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

No file

REGIONAL DIRECTOR'S OFFICE REGION IV MAR 1 1951

March 6, 1951

Hon. Carl Hayden
United States Senate
Washington 25, D. C.

In replying please refer to Docket DMA-104

My dear Senator Hayden:

In reply to your letter of February 21, concerning application by Dr. Victor Gould for federal assistance under provisions of the Defense Production Act of 1950:

During the early part of January, Ernie W. Watson, engineer representing Dr. Gould, conferred with members of the Defense Minerals Administration, Lead-Zinc Branch regarding Dr. Gould's application and the types of federal aid available to him. Following these conferences, he informed the Lead-Zinc Branch that Dr. Gould and associates had obtained private financing for their mining venture and, therefore, would not require Government assistance. As a result of this information, further processing of Dr. Gould's application was suspended.

If Dr. Gould wishes reconsideration of his application, I shall be pleased to arrange to see that such action is taken.

Copies of Dr. Gould's correspondence are returned herewith as requested.

Sincerely yours,

JAMES BOYD

Administrator

Enclosures 3

Executive Officer, Field Team, Region IV
2 copies to Mr. J. H. Last, Jr.
and
Mr. A. H. Koschmann
224 New Customhouse
Denver 2, Coloradio

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

March 6, 1951

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United States Senate
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In replying please
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and
Mr. A. H. Koschmann
224 New Customhouse
Denver 2, Coloradio

Mining Division
Data Unit
DEC 21 1950
BUREAU OF MINES
Denver, Colorado

December 18, 1950

Victor L. Gould, M. D.
Box 404
Chula Vista, Calif.

My dear Dr. Gould:

Enclosed find the supplementary questionnaire form mentioned in your recent conversation with our Mr. I. A. Stewart. Please note that the completed forms and supplementary information may be sent either to Denver or to Washington.

Sincerely yours,

Walter R. Storms, Chief
Arizona-New Mexico Branch

CC P. T. Allsman
462.1
DF

WRStorms:frj

Form 6–98

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

U. S. GOVERNMENT PRINTING OFFICE 16—53493-2

Mining Division
Region IV

April 21, 1958

Memorandum

To: Field Team, Region IV

From: Acting Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 164, Cerbalis Zinc-Lead-Copper Group, Turquoise Mining District, Cochise County, Arizona

Enclosed are nine copies of the final report on the Cerbalis Group.

The examining engineers found a lack of sufficient ore reserves to justify erection of a processing plant or to warrant the rehabilitation of the mine.

We concur in the recommendation of the examining engineers that the application be denied.

W. H. King
W. H. King

Enclosures

HMC:oc
cc: DMA Subject, Chron.
Koschmann (2)

W.H.K.

Mining Division
Date Rec'd.

APR 2 - 1952

BUREAU OF MINES
Denver, Colorado

MINING DIVISION
REGION IV

March 31, 1952

Memorandum

To : Carl Rampacek, Tucson, Arizona

From : W. R. Storms, Tucson, Arizona

Subject ; DMA Docket 104, Treatment of Zinc Carbonate Ores -, Costello Group, Turquoise Mining District, Cochise County, Arizona.

Applicant Victor L. Gould of Chula Vista, California requests a Government loan of $300,000.00 to reopen, rehabilitate and equip the Costello mine, and construct a plant for the treatment of the zinc carbonate ores remaining in the mine.

Applicant is asking for a concentration plant, consisting of electrostatic units. as well as concentrating tables; this to be complemented by roasting to recover zinc oxide for shipment to a fuming plant.

Our examining team confesses complete ignorance of the electrostatic treatment of zinc carbonate ores, and would appreciate some help from the Metallurgical Division. The cost, the feasibility and the general practicability of such a plant would be of prime interest to them, and your opinion, in this matter, in writing, would be greatly appreciated.

Walter R. Storms

CC W. H. King
DMA-104
DF

RStorms:frj

J.F.A.
WHK

STANDARD FORM No. 14
APPROVED BY THE PRESIDENT
MARCH 10, 1926

W.H.K. Albert Tombstone Dave

TELEGRAM

OFFICIAL BUSINESS—GOVERNMENT RATES

FROM Walter R. Storms

BUREAU U. S. Bureau of Mines

CHG. APPROPRIATION Full Rate DMA

Tucson, Arizona, March 3, 1952

U. S. GOVERNMENT PRINTING OFFICE 10—1723

Phoned 1.58 p.m. frj

Mr. E. W. Watson
Rosetree Inn
Tombstone, Ariz.

Retel our engineers Kumke and Brown will meet you in Tombstone about ten tomorrow morning.

WRS

Walter R. Storms

CC E. W. Watson
~~W. H. King~~
DMA-104
~~ETC~~ T.G.

WRStorms:frj

Mining Division
Date Rec'd.

MAR 5 - 1952

BUREAU OF MINES
Denver, Colorado

Mining Division
Date Rec'd.

[illegible] 1952

BUREAU OF [illegible]
Denver, Colorado

MINING DIVISION
REGION IV

February 28, 1952

Re: DMA Docket 104,
Costello Group
Turquoise District
Cochise County, Ariz.

Dr. Victor L. Gould, M.D.
278-A 3rd Ave.
Chula Vista, Calif.

My dear Dr. Gould:

Our examining team is ready to examine your Costello group of mining claims next week in connection with your application for a Government production loan.

Please advise me by wire if you can meet them here in Tucson next Tuesday and go with them to your mining property in the Courtland-Gleeson area.

Sincerely yours,

Walter R. Storms, Chief
Arizona-New Mexico Branch

CC W. H. King
C. A. Anderson
DMA-104
DF

WRSTORMS:frj

DEFENSE MATERIALS PROCUREMENT AGENCY
WASHINGTON 25, D. C.

JAN 17 1952

Dr. Victor L. Gould
278 - A Third Avenue
Chula Vista, California

Re: DMA-104

Dear Mr. Gould:

This will acknowledge receipt of your letter of November 3, 1951 to Mr. Howard Young, concerning the Costello and other properties, Cochise County, Arizona.

We have referred your docket material to Mr. J. H. East, Jr., Executive Officer of Field Team, 224 New Customhouse, Denver 2, Colorado, for further information and advice regarding certain technical aspects of your proposal.

After we receive this data, further consideration can be given to your proposed operation.

Sincerely yours,

Tom Lyon
Tom Lyon, Director
Program Development Division

ELNewcomb:pk
1/10/52

Copy to: Mr. Young
Mr. Feiss
Mr. Douglas
Mr. Lyon
Field Team IV
Mr. Johnson 7010
DMPA Files

WE W.K.K.

224 New Customhouse
Denver 2, Colorado

February 6, 1952

Memorandum

To: W. R. Storms (with brochure)

(Through Acting Chief, Mining Division, Region IV)

C. A. Anderson

From: Field Team, Region IV

Subject: Docket DMA 104, Costello Group, Courtland-Gleason District, Dragoon Mts. District, Cochise County, Arizona (Zinc-Copper-Silver)

Enclosed is the subject docket material for the above application. A copy of Mr. Johnson's letter transmitting the brochure to this office is also enclosed.

We do not agree with the final paragraph of Mr. Johnson's letter and suggest that a regular field examination should be made and a report prepared.

J. H. East, Jr.

A. H. Koschmann

Enclosures

WHK:lk

cc: Docket, chron.
Koschmann

King
Pls discuss
with me
DE

Form 6-95

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

REFERENCE SLIP

DATE 1/21/52

REFERRED TO:

1. [redacted]
2. W.H.K.
3.
4.

FOR:

..... Action	..... Recommendation
..... Approval	..... Record of .....
..... Comment	..... Referring to .....
..... Conference	..... Reply for signature of .....
..... Consideration	..... Rewriting
..... Filing	..... Signature
..... Instructions	..... Suggestions
..... Investigation	..... Your information
..... Initials	
..... Mailing	
..... Previous correspondence	

REMARKS: Brochure, DMA 104, Costello Group and other claims in Courtland-Gleeson District, Dragoon Mts. District, Chochise County Ariz., Loan $300,000, Sinc, Copper, Silver

Check (X) before the items needing attention.

Initials of sender.

GPO 16—51162-1

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

JAN 16 1952

Re: DMA-104
Costello Group and other claims
in the Courtland-Gleeson
District
Dragoon Mts. District
Cochise County, Arizona
Loan - $300,000
Zinc, copper, silver

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

Dear Mr. East:

We are forwarding the enclosed docket material pertaining to the subject properties to your office for comment and advice.

The Geological Survey Commodity Group believe that the applicant's reserve estimates are very questionable. However, even if the reserves should prove to be adequate the proposed metallurgical treatment plan has varied so from letter to letter as to suggest that the applicant is not a competent judge of what can be a successful operation.

The applicant states that Mr. Stewart, of the Bureau's Tucson office, is familiar with the properties and the proposition outlined in his letter.

If the proposed operation has any merit at all, we will be glad to obtain completed application forms for the field team's use. However, we think the field office may have enough data to judge the application (correspondence) on the basis of what the applicant has already submitted.

Very truly yours,

Frank E. Johnson
Chairman, Operating Committee
Defense Minerals Exploration
Administration

Enclosure

APPROVED:

A. N. Hedges
Bureau of Mines Member

F. P. Thayer
Geological Survey Member

224 New Customhouse
Denver 2, Colorado

February 6, 1952

Memorandum

To: W. R. Storms (with brochure)

(Through Acting Chief, Mining Division, Region IV)

C. A. Andersen

From: Field Team, Region IV

Subject: Docket DMA 104, Costello Group, Courtland-Gleeson District, Dragoon Mts. District, Cochise County, Arizona (Zinc-Copper-Silver)

Enclosed is the subject docket material for the above application. A copy of Mr. Johnson's letter transmitting the brochure to this office is also enclosed.

We do not agree with the final paragraph of Mr. Johnson's letter and suggest that a regular field examination should be made and a report prepared.

J. H. East, Jr.

A. H. Koschmann

Enclosures

WHK:ld

cc: Docket, chron.
Koschmann

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

[redacted] New Customhouse
Denver 2, Colorado

April 21, 1952

[redacted]

To: Secretary to the Operating Committee, Defense Minerals Exploration Administration

From: Field Team, Region IV

Subject: Final Report, DMA Docket 104, Costello Zinc-Lead-Copper Group, Turquoise Mining District, Cochise County, Arizona

Inclosed are the original and three copies of the final report pertaining to the above application. The brochure is also enclosed.

The examining engineers recommend that a production loan of $300,000 be denied because there are not sufficient ore reserves to warrant the rehabilitation of the mine.

We concur in the recommendation that the application be denied.

J. H. Eastman, Jr.

A. H. Koschmann

Inclosures

HMC:oc
cc: WRStorms w/copy of final report
CAAnderson w/copy of final report
MAHKoschmann w/copy of final report
DMA Final report
HMC:oc
cc: A. H. Koschmann (2)
DMA Subject, Chron.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Mining Division
Region IV

April 21, 1952

Memorandum

To: Field Team, Region IV

From: Acting Chief, Mining Division, Region IV

Subject: Final Report, DMA Docket 104, Costello Zinc-Lead-Copper Group, Turquoise Mining District, Cochise County, Arizona

Enclosed are nine copies of the final report on the Costello Group.

The examining engineers found a lack of sufficient ore reserves to justify erection of a processing plant or to warrant the rehabilitation of the mine.

We concur in the recommendation of the examining engineers that the application be denied.

W. H. King
W. H. King

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Arizona-New Mexico Branch
[redacted]
Box 4097
UNIVERSITY STATION

MINING DIVISION
REGION IV

Mining Division
Date Rec'd.
TUCSON, ARIZONA
APR 11 1952
BUREAU OF MINES
Denver, Colorado

April 7, 1952

Memorandum

To : W. H. King, Denver, Colorado

From : Chief, Arizona-New Mexico Branch

Subject : Final Report, DMA-104, Costello Zinc-Lead-Copper Group, Turquoise Mining District, Cochise County, Ariz.

Enclosed are original and 8 copies of the section on Summary, Conclusions and Recommendations by Chas. A. Kumke and B. C. Brown of the Bureau of Mines, and J. N. Faick of the Geological Survey, and the section on Engineering by Kumke and Brown for the above report. A separate section on Geology will be submitted by the Survey.

This report has my approval.

Brochure is enclosed.

Walter R. Storms
Walter R. Storms

CC: W. H. King (8)
C. A. Anderson
DMA-104
DF

FOR VICTORY
BUY
UNITED STATES SAVINGS BONDS AND STAMPS

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.
200 New Customhouse
Denver 2, Colorado

April 15, 1952

Memorandum

To: DMEA Field Team, Region IV

From: A. H. Koschmann

Subject: DMA Docket 104, Costello Claims (V. L. Gould), Cochise County, Arizona (Zinc)

Enclosed are the original and 8 copies of the above geologic report by J. N. Faick of the U. S. Geological Survey.

It has been recommended that the loan be denied.

A. H. Koschmann
A. H. Koschmann
Supervising Geologist
Colorado-Wyoming

Enclosures (9)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
P.O.Box 4126, University Station
Tucson, Arizona

April 8, 1952

Memorandum

To: A. H. Koschmann, Denver, Colorado

From: A. F. Shride, Tucson, Arizona

Subject: Geologic Report, DMA 104, Costello Claims (V. L. Gould), Cochise County, Arizona (Zinc)

Enclosed are the original and 8 copies of the above report by J. N. Faick of the Geological Survey.

This report and the recommendation that a production loan be denied, because zinc cannot be economically recovered from the oxide ore, have my approval.

A. F. Shride

A. F. Shride
Acting District Supervisor
Arizona-New Mexico

Enclosures 9

RECEIVED
APR 1952
U.S. Geological Survey
Mineral Deposits Branch
Denver

UNITED STATES
DEPARTMENT OF THE INTERIOR
OSCAR L. CHAPMAN, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMA-104, Costello Zinc-Lead-Copper Group

Turquoise Mining District

Cochise County, Arizona

Chas. A. Kumke, Mining Engineer
U. S. Bureau of Mines

B. C. Brown, Mining Engineer
U. S. Bureau of Mines

J. N. Faick, Geologist
U. S. Geological Survey

April 1952

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

By Chas. A. Kumke[1/], B. C. Brown[1/], and J. N. Faick[2/]

The Operating Committee, Defense Minerals Exploration Administration, requested in February 1952 that the Field Team, Region IV, examine the Costello zinc deposit, Cochise County, Ariz. Applicant Victor L. Gould, M. D., of Chula Vista, Calif. was asking for a production loan of $300,000.00 to equip and reopen the mine, and construct a concentration plant consisting of electrostatic units and concentrating tables. This was to be complemented by roasting to recover zinc oxide for shipment to a fuming plant. On March 4, 1952, Chas. A. Kumke[1/] and B. C. Brown[1/] visited the property with Mr. Erne W. Watson, an associate of the applicant. On March 13 the property again was visited by John Faick, geologist and Chas. A. Kumke and Wm. T. Griswold, mining engineers.

Originally the Costello deposit was worked for its rich silver ores. Low prices for silver and lead in the nineties, and a much lower grade of ore below the 100 level, led to the closing of this mine, except for occasional leasing operations and considerable ore sorting. In looking for more high-grade silver ore, the workings attained a depth of over 200 feet. Nearly all the old workings, are still open and accessible.

No reliable shipping records are available. The size of old open stopes indicates that in excess of 60,000 tons have been taken from the mine. It is said that a few small shipments, 4 and 5 tons assayed from

---

1/ Mining Engineers, Bureau of Mines
2/ Geologist, Geological Survey

$3,000 to $6,000 per ton in silver and lead values.

The deposit is variable in size, with a chimney-like shape. Below the 100 level, zinc carbonates entered in increasing amounts. These carbonates were not wanted and were left behind. No zinc sulfide ores have been found and no valid guess as to the depth to such sulfides, if any, can be made. The ores occur as replacements in limestone where cross fracturing and faulting occurs. The deposit pitches northeasterly from 35 to 45 degrees.

There is no perceptible tonnage of high grade silver ore left in the mine. The zinc carbonate ores in the lower half of the mine amount to about 50,000 tons of low or variable grade. Three selected samples of the hard portion of the zinc carbonate ore (Dry Bone) all assayed above 40% zinc, but three channel samples ranging from 8 to 40 feet in length, assayed less than 5 percent in zinc.

Ownership of the property rests with the Costello family of Los Angeles. There are 13 patented mining claims in the group.

The preperty has been idle for many years. There is no mining equipment of any kind, no buildings, no head frame. Tony Giacoma of Tombstone is carrying on a very small leasing operation. He is not interested in zinc carbonates, but is searching for any high grade silver ores that might have been overlooked.

Applicant has not presented a filled out application form. His letters, contained in the docket, present a variety of requests and suggestions. At first a $1,000,000.00 leaching plant is suggested. Then a $300,000.00 electrostatic plant is suggested. No estimates for

the cost of rehabilitating and equipping the mine are made. This item alone would require no less than $125,000.00.

As mines go, the Costello deposit constitutes a small mine. There are not sufficient ore reserves to warrant the rehabilitation of the mine. Applicant's claims of the grade of the zinc carbonate ores left in the mine are not borne out by samples taken by the Government examining engineers. The construction of an expensive plant for the treatment of zinc carbonate ores is not warranted by the tonnage and grade of ore. The obtaining of additional ores from nearby mines and surrounding districts as suggested by Watson is problematical and rests on no assurance.

During the examination, Watson stated emphatically that neither he nor Dr. Gould would be interested in the Costello deposit unless they were assured of the construction of a satisfactory treatment plant with Government funds.

A satisfactory and economical process for the treatment of the ores contained in this deposit is not assured.

It is recommended that the application be denied.

COSTELLO GROUP OF MINING CLAIMS
COCHISE COUNTY, ARIZONA
VICTOR L. GOULD, M. D., APPLICANT
DMA 104

ZINC

Geology

By
John H. Feick
Geologist, U. S. Geological Survey

COSTELLO GROUP OF MINING CLAIMS
COCHISE COUNTY, ARIZONA
VICTOR L. GOULD, M. D., APPLICANT
DMA 104

ZINC

CONTENTS

	Page
Introduction	1
Occurrence and Character of the Ore	3
Ore Reserves and Possible Exploration	6
Proposed Project	8
Conclusions and Recommendations	8

ILLUSTRATIONS

Fig. 1	Location Map	See Engineering Report
Fig. 2	Claim Map	" " "
Fig. 3	Geologic Sketch; Section of Gleeson Ridge through Silver Bill and Mystery Mines	Following Page 2
Fig. 4	Sketch Map of Silver Bill and Mystery Workings on Mystery Adit Level	" " 2

INTRODUCTION

An application has been received from Dr. Victor L. Gould, M. D., under Defense Minerals Administration Docket 104, for $300,000 for development and exploitation of zinc ores on the Costello Group of Mining Claims, near Gleeson, Arizona. The property was examined by Charles Kunke, B. C. Brown, and William Griswold, of the U. S. Bureau of Mines, and by J. M. Faick of the U. S. Geological Survey. The purpose of the examination was to determine if sufficient ore reserves exist to justify the proposed project, providing other phases of the proposal prove to be technically feasible.

The examiners were accompanied by Tony Giacoma, Tombstone, Arizona, who is thoroughly familiar with the Costello property, and whose assistance proved invaluable. Sufficient time was not available for a complete geological examination, therefore most attention was devoted to the Silver Bill Mine, the largest and most important property involved in the proposal.

The district has been studied by Ransome[1] and by Wilson[2] and these reports have been freely drawn upon during this investigation.

The Costello property consists of 18 patented claims situated on Gleeson ridge, about ½ mile northeast of the nearly abandoned community of Gleeson, Arizona. Included in the property are the Defiance, Dragoon, Mono, and Silver Bill mines; the last mentioned having been the most productive.

1/ Ransome, F. L., The Turquoise Copper Mining District, Arizona: U. S. Geological Survey Bull. 530, pp. 125-134, 1913.

2/ Wilson, E. D., Geology and Ore Deposits at the Courtland-Gleeson Region, Arizona: Univ. Ariz., Arizona Bur. of Mines Bull. 123, pp. 1-79, 1927.

Gleeson ridge is about 2 miles long and 1 mile wide and forms a prominent northwesterly trending topographic feature at the south end of the Dragoon Mountains. The ridge rises to an altitude of about 5500 feet, or about 600 feet above the surrounding desert, and the mines are situated at an altitude of about 5300 feet. The highest parts of Gleeson ridge, an area occupying about 1 mile long and ½ mile wide, is composed of bedded, bluish-gray Pennsylvanian and Permian limestone that strikes about N. 30° W. and dips from 30 to 50 degrees northeast. An incomplete section of limestone, having a stratigraphic thickness of about 250 feet, is exposed on Gleeson ridge. This appears to be a roof pendant resting on a floor of granitic and monzonitic igneous rocks that are intrusive into the limestones.

The structure of the Gleeson area is highly complex because of folding, faulting, and igneous intrusions. Low angle faults and bedding faults are numerous in the area. According to Wilson[3] Pennsylvanian Naco limestone is faulted onto grayish bedded limestone of Permian age as shown on Fig. 3. Steeply dipping faults of generally northerly and easterly trends are common and northeast fractures having little displacement are apparent in the mine workings where they are closely associated with mineralization. It is probable that localization of the ore bodies has been governed by gentle folding and complex faulting of the Pennsylvanian and Permian limestones to which the ores are confined.

3/ Wilson, E. D., et al., Arizona Zinc-Lead Deposits, Part II: Univ. Ariz., Ariz. Bur. of Mines, Bull. 158, p. 13, 1951.

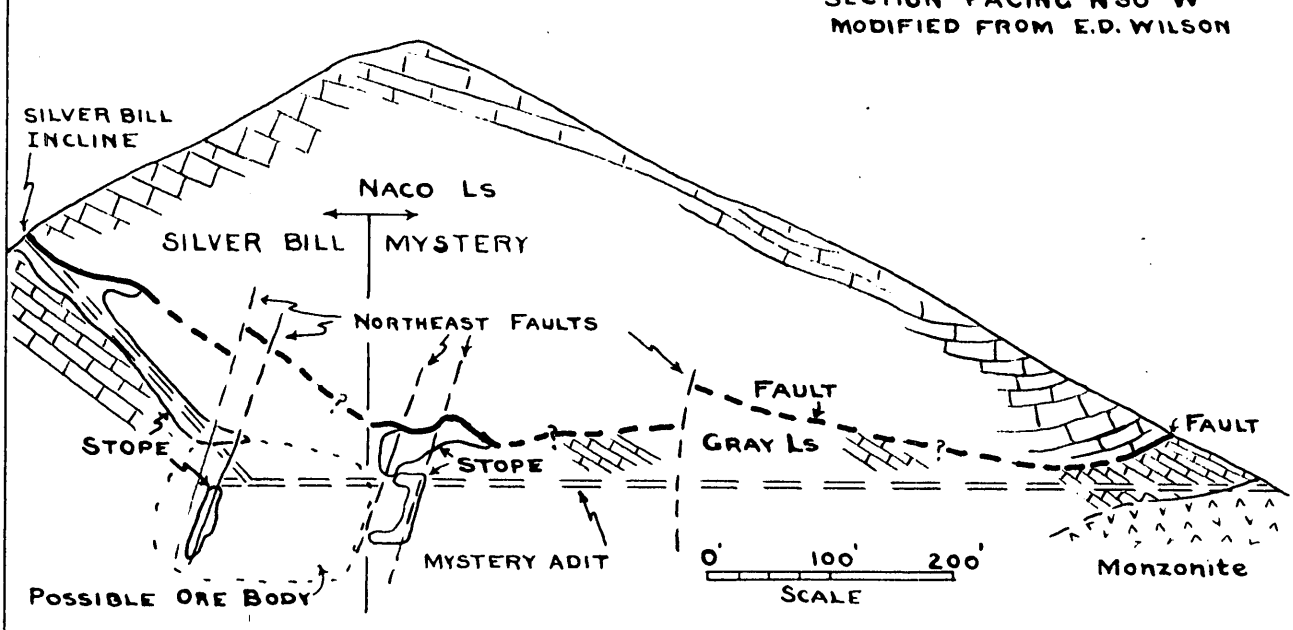

FIG 3 GEOLOGIC SKETCH; SECTION OF GLEESON RIDGE THROUGH SILVER BILL AND MYSTERY MINES

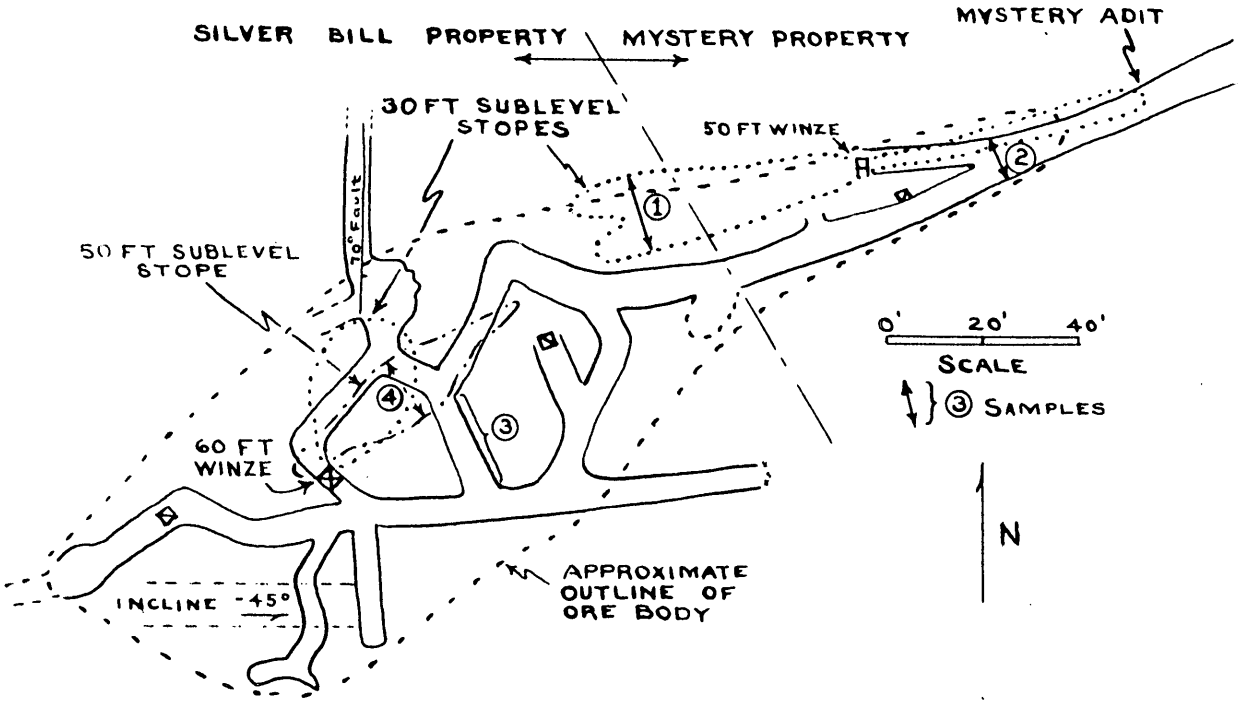

FIG 4 SKETCH MAP OF SILVER BILL AND MYSTERY WORKINGS ON MYSTERY ADIT LEVEL

DMA 104 COSTELLO GROUP; GLEESON, ARIZONA 3-20-52

The Silver Bill workings include a 200 foot shaft inclined at about 45 degrees, together with several hundred feet of drifts. The main drifts connect with the Mystery adit (200 level), driven from an adjoining group of independent claims.

According to Wilson[4] the Silver Bill workings and ore body are within a relatively elevated block bounded on the north and south by two subparallel faults which strike north 65 to 70 degrees east and dip 65 to 80 degrees south. This block ranges in width from approximately 50 feet at the surface to 80 feet on the Mystery adit level. Extending northward through the collar of the inclined shaft is an eastward dipping fault, which, in the upper workings, is roughly parallel to the bedding, and dips 30 to 40 degrees to the northeast, but with depth it apparently flattens and rolls as interpreted on Figure 3.

OCCURRENCE AND CHARACTER OF THE ORE

The Silver Bill ore body and others of similar character in the Defiance, Dragoon, and other nearby claims are essentially lead-zinc replacement deposits in limestone; and contain appreciable amounts of silver and small amounts of gold. The known ores, which were undoubtedly sulfides originally, have been completely oxidized to an ore consisting essentially of hemimorphite, smithsonite, and cerussite in a gangue of altered limestone. Associated with these are nominal amounts of limonite, pyrolusite, malachite, azurite, aurichalcite and an unusual whitish clay-like mineral tentatively identified by LaMar G. Evans, Petrographer, U. S. Bureau of Mines, as sauconite. Wulfenite, as small crystals usually not exceeding about 3/8 of an inch across, is present as coatings on a few joints and fractures.

4/ Op. cit., Bull. 158, p. 15.

The ore body conforms to the normal pattern for oxidized lead-zinc ores and reveals three well defined depth zones. Small amounts of extremely high-grade oxidized silver ores, some of which are reported to have contained from 3,000 to 5,000 ounces of silver per ton were mined near the surface. Beneath this zone and extending to depths of about 150 feet were lead carbonate ores containing small amounts of silver and zinc. The grade of this ore is not known to the writer but it was high enough to be very profitable during the early days of mining. Mr. Giacoma reports there is considerable ore containing about 7 percent lead and 3 ounces of silver per ton remaining in the old lead carbonate stopes. Beneath the old stopes and extending at least to the deepest mine workings is a substantial block of oxidized material regarded by the applicant as a large reserve of high grade zinc carbonate ore. This is exposed in the floor of the old lead stope and is developed by several drifts and cross-cuts on the 200 foot or Mystery tunnel level. A winze and sublevel stope explored and developed this ore to a depth of about 60 feet below the level.

The Silver Bill ore body is chimney-like and pitches north-eastward about 35 to 45 degrees, but at about 25 to 30 feet above the 200 foot level it flattens and nearly pinches out for a distance of 40 to 50 feet. Beyond this flat area, which may represent a low angle fault or a flexure in the bedded limestone, the ore body resumes a nearly normal pitch of 35 to 45 degrees. The pitching ore body extends beyond the Costello property line and its extension on the Mystery property has been explored by a 35 foot winze and sublevel stope.

The Silver Bill ore body increased in size with depth; at the surface it is elongated along the northwesterly striking beds and is about

40 feet long and about 5 feet thick. At the 200 foot level the mineralized area is elongated along northeasterly trending faults and in plan has a length of about 225 feet and a maximum width of about 60 feet as shown on Fig. 4. If a normal pitch is assumed, then the thickness at this point is considerable, probably in excess of 100 feet.

A few samples, the locations of which are shown on Figure 4, were taken to indicate in a general way the metal content of the ore. These are as follows:

No.	Width in Ft.	Description	Percent		
			Pb	Cu	Zn
1	16	Mystery winze, back of 30 ft. sublevel stope	2.20	0.85	4.1
2	8	Mystery adit, east end of ore body	0.90	0.73	2.2
3	40	Mystery adit level, near center of inferred ore body	2.50	0.88	3.7
4	12	Silver Bill winze, 60 ft. sublevel stope	1.09	3.68	27.4

These assays are lower than could be expected from the reports of the applicant who states there is a large body of high-grade oxidized ores in the lower part of the Silver Bill mine. It is possible that the zinc had been leached and transported downward to a zone of enrichment, as is suggested by sample 4, taken in the deepest accessible part of the ore body. However, in this writer's opinion, the area yielding low assays represents low-grade sections of the supposed ore body, and the actual ore limits can be determined only by close, careful, systematic sampling. It is probable that the portion of the ore body containing the higher grade ores will be very much smaller than the outline of the ore body as shown on Figure 4.

There is nothing to suggest that the ore body will change from oxide to sulfide or will terminate in a short distance below the present workings. It is reasonable to expect the ore body to extend in depth to the underlying intrusive granites, but it may change to sulfide ore before this depth is reached, although neither condition can be predicted from available data. No sulfides were seen by the writer except for nominal amounts of disseminated pyrite along a fracture in the deepest workings outside of the main ore zone.

ORE RESERVES AND POSSIBLE EXPLORATION

In the Silver Bill mine the oxidized lead-silver ores are essentially exhausted except for low grade material that cannot be profitably mined at the present time. The zinc oxide ores, however, remain essentially intact, because it has never been profitable to exploit them. A block of oxidized material containing zinc, irregularly lense-shaped in horizontal plan and about 225 feet long and 60 feet wide in maximum dimensions, has been explored by the 200-foot or Mystery Tunnel level by the old Silver Bill stope, and two winzes about 35 and 60 feet deep respectively. The ore zone is known to extend from about 30 feet above the Mystery tunnel to about 60 feet below it, a vertical distance of about 100 feet, including the height of the drift. Allowing 14 cubic feet per ton this block of ore amounts to about 70,000 tons, but at least 50 percent loss must be allowed for ore mined or extracted through development, and from waste rock and pillars that would be left if the ore body were exploited. Thus about 35,000 tons of oxide zinc ore is partly developed, and this is regarded as indicated ore, because it was not systematically sampled to determine the grade or the economic limits of the ore body. Much of this ore may be too low grade to mine.

It is assumed that this ore body will extend downward in the limestone to the underlying intrusives at an unknown but probably relatively shallow depth, but the ore may change to sulfides before this depth is reached. It is assumed that an additional 50 feet is a reasonable extension for the oxidized ores, in which case another 15,000 tons of ore may be inferred. Both the indicated and inferred classes of ore are very low grade on the average but it is reasonable to suppose that a higher grade product could be produced by selective mining and sorting. It is estimated that from 12,000 to 25,000 tons of ore containing 30 percent zinc could be produced in this manner.

The applicant expects to obtain ore from other parts of the Costello property and to purchase custom ores from other mines within a radius of about 20 miles of Gleeson. These other possible sources of ore were not examined by the writer, and no appraisal of the prospects can be made, although additional ore is undoubtedly available.

The possibilities of discovering additional ore by exploration on Gleeson ridge appear to have a reasonable chance of success. The area contains a favorable limestone host rock thoroughly prepared by structural deformation, and the area has been moderately mineralized. Although new discoveries may be made in the district, the ore is not desirable at the present time because of the deep oxidation. Any exploration program in the area should be preceded by thorough study and mapping of the underground workings, and by consolidation of several properties in a unit satisfactory for effective exploration under a single or unified management.

An exploration program was not suggested to the applicant because of the undesirable character of much of the ore, because of

unsatisfactory distribution of the ore in relation to property boundaries, and because the applicant has stated he wouldn't undertake any part of the program unless a processing plant was assured through Government assistance.

PROPOSED PROJECT

The applicant's proposal is to spend $300,000 to rehabilitate and place into operation the Silver Bill and other mines on the Costello group of claims, and to construct a concentrating and fuming plant capable of producing a marketable product from oxidized zinc ores. The proposal includes production of ore and the purchase of ore on a custom basis.

This writer is not qualified to pass judgment on the merits of this proposal, but is of the opinion that success in the venture depends on metallurgy, economics, and ore reserves. The metallurgical process proposed by the applicant was reviewed by Carl Rampacek, Metallurgist, U. S. Bureau of Mines, Tucson, Arizona, who concludes that the process is not technically feasible, is very expensive and not likely to succeed. Mr. Rampacek's statement is included with the engineering report by Mr. Kunke. The ore reserves are not large enough to justify erection of the required plant.

CONCLUSIONS AND RECOMMENDATIONS

The Silver Bill mine is thought to have a reserve of about 35,000 tons of indicated ore and about 15,000 tons of inferred ore containing hemimorphite and smithsonite, associated with small amounts of silver, lead, copper, iron, and manganese. The ore is low grade but it is estimated that 12,000 to 25,000 tons of ore containing about 30 percent could be produced by selective mining and sorting. At the present time there is not a suitable market for this type of oxidized ores.

The applicant proposes to rehabilitate, explore and develop the Silver Bill mine, and to erect a concentrator and zinc fuming plant capable of producing from this and purchased ore a marketable product containing about 70 percent zinc. The metallurgical process involved presents very difficult problems that are not easily solved, and if solved, the economics are such that the operation may not be profitable. Sufficient ore does not exist to justify erection of the proposed processing plants.

There is considerable oxidized zinc ore at Gleason, Arizona, but it probably cannot be profitably mined and marketed under existing conditions. Therefore the application for a production loan should be denied.

DMA-104, COSTELLO ZINC-LEAD-COPPER GROUP
TURQUOISE MINING DISTRICT
COCHISE COUNTY, ARIZONA

Engineering Report

By Chas. A. Kumke, Mining Engineer
B. C. Brown, Mining Engineer
U. S. Bureau of Mines

April 1952

DMA-104, COSTELLO ZINC-LEAD-COPPER GROUP
TURQUOISE MINING DISTRICT
COCHISE COUNTY, ARIZONA

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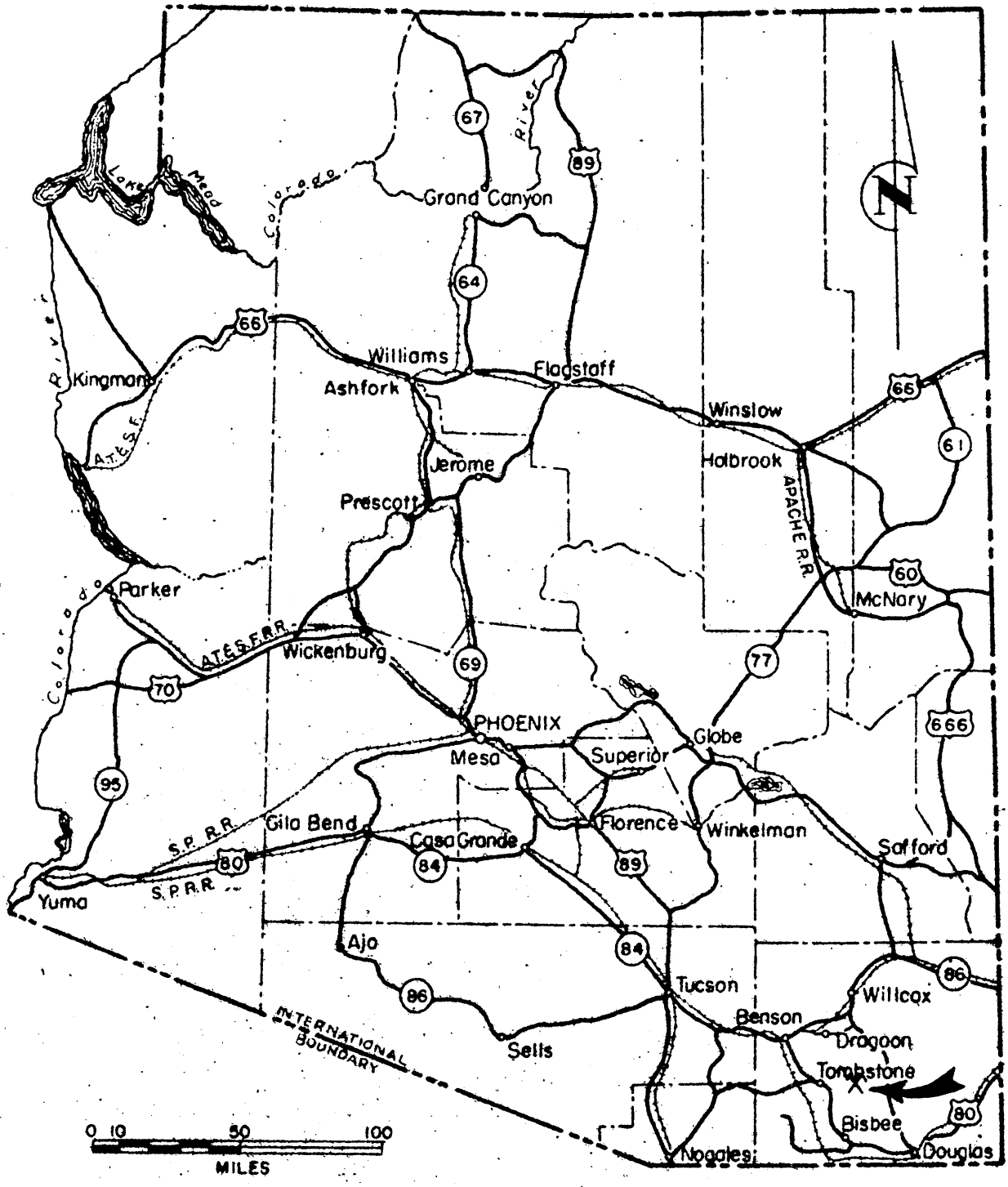
INTRODUCTION

In February 1952, the Operating Committee, Defense Minerals Exploration Administration, requested that the Field Team, Region Iv, make an examination of the Costello group of mining claims, Cochise County, Ariz. Applicant Victor L. Gould, M. D., of Chula Vista, California, was asking for a production loan of $300,000 to equip and reopen the mine, and construct a concentration plant consisting of electrostatic units and concentrating tables. This was to be complemented by roasting to recover zinc oxide for shipment to a fuming plant.

On March 4, 1952, Bureau of Mines engineers[1/] made a trip to Tombstone to meet Mr. Erne W. Watson, who is an associate of Dr. Gould, the applicant in this venture. The trip was continued to the property at Gleeson, Ariz. Again on March 13, the property was visited by C. A. Kumke and William T. Griswold of the Bureau of Mines accompanied by J. N. Faick of the Geological Survey.

Nearly all the old workings of the mine still are open and accessible even after standing idle for over 50 years. The demonitization of silver in 1893 resulted in many years of low silver prices and this, together with low prices for lead, gradually made the mining of this deposit less attractive. Some selective mining and a large amount of sorting of dumps followed. For the past 30 years the mine has been shut down except for occasional leasing on a small scale.

1/ Kumke, Chas. A. and Brown, B. C., Mining Engineers, Arizona-New Mexico Branch, U. S. Bureau of Mines



D.M.A. 104

FIGURE 1 LOCATION MAP V. L. GOULD'S COSTELLO GROUP (Zn - Cu - Ag), TURQUOISE MINING DISTRICT, COURTLAND - GLEESON REGION, COCHISE COUNTY, ARIZONA

ACKNOWLEDGMENT

Acknowledgment hereby is made to Dr. Eldred D. Wilson of the Arizona Bureau of Mines for the information obtained from Bulletin 123, Geology and Ore Deposits of the Courtland-Gleeson Region. Acknowledgment also is made to E. W. Watson, an associate of Dr. Gould. Watson was very helpful in showing the engineers over the surface and through all the workings of the mine.

Acknowledgment also is made to Tony Giacoma of Tombstone, who is at present carrying on a small leasing operation in this mine. He hopes to pick up some of the high grade silver-lead ores that were overlooked by the old timers. Giacoma was reared in this district and knows a great deal about the past mining operations of this property. He accompanied the engineers underground and proved very helpful.

LOCATION AND ACCESSIBILITY

The Costello group is less than a mile east of the old mining town of Gleeson in the Turquoise Mining District, Cochise County, Ariz. (figure 1). The claims are situated in sec. 32, T. 19 S., R. 25 E., well up on the west slope of Gleeson Ridge.

The property is accessible by an 18-mile dirt road east from Tombstone, or by a 21-mile dirt road north from the Bisbee-Douglas highway (U. S. 80). During the first quarter of this century there was a railroad connection via a spur line from Gleeson through Pearce,

Ariz. to Cochise, a junction point on the Southern Pacific railroad. This spur line was abandoned about the middle twenties. Tombstone, 16 miles to the west, is now the nearest railroad shipping point.

PHYSICAL FEATURES AND CLIMATE

The Costello mine is about two-thirds of the way up the west slope of Gleeson Ridge at an altitude of 5,200 feet above sea level. Gleeson Ridge is about 2 miles long and ½ mile wide with portions of it attaining an altitude of 5,500 feet.

Like most of the southwest, the region has a semi-arid climate. Summer temperatures rarely rise above 100° F. and winters are mild, with a minimum temperature of 16° F. Mean annual temperature is about 63° F. Annual rainfall averages about 14 inches, including occasional slight snowfalls.

HISTORY AND PRODUCTION

There are no authentic historical records pertaining to the Costello group. Dr. Eldred Wilson, geologist for the Arizona Bureau of Mines, has in past years deveted considerable time and study to the Gleeson or Turquoise district, and the Costello group receives considerable attention in the Arizona Bureau of Mines Bulletins No. 123 and 158. Historical facts and production figures are given there.

Shortly after the railroad from Yuma, Ariz. to El Paso, Tex. was completed in 1881, prospecting increased in intensity in all southern Arizona, and important discoveries of high grade silver and lead ores were made in this area. Rich silver ores were mined from grass-roots.

In some cases, small shipments assayed between 3,000 and 6,000 ounces of silver per ton. Several large open stopes, still accessible, indicate that in excess of 60,000 tons were taken from these workings.

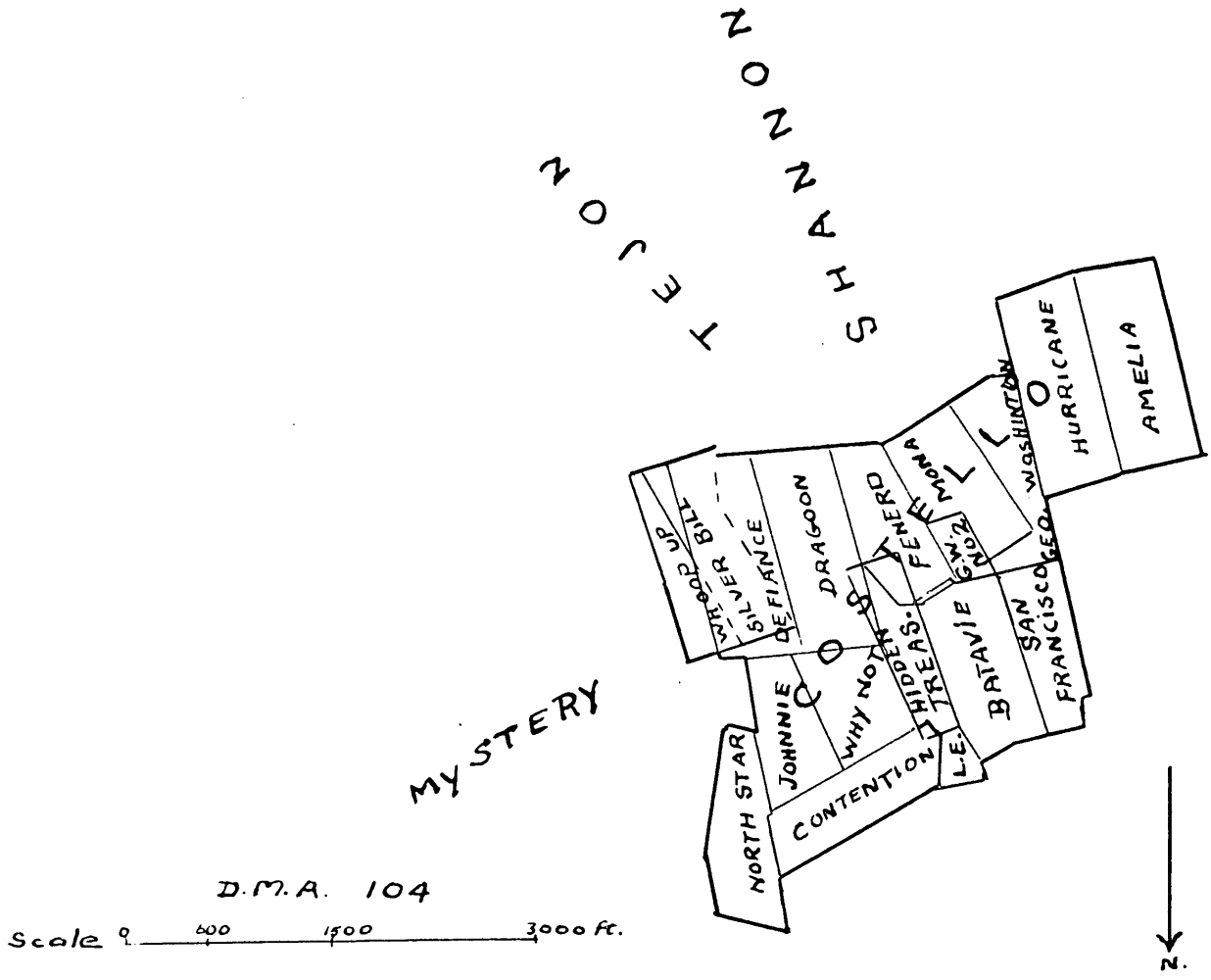
The demonitization of silver in 1893 caused a sharp drop in the price of the metal, and with lead priced at 5 cents per pound or under, it was only a question of time until operations in these workings gradually ceased as the high-grade silver values played out in depth. During the years that followed many "leasers" tried their luck searching for high-grade. All dumps were sorted several times.

OWNERSHIP AND EXTENT

The following patented claims comprise the Costello group(figure 2): Whoop Up, Silver Bill, Defiance, Dragoon, Fenerd, Mona, Geo. Washington, Geo. Washington No. 2, Hurricane, Amelia, San Francisco, Batavia, Hidden Treasure, L. E., Contention, Why Not, Johnnie, and North Star.

Ownership of the above claims rests with the Costello family of Los Angeles. The main development of this group has been in the Defiance and Silver Bill workings. Rich silver-lead ores were mined from these workings in the eighties. A large tonnage was mined previous to 1893.

During the nineties and the first decade of this century, some important tonnages were mined and shipped but gradually the work resolved itself into occasional leasing attempts and a lot of dump-sorting operations. One such dump-sorting operation yielded from 150 to 900 tons per month for a period of 2 years. This ore is said to have averaged 10 ounces of silver, and $1.50 in gold per ton, 10 percent lead, a small amount of copper, and about 3 percent manganese.



D.M.A. 104

Scale 0 500 1500 3000 ft.

Fig. 2 COSTELLO GROUP Gleeson Arizona

The high-grade silver ores occurred near the surface. Some of the richer stopes lost their high silver values from 60 to 100 feet in depth. Below that point zinc carbonate ores were encountered in considerable amounts and were very unwelcome because of the metallurgical problems involved in the treatment of such ores. For a time, the best of these zinc carbonate ores was sent to Kansas for paint pigment, but although the ores were of good grade, the venture was not profitable.

As the mine development gained depth all the zinc carbonate ores were left behind. This practice was followed for years. There are now large tonnages of zinc carbonate ore of variable grade in evidence in the lower workings, and it is in these ores that the applicant is most interested.

DESCRIPTION OF DEPOSIT

The Costello deposit is irregular and variable in size. It has a chimney-like shape. It has been mined out to a depth of about 150 feet. The ore nearest the surface contained rich silver values. Below 70 feet the high silver values dropped perceptibly and zinc carbonate ores increased in amount. These carbonates were not wanted and were left behind. Some tonnage could still be mined from these workings. However, the channel samples, ranging from 8 to 40 feet in length, taken by the examining engineers did not bear-out the applicant's estimate of 20 percent zinc.

No zinc sulfide ores were found and no valid guess as to the depth to such sulfides can be made. A diamond drilling program would be desirable and of help to prospect the deeper formations, but the applicant does not seem to be interested in such an exploration program.

The deposit pitches northeasterly from 35 to 45 degrees and occurs as replacements in limestone. The limestones where the ores occur, locally are spoken of as the "carrier" beds. Ore lenses usually are associated with cracks or breaks across these limestone beds. Where the faulting and cross-fracturing occurs across the carrier beds the chances of encountering ore are very much enhanced.

ORE RESERVES

Four samples were taken by the examining team as follows:

Sample No.	Description	Lead percent	Copper percent	Zinc percent
1	16 ft. cut across ore in back of stope in Mystery winze sub-level (taken by John Faick)	2.20	0.85	4.1
2	8 ft. cut across back on sill floor at beginning of zinc carbonate on the East end (taken C. A. Kumke)	0.90	0.73	2.2
3	40 ft. cut along side of X-cut on Mystery Tunnel level (taken by C. A. Kumke)	2.50	0.88	3.7
4	12 ft. cut across back of stope near center of 60 ft. sub-level off Silver Bill winze (taken by John Faick)	1.09	3.68	27.4

The Zinc carbonates left in the mine were represented by the applicant as averaging above 20 percent zinc. The above assay returns obviate the necessity of reporting any ore reserves. In the applicant's letter to Howard Young of DMPA he speaks of "huge zinc carbonate deposits" and again as "this vast deposit". These statements are not substantiated by the above assays. It is doubtful if 12,000 tons of ore could be selectively

mined from this deposit that would assay 30 percent or over. A very much larger tonnage would be necessary to warrant the construction of a plant as suggested by applicant.

PRESENT STATUS EXPLORATION AND DEVELOPMENT

At the present time Tony Giacoma of Tombstone has a small leasing operation at the Costello mine. He is interested only in searching out some of the richer silver ores in the old workings. He is not interested in any large tonnage of zinc carbonate ore. There is no other activity on the claims and all mining equipment, buildings, headframes, etc., have been stripped from the property for a good many years. The town of Gleeson, once a busy and attractive mining camp, has almost entirely disappeared.

PROPOSED EXPLORATION AND DEVELOPMENT

Victor L. Gould, M. D., the applicant, does not present a definite plan or proposal and is not certain as to the amount of the loan that will be required to carry out any one of several proposals.

As early as November 1950, in a letter addressed to Dr. James Boyd, Dr. Gould favored the construction of a leaching plant to treat the zinc carbonate ores of this property and of neighboring mines and districts. We quote the following paragraph from his letter: "We believe in view of the large availability of raw material, that the initial or pilot plant should be a full scale operating unit which could be embodied in a major leaching plant later on. We feel that an appropriation of at least one million dollars should be made available for this general plan".

Just a year later, the applicant, addressing Howard Young of DMPA (Nov. 3, 1951), has this to say "Our plant's product will be zinc oxide, and sulphide concentrates to be shipped to existing fuming plants". In this case, Doctor Gould estimates the cost at only $200,000.00.

The docket DMA-104 does not contain a properly filled out application form and the wide variations in the suggestions and proposals for the treatment plant and the costs thereof contained in the above mentioned letters, make it difficult for the examining engineers to understand just what the applicant proposes or requests.

Erne W. Watson, geologist and associate of Dr. Gould, met the examining engineers at Tombstone and acted as guide during the mine examination. He is a geologist and has had many years experience in mine examinations and mine operations in the United States and Mexico. Watson is well versed in lead-silver deposits as they occur in limestones similar to the Costello mine. He very definitely stated that he and Dr. Gould were interested in the Costello mine solely because of the large tonnage of zinc carbonate of good grade that remained in the old workings, and in the possibility of developing more ore of the same character and grade. Watson further stated that neither he nor Dr. Gould would be interested in mining this ore unless they were assured of the construction nearby of a satisfactory plant to treat the ore and other ores from neighboring and nearby mines.

In discussing the kind of plant required for the treatment of these ores, Watson stated that he was not in favor of a leaching plant but favored a concentration plant consisting of electrostatic units to separate the zinc carbonates, and also concentrator tables to save the lead and copper. This operation was to be complemented by roasting to recover zinc oxide for shipment to a fuming plant. It was evident that Watson would play a major role in deciding what kind of plant would be requested by applicant and the problem narrowed down to the feasibility and practicability of an electrostatic plant for this project. This phase of the problem, together with samples taken and all information pertaining to this deposit was turned over to the Metallurgical Division of the Tucson office for its opinion as to the advisability of constructing such a plant. Carl Rampacek, acting chief, has submitted the following as his opinion of the problem, his memorandum having been addressed to W. R. Storms, Chief of the Arizona-New Mexico Branch, Mining Division, Bureau of Mines:

"As requested in your memorandum of March 31, 1952, relative to DMA Docket 104, I have reviewed the metallurgical flowsheet proposed for treating zinc ores from the Costello Group, Turquoise Mining District, Cochise County, Ariz.

"Herewith are my opinions and comments regarding the proposed process:

1. "The use of electrostatic separation for recovering zinc carbonates and sulfides, while feasible, is in my opinion commercially impractical.

Cost of the separators is high per ton day of capacity. In many cases feed to the separators must be especially prepared by such methods as attritioning, washing, sizing and drying. Treating zinc ores by such involved procedures would be uneconomic.

"Although the applicant states that electrostatic tests have been made on the ore, he does not substantiate his claims with any data as to metallurgical results, size, type or quantity of equipment required, or operating costs. This phase of the proposal is incomplete and should not be accepted without further investigation.

2. "The plan to calcine zinc concentrates is feasible but the grade of the zinc oxide produced will depend upon the tenor of the concentrates roasted. In addition, the zinc sulfide content of the ore is reported to be very low. A source of external heat would be required for roasting and the operation would be expensive.

3. "Use of carbon dioxide obtained from roasting zinc carbonates to make dry ice is completely impractical both from an economic and operating standpoint.

4. "As the ore does not contain much zinc sulfide, the applicant's proposal to produce sulfurous acid for leaching copper from the ore is impractical.

5. "The plan to recover lead, copper and silver values by tabling the rejects from the electrostatic separator is possible, However, success of the operation will depend upon the character of the ore, such as the mineralogical associations and degree of grinding required for liberation.

Metallurgical tests would have to be made to determine if the separation is possible.

6. "No provision is made in the proposal for handling the slimes that would be formed. The method of treating this fraction of the ore should be clarified.

7. "In conclusion, the applicant states that the process is simple, inexpensive and conventional. It is my opinion that installation of electrostatic separators, roasters, a table plant, leaching vats and copper precipitators would be quite an expensive and involved undertaking."

ESTIMATED COST OF PROJECT

In the absence of a properly filled out application form and the wide variance in the cost estimates contained in the applicant's correspondence, it is difficult to grasp just what the applicant had in mind. Doctor Gould speaks of a leaching plant to cost one million dollars. Watson does not want a leaching plant. He favors a concentrating plant containing electrostatic units and concentrating tables. He does not know the cost of such a plant and neither Doctor Gould nor Watson have submitted an estimate of the amount required to rehabilitate and equip the mine to carry on a modern and efficient operation.

The mine would require the following, if their program were to be carried out:

(1) Rehabilitate the Silver Bill incline shaft and sink it an additional 150 feet;

(2) A new headframe, a hoist, skips, a compressor plant, a blacksmith shop, a machine shop, and an adequate change house and powder magazine;

(3) A mucking machine, slushers, mine drills, mine cars, pipe, rail, tools and ventilation equipment, also a water pumping plant, and ore bins.

All of this would require a minimum of $125,000.00. A fairly extensive diamond drill program should be considered in addition to this amount. This estimate is based on a 100 ton operation. To keep development ahead of the stoping would soon present an embarrassing problem if a larger operation were attempted.

CONCLUSIONS AND RECOMMENDATIONS

Judging from the opinions and comments submitted by Carl Rampacek of the Metallurgical Division at Tucson, a plant as suggested by applicant for the treatment of ores from this deposit would be an involved and expensive undertaking. A satisfactory and economic process would not be assured.

There is practically no high grade silver ore left in the mine and there are not sufficient reserves of zinc carbonates of economic grade to warrant the rehabilitation of the mine for a 100 ton per day operation.

The obtaining of additional ores from nearby mines and surrounding districts is problematical and rests on no assurance.

It is recommended that the application be denied.

[illegible] New Customhouse
Denver 2, Colorado

April [illegible], 1957

Memorandum

To: Secretary to the Operating Committee, Defense Minerals Exploration Administration

From: Field Team, Region IV

Subject: Final Report, DMA Docket 16, Centralia Zinc-Lead-Copper Group, Turquoise Mining District, Cochise County, Arizona

Enclosed are the original sepiaque copies of the final report pertaining to the above application. The transcript is also enclosed.

The examining engineers recommend that a production loan of $500,000 be denied because there are not sufficient ore reserves to warrant the rehabilitation of the mine.

We concur in the recommendation that the application be denied.

J. H. Eck, Jr.

A. H. Koschmann

Enclosures

HMC

HMC:ce
cc: WRBeers w/copy of final report
CAAnderson w/copy of final report
AHKoschmann w/copy of final report
DMA Final report
Mining Div. w/copy of final report

HMC:ce
cc: A. H. Koschmann (2)
DMA Subject Chron.