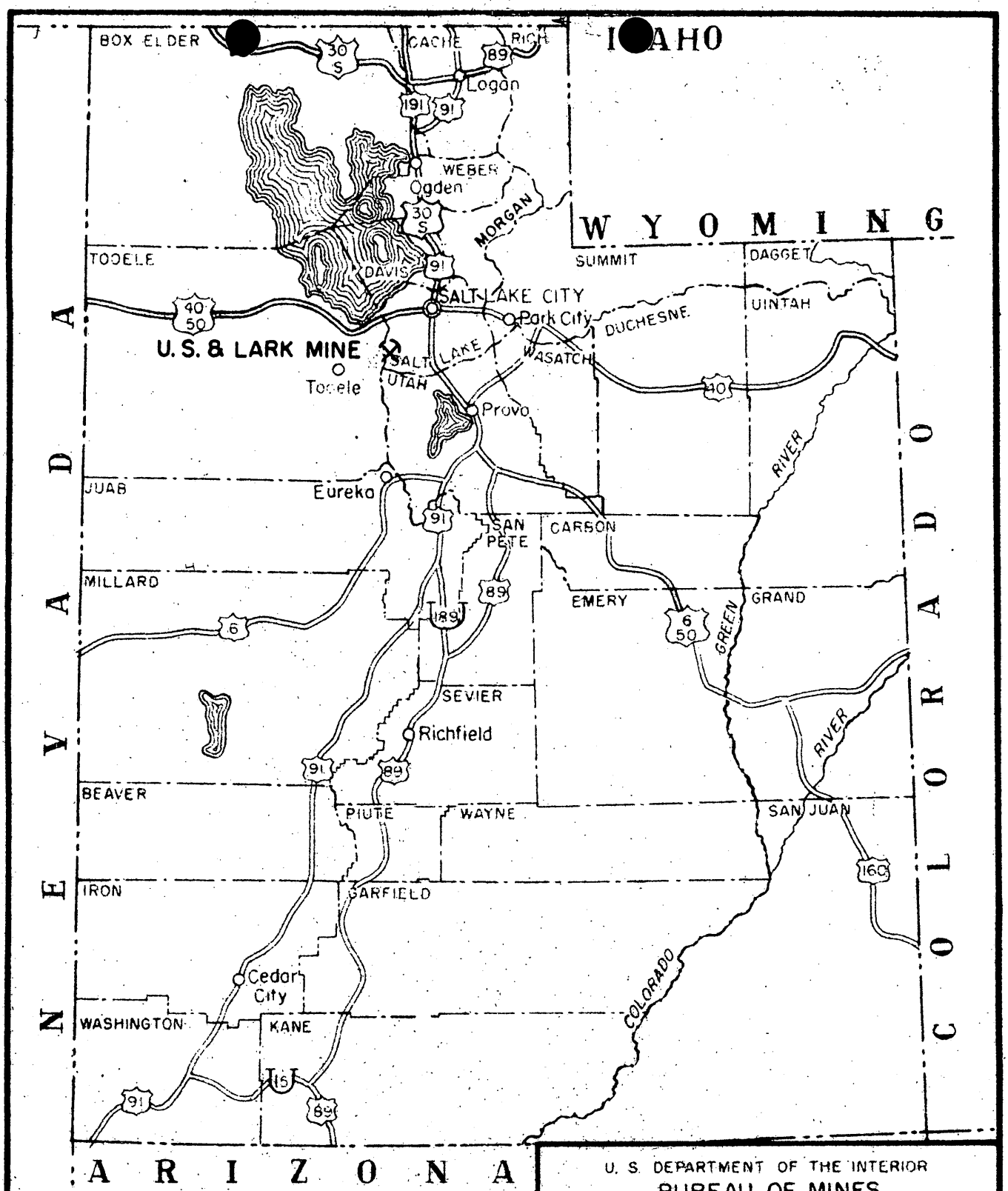
Waste and ore from the proposed project will be loaded originally in 24-inch-gauge cars, then transferred to Bingham Tunnel 36-inch-gauge cars, and transported to the surface. To transfer from the 24- to the 36-inch-gauge cars, the waste and ore from the 24-inch-gauge cars is dumped into skip pockets at No. 3 shaft, and hoisted up the shaft to loading bins, from which the 36-inch-gauge cars are loaded.

"Rubber money" is a term commonly used in the mining industry to mean "the cost of rubber clothing and rubber boots" when wet working conditions are encountered. It has been a long-established custom for mining companies to either furnish their employees rubber clothing and rubber boots for wet working conditions, or to allow the cost of this equipment. "Rubber money" in the amount of $1.00 per day per man is considered fair.

Mr. N. E. Nelson requested that a quick general summary of the results of exploration, if any, by companies other than United States Smelting, Refining and Mining Co., in the area south of the Last Chance stock, be made.

The Combined Metal Reduction Co.'s mines in Butterfield Canyon, south and east of the Last Chance stock, have derived most of their ore production from the Rough Wrestler fissure zone in the lower Bingham limestone series.

The extensively fissured, favorable limestones in close relationship to the Last Chance stock, together with known mineralization of considerable importance to the north, make the proposed project appear to be an excellent one. It is therefore recommended that the above-described exploratory program, estimated to cost $242,118, be approved.



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Fig. I DMEA Docket No. 3993
Location Map

UNITED STATES SMELTING REFINING & MINING CO.
U. S. & LARK MINE
SALT LAKE COUNTY, UTAH

ENGINEER: *M. H. HOWES*	DATE: JAN. 20, 1956
TRACED: JAN., 1956, A.P.T.S.	1500 - 1157 - E
CHECKED:	

RECEIVED
APR 9 - 1956

RECEIVED
APR 9 - 1956

DMEA
Date Rec'd.

APR 3 1956

BUREAU OF MINES
Denver, Colorado

Room 208 - 222 So. West Temple
Salt Lake City 1, Utah
March 29, 1956

TRANSMITTED

APR 4 1956

Memorandum

To: E. N. Harshman, DMEA Field Team, Region III

From: R. W. Osterstock

Subject: DMEA Docket 3993 (lead-zinc) U. S. Smelting, Refining, and Mining Company, (U. S. and Lark Mine) Salt Lake County, Utah.

Enclosed are nine copies of a geologic report by R. W. Osterstock, U. S. Geological Survey, on the subject docket.

The applicant has proposed a $242,118.00 program designed to explore mineralized fissures and favorable bedding horizons at depth in the region south of the Last Chance stock. These strata and fissures are within the Pennsylvanian Oquirrh formation on the east flank of the Oquirrh Range.

Substantial production has been recorded from the objective beds and fissures in the main workings of the U. S. section of the U. S. and Lark mine to the north of the Last Chance stock. It is mainly this evidence which is used to support the application for government aid. There is very little factual data to support the applicant's contention that large ore bodies may exist in the project area, however, there can be little doubt that the size of these ore bodies, if they do exist, easily makes them worthy of DMEA consideration. The geological conjecturing necessary to provide all the factors required to form such ore bodies appears sound but nonetheless does have very little basis in fact. This is an excusable omission on the part of the applicant as the proposed program is concerned with virgin ground and geological facts concerning this ground are not known.

The extenuating circumstances involved in this application have forced me to conclude that recommendation for approval or disapproval of this application is a decision which depends primarily on DMEA policy. With this in mind I have offered dual recommendations, one in favor of a counter exploration program, the other for denial of the entire program.

Reviewed by
DMEA OPERATING COMMITTEE
4-13-56
(date)

R. W. Osterstock

RWO/rs
cc: S. R. Wilson

RECEIVED
APR 9 - 1956

U. S. AND LARK MINE
U. S. SMELTING, REFINING, AND MINING COMPANY
SALT LAKE COUNTY, UTAH

TRANSMITTED
APR 4 1956

DMEA DOCKET 3993

Initial Geologic Report

By
R. W. Osterstock
U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE
4-13-56
(date)

TABLE OF CONTENTS

Index	Page
Introduction	1
Location and accessibility	1
History and production	2
Geology	5
Ore Deposits	7
Ore Reserves	10
Proposed Exploration	10
Conclusions and Recommendations	13

List of illustrations

Figure 1 - Index map (attached to USBM report)
2 - Claim map (" " " ")
3 - Surface geologic map (attached to USBM report)
4 - 1000 level geologic map showing proposed work (attached to USBM report)
5 - Geologic section I through proposed project area
6 - Geologic section II through proposed project area

Introduction

The United States Smelting, Refining, and Mining Company submitted, on September 26, 1955, an application for government assistance in a $242,118.00 program, under DMEA Docket 3993, to explore for lead-zinc ores on a part of their property south of the Last Chance stock in Salt Lake County, Utah. The applicants have estimated that the project area may contain 210,000 tons of ore averaging from 15 to 17 percent combined lead and zinc.

A field examination of the property, requested by the DMEA Operating Committee, was conducted on December 2, 1955 by R. W. Osterstock (USGS) and M. H. Howes (USBM). The applicant was represented by Messrs. C. L. Thornburg and Clarence Bingham, USSR company geologists. An earlier surface examination was conducted on May 11, 1954 by Osterstock and Tillman (USGS) and Howes (USBM) relative to another DMEA project (Docket 2028, Item III amended). Structural features in evidence at the surface are common to both the old and the new dockets.

Much of the basis for the present application is drawn from the historical production data relating to various ore-carrying beds and fissures in the district. This data, as compiled by company geologists, must be accepted by the DMEA field examiners inasmuch as most of the old workings are no longer accessible.

Location and accessibility

The project area includes all or parts of forty seven claims which make up only a small part of the 5,739 acres of patented and unpatented ground generally referred to as the U. S. and Lark Mine area. The forty seven claims, or portions thereof, subordinated to the present DMEA application are situate in Sections 3, 4, 9, and 10, T. 4 S., R. 3 W. in the West Mountain Mining District, Salt Lake County, Utah (see figs. 1 & 2).

The property lies on the east flank of the Oquirrh Range, approximately 30 miles southwest of Salt Lake City, Utah. The area is easily accessible by paved highways which terminate at the portal of the Mascotte tunnel at Lark, Utah. This surface opening at an altitude of about 5,500 feet is intended to service the proposed exploration work. The surface of the project area may be reached by jeep over a circuitous route through Bingham Canyon or by foot from the south or Butterfield Canyon side.

Inasmuch as the entire operation is intended to take place underground at the 1,000 U. S. level (or Bingham Tunnel level) there is no possibility of its being hampered by inclement weather. Earlier attempts to explore from the surface in the project area are attested to by the many shallow workings which are still visible. This type of operation was impeded by the inaccessibility of the surface as well as the severe winter snows whose slow melting left only a short working season.

History and production

Lead-zinc mining operations began in the Bingham district in the 1860's with the location of the old Jordan claim. Since the 1870's production has been almost continuous. Although the district is recognized as one of the copper centers of the world, the peripheral lead-zinc belt has accounted for a substantial part of the lead-zinc production of the nation for many years. The applicants report a total lead-zinc ore production of about 16,000,000 tons from all of the mines in the district; more than three quarters of this tonnage has come from properties now owned by the applicants. Company property, generally referred to as the U. S. and Lark mine, includes 5,739 acres which flank the Bingham copper pit on the north, east, and south.

Production from the U. S. and Lark mine for the years 1951 - 1954 is as follows:

	Dry tons shipped	Gold Oz.	Silver Oz.	Copper %	Lead %	Zinc %
1951	330,108	.044	4.283	.390	7.995	6.495
1952	371,964	.044	4.574	.450	8.765	6.760
1953	326,749	.041	4.255	.435	8.800	7.290
1954	307,435	.040	4.609	.435	9.410	7.815

A somewhat more detailed production breakdown furnished by Clarence Bingham, company geologist, reveals that the "B" and "D" limestones, with which the present application is concerned, in the area north of the Last Chance stock, have produced as follows:

"B" limestone - 1.2 - 1.5 million tons; .05 oz. Au, 4½ oz. Ag., 15-20 percent combined Pb-Zn.
"D" limestone - 1.1± million tons; .05 oz. Au, 4½ oz. Ag, 17-22 percent combined Pb-Zn.

The Last Chance fissure, along which the proposed exploration is to take place, in its mineable portions on the Galena 400 level, carried the following metal content over an average width of 4.1 feet: 0.17 oz. Au, 5.1 oz. Ag, 0.15 percent Cu, 3.7 percent Pb and 5.6 percent Zn.

Extensive workings have developed the lead-zinc belt immediately surrounding the Bingham copper stock but exploration to the south of the related Last Chance stock has been restricted in a general way to the northeast trending mineralized fissures.

Other DMEA projects in the district have been designed to determine the ore potential of the same and similar objectives as those offered in the present application. Under docket 2028, with the present applicants, three items were as follows:

Item I - 1,292 feet of drifting and 1,678 feet of diamond drilling explored the "B" limestone in the sedimentary interval separating the Bingham stock on the north and the Last Chance stock on the south. This work exposed no mineralization of consequence.

Item II - From the 2433 crosscut, 1,637 feet of drifting exposed the "B" limestone in the sedimentary interval separating the Bingham stock on the north and the Last Chance stock on the south. This work exposed no mineralization of consequence.

Item III - 2,130 feet of work allotted for this item was intended to explore the northeast trending Holden, Last Chance Galena and Gem fissures in the sediments immediately south of the Last Chance stock. The work was to have been performed on the Niagara 1600 level (600 feet below the level of the Bingham tunnel on which the present exploration is proposed). This item had much in common with the present application with the exception that it was intended to explore only for fissure type ore bodies whereas the present proposals anticipate the discovery of bedded ore making out from the fissures. The item was not activated because of water conditions which the operator was not equipped to handle.

Item III - (amended) About 2,500 feet of work in the Spiritualist area explored for fissure ore about 1,800 feet vertically above the presently proposed exploration program. This exploration took place considerably higher in the stratigraphic section and is not therefore directly related to the present exploration proposals, although the areas do have common sidelines. Some ore was discovered by the amended Item III work. On the Rough Wrestler(?) fissure an ore zone about 120 feet long and up to 4 feet wide is reported to assay 0.03 oz. Au, 46.6 oz. Ag, 0.51 percent Cu, 6.6 percent Pb and 4.8 percent Zn.

Under Docket 1098 with the Combined Metals Reduction Company an exploration project was set up to explore for bedded ore along the "F" limestone as well as for fissure ore where this bedding unit is intersected by the Rough Wrestler fissure. The latter target has not yet been intersected but 3,196 feet of work along the "F" limestone has disclosed no

mineralization of significance. This work took place at the Butterfield tunnel level about 450 feet above the Bingham tunnel level along which the present exploration is proposed.

Under Docket 3474 with the present applicants a search is currently being conducted for both bedded and fissure type ore deposits to the north of the Bingham stock. Too little of this project has been completed to permit a firm statement regarding the ore potential of this area.

GEOLOGY

The Bingham district is underlain by interbedded limestone and quartzite of Pennsylvanian age and by intrusive bodies which range in composition from diorite to quartz monzonite. Tertiary andesite flows mantle portions of the northeastern part of the district.

The sedimentary rocks are a part of the Pennsylvanian Oquirrh formation which is about 15,000 feet thick. Although the formation is predominantly quartzitic there are interbedded limestone members up to 150 feet thick and as the formation is traced southward from the Bingham stock area there are progressively more and thicker limestone beds and less quartzite and an attendent thinning of the entire section.

The ore deposits appear to be genetically related to the intrusive rocks which occur as irregular stocklike bodies and as dikes and sills. The major intrusive bodies in the district are the Bingham (Utah porphyry copper) stock, noted for its disseminated copper content, and the Last Chance stock, noted for its associated lead-zinc-silver deposits. These intrusives range in composition from quartz monzonite in the Bingham stock to the dioritic rock of the Last Chance stock.

Structurally, the district is one of persistent, broad, open flexures upon which are superimposed smaller less persistent parallel folds and cross folds. The major fold in the district is a large syncline whose irregular northwesterly striking and plunging axis lies to the west of the project area. A prominent zone of northeasterly trending fissures, generally with steep dips, has accounted for a considerable portion of the production from the U. S. section of the U. S. and Lark mine. These fissures, which include the Last Chance, Holden, Galena, Gem, Aetna, Royal, and Wide West, in a few instances have been traced southwesterly through the Last Chance stock into the sediments.

The proposed project area except for a small northern salient lies entirely to the south of the Last Chance stock as it is delineated at the surface. Underground evidence indicates that the south wall of this intrusive mass is nearly vertical although some local irregularities and off shoots may be expected.

Two stratigraphic units are mapped at the surface within the confines of the project boundaries. These are Yampa and the Highland Boy limestones which have been productive in the central part of the district. Within the project area these units are known by their correlative names, the Commercial and Jordan limestones. Underlying these beds are the Intermediate and Alphabetical series of limestones which have accounted for the major part of the production in the central part of the district to the north of the Last Chance stock. The beds have a general northeasterly strike and gentle northwesterly dip.

Control for the projection of the "B" and "D" target beds to the level of the proposed exploration project is gained principally from a study of the attitude of the stratigraphically higher Commercial and Jordan limestones exposed at the surface in conjunction with the known stratigraphic interval separating these beds from the target beds. Substantiating evidence is provided by the Butterfield tunnel work (DMEA 1098) which has explored the "F" limestone only about 1,000 feet east of the presently proposed project area.

ORE DEPOSITS

The ore deposits in the Bingham district are of several types; veins, bedded replacements and disseminations. The latter type is predominantly the "porphyry-copper" confined to the Bingham stock. The veins and bedded replacements are predominantly the lead-zinc-silver ores which form a roughly peripheral zone around the central copper-bearing Bingham stock. The Last Chance stock, which falls within the lead-zinc peripheral zone, is often considered as a separate center of mineralization with respect to the lead-zinc deposits.

The most extensive lead-zinc ore bodies have been formed in receptive calcareous bedding horizons and are often further locallized by a bedding fault near the footwall of the limy member. These deposits have been found to be best developed in the zone between the Bingham stock on the north and the Last Chance stock on the south.

The vein deposits or fissure ore bodies generally strike northeast and increase in importance in proximity to the Last Chance stock, some of the fissures in fact have carried considerable ore in the stock itself. The fissures are roughly 300-500 feet apart and dip steeply westward

and eastward. The applicants report that much of the ore mined in the U. S. section of the mine has come from steeply dipping shoots on bedding structures north of the Last Chance stock, and that this type of deposit is notably exemplified by the ore bodies in the "B" and "D" limestones.

The several fissures which have been traced on the surface in the project area are characterized by silicified iron and manganese stained alteration zones. Company samples taken across several of the alteration zones exposed on the north slope of Butterfield Canyon have assayed from 5 to 30 oz. of silver per ton and up to 18 percent manganese. Lessees are reported to have made two shipments of gossan-type ore but there is no information available as to the metal content of these shipments. The Aetna prospect is reported by the applicants to show lenses of high grade lead carbonate ore along a prominent northeast fissure.

The projection distance is too great to provide for precise location of the fissures exposed at the surface to the level of the proposed exploration program, although one fissure, the Wide West, is shown both on the surface and underground maps (see figs. 3 & 4). The principal fissures which are intended to be intersected by the proposed exploration are the Last Chance, along which the initial work is to take place, and the Holden and Niagara which are expected in the easterly drifts proposed along both the "B" and "D" limestones.

The applicants have estimated that the area to be explored may contain ore bodies totalling 210,000 tons. The target limestone beds on the north of the Last Chance stock have contained ore shoots which measured thousands of feet in dip dimension. The applicant's method of calculation of the ore potential of the project area is as follows:

The "B" limestone footwall is proposed for exploration over a horizontal (strike) distance of 1,600-1,700 feet. The eastern 500 feet of this distance will be in the Last Chance-Holden-Niagara fissure zone. In the productive area north of the stock where the limestone beds are intersected by a series of fissures such as these, the strike length of ore deposition is far greater than the factor of 300 feet which is used here.

$$\frac{300 \text{ feet (length)} \times 500 \text{ feet (dip dimension)} \times 6 \text{ feet (normal width}}{10} = 90{,}000 \text{ tons}$$

West of the zone of the three main fissures referred to above, the "B" limestone is intersected by the Wide West fissure which, at the surface, is identified with ore and gossan in the Jordan limestone. This intersection may be considered relatively one-third of that which is assumed for the main fissure zone.

"B" limestone west of main zone = 30,000 tons.

The "D" limestone structure has a similar possibility to the "B", geological conditions being the same.

"D" limestone in main fissure zone = 90,000 tons.

The applicants have further estimated that the grade of ore which may be expected will range from 15-17 percent combined lead and zinc.

The primary ore minerals which may be expected in the project area are: galena, sphalerite (marmatitic variety), and pyrite, with lesser quantities of chalcopyrite, and possibly some tetrahedrite. Some manganese bearing mineral, possibly manganosiderite, may also be expected. Gold, which is sparsely but uniformly distributed in the sulfides is most closely associated with pyrite. Gangue minerals will probably be quartz, calcite, and unreplaced remnants of host rock.

ORE RESERVES

The applicant's estimate of 210,000 tons of 15-17 percent combined lead-zinc ore in the project area serves to illustrate the ore potential of the geologic targets offered in the exploration proposals. Inasmuch as the objectives are in what amounts to completely virgin ground, many assumptions have been made in order to provide the estimate. It is the writer's opinion that the estimate, based as it is on assumptions and intangible evidence, should not be considered a reserve figure even of the inferred classification.

Let it suffice to say that the target beds and fissures, with favorable geologic conditions, may contain substantial amounts of ore mineralization.

PROPOSED EXPLORATION

The applicants have proposed an exploration program on the "B" and "D" limestone beds south of the Last Chance stock where these strata are intersected by northeast trending fissure zones. The entire program is based on projected geological features consequently the specific distances to various objectives are to be regarded as approximate.

The work proposed by the applicants is as follows:

1. Drive southwesterly in the zone of the Last Chance fissure an approximate distance of 950 feet or to the footwall of the "B" limestone. Short diamond drill holes from systematically spaced stub crosscuts may be advisable to cut the main Last Chance fissure, one of the chief productive fissures of the U. S. section of the mine.

2. Drive northeast about 500 feet and southeast about 1,200 feet on the "B" limestone footwall bedding. From systematically spaced diamond drill bases, drill the "B" limestone roughly fan-wise as shown on the plan map (see fig. 4).

3. From near the start of the "B" limestone drift, drive southerly about 1,600 feet to the "D" limestone footwall.

4. Drive northeasterly and southwesterly an approximate total distance of 700 feet on one or more structures in the "D" limestone, presumably near the footwall.

5. The project will require approximately 9,000 feet of diamond drilling to be carried out in conjunction with the above exploration work. The individual holes cannot be planned before a substantial part of the drifting has been done but the general plan of the proposed drilling will be in part as illustrated on the accompanying plan map (see fig. 4).

The total cost of this exploration program is $242,118.00.

At the time of the field examination of the area concerned with this application it became immediately apparent that the primary targets were the "B" and "D" limestones where intersected by the Last Chance, Holden and Niagara fissures. The subordinate targets are, therefore, the "B" and "D" limestone where intersected by the Wide West fissure zone as well as the lateral exploration along the beds between the projected fissure zones and the initial exploration along the Last Chance fissure zone.

A brief discussion with the company geologist, C. L. Thornburg, has indicated that staging of the exploration program might be in order. Therefore, the following counter proposal is offered by the examining DMEA Field geologist.

Stage 1 -

Phase 1. Drive southwesterly in the zone of the Last Chance fissure to the footwall of the "B" limestone. This distance is suggested by the applicant to be about 950 feet. Inasmuch as the location of the "B" limestone is based on long projections, this initial work perhaps should be given a maximum rather than a specified footage. A reasonable tolerance will be provided if a maximum footage of 1,200 feet is allowed for this phase.

Phase 2. Drive northeasterly and southwesterly on the "B" footwall bedding a sufficient distance to adequately

explore the entire Last Chance-Holden-Niagara fissure zone intersections with this bedding. This distance is suggested by the applicants as being approximately 500 feet. Again, it would appear judicious to provide a maximum footage for this phase inasmuch as the exact positions of the fissure intersections are not known. A reasonable tolerance will be provided if a maximum footage of 1,000 feet is allowed for this phase.

Phase 3. In conjunction with phases 1 and 2, 1,500 of diamond drilling may be accomplished for extralateral ore search and to assist in guiding the work. The individual drill holes to be positioned by the applicant as the occasion demands.

Stage II — To be pursued only in the event that the exploration attempts of Stage I indicate that additional exploration is in order. This stage to be accomplished only with prior written approval of the government.

Phase 1. Drift southwesterly along the "B" limestone footwall bedding to its intersection with the Wide West fissure zone utilizing the footage remaining from Stage I, phases 1 and 2, plus whatever is necessary to reach a maximum footage expended of 2,650 feet under Stages I and II. Diamond drilling in the amount of 3,500 feet may be utilized in conjunction with this phase. The individual drill holes to be positioned by the applicant as the occasion demands.

Stage III - To be pursued only in the event that the results of both Stages I and II are sufficiently encouraging as to indicate that additional exploration is in order.

Phase 1. Drive southerly about 1,600 feet along the Last Chance fissure zone to the "D" limestone footwall bedding.

Phase 2. Drive northeasterly and southwesterly an approximated distance of 700 feet on one or more structures in the "D" limestone, presumably near the footwall.

Phase 3. In conjunction with Stage III, 4,500 feet of diamond drilling may be utilized to assist in guiding the work and searching for ore away from the workings.

The total work to be accomplished under the counter proposal is not to exceed the applicant's original estimate of 4,950 feet of drifting and 9,000 feet of diamond drilling (with the construction of 4 drill stations) or the original total estimated cost of $242,118.00.

CONCLUSIONS AND RECOMMENDATIONS

The exploration program proposed by the applicants in the "Alphabetical" series of limestone beds south of the Last Chance stock is based almost entirely on the past production of these beds and a belt of productive northeasterly striking fissures in the main U. S. and Lark mine workings north of the stock. The "B" and "D" limestone beds, within which the proposed exploration is to take place, in other parts of the mine have produced about 2 1/2 million tons of ore which contained more than 15 percent combined lead and zinc, .05 oz. Au, and 4½ oz. Ag. The Last Chance and Holden fissures in 1951 produced ore containing .159 oz. Au, 7.89 oz. Ag, .597 percent Cu, 8.82 percent Pb, and 9.12 percent Zn over an average vein width of 5.44 feet.

That these or related fissures extend into the project area is indicated by the several mineralized fissures exposed at the surface. Control for projection of the northeasterly striking fissures into the project area is gained from their underground exposures both north of and in the Last Chance stock. Control for the location of the objective "B" and "D" beds is gained from the known stratigraphic interval separating these horizons from the Jordan limestone exposed at the surface. Additional control for the location of the beds at the level of the proposed exploration is provided by the location and exploration of the underlying "F" limestone in the adjacent Butterfield property. Some doubt is cast on the location of the target beds in the project area inasmuch as the entire stratigraphic section is known to be thinning to the south in the direction of the proposed exploration work, consequently the stratigraphic interval between the surface-exposed Jordan limestone and the "B" and "D" limestones may be considerably changed thus changing the position of the target beds in the project area.

There is evidence of some ore mineralization in the target area where some of the related northeasterly striking fissures (Aetna, Royal and Wide West) show manganese and iron stain and silicification where they intersect the Jordan limestone. Whether this evidence may be interpreted to indicate mineralization at depth along similar fissures is highly conjectural.

In a discussion of the ore potential of the project no reliable figure may be given as a reserve estimate because of the many intangible factors involved. The applicants have estimated that, geologic conditions being favorable, the block may contain 210,000 tons of 15-17 percent combined lead and zinc. It is true that the target area is sufficiently large to contain important tonnages, easily large enough to satisfy the DMEA "significant contribution to the nation's reserve" requirement.

Because of the extenuating circumstances involved in this application for government assistance, dual recommendations are tendered herewith:

1. The project area is believed to contain, based on long projections from other workings and from the surface, both fissures and beds which have been highly productive in other parts of the district. The ore capacity of these targets, as established by past production records, is easily large enough to provide a significant contribution to the nation's metals reserve. Unfortunately firm evidence of the many requisite features which are needed to form ore bodies of such size is generally lacking.

Thus the applicant's proposed exploration program must be considered from the point of view of DMEA policy. The theorizing behind the applicant's proposals appears to be sound but without factual data as regards the immediate targets. If DMEA's policy is such that it can grant assistance in the exploration for large ore bodies with little more than the production records of other areas in support of the application, it is recommended that the counter proposal as contained in this report be approved.

In the event that the above recommendation for approval is acted upon, it is further recommended that the upper vertical limit which excludes ground shallower than 200 feet vertically below bedrock, be removed. This action would appear to be called for inasmuch as mineralized fissure zones exposed at the surface in the project area are considered by the applicants as evidence of mineralization at depth. It is therefore logical to conclude that the fissures are expected to carry mineralization in the interval between the surface and the level of the proposed exploration.

2. The bulk of the geologic reasoning in support of the application is conjectural. This is not a shortcoming of the applicant, the truly critical information which might support the application is not in existence. In this sense, then the program as proposed by the applicants may justiably be regarded as a methodical prospecting venture. Additional damning evidence lies in the statistical analysis of other DMEA projects aimed at targets similar to those considered in the present application. Three projects -- DMEA 1098, 2028, and 2653 -- are essentially complete. The total cost of these ventures has been approximately $885,880.00. Only one relatively small ore body has been discovered as a result of this work (Rough Wrestler fissure ore in Spiritualist tunnel, DMEA 2028, Item III amended). To date, DMEA activities in the district may hardly be regarded as successful. A fourth project, DMEA 3474, has only recently been started and is not yet subject to evaluation, the estimated total cost of this latter project is $301,930.00.

Thus if it is DMEA's policy to regard programs, such as proposed by the applicant, as prospecting ventures then I have no recourse but to recommend denial of this application for assistance.

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

Truswold
Betty

224 New Customhouse
Denver 2, Colorado

April 4, 1956

RECEIVED
APR 9 - 1956

Memorandum

To: Secretary to the Operating Committee, DMEA

From: Field Team, Region III

Subject: Report of Examination, Docket DMEA-3993 (Lead-Zinc) U. S. Smelting, Refining, and Mining Company, (U. S. and Lark mine), Salt Lake County, Utah

Enclosed are the original and three copies of a geologic and engineering report on the subject docket.

The engineer examiner recommends that the application be approved. The geologist examiner suggests that the proposed work may be a methodical prospecting venture in virgin ground.

Although we feel that this project borders on prospecting, we believe there is enough ore potential to justify a program outlined in stages as shown in the geological report using cost estimates in the engineering report. For reasons given in the engineering report, we recommend a new contract contingent upon the applicant driving, at his expense, to the northeast boundary line of the project area as shown on Figure 4 of the engineering report. We also recommend subordination of all ground without vertical limits. The equipment to be used in this project has been well maintained, and it appears to be just to allow depreciation of this used equipment. It is reasonably expected that the proposed exploratory work will develop as much as 1,000 gallons of water per minute which must be discharged through the Bingham Tunnel flume, and it is recommended that the cost of flume enlargement be allowed.

Reviewed by
DMEA OPERATING COMMITTEE
4/13/56
(date)

W. M. Traver
W. M. Traver

E. N. Harshman
E. N. Harshman

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

DMEA
Date Rec'd.
MAR 26 1956

RECEIVED
APR 9 - 1956
BUREAU OF MINES
Denver, Colo.

TRANSMITTED
APR 9 1956

March 22, 1956

Memorandum

To: V. E. Ingner, Executive Officer, DMEA Field Team, Region III

From: Stephen R. Wilson

Subject: Docket No. DMEA-[illegible] (Lead-Zinc), United States Smelting, Refining and Mining Co., E. S. and Lark mine, Salt Lake County, Utah

Attached are the original and eight copies of an engineering report prepared by H. H. Hoover. The report covers examination of the property of United States Smelting, Refining and Mining Co. for approval of a request for assistance under docket No. DMEA-[illegible]. The brochure and a separate section, Summary, Conclusions and Recommendations, will be transmitted with the geologic report prepared by R. W. Sutcebeck. Nine sets of maps to accompany the engineering report have been mailed under separate cover. Ten prints each of figures 2, 3 and 4 for possible use in a proposed contract also have been mailed under separate cover.

The applicant has requested a loan of $[illegible],110 to conduct a project consisting of 4,[illegible] feet of drifting and crosscutting and 3,[illegible] feet of diamond drilling. The area to be explored lies south of the Lark Chasse stock in the lower limestone of the Bingham series. The property was examined by H. H. Hoover and R. W. Sutcebeck December 3, 1955.

The inspecting engineer considers the proposed project area to have considerable merit because of the favorable limestone beds and important fissures that have been productive in other sections of the district. I am in accord with the engineer's recommendations that the applicant's request for Government assistance be approved.

Stephen R. Wilson
Stephen R. Wilson

Enclosures

cc: J. F. Shea
J. R. Clemmer

Reviewed by
DMEA OPERATING COMMITTEE

(date)

RECEIVED
APR 9 1956
TRANSMITTED
APR 4 1956

UNITED STATES SMELTING, REFINING AND MINING CO.
U. S. AND LARK MINE
SALT LAKE COUNTY, UTAH
DMEA-3063
Lead-Zinc

Engineering Report

By M. E. Moran
Mining Engineer
Bureau of Mines

Reviewed by
DMEA OPERATING COMMITTEE

(date)

RECEIVED
APR 9 - 1962

UNITED STATES SMELTING, REFINING AND MINING CO.
U. S. AND LAKE MINE
SALT LAKE COUNTY, UTAH

CONTENTS

	Page
Engineering report	
Introduction	2
Location, topography and physical features	2
History and production	3
Ownership and outlook	4
General geology	10
Minable ore reserves	11
Present status	11
Project prospects	13
Estimated costs of project prospects	14
Proposed financing	15
Conclusions and recommendations	15

ILLUSTRATIONS

Fig. 1 Location map, United States Smelting, Refining and Mining Co., Salt Lake County, Utah
Fig. 2 Claim map showing boundaries of proposed project area
Fig. 3 Map of surface
Fig. 4 Map of 1000 level, showing proposed exploratory work

INTRODUCTION

An application dated September 7, 1955, for Government aid in an exploration project under docket No. DMEA-3983, was submitted by the United States Smelting, Refining and Mining Co. The proposed program consists of 4,980 feet of drifting and crosscutting and 9,000 feet of diamond drilling to explore for lead-zinc ores south of the Last Chance stock in the lower limestones of the Bingham series. The total estimated cost of the project is $342,118.

A field examination of the property was made December 2, 1955, by R. W. Osterstock, Geological Survey, and M. H. Howes, Bureau of Mines, to determine the feasibility of the proposed exploratory work, and to appraise the estimated costs and the engineering aspects of the job. The field examiners were accompanied on the trip by C. L. Thornburg and Clarence Bingham, representatives of the company.

LOCATION, TOPOGRAPHY AND PHYSICAL FEATURES

The U. S. and Lark mine lies on the east slope of the Oquirrh Range, in the Bingham area of the West Mountain mining district, Salt Lake County, Utah, approximately 28 miles southwest of Salt Lake City (fig. 1). The property rises from an elevation of about 4,530 feet above sea level at the portal of the Bingham Tunnel at Lark to more than 7,900 feet at the ridge over the Niagara No. 2 shaft.

HISTORY AND PRODUCTION

The United States Mining Co., organized in 1899, was reorganized in 1906 and named United States Smelting, Refining and Mining Co.

Three groups of claims were originally acquired in the Bingham area, the Jordan and Galena group, the Spanish group and the Telegraph group. Later the company's holdings were expanded to include 5,720 acres of mineral ground fanning out to the north, east and south of Kennecott's Utah Copper mine.

The Bingham district is one of the major mining camps of the world. Although it is particularly famous for its copper production from the Utah Copper mine, it is also one of the country's important sources of lead and zinc. More than 12,000,000 tons of lead-zinc ores have been produced from properties now owned by the U. S. and Lark mine of the United States Smelting, Refining and Mining Co. Production has been practically continuous since 1872. Production and grade of ores from the U. S. and Lark mine for the period 1951 through 1954 follow:

Year	Dry Tons Shipped	Ounces Au	Ounces Ag	Percent Cu	Percent Pb	Percent Zn
1951	330,100	.044	4.[illegible]	.[illegible]	7.[illegible]	6.[illegible]
1952	371,044	.044	4.374	.420	5.705	6.700
1953	320,700	.041	4.[illegible]	.420	5.[illegible]	7.[illegible]
1954	307,[illegible]	.040	4.[illegible]	.[illegible]	9.410	7.015

Current production of the mine is approximately 1,300 tons of ores per day, plus an average of about 120 tons of ores per day from lessees operations.

OWNERSHIP AND EXTENT

The U. S. and Lark mine, consisting of 8,720 acres of patented and unpatented mining claims, and including many well-known old operations, such as Old Jordan, Last Chance, Commercial, Galena, Kingston, Telegraph, Niagara, Brooklyn, Tecumseh, Lead King, Bulwer and Lark, Bingham Prospect, Mayflower, Tiewaukee, and Winamuck, is owned by United States Smelting, Refining and Mining Co. There are no claims, liens, or encumbrances against the property.

The real property comprising the project area includes all or portions of patented and unpatented lode mining claims situated in Sections 3, 4, 9 and 10, T. 4 S., R. 2 W., S.L.B. and M., in West Mountain mining district, Salt Lake County, Utah, as shown on figure 2, and listed as follows:

Claims Owned (patented, unless otherwise indicated)	U.S. Lot No. or U.S. Survey No.
Aetna Amd.	7629
Aladin	68
Albion	70
Alnoka	73
Armand	[illegible]
Austin	[illegible]
Austin Bay	436
Blizzard	6578
Blizzard Extension	6579
Boston	[illegible]
Bunco	3421

Claims Owned (patented, unless otherwise indicated)	U.S. Lot No. or U.S. Survey No.
Comfort	3487
Comfort Fraction	6078
Good Thing	4482
Discretion	6971
Retreat	[illegible]
Sandy Fraction (unpatented)	7117
Difficult Add.	7033
Hard Add.	7028
Experiment	5319
Fair	[illegible]
First Chance	135
G. H. Add.	7016
Hard Job Add.	7028
I Don't Care	[illegible]
Indiana	3770
Josie H.	[illegible]
Klondike No. One	[illegible]
Lilly	[illegible]
Michigan	[illegible]
Michigan Fraction	6377
Mignon	[illegible]
Morton	3040
Old Bull	76

Claims Named (patented, unless otherwise indicated)	U.S. Lot No. or U.S. Survey No.
Orphan	77
Patience	6271
Percival	6274
Rip Van Winkle	3272
Royal	75
Royal Queen	4255
Scotia	3728
Silver Amd.	7229
Stag	3272
Stella Amd.	7229
Wide West	200
Henrietta	85
Red Cloud	148

Government tie: The point of beginning is corner No. 4 of the Midnight Bell No. 1 lode mining claim, U. S. Survey No. 3222, whence the quarter corner between Sections 2 and 10, T. 4 S., R. 3 W., S.L.B. and M., bears S. 88° 30' W., 813 feet, more or less.

The interior limits of the property included in this project are as follows:

Beginning at said corner No. 4 of said Midnight Bell No. 1 lode mining claim, U. S. Survey No. 3222, and running thence along line 4-3 of said claim S. 38° 45' E., 135.3 feet, more or less, to intersect the section line between said Sections 2 and 10;

thence along said section line S. 89° 49' W., 518.6 feet, more or less, to the said quarter corner between said Sections 3 and 10;

Thence along the east line of the northwest quarter of said Section 10 S. 0° 01' W., 1,318.2 feet, more or less, to intersect the north line of the south half of the said northwest quarter of Section 10;

thence, in part, along said north line of the south half of said northwest quarter, N. 89° 59' 30" W., 3,327.7 feet, more or less, to intersect line 4-8 of the Hilmand Fraction lode mining claim, U. S. Survey No. 6276;

thence along line 4-8 of said Hilmand Fraction lode mining claim N. 0° 35' W., 706 feet, more or less, to corner No. 3 of said claim, identical with corner No. 3 of the Rosie lode mining claim, U. S. Survey No. 5426;

thence along line 3-2 of said Rosie lode mining claim N. 53° 10' W., 500 feet, more or less, to corner No. 2 of the Fred C. lode mining claim, U. S. Survey No. 5426;

thence along line 2-3 of said Fred C. lode mining claim N. 30° 00' E., 1,422.4 feet, to corner No. 3 of said claim;

thence along line 3-4 of said claim N. 59° 15' W., 425 feet, more or less, to intersect line 5-2 of the Silver Chief No. 2 lode mining claim, U. S. Survey No. 4555;

thence along said line 5-2 N. 56° 10' E., 351.4 feet, more or less, to corner No. 2 of said Silver Chief No. 2 lode mining claim, identical

with corner No. 3 of Silver Chief No. 1 lode mining claim, U. S. Survey No. [illegible];

thence along line 3-4 of said Silver Chief No. 1 lode mining claim N. 25° 54' E., 208.2 feet, more or less, to intersect line 5-1 of the Armand lode mining claim, U. S. Survey No. [illegible];

thence along said line 6-1 of said Armand lode mining claim, N. 7° 29' E., 209.3 feet, more or less, to corner No. 1 of said claim, situated on line 3-4 of the Michigan lode mining claim, U. S. Survey No. [illegible];

thence along said line 3-4 of said Michigan lode mining claim N. 52° 50' W., 130.1 feet, more or less, to corner No. 4 of said claim;

thence along line 4-1 of said claim N. 69° 33' E., 118.7 feet, more or less, to corner No. 3 of the Detroit lode mining claim, U. S. Survey No. [illegible];

thence along line 3-4 of said Detroit lode mining claim N. 42° 30' W., 150 feet;

thence N. 50° 00' E., 2,454.9 feet;

thence N. 57° 00' E., 1,[illegible].0 feet;

thence S. 72° 00' E., 700 feet;

thence S. 20° 00' W., 400 feet;

thence S. 72° 00' E., 345.8 feet, more or less, to intersect line 10-11 of the Sunbin lode mining claim, U. S. Survey No. [illegible], said line being also part of the westerly boundary line of Tract XII of Contract No. [illegible], Contract No. [illegible], as modified by Amendment No. 4, dated July 8, 1954;

thence along said line 10-11 of said Sextin lode mining claim, and, in part, along said westerly boundary line of said HRDA project, S. 20° 48' W., 782.5 feet, more or less, to intersect line 2-3 of the Silver Star lode mining claim, U. S. Survey No. 4138;

thence along said line 2-3 of said Silver Star lode mining claim S. 9° 51' E., 521.9 feet, more or less, to corner No. 3 of said claim;

thence along line 3-4 of said claim, identical, in part, with line 2-3 of the G. H. Amended lode mining claim, U. S. Survey No. 7010, N. 89° 09' E., 422.9 feet, more or less, to corner No. 3 of said G. H. Amended lode mining claim;

thence along line 3-4 of said claim South, 523.8 feet, more or less, to intersect line 3-4 of said Midnight Bell No. 1 lode mining claim, U. S. Survey No. 5000;

thence along said line 3-4 of said Midnight Bell No. 1 lode mining claim N. 36° 51' W., 711.3 feet, more or less, to corner No. 4 of said claim, the point of beginning.

The <u>vertical limits</u> of the property included in this project are as follows:

The upper vertical limit of the project is 500 feet vertically below bedrock. There is no lower vertical limit.

One unpatented claim included in the proposed project area is entered in the records of the Salt Lake County Recorder at Salt Lake City, Utah, as follows:

Name of Claim	Book	Page
Sandy Fractions	K	207.

GENERAL GEOLOGY

The proposed exploratory block lies almost entirely south of the Last Chance stock, in an area of extensively fissured Pennsylvanian limestones and quartzites. The Commercial and Jordan limestones, correlated respectively as the Yampa and Highland Bay limestones (famous for their production in the Bingham district) outcrop in the project area. Limestone beds, which have been highly productive north of the Last Chance stock, occur below the Commercial and Jordan limestones in this area in similar stratigraphic positions to those occupied by the beds north of the stock. In the project area the beds strike northeasterly and dip northwesterly (figs. 3 and 4).

A wide belt of prominent and persistent northeasterly striking fissures extends southwesterly into the proposed exploration block from the W. R. Section of the U. S. and Lark mine. An important part of the production from the W. R. Section has come from these fissures, both within and north of the Last Chance stock, as fissure deposits and as steeply dipping sheets of ore on bedding structures, and particularly those associated with the "G" and "H" limestones.

The proposed project includes a plan to drive south of the Last Chance stock on the Bingham Tunnel level to explore, within a prominent fissure zone, the series of limestone beds which have been productive north of the Last Chance stock.

MINABLE ORE RESERVES

The applicant reports an estimated minable reserve of 320,000 tons of ores containing 15 to 17 percent combined lead and zinc.

PROPOSED STUDY

The proposed exploratory project will be conducted from a drift driven northwesterly from the No. 3 shaft on the Bingham Tunnel level (U. S. Section 1000 level).

The existing usable facilities, equipment, buildings, and structures, owned by the company, that will be devoted entirely or in part to the exploration work, consist of the following:

All of the surface facilities of the U. S. and Lead mine, which include:

Machine and electrical shops and equipment

Blacksmith and steel shops and equipment

Framing mill and equipment

General offices

Warehouses

Engineering and geological offices

Rock drills, mucking machines, jumbos, haulage locomotives, mine cars, pumps and hoisting equipment.

Minimum clearance of unimbered sections of drifts and crosscuts is 7-1/2 feet high and 6-1/2 feet wide, and of timbered sections is 7 feet high and 6 feet wide. Track gauge to be used on the proposed drifting will be 24 inches. Waste and ores from the project will be

dumped from 24-inch-gauge cars into chip pockets at the No. 2 shaft and then hoisted up the shaft to loading bins, from which 24-inch-gauge cars will transport it through the Bingham Tunnel to the surface. Diamond drill stations will be 12 feet long and drift size.

Ores discovered in the project area, after being mined and transported through the Bingham Tunnel to the Lark surface plant, will be shipped via standard-gauge railroad to the United States Smelting, Refining and Mining Co. mill at Midvale, Utah, a distance of approximately 18 miles.

Ample labor is available in the Salt Lake Valley area.

Materials, supplies, and equipment not now on hand at the mine can be readily obtained in Salt Lake City.

An adequate water supply is available from the mine workings.

Power is purchased from the Utah Power and Light Co., whose main generating plants for the area are known as Ghent, Hale, and Jordan. The power company has connecting lines with its generating plants in Utah and Idaho. Power is delivered to Bingham Canyon over three separate, 44,000-volt transmission lines designated as Ruebhen, Jordan Narrows No. 1, and Jordan Narrows No. 2. There are two Kaylor lines to the mine. It is estimated that the project will consume approximately 48,000 kw.-hr. per month at a cost of 1 cent per kw.-hr.

PROJECT PROPOSALS

The proposed exploratory work is described as follows:

1. Drive southwesterly on the Bingham Tunnel Level from the northeast boundary of the proposed project area in the zone of the Last Chance fissure approximately 500 feet to the footwall of the "B" limestone. Short diamond drill holes from systematically spaced stub crosscuts may be advisable to cut the main Last Chance fissure, one of the chief productive fissures of the U. S. Section of the mine.

2. Drive northeast about 500 feet and southwest about 1,000 feet on the "B" limestone footwall bedding. From systematically spaced diamond drill bases, drill the "B" limestone roughly fanwise as shown on figure 4.

3. From near the start of the "B" limestone drift, drive southerly about 1,000 feet to the "B" limestone footwall.

4. Drive northeasterly and southwesterly an approximate total distance of 700 feet on one or more structures in the "B" limestone, presumably near the footwall.

5. The project will require approximately 5,000 feet of diamond drilling to be carried out in conjunction with the above exploration work. The individual holes cannot be planned before a substantial part of the drifting has been done, but the general plan of the proposed drilling will be in part as illustrated on figure 4.

It is estimated that the proposed exploratory work will develop an increase of 1,000 gallons of underflow per minute. In order to

handle the anticipated increase of waterflow, it will be necessary to enlarge 8,000 feet of the present Bingham Tunnel frame.

It is considered necessary to excavate and construct four diamond drill stations to facilitate the proposed diamond drilling.

Summary of Proposed Work

Drifting	4,000 feet
Diamond drilling	2,000 feet
Diamond drill stations	4
Frame enlargement	8,000-foot length.

ESTIMATED COSTS OF PROJECT PROPOSALS

The application contains a detailed and complete set of estimated costs. These figures have been carefully studied and compared with actual costs of similar work in current company MMA projects. Since the basic costs are found to be fair and accurate, it is not considered necessary to tabulate all of the detailed costs in this report, but instead to summarize the estimated costs of the proposed project as follows:

	Drifting 4,000 Feet		Diamond Drilling 2,000 Feet	
	Total Cost	Cost per Foot	Total Cost	Cost per Foot
Labor	$55,120.00	$13.78	$15,220.00	$7.60
Supervision	5,027.00	1.26	1,310.00	.65
Materials and supplies	47,000.00	11.75	10,500.00	5.25
Power	6,107.00	1.53	2,000.00	.00
Operating equipment (depreciation)	12,000.00	3.00	1,000.00	.50
Equipment repairs	5,000.00	1.25	0.00	0.00
Blasting	14,000.00	3.50	0.00	0.00
Trucking to Bingham Tunnel	11,970.00	2.99	0.00	0.00
Hauling waste to surface	610.72	.15	0.00	0.00

	Drilling 4,000 feet		Diamond Drilling 2,000 feet	
	Total Cost	Cost per foot	Total Cost	Cost per foot
Engineer and geologist—	$ 1,200.00	$ .30	$ 240.00	$ .04
Sampling and analysis—	1,760.00	.44	880.00	.44
Accounting ————	200.00	.05	200.00	.05
	$[illegible]	$[illegible]	$[illegible]	$0.57

Summary of Estimated Costs

Drilling - 4,000 feet at $[illegible] per foot ————	$[illegible]
Diamond drilling - 2,000 feet at $0.57 per foot ————	[illegible]
Diamond drill stations - 4 at $[illegible] each ————	1,[illegible]
Plane enlargement - 5,000-foot length at $[illegible] per foot—	[illegible]
Total estimated cost of proposed project————	$[illegible]
Government participation at 50 percent ————	$[illegible]

PROPOSED FINANCING

The applicant is prepared to invest $[illegible] in the proposed exploratory project, which is 50 percent of the total estimated cost of $[illegible], in accordance with the regulations on Government participation, as stated in Section 7, RMRA Order 1, Amended.

CONCLUSIONS AND RECOMMENDATIONS

An attempt will herewith be made to answer satisfactorily the specific questions asked by the Washington RMRA representatives.

Mr. Frank E. Johnson requests that comments and recommendations be given on the following:

1. If a project is recommended, the desirability should be considered of combining the proposed project with one of the

previous projects of this operation by including it under an amendment to a previous contract.

2. The first part of the proposed work would not be through an area subject to the contract. As you know, all work under a MSHA project must be done in areas subject to the contract. If your report is favorable, you should endeavor to obtain the applicant's agreement to the inclusion of additional land covering all of the proposed work.

3. Depreciation of operator's equipment to be used on the proposed project is included in the cost. Has not most of this equipment already been depreciated 100 percent or more?

4. An item of cost covering enlargement of flume is also included. Is this item necessary for the exploration project? If enlargement of the flume is required, should the entire amount be charged to the exploration project?

Comments and recommendations on Mr. Johnson's questions are as follows:

1. Even though the present proposed project area is adjacent to the Item III area of Contract 14s-4304, the proposed exploratory work will be done in an entirely different series of limestone beds approximately 1,700 feet below the Item III workings. Since there is no relationship between the two exploratory target areas, it is recommended that a new contract be processed for the subject proposed project.

2. The target area is located principally south of the Last Chance stock. The applicant proposes to start the exploratory work, in which the Government will participate, at the north boundary of the project block as shown on figure 4. At present the applicant is driving a drift southerly toward the point of proposed starting. This drift is entirely within the Last Chance stock. The project block, as outlined in the application and described in this report, is believed to include all of the company's property necessary to adequately explore the proposed target area, and that the block is of ample size to contain ore bodies more than sufficient to repay the Government loan. It is therefore recommended that the outline of the proposed block be unchanged.

3. Most of the equipment used by the applicant on the proposed project is not new, but it is maintained in first-class operating condition. It is believed that a fair depreciated value for each used piece of equipment has been established. Since the equipment does have value and a probable life of more than 5 years, the depreciation period of 5 years or 60 months, as set up in the application, appears to be just. It is recommended that the depreciation of used equipment be allowed.

4. The capacity of the Bingham Tunnel flume has been practically reached. Any appreciable increase of water will necessitate the enlargement of the flume. It is reasonably expected

that the proposed exploratory work will develop as much as 1,000 gallons of water per minute, which must be discharged through the Bingham Tunnel flume. If such is the case, it is recommended that the cost of flume enlargement, as listed in the cost estimate, be allowed.

Mr. George C. Selfridge asked that the item of "hoisting," as it appears in the cost outline in the application, be clarified, and that the term "rubber money" be explained. Answers to the above questions follow:

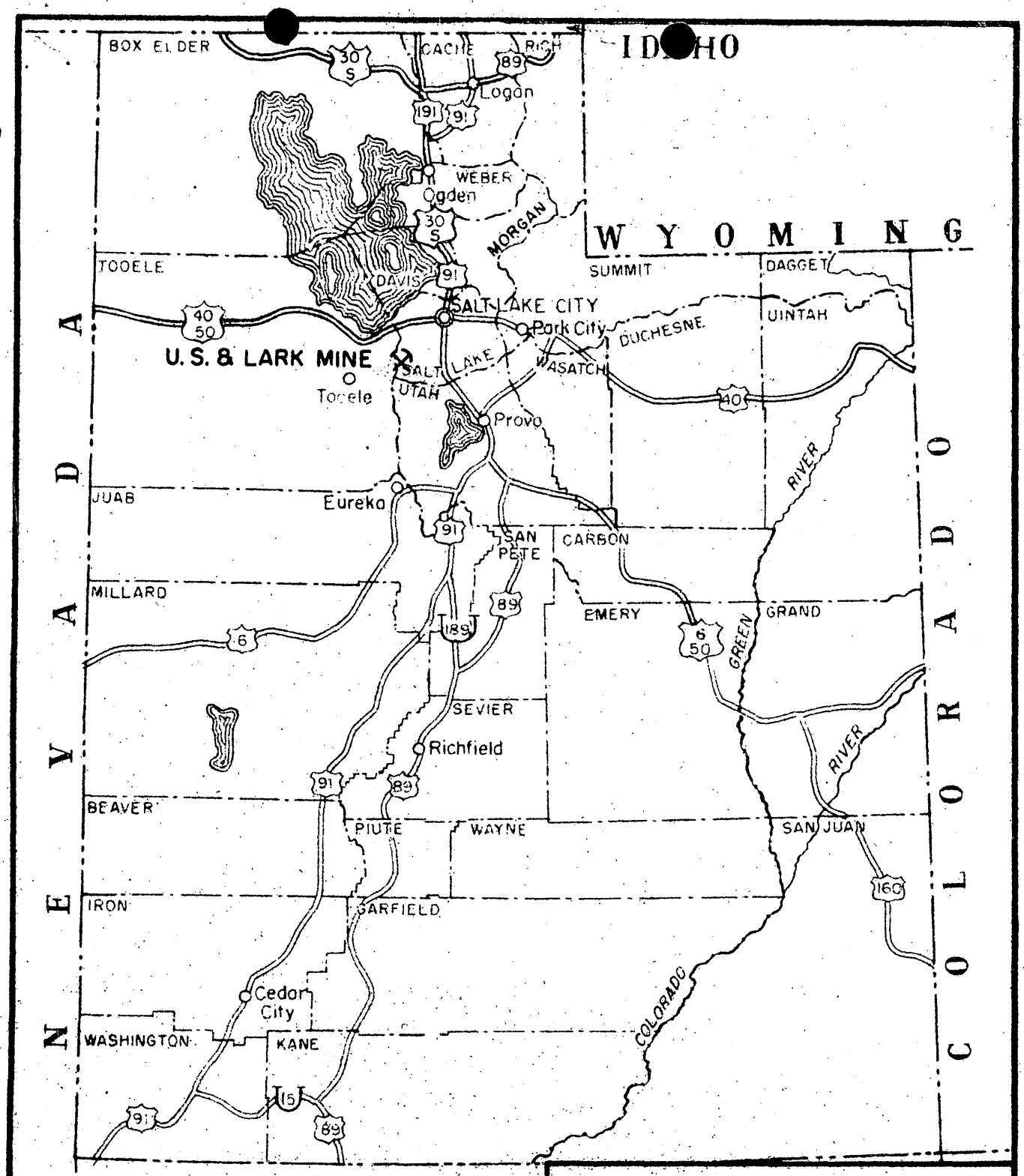
Waste and ore from the proposed project will be loaded originally in 24-inch-gauge cars, then transferred to Bingham Tunnel 36-inch-gauge cars, and transported to the surface. To transfer from the 24- to the 36-inch-gauge cars, the waste and ore from the 24-inch-gauge cars is dumped into skip pockets at No. 3 shaft, and hoisted up the shaft to loading bins, from which the 36-inch-gauge cars are loaded.

"Rubber money" is a term commonly used in the mining industry to mean "the cost of rubber clothing and rubber boots" when wet working conditions are encountered. It has been a long-established custom for mining companies to either furnish their employees rubber clothing and rubber boots for wet working conditions, or to allow the cost of this equipment. "Rubber money" in the amount of $1.00 per day per man is considered fair.

Mr. H. E. Nelson requested that a quick general summary of the results of exploration, if any, by companies other than United States Smelting, Refining and Mining Co., in the area south of the Last Chance stock, be made.

The Combined Metal Reduction Co.'s mines in Butterfield Canyon, south and east of the Last Chance stock, have derived most of their ore production from the Rough Wrangler fissure zone in the lower Bingham limestone series.

The extensively fissured, favorable limestones in close relationship to the Last Chance stock, together with known mineralization of considerable importance to the north, make the proposed project appear to be an excellent one. It is therefore recommended that the above-described exploratory program, estimated to cost $[illegible],115, be approved.



0 50 100
SCALE OF MILES

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Fig. 1 DMEA Docket No. 3993
Location Map

UNITED STATES SMELTING REFINING & MINING CO.
U. S. & LARK MINE
SALT LAKE COUNTY, UTAH

ENGINEER *M.H. HOWES*	DATE: JAN. 20, 1956
TRACED JAN., 1956, A.P.T.S.	1500-1157-E
CHECKED:	

RECEIVED
APR 9 - 1956

TRANSMITTED

APR 4 1956

DMEA
Date Rec'd.

APR 3 1956

BUREAU OF MINES
Denver, Colorado

Room 208 - 222 So. West Temple
Salt Lake City 1, Utah
March 29, 1956

RECEIVED
APR 9 - 1956

Memorandum

To: E. N. Harshman, DMEA Field Team, Region III

From: R. W. Osterstock

Subject: DMEA Docket 3993 (lead-zinc) U. S. Smelting, Refining, and Mining Company, (U. S. and Lark Mine) Salt Lake County, Utah.

Enclosed are nine copies of a geologic report by R. W. Osterstock, U. S. Geological Survey, on the subject docket.

The applicant has proposed a $242,118.00 program designed to explore mineralized fissures and favorable bedding horizons at depth in the region south of the Last Chance stock. These strata and fissures are within the Pennsylvanian Oquirrh formation on the east flank of the Oquirrh Range.

Substantial production has been recorded from the objective beds and fissures in the main workings of the U. S. section of the U. S. and Lark mine to the north of the Last Chance stock. It is mainly this evidence which is used to support the application for government aid. There is very little factual data to support the applicant's contention that large ore bodies may exist in the project area, however, there can be little doubt that the size of these ore bodies, if they do exist, easily makes them worthy of DMEA consideration. The geological conjecturing necessary to provide all the factors required to form such ore bodies appears sound but nonetheless does have very little basis in fact. This is an excusable omission on the part of the applicant as the proposed program is concerned with virgin ground and geological facts concerning this ground are not known.

The extenuating circumstances involved in this application have forced me to conclude that recommendation for approval or disapproval of this application is a decision which depends primarily on DMEA policy. With this in mind I have offered dual recommendations, one in favor of a counter exploration program, the other for denial of the entire program.

Reviewed by
DMEA OPERATING COMMITTEE

R. W. Osterstock

(date)

RWO/rs
cc: S. R. Wilson

U. S. AND LARK MINE
U. S. SMELTING, REFINING, AND MINING COMPANY
SALT LAKE COUNTY, UTAH

TRANSMITTED
APR 4 1956

RECEIVED
APR 9 - 1956

DMEA DOCKET 3993

Initial Geologic Report

By
R. W. Osterstock
U. S. Geological Survey

Reviewed by
DMEA OPERATING COMMITTEE

(date)

TABLE OF CONTENTS

Index	Page
Introduction	1
Location and accessibility	1
History and production	2
Geology	5
Ore Deposits	7
Ore Reserves	10
Proposed Exploration	10
Conclusions and Recommendations	13

List of illustrations

Figure 1 - Index map (attached to USBM report)
2 - Claim map (" " " ")
3 - Surface geologic map (attached to USBM report)
4 - 1000 level geologic map showing proposed work (attached to USBM report)
5 - Geologic section I through proposed project area
6 - Geologic section II through proposed project area

Introduction

The United States Smelting, Refining, and Mining Company submitted, on September 26, 1955, an application for government assistance in a $242,118.00 program, under DMEA Docket 3993, to explore for lead-zinc ores on a part of their property south of the Last Chance stock in Salt Lake County, Utah. The applicants have estimated that the project area may contain 210,000 tons of ore averaging from 15 to 17 percent combined lead and zinc.

A field examination of the property, requested by the DMEA Operating Committee, was conducted on December 2, 1955 by R. W. Osterstock (USGS) and M. H. Hawes (USBM). The applicant was represented by Messrs. C. L. Thornburg and Clarence Bingham, USSR company geologists. An earlier surface examination was conducted on May 11, 1954 by Osterstock and Tillman (USGS) and Hawes (USBM) relative to another DMEA project (Docket 2088, Item III amended). Structural features in evidence at the surface are common to both the old and the new dockets.

Much of the basis for the present application is drawn from the historical production data relating to various ore-carrying beds and fissures in the district. This data, as compiled by company geologists, must be accepted by the DMEA field examiners inasmuch as most of the old workings are no longer accessible.

Location and accessibility

The project area includes all or parts of forty seven claims which make up only a small part of the 5,739 acres of patented and unpatented ground generally referred to as the U. S. and Lark Mine area. The forty seven claims, or portions thereof, subordinated to the present DMEA application are situate in Sections 3, 4, 9, and 10, T. 4 S., R. 3 W. in the West Mountain Mining District, Salt Lake County, Utah (see figs. 1 & 2).

The property lies on the east flank of the Oquirrh Range, approximately 30 miles southwest of Salt Lake City, Utah. The area is easily accessible by paved highways which terminate at the portal of the Mascotte tunnel at Lark, Utah. This surface opening at an altitude of about 5,900 feet is intended to service the proposed exploration work. The surface of the project area may be reached by jeep over a circuitous route through Bingham Canyon or by foot from the south or Butterfield Canyon side.

Inasmuch as the entire operation is intended to take place underground at the 1,000 U. S. level (or Bingham Tunnel level) there is no possibility of its being hampered by inclement weather. Earlier attempts to explore from the surface in the project area are attested to by the many shallow workings which are still visible. This type of operation was impeded by the inaccessibility of the surface as well as the severe winter snows whose slow melting left only a short working season.

History and production

Lead-zinc mining operations began in the Bingham district in the 1860's with the location of the old Jordan claim. Since the 1870's production has been almost continuous. Although the district is recognized as one of the copper centers of the world, the peripheral lead-zinc belt has accounted for a substantial part of the lead-zinc production of the nation for many years. The applicants report a total lead-zinc ore production of about 16,000,000 tons from all of the mines in the district; more than three quarters of this tonnage has come from properties now owned by the applicants. Company property, generally referred to as the U. S. and Lark mine, includes 5,739 acres which flank the Bingham copper pit on the north, east, and south.

Production from the U. S. and Lark mine for the years 1951 - 1954 is as follows:

	Dry tons shipped	Gold Oz.	Silver Oz.	Copper %	Lead %	Zinc %
1951	330,108	.044	4.283	.390	7.995	6.495
1952	371,964	.044	4.574	.450	8.765	6.760
1953	326,749	.041	4.255	.435	8.800	7.290
1954	307,435	.040	4.609	.435	9.410	7.825

A somewhat more detailed production breakdown furnished by Clarence Bingham, company geologist, reveals that the "B" and "F" limestones, with which the present application is concerned, in the area north of the Last Chance stock, have produced as follows:

"B" limestone - 1.2 - 1.5 million tons; .05 oz. Au, 4½ oz. Ag., 15-20 percent combined Pb-Zn.
"F" limestone - 1.1± million tons; .05 oz. Au, 4½ oz. Ag, 17-22 percent combined Pb-Zn.

The Last Chance fissure, along which the proposed exploration is to take place, in its minable portions on the Galena 400 level, carried the following metal content over an average width of 4.1 feet: 0.17 oz. Au, 5.1 oz. Ag, 0.15 percent Cu, 3.7 percent Pb and 5.6 percent Zn.

Extensive workings have developed the lead-zinc belt immediately surrounding the Bingham copper stock but exploration to the south of the related Last Chance stock has been restricted in a general way to the northeast trending mineralized fissures.

Other DMEA projects in the district have been designed to determine the ore potential of the same and similar objectives as those offered in the present application. Under docket 2028, with the present applicants, three items were as follows:

Item I - 1,292 feet of drifting and 1,678 feet of diamond drilling explored the "B" limestone in the sedimentary interval separating the Bingham stock on the north and the Last Chance stock on the south. This work exposed no mineralization of consequence.

Item II - From the 2433 crosscut, 1,637 feet of drifting exposed the "B" limestone in the sedimentary interval separating the Bingham stock on the north and the Last Chance stock on the south. This work exposed no mineralization of consequence.

Item III - 2,130 feet of work allotted for this item was intended to explore the northeast trending Golden, Last Chance Galena and Gem fissures in the sediments immediately south of the Last Chance stock. The work was to have been performed on the Niagara 1600 level (600 feet below the level of the Bingham tunnel on which the present exploration is proposed). This item had much in common with the present application with the exception that it was intended to explore only for fissure type ore bodies whereas the present proposals anticipate the discovery of bedded ore making out from the fissures. The item was not activated because of water conditions which the operator was not equipped to handle.

Item III - (amended) About 2,500 feet of work in the Spiritualist area explored for fissure ore about 1,800 feet vertically above the presently proposed exploration program. This exploration took place considerably higher in the stratigraphic section and is not therefore directly related to the present exploration proposals, although the areas do have common sidelines. Some ore was discovered by the amended Item III work. On the Rough Wrestler(?) fissure an ore zone about 120 feet long and up to 4 feet wide is reported to assay 0.03 oz. Au, 46.6 oz. Ag, 0.51 percent Cu, 6.6 percent Pb and 4.8 percent Zn.

Under Docket 1096 with the Combined Metals Reduction Company an exploration project was set up to explore for bedded ore along the "F" limestone as well as for fissure ore where this bedding unit is intersected by the Rough Wrestler fissure. The latter target has not yet been intersected but 3,196 feet of work along the "F" limestone has disclosed no

mineralization of significance. This work took place at the Butterfield tunnel level about 450 feet above the Bingham tunnel level along which the present exploration is proposed.

Under Docket 3474 with the present applicants a search is currently being conducted for both bedded and fissure type ore deposits to the north of the Bingham stock. Too little of this project has been completed to permit a firm statement regarding the ore potential of this area.

GEOLOGY

The Bingham district is underlain by interbedded limestone and quartzite of Pennsylvanian age and by intrusive bodies which range in composition from diorite to quartz monzonite. Tertiary andesite flows mantle portions of the northeastern part of the district.

The sedimentary rocks are a part of the Pennsylvanian Oquirrh formation which is about 15,000 feet thick. Although the formation is predominantly quartzitic there are interbedded limestone members up to 150 feet thick and as the formation is traced southward from the Bingham stock area there are progressively more and thicker limestone beds and less quartzite and an attendant thinning of the entire section.

The ore deposits appear to be genetically related to the intrusive rocks which occur as irregular stocklike bodies and as dikes and sills. The major intrusive bodies in the district are the Bingham (Utah porphyry copper) stock, noted for its disseminated copper content, and the Last Chance stock, noted for its associated lead-zinc-silver deposits. These intrusives range in composition from quartz monzonite in the Bingham stock to the diorite rock of the Last Chance stock.

Structurally, the district is one of persistent, broad, open flexures upon which are superimposed smaller less persistent parallel folds and cross folds. The major fold in the district is a large syncline whose irregular northwesterly striking and plunging axis lies to the west of the project area. A prominent zone of northwesterly trending fissures, generally with steep dips, has accounted for a considerable portion of the production from the U. S. section of the U. S. and Lark mine. These fissures, which include the Last Chance, Holden, Galena, Gem, Aetna, Royal, and Wide West, in a few instances have been traced southwesterly through the Last Chance stock into the sediments.

The proposed project area except for a small northern salient lies entirely to the south of the Last Chance stock as it is delineated at the surface. Underground evidence indicates that the south wall of this intrusive mass is nearly vertical although some local irregularities and off shoots may be expected.

Two stratigraphic units are mapped at the surface within the confines of the project boundaries. These are Tampa and the Highland Bay limestones which have been productive in the central part of the district. Within the project area these units are known by their correlative names, the Commercial and Jordan limestones. Underlying these beds are the Intermediate and Alphabetical series of limestones which have accounted for the major part of the production in the central part of the district to the north of the Last Chance stock. The beds have a general northeasterly strike and gentle northwesterly dip.

Control for the projection of the "B" and "D" target beds to the level of the proposed exploration project is gained principally from a study of the attitude of the stratigraphically higher Commercial and Jordan limestones exposed at the surface in conjunction with the known stratigraphic interval separating these beds from the target beds. Substantiating evidence is provided by the Butterfield tunnel work (DMEA 1096) which has explored the "F" limestone only about 1,000 feet east of the presently proposed project area.

ORE DEPOSITS

The ore deposits in the Bingham district are of several types; veins, bedded replacements and disseminations. The latter type is predominantly the "porphyry-copper" confined to the Bingham stock. The veins and bedded replacements are predominantly the lead-zinc-silver ores which form a roughly peripheral zone around the central copper-bearing Bingham stock. The Last Chance stock, which falls within the lead-zinc peripheral zone, is often considered as a separate center of mineralization with respect to the lead-zinc deposits.

The most extensive lead-zinc ore bodies have been formed in receptive calcareous bedding horizons and are often further localized by a bedding fault near the footwall of the limy member. These deposits have been found to be best developed in the zone between the Bingham stock on the north and the Last Chance stock on the south.

The vein deposits or fissure ore bodies generally strike northeast and increase in importance in proximity to the Last Chance stock, some of the fissures in fact have carried considerable ore in the stock itself. The fissures are roughly 300-500 feet apart and dip steeply westward

and eastward. The applicants report that much of the ore mined in the U. S. section of the mine has come from steeply dipping shoots on bedding structures north of the Last Chance stock, and that this type of deposit is notably exemplified by the ore bodies in the "B" and "D" limestones.

The several fissures which have been traced on the surface in the project area are characterized by silicified iron and manganese stained alteration zones. Company samples taken across several of the alteration zones exposed on the north slope of Butterfield Canyon have assayed from 5 to 30 oz. of silver per ton and up to 18 percent manganese. Lessees are reported to have made two shipments of gossan-type ore but there is no information available as to the metal content of these shipments. The Aetna prospect is reported by the applicants to show leases of high grade lead carbonate ore along a prominent northeast fissure.

The projection distance is too great to provide for precise location of the fissures exposed at the surface to the level of the proposed exploration program, although one fissure, the Wide West, is shown both on the surface and underground maps (see figs. 3 & 4). The principal fissures which are intended to be intersected by the proposed exploration are the Last Chance, along which the initial work is to take place, and the Holden and Niagara which are expected in the easterly drifts proposed along both the "B" and "D" limestones.

The applicants have estimated that the area to be explored may contain ore bodies totalling 210,000 tons. The target limestone beds on the north of the Last Chance stock have contained ore shoots which measured thousands of feet in dip dimension. The applicant's method of calculation of the ore potential of the project area is as follows:

The "B" limestone footwall is proposed for exploration over a horizontal (strike) distance of 1,600-1,700 feet. The eastern 500 feet of this distance will be in the Last Chance-Holden-Niagara fissure zone. In the productive area north of the stock where the limestone beds are intersected by a series of fissures such as these, the strike length of ore deposition is far greater than the factor of 300 feet which is used here.

$$\frac{300 \text{ feet (length)} \times 500 \text{ feet (dip dimension)} \times 6 \text{ feet (normal width)}}{10} = 90{,}000 \text{ tons}$$

West of the zone of the three main fissures referred to above, the "B" limestone is intersected by the Wide West fissure which, at the surface, is identified with ore and gossan in the Jordan limestone. This intersection may be considered relatively one-third of that which is assumed for the main fissure zone.

"B" limestone west of main zone = 30,000 tons.

The "D" limestone structure has a similar possibility to the "B", geological conditions being the same.

"D" limestone in main fissure zone = 90,000 tons.

The applicants have further estimated that the grade of ore which may be expected will range from 15-17 percent combined lead and zinc.

The primary ore minerals which may be expected in the project area are: galena, sphalerite (marmatitic variety), and pyrite, with lesser quantities of chalcopyrite, and possibly some tetrahedrite. Some manganese bearing mineral, possibly manganosiderite, may also be expected. Gold, which is sparsely but uniformly distributed in the sulfides is most closely associated with pyrite. Gangue minerals will probably be quartz, calcite, and unreplaced remnants of host rock.

ORE RESERVES

The applicant's estimate of 210,000 tons of 15-17 percent combined lead-zinc ore in the project area serves to illustrate the ore potential of the geologic targets offered in the exploration proposals. Inasmuch as the objectives are in what amounts to completely virgin ground, many assumptions have been made in order to provide the estimate. It is the writer's opinion that the estimate, based as it is on assumptions and intangible evidence, should not be considered a reserve figure even of the inferred classification.

Let it suffice to say that the target beds and fissures, with favorable geologic conditions, may contain substantial amounts of ore mineralization.

PROPOSED EXPLORATION

The applicants have proposed an exploration program on the "B" and "D" limestone beds south of the Last Chance stock where these strata are intersected by northeast trending fissure zones. The entire program is based on projected geological features consequently the specific distances to various objectives are to be regarded as approximate.

The work proposed by the applicants is as follows:

1. Drive southwesterly in the zone of the Last Chance fissure an approximate distance of 950 feet or to the footwall of the "B" limestone. Short diamond drill holes from systematically spaced stub crosscuts may be advisable to cut the main Last Chance fissure, one of the chief productive fissures of the U. S. section of the mine.

2. Drive northeast about 500 feet and southeast about 1,200 feet on the "B" limestone footwall bedding. From systematically spaced diamond drill bases, drill the "B" limestone roughly fan-wise as shown on the plan map (see fig. 4).

3. From near the start of the "B" limestone drift, drive southerly about 1,600 feet to the "B" limestone footwall.

4. Drive northeasterly and southwesterly an approximate total distance of 700 feet on one or more structures in the "B" limestone, presumably near the footwall.

5. The project will require approximately 9,000 feet of diamond drilling to be carried out in conjunction with the above exploration work. The individual holes cannot be planned before a substantial part of the drifting has been done but the general plan of the proposed drilling will be in part as illustrated on the accompanying plan map (see fig. 4).

The total cost of this exploration program is $242,118.00.

At the time of the field examination of the area concerned with this application it became immediately apparent that the primary targets were the "B" and "B" limestones where intersected by the Last Chance, Holden and Niagara fissures. The subordinate targets are, therefore, the "B" and "B" limestone where intersected by the Wide West fissure zone as well as the lateral exploration along the beds between the projected fissure zones and the initial exploration along the Last Chance fissure zone.

A brief discussion with the company geologist, C. L. Thornburg, has indicated that staging of the exploration program might be in order. Therefore, the following counter proposal is offered by the examining DMEA Field geologist.

Stage 1 -

Phase 1. Drive southwesterly in the zone of the Last Chance fissure to the footwall of the "B" limestone. This distance is suggested by the applicant to be about 950 feet. Inasmuch as the location of the "B" limestone is based on long projections, this initial work perhaps should be given a maximum rather than a specified footage. A reasonable tolerance will be provided if a maximum footage of 1,200 feet is allowed for this phase.

Phase 2. Drive northeasterly and southwesterly on the "B" footwall bedding a sufficient distance to adequately

explore the entire Last Chance-Holden-Niagara fissure zone intersections with this bedding. This distance is suggested by the applicants as being approximately 500 feet. Again, it would appear judicious to provide a maximum footage for this phase inasmuch as the exact positions of the fissure intersections are not known. A reasonable tolerance will be provided if a maximum footage of 1,000 feet is allowed for this phase.

Phase 3. In conjunction with phases 1 and 2, 1,500 of diamond drilling may be accomplished for extralateral ore search and to assist in guiding the work. The individual drill holes to be positioned by the applicant as the occasion demands.

Stage II -- To be pursued only in the event that the exploration attempts of Stage I indicate that additional exploration is in order. This stage to be accomplished only with prior written approval of the government.

Phase 1. Drift southwesterly along the "B" limestone footwall bedding to its intersection with the Wide West fissure zone utilizing the footage remaining from Stage I, phases 1 and 2, plus whatever is necessary to reach a maximum footage expended of 2,490 feet under Stages I and II. Diamond drilling in the amount of 3,500 feet may be utilized in conjunction with this phase. The individual drill holes to be positioned by the applicant as the occasion demands.

Stage III - To be pursued only in the event that the results of both Stages I and II are sufficiently encouraging as to indicate that additional exploration is in order.

Phase 1. Drive southerly about 1,600 feet along the Last Chance fissure zone to the "B" limestone footwall bedding.

Phase 2. Drive northeasterly and southwesterly an approximated distance of 700 feet on one or more structures in the "B" limestone, presumably near the footwall.

Phase 3. In conjunction with Stage III, 4,500 feet of diamond drilling may be utilized to assist in guiding the work and searching for ore away from the workings.

The total work to be accomplished under the counter proposal is not to exceed the applicant's original estimate of 4,950 feet of drifting and 9,000 feet of diamond drilling (with the construction of 4 drill stations) or the original total estimated cost of $242,115.00.

CONCLUSIONS AND RECOMMENDATIONS

The exploration program proposed by the applicants in the "Alphabetical" series of limestone beds south of the Last Chance stock is based almost entirely on the past production of these beds and a belt of productive northeasterly striking fissures in the main U. S. and Lark mine workings north of the stock. The "B" and "D" limestone beds, within which the proposed exploration is to take place, in other parts of the mine have produced about 2 1/2 million tons of ore which contained more than 15 percent combined lead and zinc, .05 oz. Au, and 4½ oz. Ag. The Last Chance and Holden fissures in 1951 produced ore containing .159 oz. Au, 7.89 oz. Ag, .597 percent Cu, 8.82 percent Pb, and 9.12 percent Zn over an average vein width of 5.44 feet.

That these or related fissures extend into the project area is indicated by the several mineralized fissures exposed at the surface. Control for projection of the northeasterly striking fissures into the project area is gained from their underground exposures both north of and in the Last Chance stock. Control for the location of the objective "B" and "D" beds is gained from the known stratigraphic interval separating these horizons from the Jordan limestone exposed at the surface. Additional control for the location of the beds at the level of the proposed exploration is provided by the location and exploration of the underlying "F" limestone in the adjacent Butterfield property. Some doubt is cast on the location of the target beds in the project area inasmuch as the entire stratigraphic section is known to be thinning to the south in the direction of the proposed exploration work, consequently the stratigraphic interval between the surface-exposed Jordan limestone and the "B" and "D" limestones may be considerably changed thus changing the position of the target beds in the project area.

There is evidence of some ore mineralization in the target area where some of the related northeasterly striking fissures (Aetna, Royal and Wide West) show manganese and iron stain and silicification where they intersect the Jordan limestone. Whether this evidence may be interpreted to indicate mineralization at depth along similar fissures is highly conjectural.

In a discussion of the ore potential of the project no reliable figure may be given as a reserve estimate because of the many intangible factors involved. The applicants have estimated that, geologic conditions being favorable, the block may contain 210,000 tons of 15-17 percent combined lead and zinc. It is true that the target area is sufficiently large to contain important tonnages, easily large enough to satisfy the DMEA "significant contribution to the nation's reserve" requirement.

Because of the extenuating circumstances involved in this application for government assistance, dual recommendations are tendered herewith:

1. The project area is believed to contain, based on long projections from other workings and from the surface, both fissures and beds which have been highly productive in other parts of the district. The ore capacity of these targets, as established by past production records, is easily large enough to provide a significant contribution to the nation's metals reserve. Unfortunately firm evidence of the many requisite features which are needed to form ore bodies of such size is generally lacking.

Thus the applicant's proposed exploration program must be considered from the point of view of DMEA policy. The theorizing behind the applicant's proposals appears to be sound but without factual data as regards the immediate targets. If DMEA's policy is such that it can grant assistance in the exploration for large ore bodies with little more than the production records of other areas in support of the application, it is recommended that the counter proposal as contained in this report be approved.

In the event that the above recommendation for approval is acted upon, it is further recommended that the upper vertical limit which excludes ground shallower than 200 feet vertically below bedrock, be removed. This action would appear to be called for inasmuch as mineralized fissure zones exposed at the surface in the project area are considered by the applicants as evidence of mineralization at depth. It is therefore logical to conclude that the fissures are expected to carry mineralization in the interval between the surface and the level of the proposed exploration.

2. The bulk of the geologic reasoning in support of the application is conjectural. This is not a shortcoming of the applicant, the truly critical information which might support the application is not in existence. In this sense, then the program as proposed by the applicants may justiably be regarded as a methodical prospecting venture. Additional damning evidence lies in the statistical analysis of other DMEA projects aimed at targets similar to those considered in the present application. Three projects — DMEA 1096, 2028, and 2653 — are essentially complete. The total cost of these ventures has been approximately $885,880.00. Only one relatively small ore body has been discovered as a result of this work (Rough Wrestler fissure ore in Spiritualist tunnel, DMEA 2028, Item III amended). To date, DMEA activities in the district may hardly be regarded as successful. A fourth project, DMEA 2474, has only recently been started and is not yet subject to evaluation, the estimated total cost of this latter project is $301,930.80.

Thus if it is DMEA's policy to regard programs, such as proposed by the applicant, as prospecting ventures than I have no recourse but to recommend denial of this application for assistance.

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

RECEIVED
MAR 29 1956

March 26, 1956

224 New Customhouse
Denver 2, Colorado

Memorandum

Docket

To: Chairman, Operating Committee, DMEA

From: Field Team, Region III

Subject: DMEA Docket 3993 (Lead-Zinc), U. S. Smelting, Refining, and Mining Company, (U.S. and Lark Mine), Salt Lake County, Utah

Attached are three copies of a letter dated February 29, 1956 from the subject applicant pertaining to a revised description of the project area as shown on the key map. The attached information should replace the indicated pages in the original application.

The brochure, now being used by the field examiners, has been changed accordingly. Will you please make the necessary changes in the three copies of the application you now have.

DMEA Field Team, Region III

By W. M. Traver
Executive Officer

Enclosures

requested changes made —
BJL
map filed in envelope in the back of the docket

P. O. BOX 1980

UNITED STATES SMELTING REFINING AND MINING COMPANY
NEWHOUSE BUILDING
SALT LAKE CITY 10, UTAH

RECEIVED
MAR 29 1956
DMEA
Date Rec'd.
MAR 26 1956
BUREAU OF MINES
Denver, Colorado

February 29, 1956

Mr. S. R. Wilson, Chief
Mineral Exploration Branch
Mining Division, Bureau of Mines
1600 East First South
Salt Lake City, Utah

Dear Mr. Wilson:

Reference is made to our DMEA application dated September 7, 1955, which was subsequently assigned Docket No. DMEA - 3993.

It has been necessary to slightly revise the description of the project area covered by the application and in this connection there are enclosed four copies of page 2a to be added to each of the four copies of the application submitted to the DMEA, and four copies of revised Page 4, to replace a like page in each copy of the application, together with four photocopies showing the slightly revised project area.

Certain minor discrepancies were noted between the worded description and the boundary of the project area as shown on the map. In addition to the correction of these discrepancies, the north east corner of the project area was revised and enlarged somewhat in order to cover the projected course of the exploration heading which is being directed toward the project area.

Since the application is now being processed in the Salt Lake office of the DMEA, it seemed best that the enclosed material should be sent to you rather than to your Washington office.

Yours very truly,

A. G. Kirkland
Manager of Western Mines

AGK/gb

Enclosures

United States Smelting Refining and Mining Company
Western Operations
P. O. Box 1980, Salt Lake City, Utah

RECEIVED
APR 2 3 1963

3. (a) continued

Claims Owned - patented unless otherwise stated	U.S. Lot No. or U.S. Sur. No.

Add the following two claims:

Henrietta	83
Red Cloud	145

Chairman, Opr. Comm. D.M.E.A.

RECEIVED
FEB 15 1956

DN 235 BUR MINES 2-14-56 1-39

CHAIRMAN, OPERATING COMMITTEE, DMEA

REURTT FEBRUARY 13.1956, DMEA 3993, UNITED STATES SMELTING REFINING AND MINING CO., ADDITIONAL INOXX INFORMATION AND MAPS REQUESTED FROM APPLICANT NECESSARY BEFORE OCXX COMPLETION OF ENGINEERING AND GEOLOGIC REPORTS. ESTIMATED TRANSMITTAL DATE FOR BOTH REPORTS 15 DAYS AFTER RECEIPT OF REQUESTED DATA.

WM TRAVER

Denver Co.

FEB 14 3 58 PM '56
BUREAU OF M
MAIL ROOM
WASHINGTON, D.C.

RECEIVED

File Copy
Surname

Griswold
Selfridge
Kilsman
Wattenbarger

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

FEB 13 1956

WRGriswold/er Rm 4444, Ext. 3669

Base Metals Division

14X4401(01) Revolving Fund, Defense Production Act, Interior (allocated Working Fund to Office of Secy.)

TELETYPE
XXXXXXXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXXXXXXX

Date:

To: W. M. Traver, Executive Officer, DMEA Field Team, Region III, Denver , Colorado

Re application U. S. Smelting, Refining and Mining Co., Docket DMEA 3993.

Kindly advise when you can foward Field Team report.

George C. Selfridge
Chairman, Operating Committee

WGR/er 2/13/56

Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Chron.

Docket

November 4, 1953

Memorandum

To: S. R. Wilson

From: Acting Supt., Denver Experiment Station, Reg. III

Subject: Docket DMEA 3993 (Lead-Zinc), U. S. Smelting, Refining and Mining Co., U. S. and Lark Mine, Salt Lake County, Utah

Enclosed is an application submitted by U. S. Smelting, Refining and Mining Company, in the amount of $242,118.00.

A field examination and suitable report are required. The examination report should be sent directly to the Executive Officer, with a copy of the memorandum of transmittal to this office.

JOHN F. SHAW

John F. Shaw

Enclosures

cc: E. W. Harshman
R. W. Osterstock
W. M. Traver (3)
Sec. Op. Com.

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

RECEIVED
NOV - 7 1955

November 3, 1955

224 New Customhouse
Denver 2, Colorado

~~Gracelle~~
Betty

Docket

Memorandum

To: J. F. Shaw (With brochure)
R. W. Osterstock

From: Executive Officer, DMEA Field Team, Region III

Subject: Docket DMEA 3993 (Lead-Zinc), U. S. Smelting Refining and Mining Company, U. S. and Lark Mine, Salt Lake County, Utah

Enclosed is the subject application in the amount of $242,118.00.

A field examination and suitable report are required. Many pertinent questions are asked in the enclosed copies of memoranda from Frank E. Johnson, N. E. Nelson, O. M. Bishop, and the Chairman of the Operating Committee. The answers to all these questions should be covered in the Report of Examination.

W. M. Traver

By J. W. Townsend
J. W. Townsend

Enclosures
HMC:ab
cc: Chair. Op. Comm. (2)

File Copy
Surname
Selfridge
Robinson

UNITED STATES
DEPARTMENT OF THE INTERIOR 500
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

OCT 27 1955

Mr. W. M. Traver
Executive Officer
DMEA Field Team, Region III
224 New Customhouse Bldg.
Denver 2, Colorado

Re: Docket No. DMEA-3993 (Lead-Zinc)
U. S. Smelting, Refining & Mining Co.
U. S. and Lark Mine
Salt Lake County, Utah

Dear Mr. Traver:

Referring to the cited application, we are enclosing memorandums dated September 28 and October 21, by Mr. M. E. Nelson, USGS, and Mr. O. M. Bishop, USBM, respectively. You will note that a field examination is recommended.

Certain items in the cost outline of the Applicant are not clear; the company states that all work would be done through the Bingham tunnel, yet we note an item of "hoisting" in the cost outline. We also would be interested in knowing the meaning of the term "rubber money" in the cost outline.

Sincerely yours,

George C. Selfridge
Chairman, Operating Committee (WR)

Enclosures

WRGriswold/er 10/25/55

APPROVED:

O. M. Bishop (WR)
Member, Bureau of Mines

Thor H. Kiilsgaard (WR)
Member, Geological Survey

Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Chron.

RCh.

File Copy
Surnamd
Griswold
Bishop
Kiilsgaard
Selfridge

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

OCT 27 1955

Mr. Oscar A. Glaeser, Vice President
U. S. Smelting, Refining & Mining Company
Newhouse Building
Salt Lake City 10, Utah

Re: Docket No. DMEA-3993 (Lead-Zinc)
U. S. Smelting, Refining & Mining Co.
U. S. and Lark Mine
Salt Lake County, Utah

Dear Mr. Glaeser:

The application of your company for Government assistance to explore its property has been reviewed by the Base Metals Division of the Defense Minerals Exploration Administration and has been referred for a field examination to:

Mr. W. M. Traver
Executive Officer
DMEA Field Team, Region III
224 New Customhouse Bldg.
Denver 2, Colorado

The Regional Office will contact you at an early date as to when an examination is to be made. Any assistance that you may give the members of the Field Team during the examination will be appreciated.

Sincerely yours,

Frank E. Johnson

ACTING Administrator

WRGriswold/er 10/25/55
Copy to: Docket
Admr R File
Op. Committee
Base Metals
Mr. Bishop, USBM
Mr. Kiilsgaard, USGS
Region III (2)
Chron.

R.C.B.

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

Griswold

RECEIVED
OCT 21 1955

October 21, 1955

Re: DMEA-3993
(Lead-Zinc, $242,118)
United States Smelting,
Refining & Mining Co.
U. S. & Lark Mine
Salt Lake County, Utah

Memorandum

To: W. R. Griswold, DMEA

From: O. M. Bishop,
Branch of Base Metals

Subject: Review of subject application and recommendation for field referral. Application received September 26, 1955.

I have reviewed the application which provides for exploration of an area of extensively fissured Pennsylvanian limestones and quartzites which flank the south side of the Last Chance stock. The presence of favorable limestone host rocks, extensive fracturing, proximity to the porphyry stock, and known mineralization provide a very worthwhile target area in both the fissures of the stock and specific beds of the limestones.

The work plan provides for drifting from the Bingham tunnel on the Last Chance fissure to the footwall of the "B" and "D" limestones with drifting along these favorable horizons and diamond drilling as appropriate. The total work projected includes 4,950 feet of drifting @ $40.46 per foot, 9,000 feet of diamond drilling at $3.57 per foot, cutting 4 diamond drill stations @ $3.95 per station, and the enlarging of 6,023 feet of flume @ $1.35 per foot.

The target area, the work plan, the costs, etc. all appear to be excellent. I recommend that the application be referred to the Region III field team for examination on the ground and their recommendations.

O. M. Bishop

O. M. Bishop

Copy to - Div. of Minerals
Mr. Kiilsgaard, Rm. 5222
O. M. Bishop
Files

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

RECEIVED
OCT 21 1955

October 21, 1955

Re: DMEA-3993
(Lead-Zinc, $242,118)
United States Smelting,
Refining & Mining Co.
U. S. & Lark Mine
Salt Lake County, Utah

Memorandum

To: W. R. Griswold, DMEA

From: O. M. Bishop,
Branch of Base Metals

Subject: Review of subject application and recommendation for field referral. Application received September 26, 1955.

I have reviewed the application which provides for exploration of an area of extensively fissured Pennsylvanian limestones and quartzites which flank the south side of the Last Chance stock. The presence of favorable limestone host rocks, extensive fracturing, proximity to the porphyry stock, and known mineralization provide a very worthwhile target area in both the fissures of the stock and specific beds of the limestones.

The work plan provides for drifting from the Bingham tunnel on the Last Chance fissure to the footwall of the "B" and "D" limestones with drifting along these favorable horizons and diamond drilling as appropriate. The total work projected includes 4,950 feet of drifting @ $40.46 per foot, 9,000 feet of diamond drilling at $3.57 per foot, cutting 4 diamond drill stations @ $3.95 per station, and the enlarging of 6,023 feet of flume @ $1.35 per foot.

The target area, the work plan, the costs, etc. all appear to be excellent. I recommend that the application be referred to the Region III field team for examination on the ground and their recommendations.

O. M. Bishop

O. M. Bishop

Copy to - Div. of Minerals
Mr. Kiilsgaard, Rm. 5222
O. M. Bishop
Files

IN REPLY REFER TO:

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

Griswold

September 28, 1955

Re: DMEA 3993
U. S. Smelting & Refining Co.
South of Last Chance Stock
Salt Lake County, Utah
$242,118.00 - Lead, Zinc

Memorandum

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

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

Subject: Review of application.

The project area is a large tract on the south side of the Last Chance Stock. The immediate objective is the prospecting for and exploration of a system of fissures in certain limestone beds, low in a series, within whose counterpart on the north side of the stock, limestone beds are the host rocks of large orebodies. The project area adjoins a smaller area, the subject of Contract Idm-E360 (July 1952), DMEA 2028, work on which is still in progress. No significant discovery had been made up to June 10, 1955. (R. W. Osterstock, interim report July 25, 1955.) The target of the DMEA 2028 project was the finding of 550,000 tons of ore.

Obviously, as the maps which accompany the application are poorly related one to another and not at all to old and new district geologic maps, the appraising of the chances of a project of the character and magnitude of this one, must be done by those intimately acquainted with the district. Three large contracts have been given the applicant and in two cases, (Mayflower and Spiritualist) the results, at last reports, had been disappointing. Contract E784, DMEA 3474, was recently (August 1955) awarded and no information concerning the project has been received.

Perhaps the examiners will give us a quick general summary of the results of exploration, if any, by companies other than U. S. Smelting in the area south of the Last Chance stock.

Referral to the Field Team is recommended.

N. E. Nelson

N. E. Nelson

IN REPLY REFER TO:

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

RECEIVED
SEP 29 1955

September 28, 1955

Re: DMEA 3993
U. S. Smelting & Refining Co.
South of Last Chance Stock
Salt Lake County, Utah
$242,118.00 - Lead, Zinc

Memorandum

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

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

Subject: Review of application.

The project area is a large tract on the south side of the Last Chance Stock. The immediate objective is the prospecting for and exploration of a system of fissures in certain limestone beds, low in a series, within whose counterpart on the north side of the stock, limestone beds are the host rocks of large orebodies. The project area adjoins a smaller area, the subject of Contract Idm-E360 (July 1952), DMEA 2028, work on which is still in progress. No significant discovery had been made up to June 10, 1955. (R. W. Gaterstock, interim report July 25, 1955.) The target of the DMEA 2028 project was the finding of 550,000 tons of ore.

Obviously, as the maps which accompany the application are poorly related one to another and not at all to old and new district geologic maps, the appraising of the chances of a project of the character and magnitude of this one, must be done by those intimately acquainted with the district. Three large contracts have been given the applicant and in two cases, (Mayflower and Spiritualist) the results, at last reports, had been disappointing. Contract E784, DMEA 3474, was recently (August 1955) awarded and no information concerning the project has been received.

Perhaps the examiners will give us a quick general summary of the results of exploration, if any, by companies other than U. S. Smelting in the area south of the Last Chance stock.

Referral to the Field Team is recommended.

N. E. Nelson

N. E. Nelson

NENelson:iml
G-9/28/55
cc: Director's reading, 4212
Branch reading, 4212
DMEA (3)
Docket file
O. M. Bishop, 3617

P. O. BOX 1980

UNITED STATES SMELTING REFINING AND MINING COMPANY
NEWHOUSE BUILDING
SALT LAKE CITY 10, UTAH

September 22, 1955

RECEIVED
SEP 26 1955

Mr. C. O. Mittendorf, Administrator
Defense Minerals Exploration Administration
Room 4624, New Interior Bldg.
Washington, D. C.

Dear Mr. Mittendorf:

We submit herewith four copies of Application for Aid in an Exploration Project, pursuant to D.M.E.A. Order 1, under the Defense Production Act of 1950, as Amended, for this Company's United States and Lark Mine, Salt Lake County, Utah.

Very truly yours,

Oscar A. Glaeser
Vice President and General Manager
of Western Operations

OAG:FG
Encl.

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

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

RECEIVED
SEP 26 1955

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

Not to be filled in by applicant

Docket No. DMEA-3993
Metal or Mineral Lead & Zinc
Date Received 9/26/55
Estimated Cost $242,118.00
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: United States Smelting Refining and Mining Company
P.O. Box 1980
Salt Lake City, Utah
a corporation organized under the laws of the State of Maine and qualified to do business in the State of Utah.

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

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

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

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

ANSWERS TO FOLLOWING QUESTIONS ARE ATTACHED HERETO:

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract

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

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise

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

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

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

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

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

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

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

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

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

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

(*c*) The work will start within 15 days and be completed within 24 months from the date of an exploration project contract.

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

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

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

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

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

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

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

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

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

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

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

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

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

☐ Money ☐ Use of equipment owned by you ☐ Other

Explain in detail on acompanying paper.

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated September 7, 1955

United States Smelting Refining and Mining Company
(Applicant)

By Oscar A. Glaeser
Oscar A. Glaeser
Vice-President and General Manager of Western Operations

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

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

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

RECEIVED
SEP 26 1955

Statement Accompanying Form MF-103

Questions 1. (a), (b) and (c): Answered on Application Form MF-103.

2. General: consists of general instructions and reference to DMEA Order 1.

3. Applicant's Property Rights:

3. (a) Description of Project Block (map attached)

The real property comprising the project area includes all or portions of patented and unpatented lode mining claims situate in Sections 3, 4, 9 and 10, Township 4 South, Range 3 West, in West Mountain Mining District, Salt Lake County, State of Utah, as shown on the accompanying claim map, and listed as follows:

Claims Owned - patented unless otherwise stated	U.S. Lot No. or U.S. Sur.No.
Aetna Amd.	7020
Aladin	68
Albino	70
Almeda	73
Armand	4030
Austin	4030
Austin Ray	410
Blizzard	6376
Blizzard Fraction	6375
Boston	3532
Buzzo	3531
Contact	5407
Contact Fraction	6373
Dead Thing	4463
Decoration	6971
Detroit	3528
Dandy Fraction (unpatented)	7117
Difficult Amd.	7019
Earl Amd.	7020
Experiment	5319

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

3. (a) continued

Claims Owned - patented unless otherwise stated	U.S. Lot No. or U.S. Sur.No.
Fair	3980
First Chance	135
G.H. Amd.	7019
Hard Job Amd.	7020
I Don't Care	4030
Indiana	3779
Josie K.	4030
Klondyke No. One	3966
Lilly	4363
Michigan	3529
Michigan Fraction	6377
Mignon	6378
Morton	6940
Ole Bull	76
Owyhee	77
Patience	6372
Percival	6374
Rip Van Winkle	3978
Royal	75
Royal Queen	4955
Scotia	3026
Sliver Amd.	7020
Stag	3979
Stella Amd.	7020
Wide West	289
Henrietta	83
Red Cloud	145

Government tie: The point of beginning is Corner No. 4 of the Mednight Bell No. 1 lode mining claim, U.S. Survey No. 5609, whence the quarter corner between Sections 3 and 10, Township 4 South, Range 3 West, Salt Lake Base and Meridian, bears South 85° 20' West, 813 feet, more or less.

The lateral and vertical limits of the property included in this project are as follows:

Lateral Limits:

Beginning at said Corner No. 4 of said Mednight Bell No. 1 lode mining claim, U.S. Survey No. 5609, and running thence along line 4-3 of said claim South 59° 45' East, 125.3 feet, more or less, to intersect the section line between said Sections 3 and 10;

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

3. (a) continued

thence along said section line South 89° 49' West, 918.6 feet, more or less, to the said quarter corner between said Sections 3 and 10;

thence along the east line of the northwest quarter of said Section 10 South 0° 01' West, 1315.2 feet, more or less, to intersect the north line of the south half of the said northwest quarter of Section 10;

thence, in part along said north line of the south half of said northwest quarter, North 89° 53' 20" West, 3297.7 feet, more or less, to intersect line 4-3 of the Blizzard Fraction lode mining claim, U.S. Survey No. 6375;

thence along line 4-3 of said Blizzard Fraction lode mining claim North 9° 33' West, 705 feet, more or less, to Corner No. 3 of said claim, identical with Corner No. 3 of the Beebe lode mining claim, U.S. Survey No. 5436;

thence along line 3-2 of said Beebe lode mining claim North 52° 15' West, 300 feet, more or less, to Corner No. 2 of the Fred C. lode mining claim, U.S. Survey No. 5436;

thence along line 2-3 of said Fred C. lode mining claim North 33° 00' East, 1422.4 feet, to Corner No. 3 of said claim;

thence along line 3-4 of said claim North 52° 15' West, 426 feet, more or less, to intersect line 3-2 of the Silver Chief No. 2 lode mining claim, U.S. Survey No. 4985;

thence along said line 3-2 North 56° 19' East, 321.4 feet, more or less, to corner No. 2 of said Silver Chief No. 2 lode mining claim, identical with Corner No. 3 of Silver Chief No. 1 lode mining claim, U.S. Survey No. 4985;

thence along line 3-4 of said Silver Chief No. 1 lode mining claim North 35° 54' East, 395.2 feet, more or less, to intersect line 6-1 of the Armand lode mining claim, U.S. Survey No. 4030;

thence along said line 6-1 of said Armand lode mining claim, North 7° 30' East, 368.3 feet, more or less, to Corner No. 1 of said claim, situate on line 3-4 of the Michigan lode mining claim, U.S. Survey No. 3529;

thence along said line 3-4 of said Michigan lode mining claim North 52° 58' West, 110.1 feet, more or less, to Corner No. 4 of said claim;

thence along line 4-1 of said claim North 59° 33' East, 112.7 feet, more or less, to Corner No. 3 of the Detroit lode mining claim, U.S. Survey No. 3528;

thence along line 3-4 of said Detroit lode mining claim North 43° 39' West, 150 feet;

United States Smelting Refining and Mining Company
Western Operations
P. O. Box 1980, Salt Lake City, Utah

3. (a) continued

thence North 80° 00' East, 2494.9 feet;

thence North 37° 00' East, 1056.8 feet;

thence South 72° 00' East, 750 feet;

thence South 23° 00' West, 460 feet;

thence South 72° 00' East, 345.8 feet, more or less, to intersect line 10-11 of the Scotia lode mining claim, U.S. Survey No. 3026, said line being also part of the westerly boundary line of Item III of DMEA Project Docket No. DMEA 2028, Contract No. Idm-E-360, as amended by Amendment No. 4, dated July 2, 1954;

thence along said line 10-11 of said Scotia lode mining claim, and, in part, along said westerly boundary of said DMEA Project, South 30° 49' West, 752.2 feet, more or less, to intersect line 2-3 of the Silver Star lode mining claim, U.S. Survey No. 4138;

thence along said line 2-3 of said Silver Star lode mining claim South 0° 51' East, 831.9 feet, more or less, to Corner No. 3 of said claim;

thence along line 3-4 of said claim, identical, in part, with line 2-3 of the G. H. Amended lode mining claim, U.S. Survey No. 7019, North 89° 09' East, 402.9 feet, more or less, to Corner No. 3 of said G. H. Amended lode mining claim;

thence along line 3-4 of said claim South, 523.3 feet, more or less, to intersect line 5-4 of said Mednight Bell No. 1 lode mining claim, U.S. Survey No. 5609;

thence along said line 5-4 of said Mednight Bell No. 1 lode mining claim South 35° 51' West, 711.2 feet, more or less, to Corner No. 4 of said claim, the point of beginning.

Vertical Limit

The upper vertical limit of the project is 200 feet vertically below bedrock.

No lower vertical limit.

- - - - -

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

3. (a) continued

thence North 82° 00' East, 2540 feet;

thence North 28° 30' East, 500 feet;

thence South 73° 00' East, 270 feet;

thence North 23° 00' East, 500 feet;

thence South 73° 00' East, 600 feet;

thence South 23° 00' West, 500 feet;

thence South 73° 00' East, 339.2 feet, more or less, to intersect line 10-11 of the Scotia lode mining claim, U.S. Survey No. 3026, said line being also part of the westerly boundary line of Item III of DMEA Project Docket No. DMEA 2028, Contract No. Idm-E-360, as amended by Amendment No. 4, dated July 2, 1954;

thence along said line 10-11 of said Scotia lode mining claim, and, in part, along said westerly boundary of said DMEA Project, South 30° 49' West, 663.9 feet, more or less, to intersect line 2-3 of the Silver Star lode mining claim, U.S. Survey No. 4138;

thence along said line 2-3 of said Silver Star lode mining claim South 0° 51' East, 831.9 feet, more or less, to Corner No. 3 of said claim;

thence along line 3-4 of said claim, identical, in part, with line 2-3 of the G.H. Amended lode mining claim, U.S. Survey No. 7019, North 89° 09' East, 402.9 feet, more or less, to Corner No. 3 of said G.H. Amended lode mining claim;

thence along line 3-4 of said claim South, 523.3 feet, more or less, to intersect line 5-4 of said Mednight Bell No. 1 lode mining claim, U.S. Survey No. 5609;

thence along said line 5-4 of said Mednight Bell No. 1 lode mining claim South 35° 51' West, 711.2 feet, more or less, to Corner No. 4 of said claim, the point of beginning.

Vertical Limit

The upper vertical limit of the project is 200 feet vertically below bedrock.
No lower vertical limits.

- - - - -

See revised Page 4

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

3. (b) U.S. and Lark Mine of United States Smelting Refining and Mining Company.

3. (c) Owner of project area.

3. (d) -

3. (e) None

3. (f) One unpatented claim: Recorded in Salt Lake County:

	LOCATION	
	Book	Page
Dandy Fraction	K	387

4. Physical Description:

4. (a) The project block lies in an area of extensively fissured Pennsylvanian limestones and quartzites which adjoin the Last Chance stock on the south. Fissures, or veins, within the stock and limestone replacement deposits just north of the stock constituted some of the early ore discoveries of the district; in fact, the old Jordan claim, located in 1863, and the first location in territory which later became the State of Utah, lies within and north of the stock. From mines in adjacent areas has come a substantial part of some 16,000,000 tons of lead-zinc ore produced from the Bingham district. The project under consideration is to drive southerly on the Bingham Tunnel level (U.S. Section 1000 Level) to explore, within a prominent fissure zone, the series of limestones which has been productive north of the Last Chance Stock. The fissure zone in which the work is planned extends southwesterly from the heart of the Bingham district.

The existing usable facilities, equipment, buildings, or structures, owned by United States Smelting Refining and Mining Company, that will be devoted to the exploration work follows:

All the surface facilities of the U.S. and Lark Mine, including the surface plant, which includes:

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

4. (a) continued

Machine and electrical shops and equipment
Blacksmith and steel shops and equipment
Framing mill and equipment
General Offices
Warehouses
Engineering and geological offices

all completely equipped for 1200 tons per day operation, together with such mine equipment as rock drills, mucking machines, jumbos, haulage locomotives, mine cars, pumps and hoisting equipment.

Access to this project is gained from surface through the Bingham Tunnel.

4. (b) Past and Present Production, Ore Reserves, Grades:

Refer to Form MF-100 filed May 23, 1951 with Defense Minerals Administration (now DMEA). Given Serial No. 0139 by government agency.

4. (c) Geology (maps and section attached)

Within the large area of limestones and quartzites there are prominent and persistent northeasterly-striking fissures which are locally identified with surface exposures of oxidized iron, manganese, lead, zinc and silver minerals. These fissures lie in a wide belt which covers the U.S. Section of the U.S. and Lark Mine and extends southwesterly therefrom. The fissures are predominantly pre-mineral and post Last Chance stock porphyry. Prominent fissuring, favorable limestones, proximityto porphyry, highly productive mines in adjacent localities, all provide a geological setting in which ore could occur in various ways: namely, along fissures, in bedded structures and as irregular replacement deposits in limestone.

Shallow workings mark the showings which attracted miners of earlier times, but the former attempts at mining and exploring near the surface were impeded by a short working season and difficult transportation over the high, rugged terrain. In conjunction with renewed examination of the area during recent summers, a road was built to provide access for lessees. On completion of the road, the lessees made two shipments of ore. The depth of the excavation in the gossan ore was five or six feet below the steeply sloping surface. One thousand feet southwest of the

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

4. (c) continued

end of the road is the Aetna lead prospect which shows lenses of high grade lead carbonate ore along a prominent northeast fissure.

The Yampa and Highland Boy limestones, famous for their productivity in the Bingham district, constitute the upper members of the sedimentary series within the project area, although here they are known by their correlative names of Commercial and Jordan limestones, respectively. Underlying these at various depths are the lower limestone members of the series which have been highly productive north of the Last Chance Stock. The dominant dip of the sedimentary beds is northerly to northwesterly, in part toward this stock, the strike being northeasterly.

Production from the U.S. Section has come from northeasterly-striking veins, or fissures, within and north of the Last Chance stock, and from steeply-dipping shoots on bedding structures north of the stock, notably exemplified by those associated with the "B" and "D" limestones. By correlation it has been shown since early day mapping (Professional Paper No. 38) that the Jordan limestone covers a large area in the locality of this project block. Stratigraphic intervals are such that the favorable "B" and "D" limestones should lie well within the range of exploration proposed on the 1000 or Bingham Tunnel levels, as shown on the accompanying plan and section. The fact that these beds lie in fissured ground, as indicated by the mineralized fissures at the surface, enhances the possibilities of there being ore shoots in the project block similar in structural control to those north of the stock.

4. (d) Accessibility

The U.S. and Lark Mine lies 25 miles southwesterly from Salt Lake City, Utah, and is connected to various points in the Salt Lake industrial area by excellent highways and a standard-gauge railroad.

Ore from the project area would be hauled in underground mine trains through the Bingham Tunnel to the Lark surface plant, from whence it would be shipped via standard-gauge railroad to the USSR&MCo mill at Midvale.

4. (e) Availability of manpower, materials, supplies, equipment, water and power.

<u>Manpower</u> Ample labor is available in the Salt Lake Valley area.

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

4. (e) continued

Materials, Supplies and Equipment Amount not on hand is readily available in nearby Salt Lake City.

Water Adequate water is available from the Town of Lark culinary water supply, the source of which is in the U.S. Section of the U.S. and Lark Mine.

Power It is estimated that the project will consume approximately 46,000 KWH per month at a cost of 1¢ per KWH.

5. The Exploration Project

5. (a) Minerals to be explored for:

Exploration will be primarily for lead and zinc, which, it is assumed will be in the unoxidized state as galena and sphalerite (or marmotite). Minor amounts of chalcopyrite, gold and silver are usually associated with the ores. These ores are expected to be found as veins, fissures, bedded structures or limestone replacement deposits.

5. (b) Proposed Work:

The following plan assumes the position of the "B" limestone to be near that shown on accompanying maps, Since this position is based on projected geology, the specific distances to various objectives are to be regarded as approximations. However, the position of the Jordan limestone is reasonably well established at the surface, and it is known from the stratigraphic section that the favorable alphabetical limestones must lie within fairly definite vertical ranges below the Jordan and therefore be in the approximate positions illustrated on the accompanying plan and section.

The project should be carried out as follows:

(1) Drive southwesterly in the zone of the Last Chance fissure an approximate distance of 950 feet or to the footwall of the "B" limestone. Short diamond drill holes from systematically-spaced stub crosscuts may be advisable to cut the main Last Chance fissure, one of the chief productive fissures of the U.S. section of the mine.

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

5. (b) continued

(2) Drive northeast about 500 feet and southwest about 1200 feet on the "B" limestone footwall bedding. From systematically-spaced diamond drill bases, drill the "B" limestone roughly fanwise as shown on the plan.

(3) From near the start of the "B" limestone drift, drive southerly about 1600 feet to the "D" limestone footwall.

(4) Drive northeasterly and southwesterly an approximate total distance of 700 feet on one or more structures in the "D" limestone, presumably near the footwall.

(5) The project will require approximately 9,000 feet of diamond drilling to be carried out in conjunction with the above exploration work. The individual holes cannot be planned before a substantial part of the drifting has been done but the general plan of the proposed drilling will be in part as illustrated on an accompanying map.

It is anticipated that drilling for objectives under the "D" limestone will be in comparatively favorable ground because limestone predominates over quartzite in the lower part of the Bingham series.

5. (c) The work will be started within 15 days and be completed within 24 months from the date of the exploration project contract.

5. (d) The applicant has been engaged in mining, milling, smelting and refining for more than 40 years.

The following person or persons will supervise the operations:

A. G. Kirkland, Manager of Western Mines
Benton Boyd, General Superintendent, U.S. and Lark Mine.

Each of these persons has had many years experience in the operation and management of mines.

- - - - -

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

SUMMARY

6. ESTIMATE OF COSTS

Drifting		
4950' at $40.46 per foot	=	$200,277.00
Diamond Drilling		
9000' at $3.57 per foot	=	32,130.00
Diamond Drill Stations		
4 at $395 each	=	1,580.00
Flume		
Enlarge flume; 6,023' length at $1.35 per foot	=	8,131.00
TOTAL ESTIMATED COST	=	$242,118.00

- - - - - -

Government's participation at 50%	=	$121,059.00

- - - - - -

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. Summary of Estimated Cost of Drifting and Diamond Drilling

		DRIFTING 4950'		DIAMOND DRILLING 9000'		TOTALS
		Total	Cost/ft	Total	Cost/ft.	
(a) Independent Contracts	None	-		-		-
(b) Labor	=	$69,110.86	$ 13.96	$15,226.92	$ 1.69	$ 84,337.78
Supervision	=	5,627.30	1.14	1,319.98	.15	6,947.28
(c) Materials and Supplies	=	67,662.20	13.67	10,350.00	1.15	78,012.20
Power	=	8,167.50	1.65	2,880.00	.32	11,047.50
Water	None	-		-		-
(d) Operating Equipment (depreciation)	=	12,039.66	2.43	1,388.09	.15	13,427.75
(e) Rehabilitation and Repairs	None	-		-		-
(f) New Buildings, etc.	None	-		-		-
(g) Miscellaneous						
Drill & Mucking Machine Repairs	=	6,336.00	1.28	-		6,336.00
Hoisting	=	14,355.00	2.90	-		14,355.00
Tramming in Bingham Tunnel	=	11,979.00	2.42	-		11,979.00
Handling Waste at Surface	=	910.73	.18	-		910.73
Engineer and Geologist	=	1,386.24	.28	346.56	.04	1,732.80
Assaying and Sampling	=	1,745.89	.35	381.10	.04	2,126.99
Accounting	=	968.83	.20	242.21	.03	1,211.04
		$200,289.21	$40.46	$32,134.86	$3.57	$232,424.07

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (a) Independent Contracts

NONE

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (b) Labor and Supervision

Months	MINERS No.	MINERS Shifts per Mo.	MINERS Labor Cost per Shift	MINERS Total Earnings per Mo.	DIAMOND DRILLER AND HELPER No.	DIAMOND DRILLER AND HELPER Shifts per Mo.	DIAMOND DRILLER AND HELPER Labor Cost per Shift	DIAMOND DRILLER AND HELPER Total Earnings	OTHERS No.	OTHERS Shifts per Mo.	OTHERS Labor Cost per Shift	OTHERS Total Earnings
1	4	92	$19.79	$ 1,820.68			$18.39		.20	4.6	$ 17.25	$ 79.35
2	4	92		1,820.68					.20	4.6		79.35
3	4	92		1,820.68					.20	4.6		79.35
4	4	92		1,820.68					.20	4.6		79.35
5	4	92		1,820.68					.20	4.6		79.35
6	4	92		1,820.68					.20	4.6		79.35
7	4	92		1,820.68					.20	4.6		79.35
8	8	184		3,641.36					.20	4.6		79.35
9	8	184		3,641.36					.20	4.6		79.35
10	8	184		3,641.36					.20	4.6		79.35
11	8	184		3,641.36	2	46	18.39	$ 845.94	.20	4.6		79.35
12	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
13	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
14	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
15	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
16	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
17	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
18	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
19	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
20	8	184		3,641.36	2	46		845.94	.20	4.6		79.35
21	8	184		3,641.36	4	92		1,691.88	.20	4.6		79.35
22	8	184		3,641.36	4	92		1,691.88	.20	4.6		79.35
23					4	92		1,691.88				
24					4	92		1,691.88				
TOTALS =		3,404		$67,365.16		828		$15,226.92		101.2		$1,745.70

Detailed Labor Cost/Shift

			Rate per Shift	
(a) Base Hourly Pay		$ 1.895		$ 1.75
(b) Base Daily Pay		15.16		13.99
(c) Shift Differential		.30	Diamond Driller $14.90	.30
(d) Rubber Money		1.00	Drill Helper 13.08	1.00
(e) Overtime on b, c & d		.75	$27.98	.70
DIRECT LABOR COST =		$ 17.21		$ 15.99
Employees Comp. Ins.	3.00%	.52	Average:	.48
Medical Expense	1.25	.22	$27.98 / 2 = $13.99	.20
State Unemployment Ins.) Federal " Ins.)	2.86	.49		.46
F.I.C.A. Tax)				
Group Ins.	2.29	.39		.37
Holiday Pay	1.72	.30		.28
Vacation Pay	2.79	.48		.45
Pensions	1.08	.18		.16
	14.99%			
INDIRECT LABOR COSTS		$ 2.58		$ 2.40
TOTAL LABOR COST PER SHIFT		$ 19.79		$ 18.39

Weighted Average of Others

				Labor Cost per Shift
				$ 1.79
.06	Framer	14.12	.8472	14.35
.04	Electrician	15.94	.6376	-
.05	Drill Doctor	14.90	.7450	-
.05	Timber Crew	12.82	.6410	.65
.20			2.8708	$ 15.00
				.45
				.19
				.43
				.34
				.26
				.42
				.16
				$ 2.25
				$ 17.25

$\frac{2.8708}{.20} = 14.35$

Supervisors	No.	Monthly Salary	Amount per Mo.
Mine Superintendent	.02	$900.	$ 18.00
Gen. Mine Foreman	.04	610.	24.40
Foremen (2 at .22% of time)	.44	505.	222.20
Total direct Supervisors	.50		264.60
Total indirect Supv. 9.4%			24.87
Total Cost Per Month	=		$289.47
Total Cost for 24 Months			$6,947.28

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (c) Operating Materials and Supplies
Power, Water and Fuel.

	Drifting and Crosscutting 4950'		Diamond Drilling 9000'	
	Cost/ft	Cost	Cost/ft	Cost
Materials and Supplies:				
Explosives	$2.95	$14,602.50		
Ground Support	3.02	14,949.00		
Drill Steel and Bits	1.71	8,464.50		
Tools, Hoses and Other	1.40	6,930.00		
Track - 30#	1.95	9,640.20		
Pipe - 1" water pipe; 3" air line	1.06	5,246.00		
Vent Pipe - 16"	1.58	7,830.00		
Diamond Drill Supplies			$1.15	$10,350.00
Total =	$13.67	$67,662.20	$1.15	$10,350.00
Power	$ 1.65	$ 8,167.50	$0.32	$ 2,880.00

Water No charge

Fuel No charge

United States Smelting Refiming and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (d) Operating Equipment Depreciation
(no operating equipment purchased)

No.			Cost	Depreciated Value		Monthly Depreciation 1/60 of Value	Distribution Factor	Depreciation per Mo.	Number of Months	Total Depreciation	Charge to Drifting	Charge to Diamond Drilling
	For Drifting and Crosscutting											
2	Battery Trammers complete with battery and M.G. set; at $10,040 ea	=	$ 20,080.00	50%	$10,040.00	167.33	1.0	167.33	22	$ 3,681.26	$ 3,681.26	$ -
18	36 cu.ft. mine cars at $558.75 ea	=	10,057.50	75%	7,543.13	125.72	1.0	125.72	22	2,765.84	2,765.84	-
2	15HP fans at $1,010 each	=	2,020.00	75%	1,515.00	25.25	1.0	25.25	24	606.00	484.80	121.20
4	J38 Jackhammers and legs at $750 ea	=	3,000.00	100%	3,000.00	50.00	1.0	50.00	22	1,100.00	1,100.00	-
2	Eimco 12B loaders at $3,028 each	=	6,056.00	75%	4,542.00	75.70	1.0	75.70	22	1,665.40	1,665.40	-
2	Cherry pickers at $250 each	=	500.00	75%	375.00	6.25	1.0	6.25	22	137.50	137.50	-
	Compressor Plant) Hoist) see below *											
	For Diamond Drilling											
2	Diamond drills at $3,517 each	=	7,034.00	80%	5,627.20	93.79	1.0	93.79	9	844.11	-	844.11
	*					Monthly Depreciation 1/240 of Value (20-year period)						
	Compressor Plant	=	259,108.00	90%	233,197.20	971.66	.049	47.61	24	1,142.64	719.86	422.78
	Hoist	=	50,000.00	90%	45,000.00	187.50	.36	67.50	22	1,485.00	1,485.00	-
										$13,427.75	$12,039.66	$1,388.09
											avg $2.43/ft drifting	Avg 15¢/ft diamond drilling

Compressor plant consists of 4 new, Worthington air compressors: Type FV; 32", 21" x 25"; 800 HP motors; Each compressor has a capacity of 4500 cfm at 115 psi. Placed in operation in 1953.

Hoist is a new Nordberg double drum; 5' diameter, 3' face; 250HP motor. Placed in operation in 1953.

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (e) Rehabilitation and Repairs to Buildings, Installations, Fixtures

NONE

6. (f) New Buildings, Improvements, Installations

NONE

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (g) Miscellaneous

		Drifting 4950'		Diamond Drilling 9000'	
		Cost/ft	Total	Cost/ft	Total
Drill and Mucking Machine Repairs	=	$ 1.28	$ 6,336.00		
Hoisting	=	2.90	14,355.00		
Tramming in Bingham Tunnel	=	2.42	11,979.00		
Handling Waste at Surface	=	.18	910.73		
Engineer and Geologist	=	.28	1,386.24	$ .04	$ 346.56
Assaying and Sampling	=	.35	1,745.89	.04	381.10
Accounting	=	.20	968.83	.03	242.21
		$7.61	$37,681.69	$ .11	$ 969.87

- - - - -

Workmen's Compensation
Employers Liability Insurance
Payroll Taxes

included under "Indirect" under Labor and Supervision, and shown on 6. (b), Page 12.

- - - - -

Engineer and Geologist

		Number	Monthly Salary	Amount/month on Project
Engineer	=	.06	$500.00	$ 30.00
Geologist	=	.06	600.00	36.00
Total Direct Cost	=			66.00
Total Indirect 9.4%	=			6.20
Total Cost per Month	=			$ 72.20
Total Cost for 24 months	=			$1,732.80

- - - - -

Accounting

		Number	Monthly Salary	Amount/month on Project
Chief Clerk	=	.04	$575.00	$ 23.00
Time Keeper	=	.06	385.25	23.12
Total Direct Cost	=			46.12
Total Indirect 9.4%	=			4.34
Total Cost per Month	=			$ 50.46
Total Cost for 24 months	=			$1,211.04

- - - - -

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (g) Miscellaneous - continued

Assaying and Sampling		Number	Monthly Salary	Amount/month on Project
Sampler	=	.05	$375.00	$ 18.75
	Total Direct Cost	=		18.75
	Total Indirect 9.4%	=		1.76
	Total Cost per Month	=		$ 20.51
	Total Cost for 24 Months	=		$492.24

Sampling in drifting: Assume 1/2 of advance is on structure; 4950 divided by 2 = 2475' to be sampled at 6' intervals or a total of 413 samples will be taken in drifting.

Assume one sample to be taken in every 100' of diamond drilling; 9,000' of diamond drilling would provide 90 samples.

Total of 503 samples; drifting and diamond drilling.

Assaying: $3.25 cost per sample.

503 samples x $3.25 = $1,634.75 total assaying cost.
492.24 sampling cost
$2,126.99 total assaying and sampling cost

- - - - -

Diamond Drill Stations

4 at $395 each = $1,580 total estimated cost.

12' in length and drift size.
12' x $32.85/ft = $394.20; say $395.

$32.85/ft is cost/ft of drifting ($40.46) minus cost/ft of track, pipe, vent pipe and timbering - all of which are not necessary in diamond drill station.

The four diamond drill stations will be located at points in proposed drifting considered geologically favorable by geologist.

- - - - -

United States Smelting Refining and Mining Company
Western Operations
P.O. Box 1980, Salt Lake City, Utah

6. (h) Contingencies

Flume

Enlarge 6,023' of Bingham Tunnel flume at estimated cost of $1.35/ft = $8,131.05 total estimated cost.

It is necessary to increase present capacity of flume in order to handle anticipated increased water flow (estimated up to 1,000 gallons per minute) by reason of proposed exploratory work in DMEA project area.

7. Cost of Project

(a) Applicant is prepared to invest $121,059.00 in the proposed project, which is sufficient to pay applicant's part (50%) of the cost of the project, in accordance with regulations on government participation (Section 7, DMEA Order 1, Amended).

(b) Answered by (a).

- - - - -

September 27, 1955
Subject: DMEA-3993
Re: Exploration Assistance
U. S. & Lark Mine

United States Smelting Refining
and Mining Company
P.O. Box 1980
Salt Lake City, Utah

Gentlemen:

The receipt of your application dated September 7, 1955, for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-3993 and referred to the Base Metals Division.

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

Sincerely yours,

Robert E. Adams, Chief
Operations Control and
Statistics Division

Revised map transmitted by
Traver's letter to O. C. 3/26/56

lje

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

OFFICIAL BUSINESS

AUG 17
430PM
1955
TENN.

Operating Committee - D.M.E.A.
Dept. of the Interior
Washington 25, D.C.

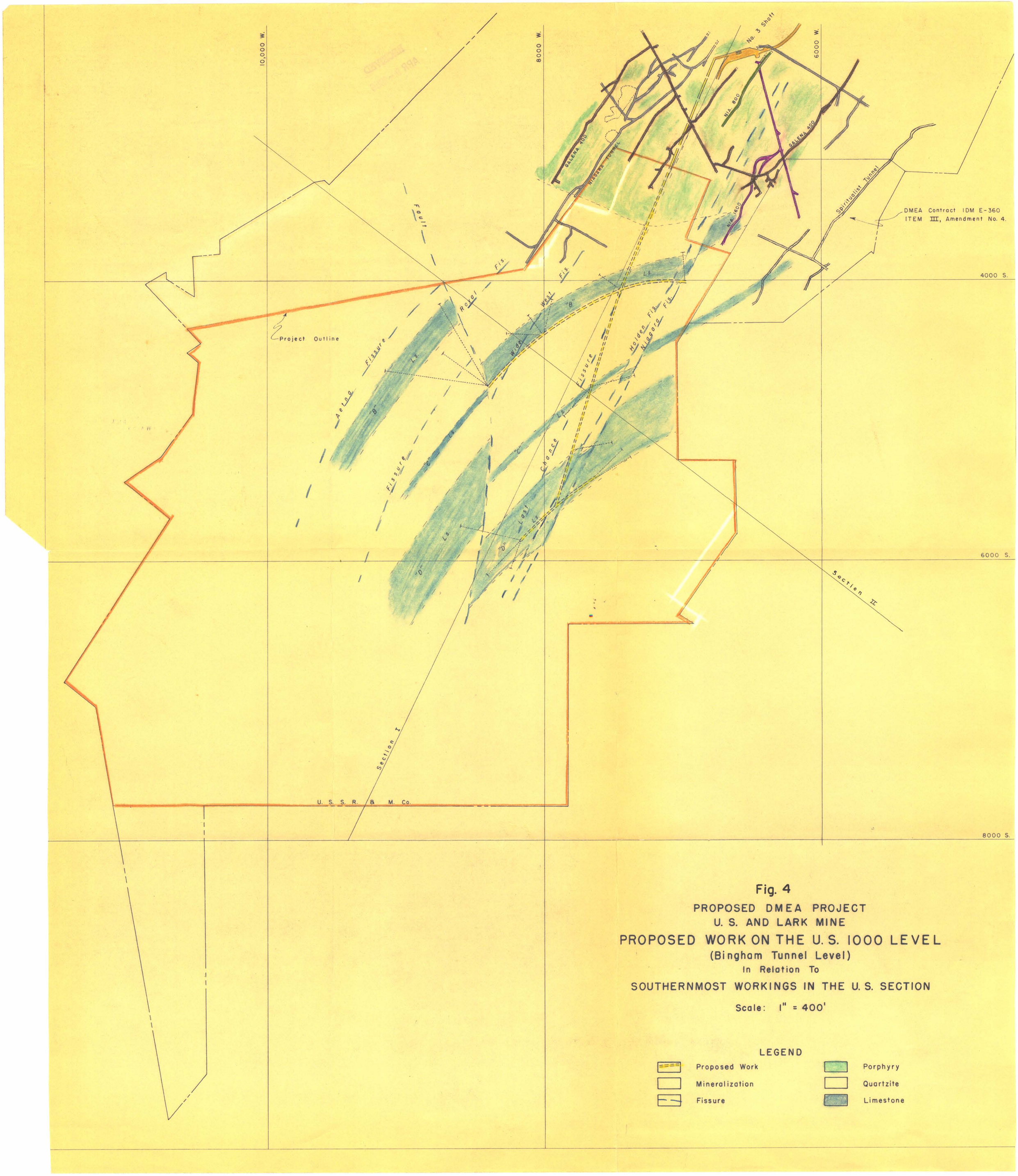


Fig. 4

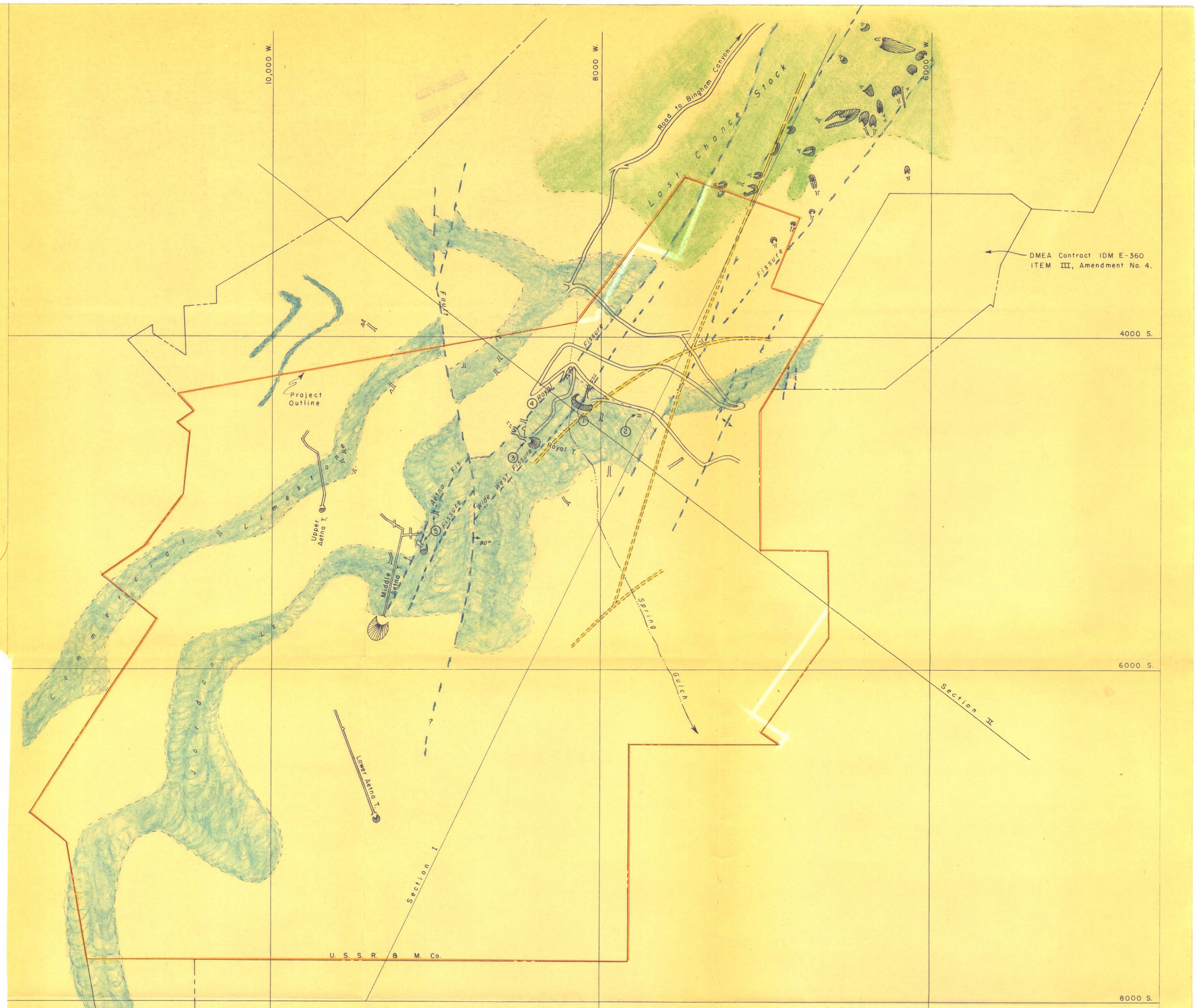
PROPOSED DMEA PROJECT
U. S. AND LARK MINE

PROPOSED WORK ON THE U. S. 1000 LEVEL
(Bingham Tunnel Level)
In Relation To
SOUTHERNMOST WORKINGS IN THE U. S. SECTION

Scale: 1" = 400'

LEGEND

	Proposed Work		Porphyry
	Mineralization		Quartzite
	Fissure		Limestone



① Old prospect above Jordan limestone. Average of 7 cut samples: .06 Oz. Au, 11.5 Oz Ag, .09% Cu, 1.4% Pb, 2.7% Zn.

② Outcrop - 2.5' cut sample: .04 Oz. Au, 1.6 Oz. Ag, .05 % Cu, 4.6 % Pb, 5.2 % Zn.

③ Average of 6 cut samples of mineralized limestone bedding: .08 Oz. Au, 7.7 Oz. Ag, .08 % Cu, 1.2 % Pb, 1.8 % Zn.

④ Oxidized silver ore with minor lead and zinc.

⑤ Irregular spots of lead ore on irregular fissure (up to 30% Pb).

Fig. 3

PROPOSED DMEA PROJECT
U. S. AND LARK MINE
MAP OF SURFACE
AND
PROPOSED WORK ON THE U. S. 1000 LEVEL
(Bingham Tunnel Level)

Scale: 1" = 400'

LEGEND

- Proposed Work
- Mineralization
- Fissure
- Porphyry
- Quartzite
- Limestone

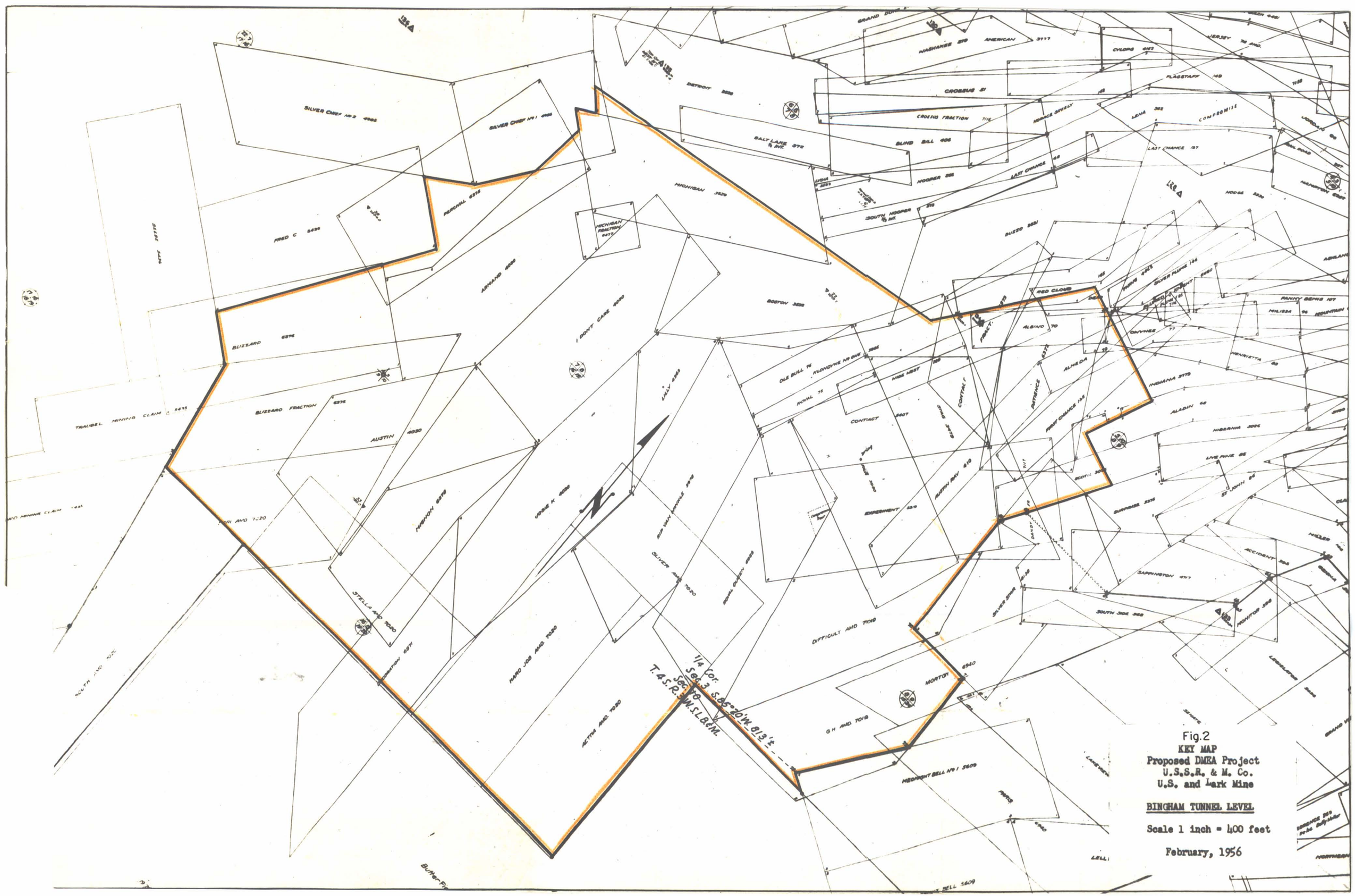


Fig.2
KEY MAP
Proposed DMEA Project
U.S.S.R. & M. Co.
U.S. and Lark Mine

BINGHAM TUNNEL LEVEL

Scale 1 inch = 400 feet

February, 1956

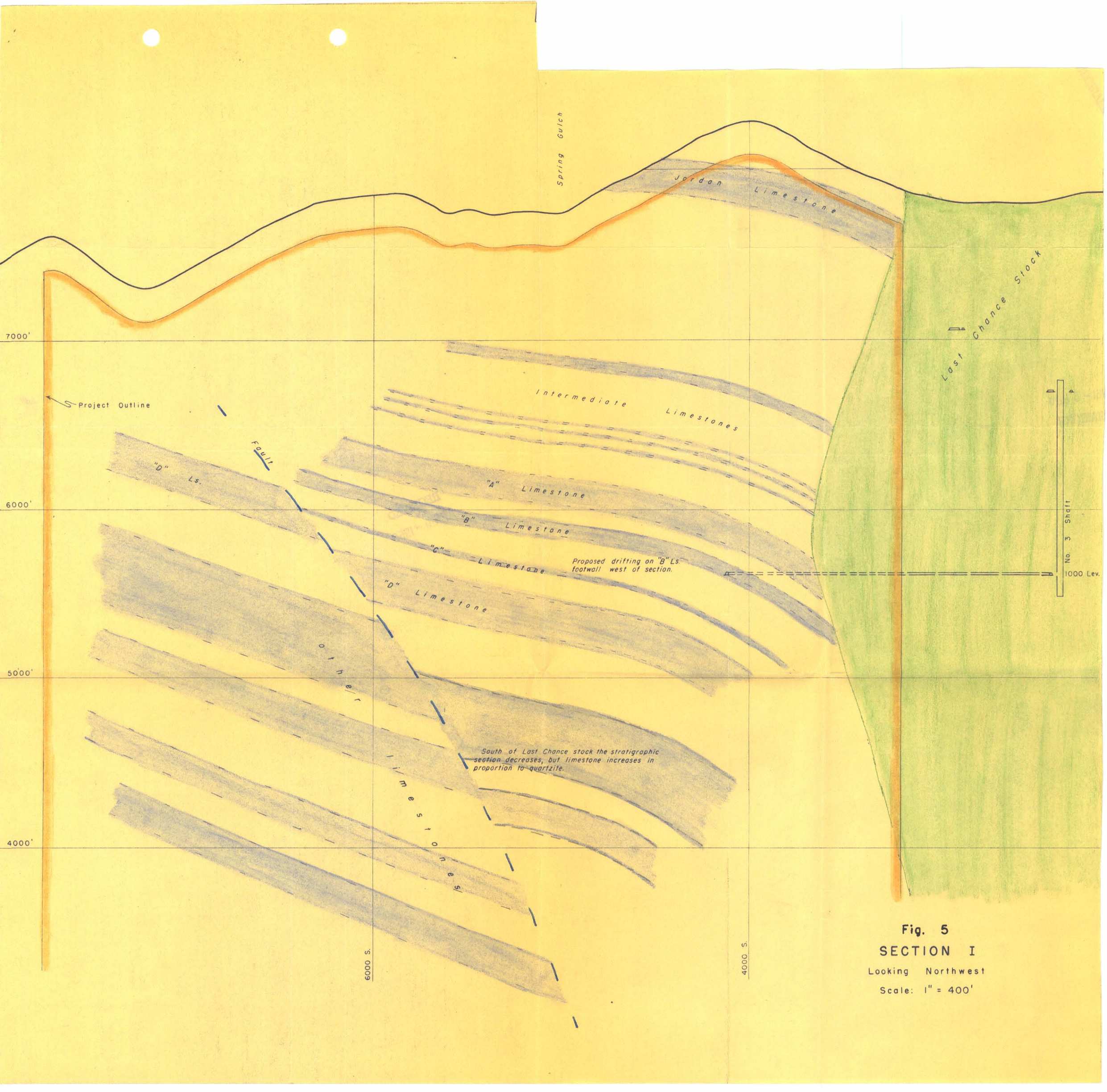


Fig. 5

SECTION I

Looking Northwest

Scale: 1" = 400'

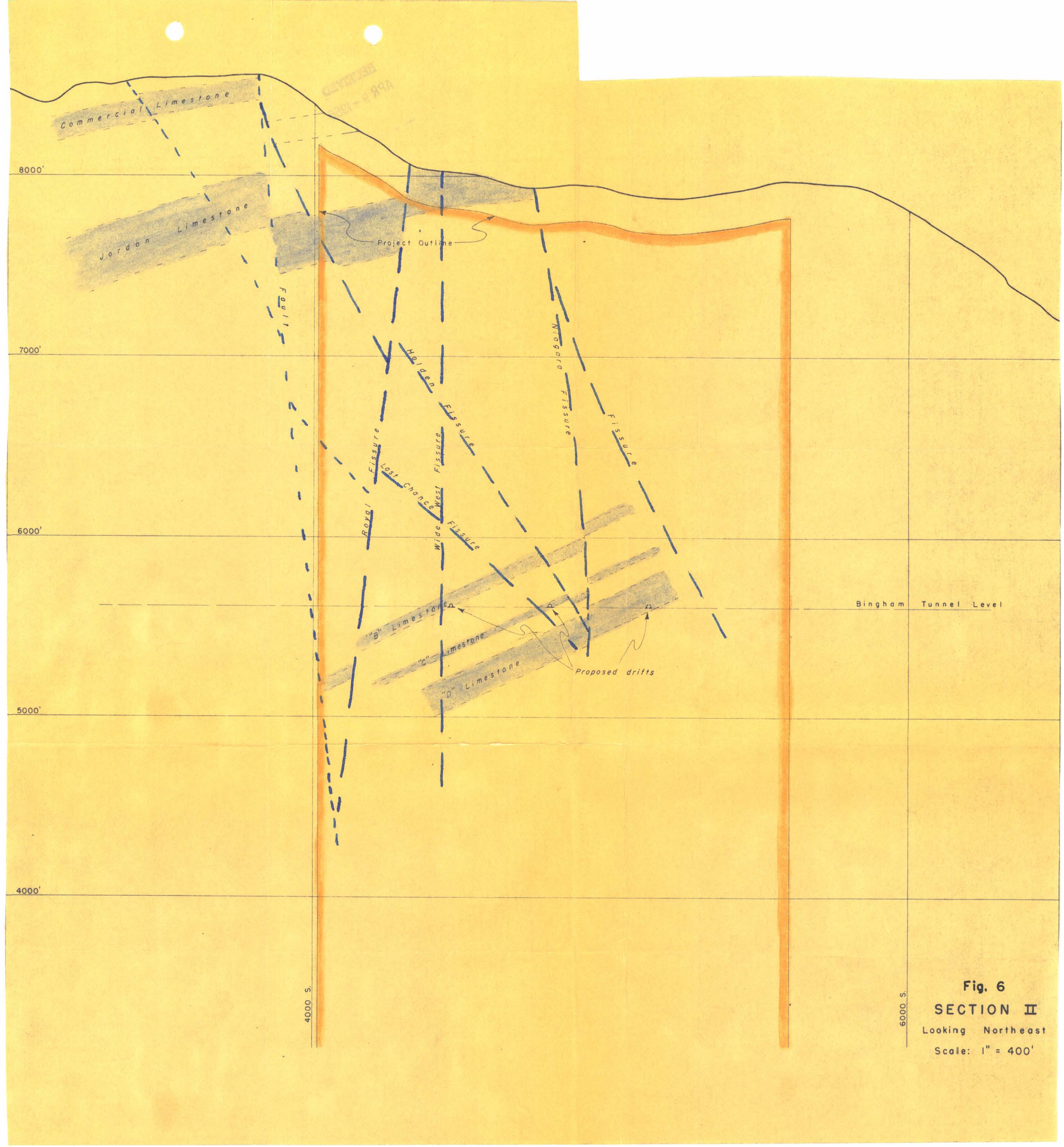
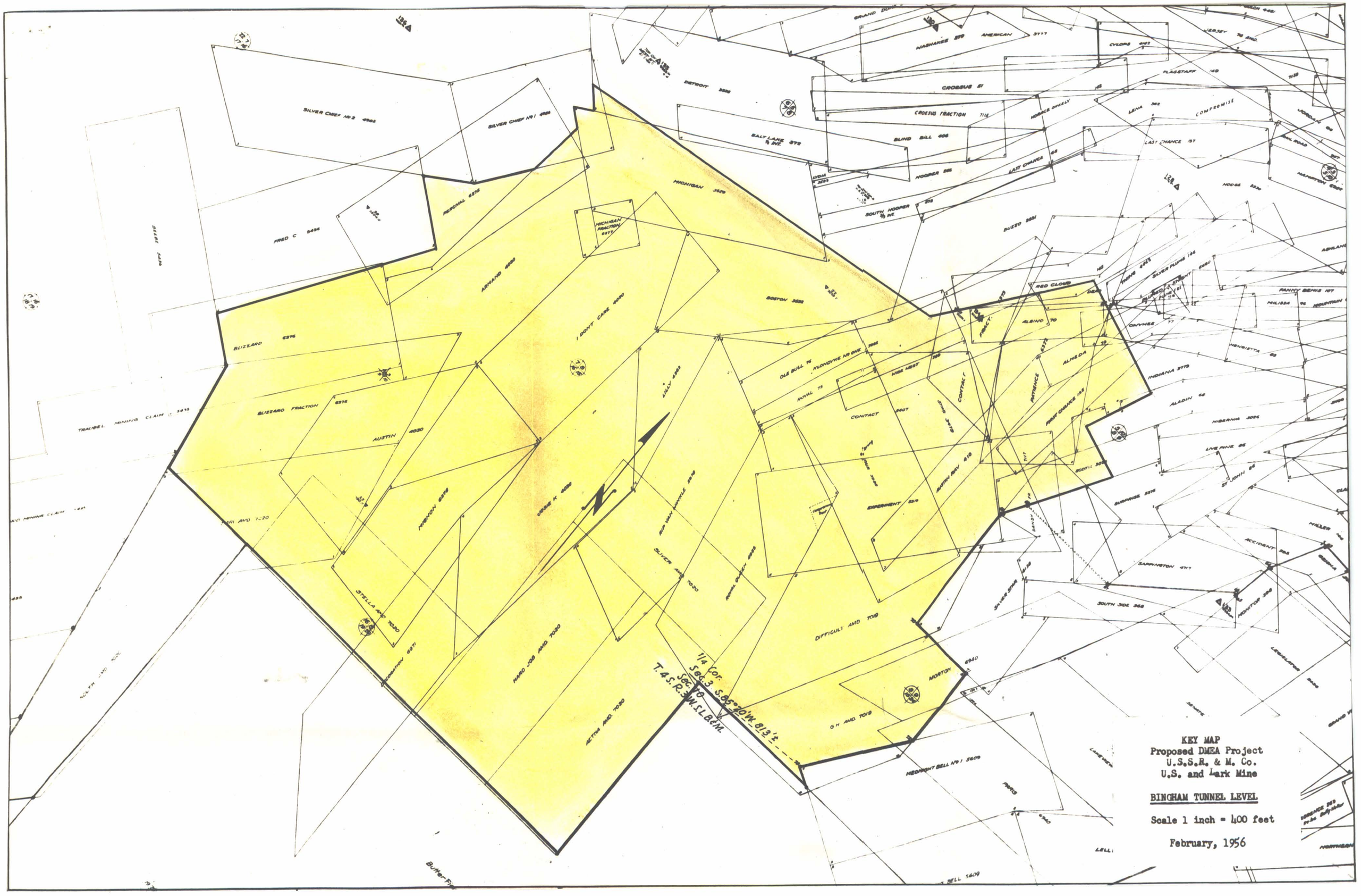
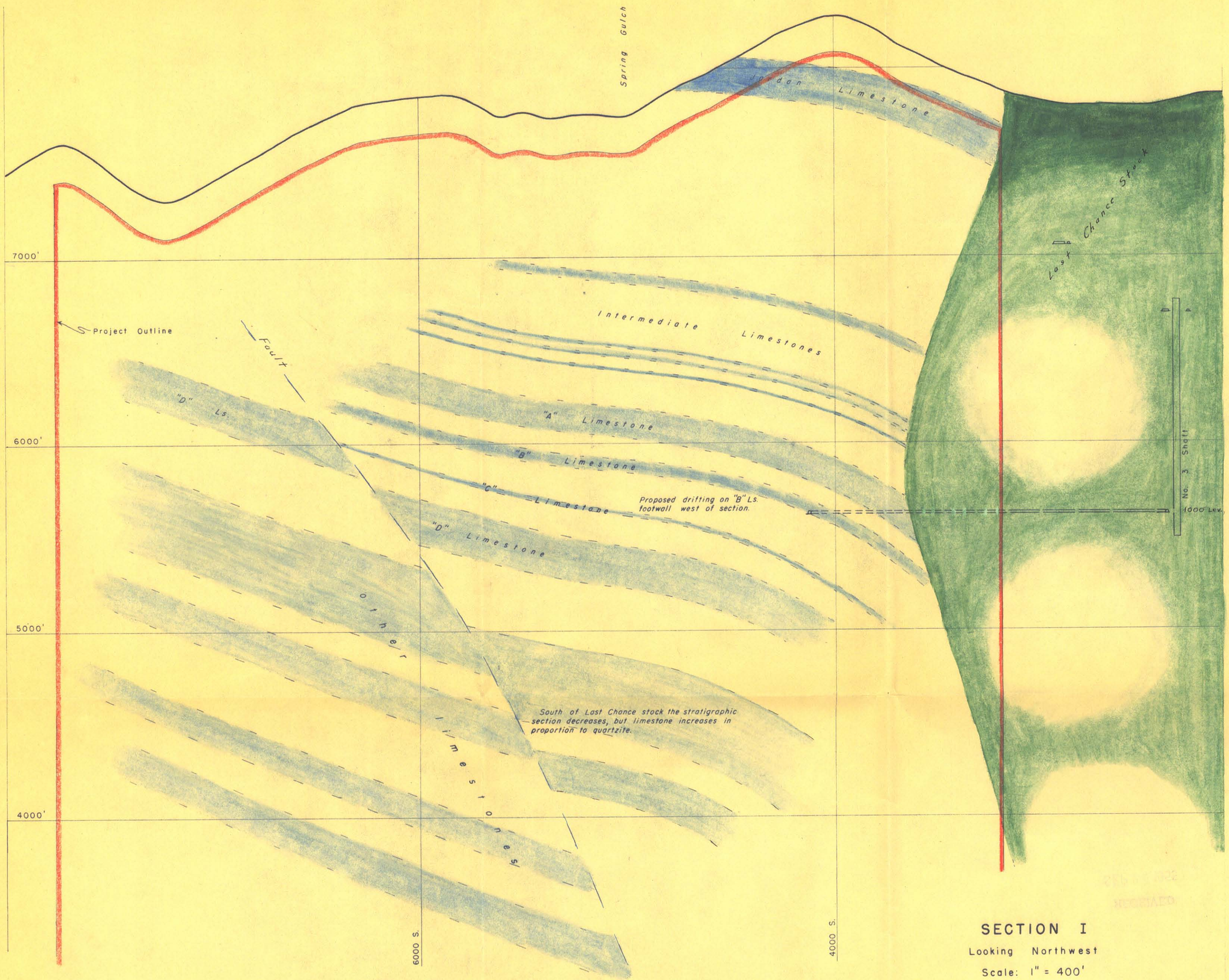


Fig. 6
SECTION II
Looking Northeast
Scale: 1" = 400'

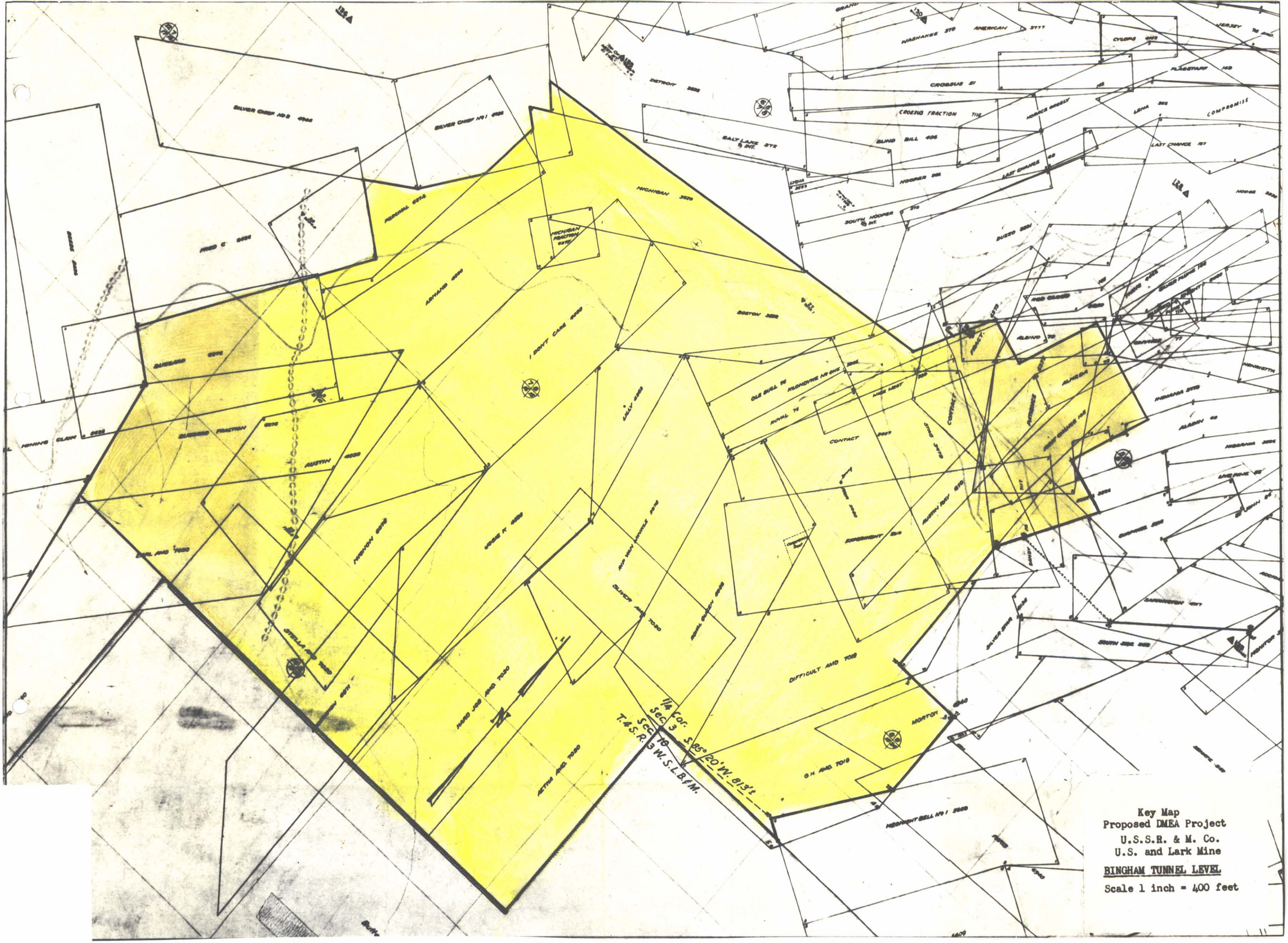

KEY MAP
Proposed DMEA Project
U.S.S.R. & M. Co.
U.S. and Lark Mine
BINGHAM TUNNEL LEVEL
Scale 1 inch = 400 feet
February, 1956
1/4 Cor. Sec. 3 S.85°10'W. 813'±
Sec. 10 T.4S.R.3W.S.L.B&M.
SILVER CHIEF No 2
SILVER CHIEF No 1
FRED C
PERCIVAL
MICHIGAN
MICHIGAN FRACTION
ARMAND
BOSTON
I DON'T CARE
BLIZZARD
BLIZZARD FRACTION
AUSTIN
LILLY
OLE BULL
KLONDYKE No ONE
ROYAL
CONTACT
HIDE NEST
CONTACT FRACT.
ALBINO
ALADDIN
INDIANA
HIBERNIA
LIVE PINE
ST JOHN
SURPRISE
ACCIDENT
SAPPINGTON
SOUTH SIDE
MONITOR
SILVER STAR
DIFFICULT AND TOID
MORTON
G H AND TOID
HARD JOB AND TOID
STELLA AND TOID
ALTHA AND TOID
MIDNIGHT BELL No 1
PARIS
TRAUBEL MINING CLAIM
GRAND DUKE
DETROIT
SALT LAKE
HASHAKEE
AMERICAN
CYCLONE
JERSEY
CROESUS
CROESUS FRACTION
BLIND BILL
HOPPER
SOUTH HOPPER
LAST CHANCE
FLAGSTAFF
LENA
COMPROMISE
HORACE GREELY
BUZZO
RED CLOUD
SILVER PLUME
ONYMER
HENRIETTA
PANNY BEMIS
MILISSA
MOUNTAIN
ALADDIN
HILLER
SILVER



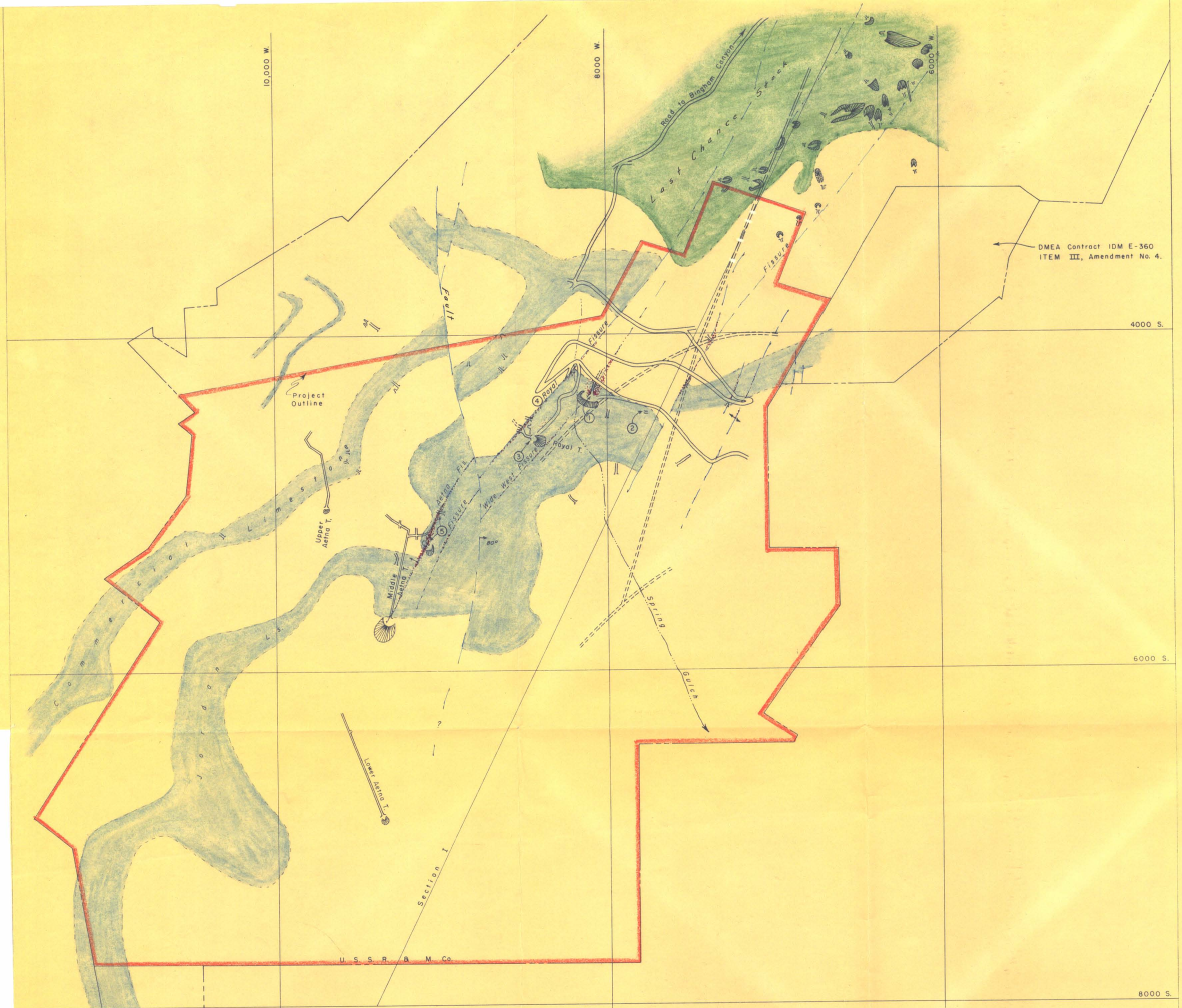
SECTION I

Looking Northwest

Scale: 1" = 400'



Key Map
Proposed DMEA Project
U.S.S.R. & M. Co.
U.S. and Lark Mine
BINGHAM TUNNEL LEVEL
Scale 1 inch = 400 feet



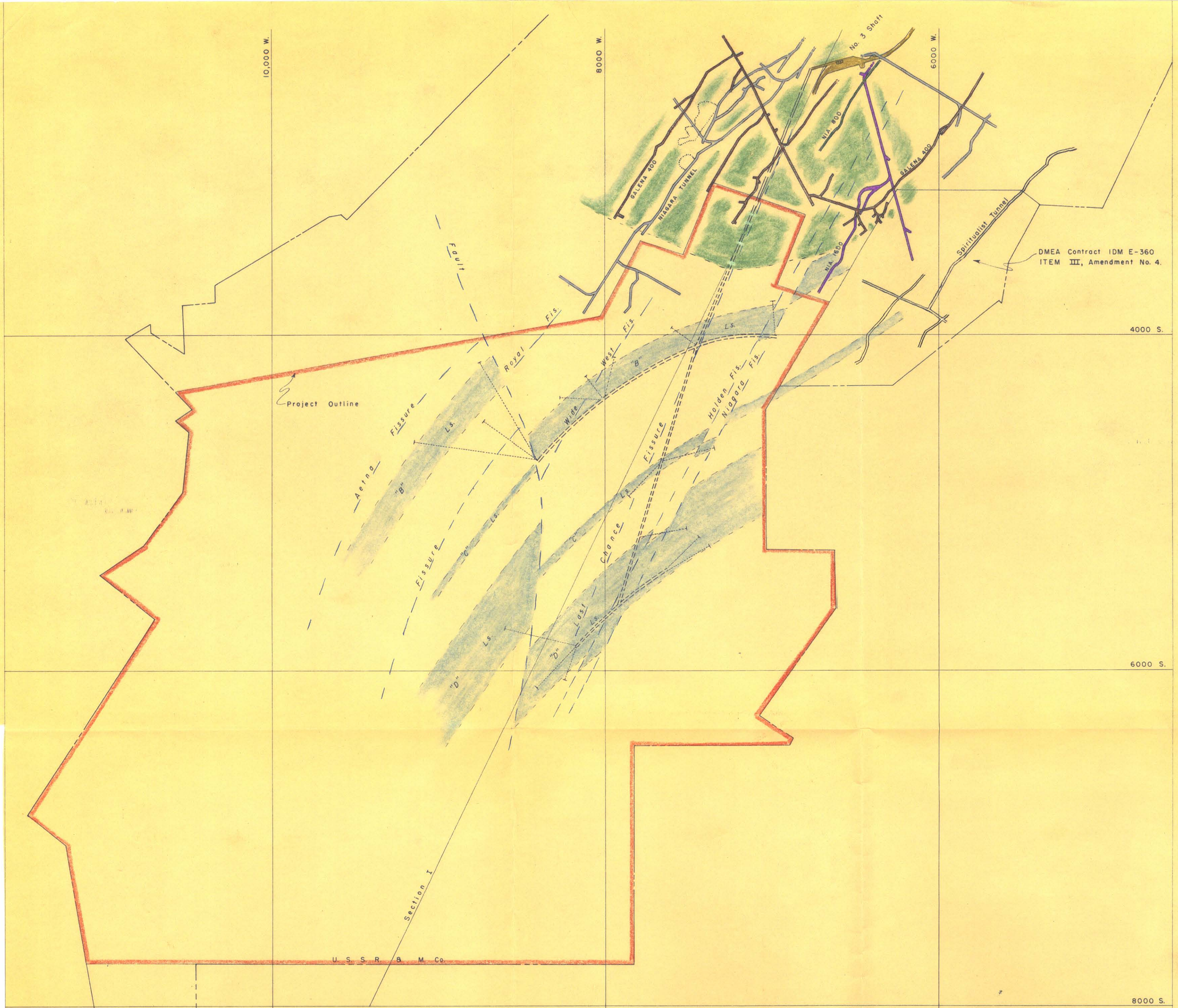
1. Old prospect above Jordan limestone. Average of 7 cut samples: .06 Oz. Au, 11.5 Oz Ag, .09% Cu, 1.4% Pb, 2.7% Zn.
2. Outcrop - 2.5' cut sample: .04 Oz. Au, 1.6 Oz. Ag, .05% Cu, 4.6% Pb, 5.2% Zn.
3. Average of 6 cut samples of mineralized limestone bedding: .08 Oz. Au, 7.7 Oz. Ag, .08% Cu, 1.2% Pb, 1.8% Zn.
4. Oxidized silver ore with minor lead and zinc.
5. Irregular spots of lead ore on irregular fissure (up to 30% Pb).

PROPOSED DMEA PROJECT
U. S. AND LARK MINE
MAP OF SURFACE
AND
PROPOSED WORK ON THE U. S. 1000 LEVEL
(Bingham Tunnel Level)

Scale: 1" = 400'

LEGEND

- Proposed Work
- Mineralization
- Fissure
- Porphyry
- Quartzite
- Limestone



PROPOSED DMEA PROJECT
U. S. AND LARK MINE

PROPOSED WORK ON THE U. S. 1000 LEVEL

(Bingham Tunnel Level)
In Relation To
SOUTHERNMOST WORKINGS IN THE U. S. SECTION

Scale: 1" = 400'

LEGEND

Proposed Work	Porphyry
Mineralization	Quartzite
Fissure	Limestone