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

DEFENSE MINERALS ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION IV

DMA-1683X - State of Texas Mine, Lead-Zinc Project

Hartford Mining District, Cochise County, Arizona

Grant F. Rubly, Mining Engineer
U. S. Bureau of Mines

September 1951

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

By Grant P. Fubly 1/

Grace M. Sparkes filed an application on May 28, 1951 with the Defense Minerals Administration for Governmental aid for an exploration project pursuant to Mineral Order 5 under the Defense Act of 1950. Form MF-100, General Technical Data, subsequently was filed with additional data in the form of copies of reports, comments, notes, sketch maps and other miscellaneous material. This application, as DMA Docket 1633X, was reviewed in Washington and forwarded to the Field Team, Region IV, Defense Minerals Administration, for further action. The application requested aid in exploring the State of Texas mine, Cochise Co., Ariz., in the total amount of $90,821, of which Government participation was to be $45,410.

Locations were made in the area as early as 1889 by August Baron of Tombstone. His State of Texas claim was surveyed for patent in 1898. This and a number of other claims were acquired by the Mitchell Development Co. of Ishpeming Mich. in the early 1900's. A shaft, some 350 feet deep, was sunk near a granite-limestone contact and some drifting and diamond drilling is said to have been done. After the company was liquidated the mine remained essentially idle until World War II, when some work was done. Operations again ceased with the removal of premium prices for metals.

1/ Mining Engineer, Bureau of Mines

Sixty-seven tons of ore were shipped to Canon, Colo. before 1900. Some 1,300 tons were mined and shipped about 1914 to the Hermitage Mill on the desert, some 7 miles from the mine. Of this amount, about 500 tons are reported remaining on the dump at the mill site. During World War II the present owners shipped 1,784 tons to the Shattuck-Denn custom mill at Lowell, Ariz. Total production has been in excess of 3,000 tons of ore.

The zinc-lead ore of the State of Texas mine occurs in a block of altered limestone, approximately 350 feet by 500 feet in area, surrounded on three sides by granite and on the fourth by Cretaceous shales and sandstones. Sills of granite porphyry intruded into the limestone and it is presumed that granite underlies the block at comparatively shallow depths.

The ore minerals are sphalerite, galena and chalcopyrite with some silver and gold. The ore replaced favorable portions of the impure lime within the crest of a northward plunging anticline. It is associated with several fissure zones up which mineralizing solutions are presumed to have come.

An irregular area, about 80 feet across and 5 to 15 feet high, has been stoped for zinc and lead. No ore remains in the back or walls of the stope. There may be a small amount of ore in the floor of the stope. Two diamond drill holes drilled by the applicant indicate some ore along fissures at depth.

There are several features which preclude the possibility of finding an extensive ore body:

(1) The comparatively small volume of the limestone block which the ore was deposited;

(2) The very limited extent of the ore along the strike of the limestone beds;

(3) The fact that no zinc ore has been found at the surface within 100 feet of the contact metamorphiczone. The mineralization of the contact metamorphic zone offers no inducement for mining.

It is recommended that the application for aid for an exploration loan be denied becauge there is no geological evidence to substantiate existance of commercial ore bodies. Any ore that could be found could not be mined at a profit at the present time.

STATE OF TEXAS MINE, LEAD-ZINC PROJECT
HARTFORD MINING DISTRICT, COCHISE COUNTY, ARIZONA
DMA DOCKET 1633X

Engineering Report

By Grant R. Rubly
Mining Engineer
U. S. Bureau of Mines

September 1951

STATE OF TEXAS MINE, LEAD-ZINC PROJECT
HARTFORD MINING DISTRICT, COCHISE COUNTY, ARIZONA

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ILLUSTRATIONS

INTRODUCTION

Grace M. Sparkes filed an application on May 28, 1951 with the Defense Minerals Administration for Governmental aid for an exploration project pursuant to Mineral Order 5 under the Defense Production Act of 1950. On June 27, 1951, Form MF-100, "General Technical Data for Use Under the Defense Production Act of 1950," was completed. Additional data in the form of copies of reports, comments, notes, sketch maps and other miscellaneous material also was received. This application, as DMA Docket-1633X, was reviewed in Washington and forwarded to the Defense Minerals Administration Field Team, Region IV, for further action. The application requested aid in exploring the State of Texas mine in the total amount of $90,821, of which Government participation was to be $45,410.

It is necessary to point out at this time that the complete brochure pertaining to this application was not available to the examining engineer. This is evidenced by comments in the "Review of Application for Exploration Assistance." Other references to unit costs of shaft sinking and drifting, as well as costs of additional facilities, rental of equipment and labor costs are made. The only indication of the proposed crosscut is on a rough sketch map and the only reference to the shaft is on another sketch map.

It also is evident that the reviewer has accepted the applicants statements regarding geological conditions favoring ore occurence at face value and did not refer to the Bureau of Mines reports 1/ nor the U. S. Geological Survey report 2/ on this mine.

ACKNOWLEDGEMENTS

The State Of Texas mine has been the subject of numerous examinations. Very complete reports are available to Governmental agencies. The writer has drawn freely from those reports in the preparation of this report and hereby acknowledges his debt to their authors. Personal examination has served to substantiate the findings of other Government engineers.

LOCATION, TOPOGRAPHY AND CLIMATE

The State of Texas mine is situated in Montezuma Canyon near the southern end of the Huachuca Mountains. It is in Sec. 12 and 13, T. 24 S., R. 20 E., in the Hartford Mining District, Cochise County, Ariz. The well-graded Montezuma Pass-Nogales road passes by the mine camp. This camp is 6.4 miles west of the junction of that road with paved State Highway 92, at a point 22 miles west of Bisbee. The nearest railroad shipping point is Hereford, on the Southern Pacific Railroad, 15 miles from the mine.

1/ Price, John M. and Haury, P. S., War Minerals Report, State of Texas Mine, Cochise Co. Arizona, 1943.
Stewart, Lincoln A., Supplemental Examination Report (supplement to War Minerals Report, Price, John M. and Haury, P. S., 1943), State of Texas Zinc-Ledd Mine, Cochise Co., Arizona, 1948.

2/ Richards, A. and Brokaw, A. L., A preliminary report, Zinc Deposits of the State of Texas Mine, Cochise County, Ariz., August 1943.

The mine is located on the north side of Montezuma Canyon at an altitude of approximately 5,700 feet. The camp is some 200 feet lower and in the bottom of the valley. The higher slopes on the sides of Montezuma Canyon are rugged and precipitous, but more moderate relief is found on the floor of the canyon. The canyon is well-watered and has a thick cover of oak along its upper course.

At the altitude of the mine, summers are mild with high temperatures in the 90's. Winters are fairly moderate with some snow. Occasional near-zero weather can be expected. The annual precipitation is about 20 inches.

HISTORY AND PRODUCTION

Locations in this area were made by August Baron of Tombstone in 1889. His State of Texas claim was surveyed for patent in 1898. Some diggings are reputed to have been made by early Spaniards. Baron's claim and 32 other claims later were acquired by the Mitchell Development Co. of Ishpeming, Mich. This company sank a shaft some 350 feet deep near the granite-limestone contact and is reported to have drilled several diamond drill holes from drifts at the bottom of the shaft. After the company was liquidated the mine remained essentially idle until World War II, when some work was done. It again became idle with the removal of the premium price plan for metals after the war. Since then the present owners have done a small amount of diamond drilling to verify certain geophysical anomalies, and also some cleaning up in the old stoped area.

Production figures prior to 1943 are not definitely known. About 70 tons of ore was hand-sorted and shipped to Canon, Colo. before the turn of the century. Around 1914 some ore was mined and hauled to the Hermitage Mill on the open desert some 7 miles distand and 3 miles from the San Pedro River. Exact figures are not available but it appears that some 800 tons was treated. There are some 500 tons still in a dump at the mill site. Mill operations were not successful. During World War II, 1,784 tons of sorted ore were mined and treated at the Shattuck Denn Mill at Lowell, Ariz.

Total known production is as follows:

		Ounces		Percent		
Date	Tons	Gold	Silver	Lead	Copper	Zinc
1897	25	0.25	69.	49.5	1.3	18.0
1898	42		17.5	10.0		28.5
1914	800		17.0	8.0	1.0	22.0
	500		13.4	5.0	1.0	17.0
1943-46	1784	0.04	6.45	3.07	0.56	13.67

Total production to date is somewhat over 3,150 tons of ore.

OWNERSHIP AND EXTENT

The property consists of two patented lode mining claims, two patented mill site claims, and four unpatented lode mining claims, all owned by Grace M. Sparkes, the applicant.

DESCRIPTION OF THE DEPOSITS

The description of the deposits has been abstracted in part from unpublished notes on the State of Texas mine by Eldred D. Wilson, Arizona Bureau of Mines.

The State of Texas mine is located on the north side of Montezuma Canyon. From top to bottom, that side of the canyon shows the

following sequence of rocks: granite, forming a large mass below the crest of the ridge; marble, approximately 60 feet thick; impure dark-gray limestone, approximately 40 feet thick; a granite porphyry sill, 5 to 20 feet thick; and reddish-brown shale, sandstone and quartzite to bed of canyon.

The marble and limestone are probably of Paleozoic age (Escabrosa and Naco), and the underlying shale-sandstone series is of Cretaceous age. Low-angle and steep reverse faulting has thrust the older rocks over younger rocks. The granite-porphyry sill was intruded along a low-angle fault, and presumably the large masses of granite came in along zones of reverse faulting. Renewed fault movement occurred in places along the contacts. The marble and limestone block in which the main workings occur is approximately 350 feet wide and 500 feet long. Although its thickness is not known it is probably less than 700 feet. The beds in general dip 15° northward, but in places have been deformed by flexures and faults.

The zinc-lead workings consist of an adit with about 250 feet of drifts, and an irregular stope about 80 feet in maximum length and breadth by 5 to 15 feet high. As seen in these workings, the ore replaced favorable portions of the impure limestone within the crest of a northward plunging anticline. The roof in the southern part of the stope shows a fault dipping 20° southward, immediately above the ore. The fissure zones, about 25 feet apart, striking N. 80° W. and dipping almost vertically, are associated with the best developed mineralization. The surface outcrop of the stronger zone is marked by dark limonitic mineralization. Presumably the

ore-bearing solutions came up along these fractures.

North of the stope a short drift extends into unmineralized marble. Two inclined diamond-drill holes from this drift encountered some high-grade sphalerite, together with some galena and chalcopyrite, at a depth of about 55 feet below the floor of the stope. These holes probably intersected the fractures that are found in the stope.

One of the drill holes encountered granite at a vertical depth of 85 feet below the stope floor. Granite also is in fault contact with the west end of the stope. It also occurs on the surface northeast of the stope area and there is faulted against the limestone. These granite bodies are presumed to be sills, but their thickness and extent are not known.

The ore minerals are sphalerite, galena and chalcopyrite. Some silver is present, also a small amount of gold.

ORE RESERVES

The stope from which the ore was mined during World War II is essentially mined out. A few small bunches of ore can be found in the back and in pillars. The floor of the stope has been covered wity rejected low grade and barren rock. There may be some ore in the floor close to the fracture zones and a few hundred tons can possibly be inferred from the diamond drill holes. Otherwise there are no known ore reserves.

From the size of the limestone block and the mineralized fractures in it, the amount of ore that might be found can not possibly be large. Five thousand tons of ore, averaging 14 percent zinc, would be an optimistic estimate of inferred reserves.

PRESENT STATUS

Since the last production from the State of Texas mine in 1946 the property has been essentially idle. The owners have done some exploratory work. A geophysical survey was made and three short diamond-drill holes were drilled to check the indicated anomalies. Several engineers made studies and submitted reports on the property. One lode mining claim and two mill-site claims have been recently patented. No work is being done at the present time.

PROPOSED EXPLORATION

As was stated in the Introduction of this report the brochure on this project is not complete. There is no information regarding an inclined shaft nor a drift to intersect favorable ore zones. The one sketch showing a long drift on the State of Texas No. 2 claim has absolutely no relationship to the zinc-lead stope where former mining was done. This sketch does not tell the whole story either.

However, since no exploration is warranted on this property a discussion of the applicants proposals would be quite useless.

CONCLUSIONS

If there was any reason to believe that any appreciable tonnage of zinc ore could be found in the State of Texas mine, then a few diamond drill holes might be warranted. However, there are several features which preclude the possibility of finding an extensive orebody; first and most important is the comparatively

small volume of the limestone block in which the ore was deposited; second, the very limited extent of the ore along the strike of the limestone beds; third, the fact that no zinc ore has been found at the surface within 100 feet of the contact metamorphic zone. The deposition of zinc ore was confined to the interior of an already small block of limestone.

The mineralization of the contact metamorphic zone offers no inducement for mining.

The evidence of copper mineralization in the west shaft is based entirely on rumor, and cannot be considered seriously. The material on the dump shows very little mineralized matter, even where the dump has been trenched.

Any ore that might, by chance, be found could not be economically mined at present metal prices. The last operation was not financially successful where practically no development work was needed. Any new venture would require sinking of a shaft or winze, and additional development work, all chargeable to mining.

That the former operations were not economical is borne out by a statement in a letter from Grace Sparkes to J. H. Hedges,[3] dated August 3, 1943, "We have less than a third of the return from our cars of ore and yet we must pay our mining cost, figure return of Reconstruction Finance Corporation loan and interest, Industrial compensation charges, etc., taxes and no development program."

Stewart[4] computed a net value per ton of ore, after all milling freight and other charges but prior to mining, development, return of

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3/ Former District Engineer, Bureau of Mines, Tucson, Ariz.
4/ Previously cited in Footnote 1.

Reconstruction Finance Corporation Loan, interest etc., of $9.93. When one considers that the ore shipped was sorted and screened to bring it up to shipping grade and that S. A. Spellmeyer[5/] states that "The stope section indicates that 4 tons of material were moved for each ton shipped", it becomes very evident that mining can be done only at a loss. It is not possible to check Spellmeyer's figures accurately but they are within reason. The stope is full of rejected material and there is a sizeable waste dump outside of the workings. If the ratio were reduced to 1 ton of ore to 2 tons of waste the project still would not be economical.

It is realized that metal prices have increased materially since the former operation but costs have more than kept pace with them. Even with the aid of special premiums paid during World WarrII, which amounted to $14.12 per ton on the average grade of ore, only about 50 percent of the RFC loan was repaid.

The applicant and her associates have had no formal training in geology nor mining although they do have some practical knowledge of mining. It is unfortunate that their enthusiasum blinds them to the otherwise obvious features that preclude any extensive ore deposits. They have acquired a mass of data, information and misinformation, and reports, some by supposedly reputable engineers, upon which they have based their conclusions. The findings of Bureau of Mines engineers and others have been that no commercial ore deposits can be found, and the applicant has been informed of this as definitely as diplomacy allows.

The project does not warrant any exploration aid, much less the more than $90,000 requested

5/ Spellmeyer, S. A., Unpublished report on State of Texas Mine, August 3, 1949

RECOMMENDATIONS

It is recommended that the application for aid for an exploration loan be denied because there is no geological evidence for the existence of commercial ore bodies. Any ore that could be found would not be economically feasible.

NO. 6 "G"

COPY

Diamond 25 T/D mill

RECONNAISSANCE NOTES

STATE OF TEXAS MINE

By Seton S. Williams
Registered Geologist
Arizona USA

Dated April 5, 1951

COPY

636 North Third Ave.,
Tucson, Arizona
April 5, 1951.

Dr. C. A. Porter
Tucson, Arizona.

State of Texas Mine
Cochise County, Arizona.

Dear Dr. Porter:

The following notes deal with the reconnaissance of the State of Texas Mine, which was made at your request on April 3, 1951. Purpose of the trip was to estimate whether or not the mine can furnish sufficient ore to justify installation of a mill of 25 tons daily capacity.

The Copper Handbook gives the following pertinent information on the history of the mine. The original locations were made in 1898, and by 1904 workings were reported to consist of 3 tunnels, a shaft about 250 feet deep and a shallower shaft. The Mitchell Development Company, which had done most of the early work, liquidated in 1906 and the property remained essentially idle until World War II. Production during 1943-1947 reportedly totalled 1,791 tons which was sent to the Shattuck-Denn mill at Bisbee. This ore yielded essentially all the zinc output (330,000 pounds) credited to the Hartford district for the years 1943-1947.

It appears highly probable, from observation of various prospect works on the property, and from the general history of small mine operations in Arizona, that copper was the metal sought by the early operators. Hence the long period of inactivity until the wartime prices of zinc led to the reopening of the mine as a zinc producer.

Under the incentives of high metal prices and government premiums the present owners laid out a program to develop the lead-zinc ore body. Reportedly, however, this program was terminated by government order, due to the urgent demand (wartime demand) for zinc, and all readily available shipping ore was stripped to form a large open stope, roughly eighty feet in diameter and 10 to 15 feet high. Almost no development work was subsequently done.

The mine lies in a belt of complexly faulted and deformed limestone which overlies a shaly quartzite and has been intruded by granite. The present known ore-body lies in the lower portion of the limestone belt, ore replacing favorable portions of the impure limestone where the formation is broken up close to the prominent, almost vertical fissure veins.

As mentioned earlier, easily accessible shipping ore has been stripped from the open stope. Granite forms the west wall of the stope, and a less favorable pure limestone forms the north wall. Extension of ore in depth is presumably limited by the shaly quartzite which underlies the limestone, perhaps 75 feet below the level of the floor of the stope, but dips rather steeply downward parallel to the dip of the favorable limestone.

Copy
Dr C A Porter
Tucson, Arizona.

State of Texas Mine
Cochise County, Arizona.

Mining on the east side of the stope apparently was terminated when the grade became submarginal for shipping ore, since abundant mineralization is visible in the fissure zones. The floor of the stope is hidden by submarginal material from the stope, except for a winze started in one fissure zone. High grade ore is visible in the walls of the winze. Two inclined diamond drill holes cut ore about 55 feet below the level of the stope, each hole passing through about eight feet of high grade zinc ore. One of these holes was stopped with high grade ore showing in the last five inches of core.

Lack of adequate development work prevents a definite appraisal of ore reserves. Appearance of the mineralized fissure zones in the east wall of the stope, exposures of high grade ore in the winze started in the floor of the stope, and the diamond drill findings are all encouraging. Settlement sheets covering 1681 tons of ore shipped to the Shattuck-Denn mill indicate a grade, and gross value per ton at present metal prices approximately as follows:

	Ozs. Gold	Ozs. Silver	% Copper	% Lead	% Zinc
Assay Grade	0.038	6.71	0.58	3.16	14.36
Gross Value	$1.33	$5.37	$2.78	$10.74	$50.25

Thus at present prices, the combined metal content of the 1681 tons covered by the settlement sheets examined would amount to roughly $70.46 per ton.

Lack of development work precludes any definite estimate of ore reserves, but the tonnage and grade of past shipments, coupled with observations within the mine and on the surface suggest the strong possibility that the mine can furnish profitable feed for some time to come to a small mill located on the property. At present metal prices, it seems probable also that the dump, which was submarginal as shipping ore during the recent operating period, and broken rock left on the open stope may well furnish several hundred tons of profitable milling ore.

(signed) Respectfully yours
Seton S Williams

Registered Geologist
Arizona, USA.
(seal)

Deep Shaft List as Reference

COPY

Property of
Grace M. Sparkes
State of Texas Mine
Star Rt - Hereford, Arizona.

Gray Metals Co., Huachuca Mtns., Abstracted from "Arizona Mining Journal," Vol. 3, No. 12, p 21 (1920) C. F. Willis.

Over 500 tons of ore have been shipped which average 17 ozs in silver, 7.5% lead and 22 to 24% zinc. High grade ore shows 84 ozs. in silver, 40% lead and 18% zinc. The silver follos the lead and with an increase in lead there is a decrease in zinc content.

The property of the company, geologically, shows two types of deposits, one an interbedding of the lead zinc ores along the bedding planes of lime-stones, and a copper showingthat has been explored along the limestone granite contact. The sedimentary lime shows for a length of 2400 feet on the property of the Gray Metals, but is continuing on both ends on which considerable ex-ploration has been and is being done at the present time. These sedimentaries show a width of about 200 ft. on the surface and are bounded on the north by a massive granite and on the south by a porphyry. The lime beds show considerable evidence of mineral bearing solutions and metamorphism.

The lead-zinc deposit has been opened up by an inclined shaft,and a tunnel, from both of which considerable stoping has been done. Then, at intervals of about fifty feet, trenches have been put on the surface which demonstrate the continuity of the deposit. Almost from the surface the sulphides show, and two layers of the ore have been shown, while the surface indicates a third layer. Little work has been done except on the second highest of these layers and this shows from 7-11 ft in thickness with an average assay of 16.5% oz silver, 10% lead, 21% zinc, while the ore on the dump extracted from this and other places, shows 11.6% oz of silver, 7.65% lead and 22.5% zinc.

--

The Copper bearing contact of the lime-granite has been opened by a 350 ft shaft with considerable drifting, with 1390 ft of diamond drilling holes sent out from the 350' level. The first of these holes struck ore at 170 ft and ran 20 ft through ore running 4-5% copper and $5 in gold and silver. The second hole, at about 300 ft ran through four layers of ore, 3, 5, 6 and 7 ft thick respectively, the latter assaying 6% copper. The third hole showed blank with the exception of the first ten feet. No ore has been encountered outside the limestone. The contact deposits have been opened also by two fifty ft shafts following the contact. At 310 feet the shaft passed through 13 ft of copper ore running better than 4% copper and 3.3 oz in silver.

(Note Gray had option from August Baron, original locator.)

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COPY

Property of
Grace M. Sparkes
State of Texas Mine
Star Rt - Hereford, Arizona.

1914 - March 14 from Dr. E. Grebe's unpublished Report - "At a point several hundred feet to the southwest from the inclined shaft workings, but in close proximity tothe contact, a vertical shaft was sunk to a depth of 350 feet. It is reported that ore was cut in the sinking thereof 300 ft from the collar. Verification of this statement was not feasible since the shaft is now under water. .... Some material scattered over the dump showing sulphide was sampled with Assay results as follows: (see "A" below)

"Three diamond drill holes are said to have been drilled from the bottom level of the shaft and it was reported that allholes cut ore:

D H No. 1 - perpendicular - 600' deep - 45' W N W of shaft.
" " " 2 - 45 deg to north - 300 ft deep - 100' W of shaft.
" " " 3 - 70 " " south - 185' " " - 100' N of shaft."

"A"
from dump
between shaft and engine house --- Trace gold 1.20 silver 3.15 copper
from top
layer of waste dump 20' south of shaft - gold 0.01 silver 6.44 copper 1.29.

To verify statements re: drill holes had Mr. Brandt contact men who drilled, etc: Excerpts therefrom:

From R. C. Breen, Hibbing, Minn. ....."Referring to the 'State of Texas' will say that I did not drill #1 hole but was told there was about 10 ft of ore in it near the collar. #2 hole which I drilled struck between six and seven feet of ore, as I did not take care of the samples nor did I have it assayed, I cannot say what the per centage was but it looked very good. #3 hole, drilled 180 ft (I think) near the bottom struck soft material that would not core, it looked good and was told it was assayed 4 to 5% copper. Take it all in all, this looked favorable and would not be surprised if a large body of ore would develop as the formation was very favorable for copper ore."

Copy - Chas. Gerdes letter to Mr. Brandt ... Courtland 3/23/1914. "Concerning the drill holes on the Baron property would say that I do not know anything about hole No. 1 and never saw the core from it, thought it is likely that it showed ore near the top, as the ore shows in the shaft about 45 feet above the level of the drift from where the drillholes were sunk and the apparent pitch of the ore there is such as to make it likely that No. 1 hole should tap it near its collar. (Note: During the visit of Dr. E. D. Wilson to property Nov. 8, 1948 "this is a most important statement for you as the owner of the mine - remember this.)" I saw some core from No 2 hole that showed white iron heavily tinged with copper, it was in fact almost a solid iron sulphide that I should say would run 5% or so in copper. The boys stated that there was 7 feet of this, but that's all I know. No. 3 I partly drilled myself, had one of the two shifts. It is approximately 170' deep and bottomed in soft matter that did not core. It seemed from the tailings to be low grade ore. August Baron told me that the assays from these cuttings went from 4 to 6% in copper, silver and gold values I have forgotten, but they amounted to several dollars per ton. The core from No 2 hole and cuttings from No. 3 were in the office of the company, some time after the holes were drilled. This core should be there still. Roderic Breen, of Hibbing, Minn., was diamond setter and chief of all drilling operations, he perhaps can give you greater details of No. 1 and 2 ..."

Property of
Grace M. Sparkes
State of Texas Mine
Star Rt - Hereford, Arizona.

Copy - Notes Grace M. Sparkes took from Scowden's Old Report through 1912 through courtesy Mr. Spellmeyer:

"Sixty foot tunnel - pocket shipping ore 30-35' deep - 75' long. Cu and Ag Smelter return averaged 18% cu; 20 ozs Ag; 2' x 5' wide. Shaft 50' on contact vein - 8' wide cu seams 15' - 20' wide with lime. Dips N. sank 1880. Caved at bottom in lime. Hard barren lime may be in fact wall folded as shown. Also by fold in hanging wall seen at foot of 88' incline. Folding accounts shortness of croppings.

"350' Vertical shaft - contact lime - water level 100' DD Hole "C" cut through porphyry and from there 320' through lime to 670' level. At bottom cut 22' cu sulphides. No core obtained but some small pieces assay sludge 4½ to 5½ cu; 4 - 7½ ozs ag. Infromation gotten from drilling man."

Re: 350' Vertical Shaft - Diamond drill holes, etc.
Reported to Grace M Sparkes by Johnathan Gordon, during his visit to mine camp, Jan. 28, 1944:

"Vertical shaft sunk by Mitchell Company -- mineral encountered somewhere around the 165' point and continued to within 20 or 25' of bottom. In my mind there was immediately under the upper ore a lith of from 15 to 20' of better ore which I think carried some copper, but I do not remember the grade. Three diamond drill holes sunk from shaft - cut ore - north tapped water - plugged with pipe and faucet - good water." "Copper ore found in this hole - forgotten just where and how much - 7% material crushed and oxidized about 2# Baron brought to me. DD #3 dipping at 70 deg - 185' deep at 100' from shaft struck ore at 165' and remained in ore to bottom."

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Report mailed to Washington

January 4, 1944

WAR MINERALS R

Report of the Bureau of Mines to Secret

STATE OF TEXA
Cochise County,

- Zinc-Lead-Copper -

Summary

The State of Texas mine, situated in Montezuma Canyon, near the south end of the Huachuca Mountains, is yielding some zinc ore that occurs as replacements in a small block of Paleozoic limestone that was engulfed in intrusive granite. The limestone block is bounded on the south by down-faulted Cretaceous rocks. It is surrounded by granite on all other sides. The major dimensions of the limestone are 550 feet east-west and 375 feet north-south. Interfingering of the limestone with the granite on the east and faulting found in the underground workings and in the limestone at the surface indicate that the block was broken into several slabs probably at the time of the granite intrusion, prior to the ore deposition. The ore body that is being mined is very irregular due to faulting both preceding and following the ore deposition.

Ore has been stoped downward at a low angle for 80 feet from an outcrop at the surface and for a strike length of 40 to 60 feet. It is reported

* The War Minerals Reports of the Bureau of Mines are issued by the United States Department of the Interior to give official expression to the conclusions reached on various investigations relating to domestic minerals. These reports are based upon the field work of the Bureau of Mines and upon data made available to the Department from other sources. The primary purpose of these reports is to provide essential information to the war agencies of the United States Government and to assist owners and operators of mining properties in the production of minerals vital to the prosecution of the war.

that 1,500 tons of lead-silver ore was mined from this stope in 1936. The mine was re-opened with the aid of a loan from the Reconstruction Finance Corporation and nearly 1,000 tons of ore, that averaged about 15.5 percent zinc, 3.5 percent lead, 0.45 percent copper, 8.5 ounces per ton silver, and 0.02 ounce per ton gold, has been shipped to the Shattuck-Denn mill near Bisbee.

Returns from the mill and from Metals Reserve Company premiums amount to about $24.67 per ton. The mine manager stated that there is no profit from the operation. Calculations from the known cost factors--labor, transportation, and probable consumption of supplies--indicate a cost of about $15 per ton.

The stope is bottomed against an east-west fault with steep dip. Diamond drill exploration by the Bureau of Mines for major extensions of the ore body beyond the fault was requested by the operators. The following observed facts indicate that the existence of major extensions of the ore body is very doubtful: (1) Extensive surface prospecting has not found any zinc ore within 100 feet of the outcrops of the contact metamorphic zone that is well exposed along the north contact of the limestone with the granite and at places along the eastern limestone fingers. (2) The volume of the entire limestone block is so small that the underground workings are probably approaching this zone adjacent to the contact metamorphic zone in which the zinc ore replacement may have been inhibited. (3) The deposition of the zinc ore was apparently confined to a very limited segment of the limestone along the strike--about 1/3 of the strike length along which the limestone was altered at the outcrop.

Exploration by following indications of ore with short exploratory drifts or raises has been successful in discovering irregular extensions of the ore body and is the most effective means for discovering adjacent extensions beyond the fault. The manager reported that banded zinc ore was indicated by

the cuttings from a short drill hole into the hanging wall of the fault. He proposes to drift into the wall at that place and will probably discover such extensions of this ore body as may lie beyond the fault.

Major extensions of the ore body are unlikely since they would need to lie near the contact metamorphic zone where it appears that the zinc ore deposition was inhibited. Diamond drilling in search of such major extensions is not recommended.

Introduction

Exploratory drilling by the Bureau of Mines at the State of Texas mine was requested by the owners. The mine was examined by engineers[1/] of the Bureau of Mines on February 20, 1943. This examination was covered by a War Minerals Report submitted March 12, 1943. It was then being re-opened, with the aid of a class "B" loan from the Reconstruction Finance Corporation, and shipment of ore to the Shattuck-Denn mill near Bisbee was planned. Exposures of ore in the old workings were largely masked by back-fill and it was recommended that the mine be re-examined after some months when these faces would be cleared and the extraction of ore would secure new information regarding the attitude and habit of the ore body. This examination was made by an engineer[2/] on December 17-18, 1943. In the meantime, the geology had been mapped by geologists of the Federal Geological Survey and the mine had been examined by a geologist of the Arizona Bureau of Mines.

Location and Accessibility

The State of Texas mine is situated in Montezuma Canyon, which trends easterly through the southern end of the Huachuca Mountains. The well-graded Montezuma Pass road passes by the mine camp, which is approximately 6 miles west of the junction of that road with the paved state highway 92, at a point 24 miles west of Bisbee. The nearest railroad point is Hereford, on the El Paso and

1/ John M. Price and P. S. Haury, mining engineers
2/ P. S. Haury, mining engineer

Southwestern railroad, 15 miles from the mine.

Ownership

The mine is owned and operated by Grace M. Sparkes, Thomas Sparkes, and Perry T. Bones. Mr. Bones is in charge of operations. Development is financed by a class "B" Reconstruction Finance Corporation loan.

The holdings consist of one patented and two unpatented lode claims and one mill site.

History

The Texas claim was located by T. J. Sparkes in the early 1880's and was patented in 1898. The present owners are his heirs. About 1,500 tons of oxidized lead-zinc ore with high silver values was mined and shipped in 1936.

A vertical shaft was sunk, 130 feet northwest of the present workings, by the Mitchell Development Company of Houghton, Michigan, at some time in the early 1900's.

Physical Features

The higher slopes at the sides of Montezuma Canyon are rugged and precipitous. The floor of the canyon has more moderate relief. The canyon is fairly well watered and has a thick cover of oak along its upper course and on the southwest side with some pines on the higher slopes. A new camp of four frame houses has been erected on the mill site claim beside the road. This is at about 5,400 feet altitude. The mine workings are some 200 feet higher.

Geology and Ore Occurrence

The ore at the State of Texas mine occurs in a small, broken block of Paleozoic limestone which was engulfed in intrusive granite that is ascribed to the Cretaceous. At the outcrops the granite surrounds the limestone on the west, north, and east. On the south, the limestone is in contact with red Cretaceous shale and the sandstone that has been down-faulted against the limestone and

granite (fig. 1). There is a similar detached block of the limestone across the gulch to the northwest and another farther southeast.

The greatest length of the limestone block that contains the ore is 550 feet and the greatest width 375 feet. The length of the solid block is only 400 feet. Three narrow fingers of the limestone extend back into the granite on the east side. This interfingering, along with some other evidence, suggest that the limestone was broken into 3 or 4 blocks by nearly east-west faults probably at the time the granite was intruded and prior to the ore deposition. Two such faults are indicated on the ideal section through the base of the fingers at the east side (fig. 4).

There is little evidence regarding the depth of the limestone but it probably is shallow for a considerable part of the block. Granite was encountered adjacent to a northeast fault, at a depth of 50 feet at one place in the underground workings. A shaft 150 feet deep, situated 130 feet northwest of this place, did not pass out of the limestone.

There is conclusive evidence that the granite was intruded into the limestone along the contacts at the north. A fairly broad band of the limestone was contact metamorphosed along the northwest trending portion of this contact and also along the north side of the most northerly of the three fingers at the east. The granite is finer-grained adjacent to the contact than farther back and shows some metamorphism in places.

The northwest trending portion of the contact strikes N.30°W. and dips about 50° southwest. Some very early mining was done here in a steeply dipping faulted zone parallel to this contact. One of the shafts is over 30 feet deep; the other is shallower. These seem to have been connected by stoping. The metamorphosed limestone, beside garnet and epidote, contains hematite, limonite, and jasper, and small amounts of copper minerals. The early mining here was

probably done for gold. Eastward, along the north side of the finger, the contact metamorphic rock is similar. The limestone there dips steeply under the granite. The shallow shaft was sunk in a fault breccia that strikes N.80°E. and dips 80° north. This is in alignment with the surface trace of faulting with similar strike, in the limestone 275 feet west of this place. No zinc ore has been found in or near this contact metamorphic zone along the north side of the limestone block.

The granite tongue between the north and middle limestone finger may be along a parallel fault, 75 feet south of the first suggested fault. The granite tongue is in alignment with a fault found in the underground workings ("F" on fig. 2) that strikes N.80°E. and dips steeply north. Some features noted on the underground fault together with the relative attitude of the limestone fingers suggest that the north or hanging wall block is upthrown with respect to the footwall block, but there is no definite evidence of this.

Zinc Ore: All the zinc ore so far found has been mined from the block south of this fault. This ore outcropped at "O" on fig. 1. The ore is a replacement of more or less silicified limestone by sphalerite with some galena, pyrite, and chalcopyrite. This ore averages about 15.5 percent zinc, 3.5 percent lead, 0.45 percent copper, 8.5 ounces per ton silver, and 0.02 ounce per ton gold. The ore body, so far as it has been developed and stoped, extends 80 feet northerly, down dip from the outcrop and was 40 to 60 feet wide along the strike. The limestone and ore have been very much disturbed, and the ore body is very irregular. A number of minor faults and fractures were noted both underground and on the surface. The movement was not large along most of them. It is probable that these fractures are largely responsible for the localization of the ore and that the irregularity of the ore body is largely due to irregular

replacement of the limestone due to this irregular fracturing although some post-ore fracturing was noted. The most regular ore deposition took place in the upper 50 feet of the stope, in part beneath a flat fault in the roof. (Figs. 2 and 3). The greatest width of ore, 60 feet along the strike, is at the bottom of the stope, near the fault at the north. Nowhere was ore found to extend east of the stope boundary shown on fig. 2 although the altered limestone outcrops for 100 feet farther easterly at the surface. The vertical thickness of the ore varied from 3 feet near the top of the stope to 10 or 12 feet at some places near the bottom of the stope.

Development

In addition to the stoping on the zinc ore, just described, some very old work, consisting of several comparatively shallow shafts and opencuts, with probably a little stoping at one place, was done in the contact metamorphic zone at the north. This mining probably was for gold ore. Also, a vertical shaft was sunk, near the northwest granite-limestone contact, 130 feet northwest of the zinc ore stope. Mr. Bones, the superintendent, reported that this shaft is 150 feet deep. The collar is now caved and the shaft is inaccessible. He further reported that no crosscutting was done from the shaft but that three diamond drill holes were drilled from the bottom: one inclined northeasterly toward the north contact, one vertical, and one inclined southwesterly. No data on these drill holes could be obtained. The work was done in the early 1900's. The material on the dump is all limestone, with very little garnetized or epidotized limestone.

Production

It is reported that about 1,500 tons of lead-silver ore was mined from the zinc ore stope in 1936. Nearly all the upper part of the stope, shown in dash lines on fig. 1, was mined out at that time. Some 300 tons, containing a

considerable percentage of zinc, remains on the dump from that work. Mr. Bones reported that one carload of sorted dump ore was shipped to the Shattuck-Denn mill and that this ore was successfully treated and a good recovery of the metal was made but that the cost of hand screening, sorting, and loading this dump ore exceeded the profit derived. This first car was shipped on March 13, 1943. Shipments of mined ore have been maintained at 2 cars, or about 100 tons, per month since then, making a total of 19 cars shipped to December 9. Figures were obtained on the first seven cars shipped. These averaged 0.0215 ounce per ton gold and 8.45 ounces per ton silver, 15.4 percent zinc, 3.535 percent lead, and 0.443 percent copper. The overall recoveries from mill and smelter were 62.6 percent of the gold, 83.7 percent of the silver, 76.9 percent of the zinc, 68.1 percent of the lead, and 52.3 percent of the copper. The gross value of the recovered metal was $9,815.46 and the net mill payments, after deductions for shipping and smelting concentrates, milling charge, and handling charges, amounted to $3,894.04 ($10.556 per ton). Mr. Bones reported that subsequent shipments averaged about the same in grade and recovery.

A special premium of 2.75 cents per pound of zinc is paid by the Metals Reserve Company, in addition to the regular premiums on zinc, lead, and copper. Metals Reserve premiums amount to $14.12 per ton on the average grade of ore, yielding a total return from mill payments and premiums of $24.67 per ton.

Costs

Four men are employed when mining ore and three when developing. The ore is shipped to the Shattuck-Denn mill in 2-carload lots and milled separately from other ore. It is trucked about 27 miles to Don Luis and loaded onto railroad cars at a cost of $2.75 per ton. The switching charge from Don Luis to the mill is 15 cents per ton. Costs, calculated from these data are about as follows:

Mining $12.00 per ton

Transportation 2.00 " "

Total costs $14.00 per ton

Mr. Bones stated that there is no profit from the operation. According to these figures there should be a profit of $9 to $10 per ton.

Ore Reserve

There is scarcely any ore developed at this time.

There is about 100 tons of approximately 18-percent zinc ore along both sides of the short east drift at the bottom of the stope. A small fault, that dips west at 35° was noted in this ore. It did not displace the ore appreciably.

Development

As noted above, the ground has been much disturbed by fractures with several directions both preceding and following the ore deposition. As a consequence, much of the ore is in small blocks. The operator has succeeded in maintaining a production of 100 tons per month by driving short drifts or raises where there were indications of ore and finding small blocks of ore in this way.

Drifting was in progress on a vein that strikes N.55°E. and is nearly vertical. This is a narrow, banded quartz vein with alteration and mineralization extending into fractured wall rock on both sides. The mineralization is not of the zinc replacement type. The vein and fracture zone contain pyrite and chalcopyrite and much finely divided specular hematite. There is a considerable amount of green, chloritic gouge in pockets and bunches along the vein. One sample assayed 6.4 percent copper, with good silver and fair gold values and low lead and zinc.

Mr. Bones proposes to abandon the development on this vein shortly if it does not lead to zinc ore and drift into the hanging wall of the fault

marked "F" on figure 1, where a drill hole showed several feet of banded zinc ore. It is likely that an extension of the zinc ore will be found beyond the fault by following this ore upward or downward. The fault steepens and turns parallel to the vein. It is not improbable that it crosses the vein and resumes its normal N.80°E. strike further ahead along the vein.

Conclusion

Three features indicate that the zinc ore body probably is not extensive: (1) The comparatively small volume of the limestone block in which the ore was deposited. (2) The limited extent of the ore along the strike of the beds. This is only about one-third of the strike length along which the limestone has been altered. (3) The fact that no zinc ore has been found at the surface within 100 feet of the contact metamorphic zone. This probably is due to temperature control of the deposition of the zinc ore. The underground workings probably are approaching this zone adjacent to the contact metamorphic zone in which deposition of the zinc ore was doubtful.

The method of following indications of ore with short underground exploratory workings has been successful in finding small irregular extensions of the ore body and probably will expose any extension of the ore body that lies beyond the fault against which the stope is now bottomed. Diamond drilling for locating closely adjacent extensions would be more uncertain.

Since it is unlikely that the zinc ore extends much farther toward the contact metamorphic zone, diamond drilling to discover ore at considerable distance from the underground workings would probably be unsuccessful.

Exploratory drilling by the Bureau of Mines is not recommended.

Dec. 24, 1943

State of Texas Mine,
Arizona No. _____

Sources of Information

Examinations by John M. Price and P. S. Maury, February 20, 1943, and by P. S. Maury on December 17-18, 1943.

Report by Federal Geological Survey.

Geologic examination by Eldred D. Wilson of the Arizona Bureau of Mines.

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN ORE PURCHASING OFFICE
810 VALLEY BANK BUILDING
TUCSON, ARIZONA

REED F. WELCH
MANAGER

August 8, 1951

Mrs. Grace M. Sparkes
State of Texas Mine
Star Route
Hereford, Arizona

Dear Mrs. Sparkes:

Enclosed is Deming Schedule D-67 outlining purchase terms for ore from your State of Texas Mine similar to the sample recently submitted for mill test, assaying:

	Gold oz	Silver oz	Lead %	Copper %	Zinc %
	.016	10.82	5.99	0.42	22.5
Non-sulphide					.5

On present metal prices the net return based on above-quoted assays would be approximately $33.95 per ton after deducting the milling charge and freight from Hereford to Asarco Mill (freight rate $4.10 per ton including tax)

When you get into production your shipments should be consigned to American Smelting and Refining Company, Asarco Mill, New Mexico. Shipping advices, settlement instructions, etc. should be mailed direct to the Deming Office (P.O. Box 998, Deming, New Mexico).

Yours very truly,

REED F. WELCH

By A C Stipp

Enclosure

NUMBER [illegible]

AMERICAN SMEL NG AND R_FININ COMPAN PURCHASE SCHEDULE

PLEASE RETURN TO

DEMING MILLING UNIT EFFECTIVE DATE Aug. 8, 1951

ALL SCHEDULES ON ORE NOT UNDER CONTRACT FOR A DEFINITE PERIOD OF TIME ARE SUBJECT TO CHANGE OR TERMINATION ON 30 DAYS WRITTEN NOTICE.

SCHEDULE FOR THE PURCHASE OF CRUDE LEAD-ZINC-COPPER SULPHIDE ORES FROM:

Mine: STATE OF TEXAS Location: Hartford Mining District Cochise County, Arizona

Shipper: MRS. GRACE M. SPARKES(owner) Address: Star Route, Hereford, Arizona

PAYMENTS

GOLD: If .02 oz. per dry ton or more, deduct .02 oz. from assay and pay for 50 % of balance at ~~net realized price. At present this is equivalent~~ to $ 31.00 per ounce.

.75
45

SILVER: If 1.0 oz. per dry ton or more, deduct 1.0 oz. from assay and pay for 80 % of the balance at Handy & Harman New York silver quotation or, if higher, at the realized "Mint Price" provided silver qualifies for Government purchase and affidavit is furnished, less a deduction in either case of 1.5¢ per ounce.

- 10
42%

LEAD: No pay if sulphide lead content is 1.0 % or under. If sulphide lead content is over 1.0 %, deduct 1.0 % from sulphide lead assay and pay for 67 % of the remaining sulphide lead at the E.&M.J. New York quotation for common desilverized domestic lead less 2.8 ¢ per pound.

COPPER: No pay if sulphide copper content is 0.3 % or under. If sulphide copper content is over 0.3 %, deduct 0.3 % from sulphide copper assay and pay for 71 % of the remaining sulphide copper at the E.&M.J. New York domestic price for electrolytic cathode copper less 6.5 ¢ per pound.

ZINC: No pay if sulphide zinc content is 4.0 % or under. If sulphide zinc content is over 4.0 % deduct 0.5 % from sulphide zinc assay and pay for 73.5 % of the remaining sulphide zinc at the E.&M.J. East St. Louis quotation for prime Western zinc less 6.05 ¢ per pound, increasing or decreasing this deduction 0.11 ¢ for each one cent increase or decrease in the price above or below 15 ¢ per pound, fractions in proportion.

87%

No payment will be made for non-sulphide content of lead, copper or zinc, or for any metal or content except as above specified.

QUOTATIONAL PERIOD: For the purpose of determining metal payments, each quotation specified for silver, lead, copper and zinc shall be the average of the daily published quotation for the calendar week including the date of delivery at buyer's mill.

DEDUCTIONS

BASE CHARGE: $ 4.00 per net dry ton of 2000 pounds of ore.

DELIVERY: F.O.B. mill bins of buyer's mill. Rates quoted are based on shipment in bottom-dump gondol equipment or truck. Extra unloading charges of $1.00 per ton will be assessed for products received in solid-bottom or box cars. Bill of lading covering each rail shipment must be delivered to buyer promptly on release of shipment to Carrier.

TONNAGE: Limited to 100 tons per month except by special arrangement. Minimum lot 50 ton

AMERICAN SMELTING AND REFINING COMPANY

By Reed F Welch

REED F. WELCH, Ore Buyer

(Over)

Bisbee, Arizona
March 21, 1914

Below please find my report on the State of Texas Mine situated in Montezuma Canon in the southeast slope of the Huachuca Mts., Huachuca Min. District, Cochise Co. Ariz.

The property consists of six mining claims, namely, State of Texas, Texas No2, Extension, Bonita, Josephine and New York. The State of Texas is a patented claim, all others are held by right of location and surround the former. Mrs. Christina Baron is the owner and the property is offered for purchase for $50,000.00. The group is situated on the north side of the canon and has been located to take in the contact zone of an intrusive granite with limestone. Contact metamorphism with strong development of garnet and also of magnetite was observed, the latter especially in the eastern portion of the ground and beyond the boundary of the property on the McCabe holdings.

The trend of the contact is N66°E with a dip inclined 40° to the north.

Contact metamorphism and mineralization is not confined entirely to the contact but was also observed to extend into the limestone for a distance of about 80 - 100 ft. therefrom. The workings of the inclined shaft are on this interior zone and the orebody opened up therein is of a somewhat different character than the mineralization along the contact, the ores being sphalerite and argentiferous galena in a gangue of garnet.

An inclined shaft was originally sunk on this orebody to a depth of 80 ft. Subsequently a crosscut adit was driven somewhat lower down on the canon side to tap the orebody at a depth of about 65 ft. Stoping was then carried out around the inclined shaft. Both breasts of the stope are still in ore, the average thickness thereof being about 5 ft. in the back and 7 ft. in the breasts. In the bottom of the stope a fault appears to have cut off the ore, and the bottom of the incline, sunk 15 ft. beyond the break, is entirely barren.

It appears that the orebody had a lenticular form attaining a greatest thickness of about 12 feet in its center.

The mineral constituents, galena and sphalerite, are finely intergrown and form stringers and patches in the garnet gangue. A sample taken normally in the breast of the stope assayed:
Au - 0.04; Ag - 10.12; Cu - 0.22; Pb - 5.6; Zn - 24.8

The bulk of the excavated ore was hauled by autotruck to the Hermitage mill, erected by the last operators of the property

on the open desert 7 miles from the mine and 3 miles from the San Pedro river. The concentrators, consisting of the usual crushing machinery and a battery of Hartz jigs, proved to be a complete failure. Operation thereof after a 10 month run gave convincing proof that a separation with the methods employed could not be effected.

A quantity of ore, said to amount to 500 tons, is on dump at the mill. Evidently this is sorted ore, since a sample thereof procured by me assayed:

Au - 0.06; Ag - 25.66; Cu - 0.80; Pb - 18.6; Zn - 35.0

Concentration tests by panning yielded unsatisfactory results, the heads assaying:

Au - 0.04; Ag - 27.7; Pb - 20.4

As previously stated the ore occurrences on the contact proper are of somewhat different character and confine themselves to small bunches of secondary enriched ores carrying generally high values of copper. From a small pocket in one of the numerous shallow openings along the contact a sample was taken which assayed:

Au - 0.02; Ag - 13.34; Cu - 32.71; Zn - 4.2

The mineral showings on the contact are more pronounced on the State of Texas claim from where above sample was procured. Occasionally indications of mineralization were also observed on the extension of the contact into the adjoining claims of the group and still further to the N.E. into the McCabe ground. At no point were such showings sufficiently encouraging to recommend further exploration work to the Company.

At a point several hundred feet to the southwest from the inclined shaft workings, but in close proximity to the contact, a vertical shaft was sunk to a depth of 350 ft. It is reported that ore was cut in the sinking thereof 300 ft. from the collar. Verification of this statement was not feasible since the shaft is now under water. Some material scattered over the dump, showing sulphide, was sampled with assay results as follows:

Au - tr.; Ag - 1.20; Cu - 3.15 (from dump between shaft and engine house)

Au - 0.01; Ag - 6.44; Cu - 1.29 (from top layer of waste dump 20 ft. south of shaft)

Three diamond drill holes are said to have been drilled from the bottom level of the shaft and it was reported that all holes cut ore.

The following data were obtained:

D.H. No. 1	- perpendicular	- 600' deep	- 45'	W.N.W.	of	shaft
Do 2	- 45° to north	- 300' do	-100'	W		do
Do 3	- 70° to south	- 125' do	-100'	N		do

In order to verify Mr. Brandt's statement relating to the cores I requested him to write to the men engaged with the drilling and their replies to his letters are now at hand and copies thereof you will find attached to this report. I find the statements contained therein rather vague and based too much on hearsay to be of much assistance in forming an opinion on the possibilities of the ground. To fully verify these statements it would become necessary to put down some deep holes from the surface, or from the bottom of the shaft workings after un-watering, an undertaking hardly justified under the circumstances.

Respectfully

/s/ E. Grebe

NO. 3 "E"

Return to:
State of Texas Mine
Craco M. Sparkes, owner-operator
Star Rt - Hereford, Arizona.

NOTES: STATE OF TEXAS MINE

By Dr. Eldred D. Wilson, Geologist
College of Mines
Arizona Bureau of Mines
University of Arizona
Tucson, Arizona

Dated - Nov. 8, 1948.

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Note: These notes are in finished and corrected form in Part II ARIZONA ZINC AND LEAD DEPOSITS - Arizona Bureau of Mines Geological Series No. 19, Bulletin No. 154, published by University of Arizona, Tucson, Arizona, and typewritten copy thereof attached to these records.
Date of Publication July, 1951.

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MEMORANDUM:

During visit of Dr E. D. Wilson, Arizona Bureau of Mines Tucson, Arizona, to the State of Texas Mine, owner discussed various angles with him and asked for suggestions. He remarked:

"Marbles should not be discarded or discounted. Ores favor darker limes in State of Texas, but ore may be found in marbles. Gleason properties (Wild Bill and Despite) contain such a situation."

(this comment when we discussed finding sulphides in garnetized limes.)

He checked Old Gordon Map (1914) and estimated about 50' further would have put them from drift showing in Old Vertical 350' Shaft, toward War Stope.

"100' to Little Shaft Copper at Top of the Hill.
Cu - State of Texas - from adit near compressor house.
Could have as big a deposit as War Stope.
Get back under Little Shaft workings.
Top workings (Cu) showings as in stope.
Certainly strong mineralization.
Splashed up.
Needs drill hole half way up.
Also more drilling stope."

While on State of Texas No. 2 said:

"They didn't go far enough referring to tunnel above water drift."

While in cross cut below road near Powder Magazine said:

"Good bet - garnetized live ground - go further."

Note: (We drove this cross cut 138' - started on side lines of Eureka M C and continued on State of Texas Pat Lode. Now requires 250' -300' to reach contact. Dr. Wilson saw this cross cut at the 138').

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COPY

STATE OF TEXAS MINE
Bruce M. Sparkes, owner-operator
Star Rt - Hereford, Arizona.

STATE OF TEXAS MINE

SITUATION: The State of Texas Mine is in Montezuma Canyon, near the south eastern end of the Huachuca Mountains. It is about 30 miles from Bisbee, via State Highway 92 and the Montezuma Pass road. The property consists of one patented and 6 unpatented claims, owned by Miss Bruce M. Sparkes.

HISTORY: Locations in this area were made by August Baron, of Tombstone, in 1869 and his State of Texas claim was surveyed for patent in 1898. A few years later Baron's claim and 32 other claims in the area were acquired by the Mitchell Development Company, of Ishpeming, Michigan. Workings in 1904 were reported (1) to consist of 3 tunnels, a shaft about 250 feet deep, and a shallower shaft. According to Crebe (2) some copper was reported to have

(1) H. J. Stevens, the Copper Handbook, vols. 3-5
(2) Unpublished Report, March 21, 1914.

been found in the main shaft at a depth of 300 feet and in diamond-drill holes below the 350 level. The Mitchell Development Company liquidated in 1905 (3) and the property remained essentially idle until World War II. According to Miss Sparkes production 1943-47, totaled 1,791 tons, which was sent to the Shattuck Denn custom mill at Bisbee. This ore yielded essentially all of the zinc output (330,000 lbs) credited to the Hartford Mining district, for the years 1943-47; also, it contained from 1.0 - 5.25 per cent lead and 0.2 - 0.75 per cent copper, together with 2.75 - 11.0 ounces of silver and generally less than 0.01 ounce of gold per ton.

GEOLOGY: The State of Texas mine is on the north side of Montezuma Canyon, at an altitude of approximately 5,700 feet. From top to bottom this side of the Canyon shows the following sequence of rocks: 1) Granite, forming large mass below crest of ridge; 2) marble, approximately 60 feet thick; 3) impure dark-gray limestone, approximately 40 feet; 4) granite-porphyry sill, 5 to 20 feet; and 5) reddish-brown shale, sandstone, and quartzite, to bed of canyon.

The marble and limestone are probably of Paleozoic (Escabrosa and Naco) age, and the underlying shale-sandstone series is of Cretaceous aspect; low- to angle and steep reverse faulting has thrust the older rocks over younger rocks. The granite-porphyry sill (4) was intruded along a low-angle fault, and presumably the larger masses of granite came in along zones of reverse faulting. In places renewed fault movement occured along the contacts; for example a fault zone dipping 80 deg northward and locally marked by copper stain, separated the marble from the granite mass north of the mine. The marble and limestone south of this fault form a belt of approximately 350 feet wide and several hundred feet long from east to west. Their beds in general dip 15 deg northward, but in places they have been deformed by flexures and faults.

WORKINGS AND MINERALIZATION: The zinc-lead workings are about 200 feet southeast of the old Mitchell vertical shaft. They consist of an adit with about 250 feet of drifts and an irregular stope about 60 feet in maximum length and

COPY

State of Texas Mine
Grace M. Sparkes, owner-operator
Star Rt - Hereford, Arizona.

STATE OF TEXAS MINE

breadth by 5-15 feet high. As seen in these workings, the ore replaced favorable portions of the impure limestone within the crest of a northward-plunging anticline. The roof in the southern part of the stope shows a fault dipping 20 deg southward immediately above the ore. Two fissure zones, about 25 feet apart, striking N. 80 deg. W., and almost vertical are associated with the best-developed mineralization. The surface outcrop of the stronger zone is marked particularly by dark limonitic mineralization. Presumably the ore bearing solutions came up along these fissures.

North of the stope a short drift extends into unmineralized marble. During 1948 two inclined diamond-drill holes from the drift found high-grade sphalerite, together with some galena and chalcopyrite, at a depth of about 55 feet vertically below the floor of the stope. Not enough development work has been done to determine the attitude, thickness and extent of this mineralization.

One of the drill holes encountered granite at a vertical depth of 85 feet below the floor of the stope. Granite also occurs in workings northeast of the stope and is there faulted against the limestone. Presumably these granite bodies are sills, but their thickness and extent remain unpredictable from existing data.

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UNIVERSITY OF ARIZONA
Tucson, Arizona - November 8, 1948

COLLEGE OF MINES
Arizona Bureau of Mines

Miss Grace M Sparkes
P O Box 1099
Bisbee, Arizona.

Dear Miss Sparkes: Enclosed is copy of my notes regarding your State of Texas property. They are in preliminary form for our forthcoming publication on "Zinc and Lead Deposits of Arizona" and as such are submitted to you for consideration and comment. For example you might wish to modify or expand the statement regarding production. With kindest wishes.

Yours sincerely

(signed) Eldred D. Wilson
Geologist.

COPY

VOL. XXII, No. 3 July, 1951
UNIVERSITY OF ARIZONA BULLETIN
ARIZONA BUREAU OF MINES - Tucson, Arizona.

ARIZONA ZINC AND LEAD DEPOSITS

Part II
Arizona Bureau of Mines, Geological Series No. 19
Bulletin No. 158

(Re: State of Texas Mine - Pages 37-38-39
By Mildred D. Wilson, Geologist
College of Mines - University of Arizona
Tucson, Arizona.)

UNIVERSITY OF ARIZONA BULLETIN

ARIZONA ZINC AND LEAD DEPOSITS, Pages 38-39

COPY

STATE OF TEXAS MINE

Situation: The State of Texas Mine is in Montezuma Canyon, near the southeastern end of the Huachuca Mountains. It is about 30 miles from Bisbee, via State Highway 92 and the Montezuma Pass road. When visited in 1949, the property consisted of one patented and six unpatented claims, held by Miss Grace M. Sparkes.

History: Locations in this area were made by August Baron, of Tombstone, in 1889, and his State of Texas claim was surveyed for patent in 1898. A few years later Baron's claim and thirty-two other claims in the area were acquired by the Mitchell Development Company, of Ishpeming, Michigan. As reported in the Copper Handbook, (6) workings in 1904 consisted of three tunnels, a shaft about 250 feet deep, and a shallower shaft. According to Grebe, (7) some copper ore was reported to have been found in the main shaft at a depth of 300 feet and in diamond drill holes below the 350 level. The Mitchell Development Company liquidated in 1906, (8) and the property remained essentially idle until World War II.

According to Miss Sparkes, (9) production during 1943-46 totalled 1,791 tons, which was sent to the Shattuck Denn custom mill at Bisbee. This ore yielded essentially all of the output of recoverable zinc (330,000) credited to the Hartford district for the years 1943-1946." (11). Also, it contained from 1.0 to 6.65 per cent lead and 0.2 to 1.12 per cent copper, together with 2.75 to 11.0 ounces of silver and generally less than 0.1 ounce of gold per ton. (9). It commonly ranged from 10 to 19.65 per cent in zinc content. (9).

Geology: The State of Texas mine is on the north side of Montezuma Canyon, at an altitude of approximately 5,700 feet. From top to bottom this side of the canyon shows the following sequences of rocks: (1) Granite rock, classified as quartz monzonite by Weber, (2) forming large mass of ridge; (2) marble, approximately 60 feet thick; (3) impure dark-gray limestone, approximately 40 feet; (4) porphyry sill, 5 to 20 feet; and (5) reddish brown shale, sandstone, and quartzite, tobed of canyon.

The marble and limestone resemble portions of the Carboniferous Escabrons and Naco formations, and the underlying shale-sandstone series is probably Cretaceous; low-angle and steep reverse faulting has thrust the older rocks over the younger rocks. The porphyry sill (4) was intruded along a low-angle fault, and presumably the larger masses

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UNIVERSITY OF ARIZONA BULLETIN

ARIZONA ZINC AND LEAD DEPOSITS --- Pages 38-39

of quartz monzonite came in along zones of reverse and shear faulting. In places renewed fault movement occured along the contacts; for example a fault zone, dipping 80 degrees northward and locally marked by copper stain, separates the marble from the intrusive mass north of the mine. The marble and limestone south of this fault form a belt approximately 350 feet wide and several hundred feet long from east to west. Their beds in general dip 15 to 50 degrees northward, but in places they have been deformed by flexures and faults.

Workings and Mineralization: The zinc-lead workings in the State of Texas mine are about 200 feet southeast of the old Mitchell vertical shaft. They consist of an adit with about 250 feet of drifts and an irregular stope about 80 feet in maximum length and breadth by 5 to 15 feet high.

The ore consists essentially of sphalerite and galena together withl pyrite and a little chalcopyrite. It occurs associated with garnet and other silicates, minor quantities of willemite (?), calcite and quartz.

As seen in the workings, the ore replaced favorable portions of the impure limestone within the arch of a northward-plunging low anticline. The roof in the southern part of the stope shows a fault dipping 20 degrees southward immediately above the ore. Two fissure zones, about 25 feet apart, striking N. 80 degrees W., and almost vertical, are associated with the best-developed mineralization. Presumably the ore-bearing solutions were localized to a considerable extent along these fissures. The surface outcrop of the stronger zone of fissuring, marked particularly by dark limonitic alteration, extends east of the present workings.

North of the stope a short drift extends into unmineralized marble. During 1948 two inclined diamond-drill holes driven from this drift found high-grade sphalerite, together with some galena and chalcopyrite, at a depth of about 55 feet vertically below the floor of the stope. Not enough development work has been done to determine the attitude, thickness and extent of this mineralization.

One of the drill holes encountered quartz monzonite at a vertical depth of 55 feet below the floor of the stope. Granitic rock also occurs in workings northeast of the stope and is there faulted against the limestone. Presumably these granitic bodies are sills, but their thickness, extent, and structural relations are not evident.

State of Texas Mine -

References, Huachuca Mountains

2. Robert H. Weber. The geology of the east-central portion of the Huachuca Mountains, Arizona; Univ. Arizona., PhD, Thesis, 164 pp., maps, 1950.

32. For years prior to 1930, partly from unpublished notes of J. B. Tenney.

4. Wm. P. Blake, Report to the Governor of Arizona, 1903.

5. Eldred D. Wilson, Tungsten Deposits of Arizona; Univ. Ariz., Ariz. Bureau of Mines Bulletin 148, 1941; also Robert H. Weber, work cited.

6. H. J. Stevens, The Copper Handbook, vols. 3-5, 1903-05.

7. E. Grebe, Unpublished report, March 21, 1914.

8. H. J. Stevens, The Copper Handbook, vol. 6, 1906.

9. Written communication from Miss Grace Sparkes, Nov. 13, 1943.

11. U. S. Minerals Yearbooks.

Grace M. Sparkes
State of Texas Mine
Star Rt - Hereford, Arizona.

COPY- VOL.XXII, No. 3 - July 1951.

(Following from University of Arizona Bulletin - "Arizona Zinc and Lead Deposits," Part II, Arizona Bureau of Mines, Geological Series No. 19 Bulletin No. 158, published by University of Arizona, Tucson, Arizona.)

CHAPTER IV - HUACHUCA MOUNTAINS

By Eldred D. Wilson

PHYSICAL FEATURES

The Huachuca Mountains are in southwestern Cochise County, on the west side of the San Pedro Valley. They form a range approximately 22 miles long by a maximum of 8 miles wide which trends northwestward from the International boundary. The maximum altitude 9,446 feet, is on Miller Peak, 4,500 feet above the eastern base of the range. The slopes are prevailingly steep and deeply dissected by canyons.

Topography of the Huachuca Mountains has been mapped by the U. S. Geological Survey on the Hereford and Benson quadrangle sheets.

The principal settlement is Fort Huachuca, at the northeastern base of the range. Ranches and summer homes are in several of the canyons, and a few people live at some of the mines. Hereford, a station on the Southern Pacific railway, is 9 miles east of the mountains.

The eastern margin of the range is skirted by State Highway 93, and its southern end is crossed by the Montezuma Canyon road. Access roads from these routes and from highways on the north and west lead to the mines.

ROCKS

The rocks of the Huachuca Mountains have been described in considerable detail by Alexis (1) and Weber (2).

Bolsa quartzsite rests upon pre-Cambrian granite and is overlain by limestones and shales of Cambrian, Devonian, Mississippian, Pennsylvanian and Permian ages. Above the Permian is a thick succession of conglomerate, sandstone, quartzsite, shale, and interbedded volcanic flows, of Lower Cretaceous age. These beds are unconformably overlain by Tertiary (?) volcanic rocks in the northwestern part of the range.

Intruding the Cretaceous and older rocks is a northwestward-trending stock of quartz monzonite which crops out over an area 7 miles long by 2½ miles wide in the southern part of the range, between

COPY (CHAPTER IV - HUACHUCA MOUNTAINS, by Eldred D. Wilson, Bulletin No. 158, Part 11, Arizona Bureau of Mines Geological Series No. 19, ARIZONA ZINC AND LEAD DEPOSITS, published by University of Arizona - Tucson.)

Montezuma Canyon and Carr Peak. (2) Associated with it are dikes of andesite and quartz-latite porphyry.

STRUCTURE

As determined by Alexis (1) and Weber (2) the Huachuca Mountains area was successively deformed by folding, broken by thrust and reverse faulting, and subjected to normal faulting. In the east-central portion, according to Weber, (2) six major thrust-fault systems were superimposed upon the northeastern limb of a regional anticlinal fold.

Folding was apparently initiated previous to thrust faulting, but continued with the development of successively younger thrusts northeastward from the anticlinal axis. Both fold axes and thrust faults strike persistently northwestward, generally paralleling the trend of the range. The thrust dip prevailingly northeastward at low to high angles.

The development of minor anticlinal and synclinal folds apparently accompanied thrust faulting, in several places resulting in folding of the earlier thrust sheets. Overturned folds and drag folds were also companion features.

The observed major structural deformation apparently began in post-early Cretaceous time, and may have continued into the Tertiary. (2).

The quartz monzonite is largely younger than the major deformation of the range. (2).

ORE DEPOSITS

History and Production (3)

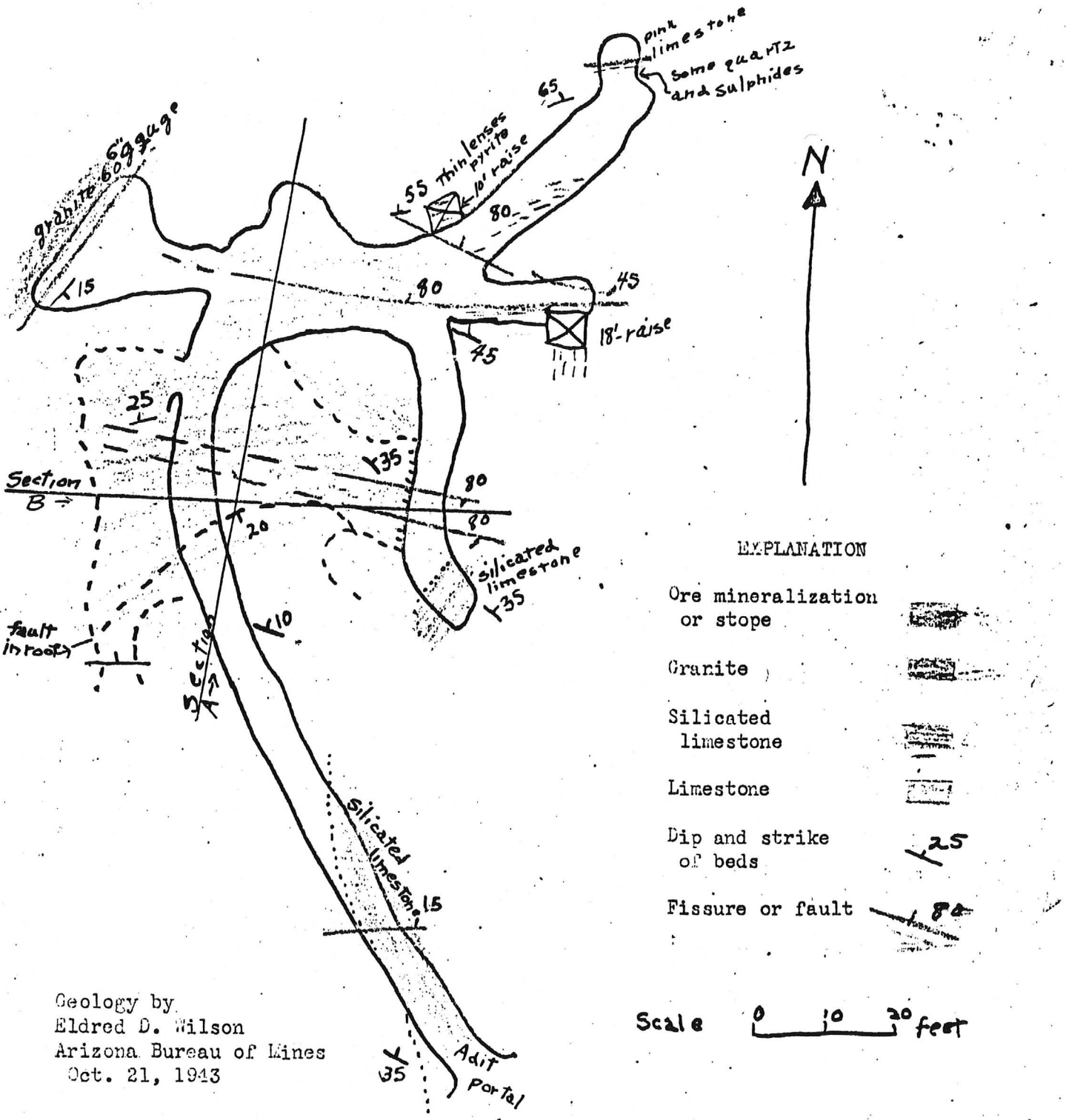
Prospecting in the Huachuca Mountains began at an early date but was retarded by Apache hostilities, until the establishment of Fort Huachuca in 1877. During the early eighties a little ore was sent from the Nellie James and other properties to lead smelters at Charleston and Benson.

Early in the present century, the Butte and Arizona, State of Texas, and Sitric were developed, and the Exposed Reef was worked as a gold prospect. The Eureka and Copper Glance mines were operated by a religious sect living at Sunnyside. (1). The Wisconsin mines were developed by a company which in 1903 was managed by Harry Hamburg (4).

Tungsten deposits (5) were worked mainly during war years, and gold placers during periods of depression. Zinc and lead have been mined principally since the beginning of World War 11.
(other data follows but thought this the most pertinent at this time.)

STATE OF TEXAS MINE

COCHISE COUNTY, ARIZONA.



Geology by
Eldred D. Wilson
Arizona Bureau of Mines
Oct. 21, 1943

ARIZONA DEPT. OF MINES & MINERAL RESOURCES
STATE OFFICE BUILDING
416 W. CONGRESS, ROOM 161
TUCSON, ARIZONA 85701

General Information: 2/1943

Ore occurs as replacements in limestone engulfed by granite. The ore body being mined is very irregular due to faulting both before & after deposition. Development consists of several shallow shafts, & shaft 150' deep, considerable drifting & crosscutting besides opencuts. The mine was re-opened with RFC funds. Of nearly 1000 T mined that assayed 15.5% Zn, 3.5% Pb, 0.45% Cu, 8.5 Ag & 0.02 Au, the mine manager stated that the operation showed no profit. There is scarcely any ore developed. The USBM was approached to do exploatory work by drilling. Drillin was not recommended by USBM engineers. The group consists of a millsite, 1 patente claim & 2 unpatented.

8/1944 - A $14,000 RFC loan was expended. 1170 T of ore shipped. Possibly 200 to 3 remain. Application for a 2nd RFC loan was not approved.

11/1946 - Owner shipped small amount of mill ore obtained from pillars. A geophysi survey was reported made---results unknown.

Character of Ore:

Sulphides & oxidized ores.

Equipment (Date 2/1943):

No list of equipment.

STATE OF TEXAS MINE

DMA Report 1633X by Grant R. Rubly (September 1951)

Production:		Ounces		Percent		
Date	Tons	Gold	Silver	Lead	Copper	Zinc
1897	25	0.25	69.0	49.5	1.3	18.0
1898	42		17.5	10.0		28.5
1914	800		17.0	8.0	1.0	22.0
	500		13.45	5.07	1.0	17.07
'43-'46m	1784	0.04	6.45	3.07	0.56	13.67
Total	3151					

General Information: The stope from which the ore was mined during W.W. II is essentially mined out. A few small bunches of ore can be found in the back and in pillars. There may be some ore in the floor close to the fracture zone and a few hundred tons can possibly be inferred from the diamond drill holes. Otherwise there are no known ore reserves.

Present Status: Since 1946 the property has been idle. Owners have done some exploratory work. A geophysical survey was made and three short diamond-drill holes were drilled to check indicated anomalies.

Conclusion: No geologic evidence to substantiate existance of commercial ore.

Drill Hole logs deemed
very detailed, constructive report.
Drilling [illegible]
350 ft. [illegible]

SUPPLEMENTAL EXAMINATION REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

(Supplement to War Minerals Report,
P. S. Haury, December 1943)

STATE OF TEXAS ZINC-LEAD MINE, COCHISE COUNTY, ARIZONA

By Lincoln A. Stewart 1/

CONTENTS

ILLUSTRATIONS

1/ Mining Engineer, Bureau of Mines, Tucson, Arizona

INTRODUCTION AND RÉSUMÉ

The State of Texas mine, situated in Montezuma Canyon near the south end of the Huachuca Mountains, has yielded some zinc ore that occurs as replacements in a small block of Paleozoic limestone that was engulfed in intrusive granite. The limestone block is surrounded on three sides by granite and cut off on the south by down-faulted Cretaceous rocks. The major dimensions of the limestone are 550 feet east-west and 375 feet north-south. The ore body that was mined lies near the center of the limestone area.

Exploratory drilling by the Bureau of Mines was first requested at the State of Texas mine in December 1942, at which time the mine was being reopened with the aid of a class "B" loan from the Reconstruction Finance Corporation. Engineers[2/] of the Bureau of Mines examined the mine in February 1943, but the exposures of ore in the old workings were largely masked by back fill. An engineer[3/] revisited the property in December 1943. In the meantime, the geology had been mapped by geologists of the Federal Geological Survey and the mine had been examined by a geologist of the Arizona Bureau of Mines.

2/ John M. Price and P. S. Haury, mining engineers, Bureau of Mines

3/ P. S. Haury, mining engineer, Bureau of Mines.

A War Minerals Report covering the examination was written in December 1943, at which time drilling by the Bureau was not recommended, owing to the small size of the ore deposit.

During the years 1943 through 1946, 35 carloads of zinc-lead ore were shipped to the Shattuck Denn mill at Lowell, Ariz.

In 1947 the owner had a geophysical survey made by the Radar Geophysical Service of Los Angeles, Calif. As this survey indicated downward extension of the ore and the two short holes diamond drilled by the owner showed ore at 60 feet below the stope level, exploration by the Bureau of Mines was again requested.

A Bureau engineer [4/] re-examined the property on October 12-13, 1948. It was found that sufficient exploratory work had been done during the last operations to delimit the lateral extent of the ore, and that mining had ceased when the ore body was mined out.

The small amount of diamond drilling indicates that zinc mineralization of fair grade is contained in a steeply dipping vein, approximately 5 feet wide, that extends below the stope. As commercial ore in the main stope was confined to a strike length of not more than 70 feet, it is reasonable to assume that similar mineralization in the vein below will not exceed this distance laterally.

[4/] Lincoln A. Stewart, mining engineer, Bureau of Mines

There is insufficient evidence at hand to make an assumption on the depth of mineralization, but the probabilities are that granite underlies the limestone block at a depth of some hundreds of feet. Owing to the interfingering of granite on the east side, it seems evident that the limestone is thinner there than on the west where the contact with granite is regular. On the west, the depth of limestone is more than 350 feet; it may be 1,000 feet or more. In any case, it would appear that the ore shoot would be relatively small.

Regarding the reported copper mineralization in the west shaft, there is a probability that mineralisation is present, but the quantity and grade are problematical. Statements of the existence of ore were obtained from drillers and others at least 10 years after the work was done. Their accounts are vague and somewhat at variance.

LOCATION AND ACCESSIBILITY

The State of Texas mine is situated in Montezuma Canyon which trends easterly through the southern end of the Huachuca Mountains. The well-graded Montezuma Pass-Nogales road passes by the mine camp, which is 6.4 miles west of the junction of that road with paved state highway 92, at a point 22 miles west of Bisbee. The nearest railroad point is Hereford, on the El Paso and Southwestern Railroad 15 miles from the mine.

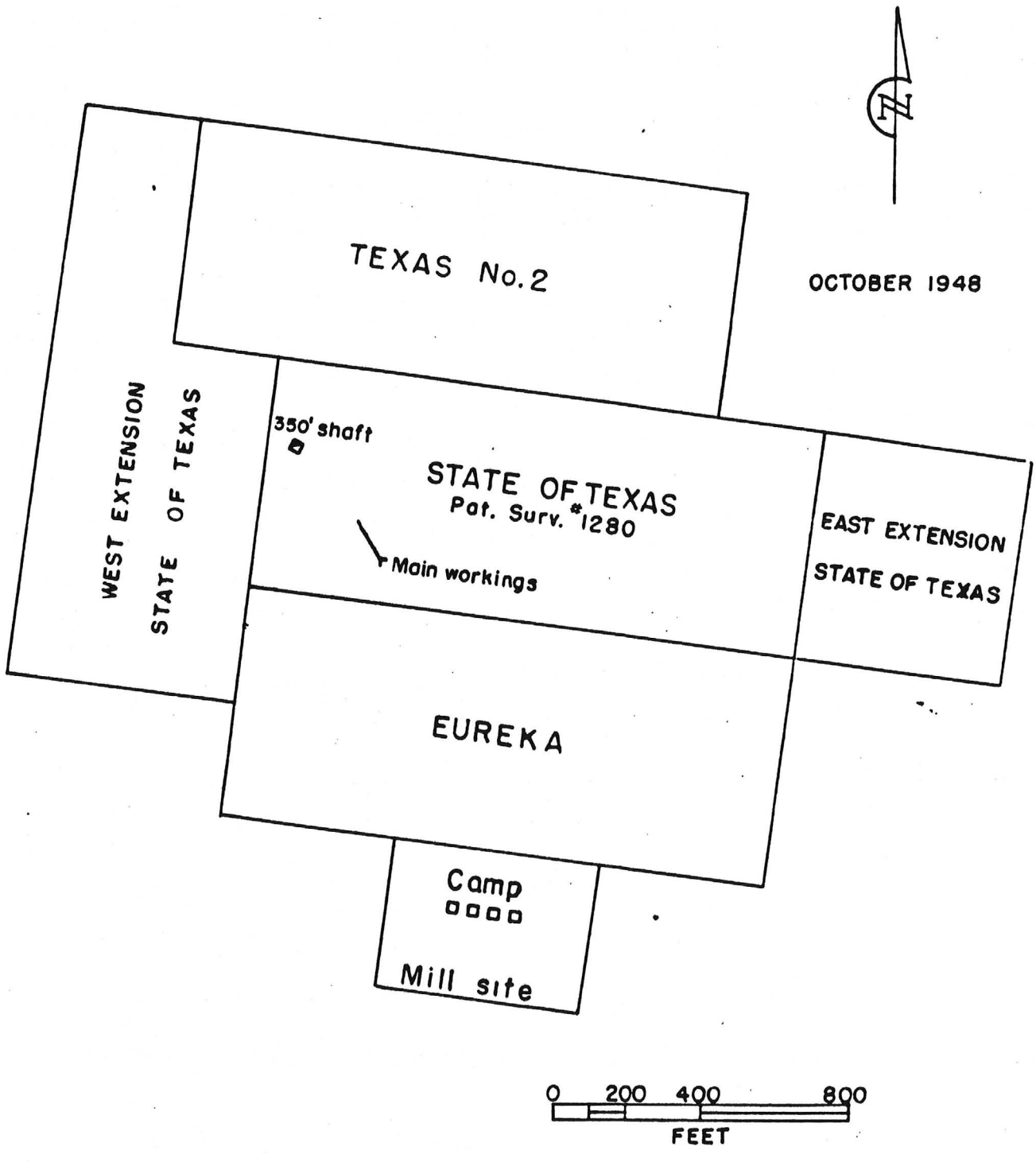


Figure 1.- Claim map - State of Texas mine - Cochise County, Ariz.

The property is in secs. 12 and 13, T. 24 S, R. 20 E, 3 miles inside the Coronado National Forest, and 1 mile north of the International boundary. The mine is at an altitude of 5,800 feet, the mine camp is 200 feet lower.

PROPERTY AND OWNERSHIP

The property is owned by Grace M. Sparkes(majority owner) and associates. The holdings consist of one patented claim, three full and two fractional unpatented claims, and a mill site. (Fig. 1)

HISTORY

The State of Texas claim was located by T. J. Sparkes in the early 1880's and was patented in 1895. Contiguous claims were held by location. The present owner is his heir.

An old incline on the property antedates the original claim location and is thought to have been sunk by the early Spaniards. There are several shallow shafts along the granite-limestone contact but there is no record of when or by whom they were sunk.

In the early 1900's the main ore body in the limestone was opened by a 70-foot incline, but the high zinc content of the ore discouraged work at that time. In 1936 some selected lead-silver ore was shipped from this place.

About 1904, a vertical shaft was sunk on the patented claim by the Mitchell Development Co. of Ishpeming, Mich. It is variously described as being from 250 to 350 feet deep, with the preponderance of evidence favoring the latter figure.

PHYSICAL FEATURES AND CLIMATE

The higher slopes at the sides of Montezuma Canyon are rugged and precipitous. The floor of the canyon has more moderate relief. The Canyon is fairly well watered and has a thick cover of scrub oak along the sides. Laurel bushes are plentiful on the limestone areas.

The summers are mild, with average high temperatures in the 90's. Winters are fairly moderate with some snow, but occasional near-zero weather can be expected. The annual precipitation is about 20 inches, with the heaviest rainfall in July and August.

EQUIPMENT

There is an ore bin at the adit level. A 310-cubic foot air compressor, connected in tandem with a semi-Diesel engine and a gasoline driven water supply pump, has been installed. Drilling equipment includes a drifter, stoper, and jackhammer. Rail, pipe, and usual hand tools for a small operation are at hand. Four frame buildings constitute the camp.

GEOLOGY AND ORE OCCURRENCE

The State of Texas mine is in a relatively small, broken block of Pennsylvanian limestone which is intruded by granite. The granite is in contact with limestone on the east, north, and west. On the south, the limestone is in contact with red Cretaceous shale and sandstone that has been down-faulted against the limestone and granite. The limestone has a general eastward strike and an average dip of about 40° to the north.

The greatest length of the limestone block that contains the ore is 550 feet and the greatest width is 350 feet. The length of the solid block is only 400 feet. Three narrow fingers of the limestone extend back into the granite on the east side. The limestone probably was fractured at the time the granite was intruded and prior to mineralization, but some post-ore fracturing also was noted.(Fig. 3)

Evidence indicates that the granite was intruded into the limestone along the contacts at the north. A fairly broad band of limestone is contact metamorphosed along the northwest trending portion of this contact and also along the north side of the most northerly of the three fingers to the east. The granite is finer grained adjacent to the contact than farther back.

The northwest-trending portion of the contact strikes N. 30° W. and dips about 50° southwest. Some very early mining was done here in a steeply dipping faulted zone parallel to this contact. The metamorphosed limestone contains garnet and epidote, some hematite and jasper, and small amounts of copper minerals. No zinc mineralization was seen in or near this contact metamorphic zone along the north side of the limestone block.

The zinc deposit, near the center of the limestone area, is a replacement of impure silicified limestone with an approximate bedding plane attitude. The mineralized outcrop is elongate, roughly

parallel to the strike of the beds, and not over 180 feet in length. The ore minerals are sphalerite, some galena, pyrite, and chalcopyrite. Oxidation has affected only the upper few feet of the deposit. The ultra-violet lamp shows the presence of willemite as thin coatings along seams. Much of the calcite has a red fluorescence.

There is little evidence regarding the depth of the limestone. In the underground workings granite was encountered adjacent to a northeast fault at a depth of 50 feet, but the granite does not appear on the surface; a 6-foot vertical drill hole bottomed in granite 25 feet southeast of this fault, but a 10-foot winze 15 feet from this place was entirely in limestone; an inclined diamond drill hole bottomed in 8 feet of granite at 80 feet below the stope floor, but a vertical hole from the same set-up was drilled 102 feet in limestone. This would seem to indicate that tongues of granite were intruded into the limestone for considerable distances from the main intrusive contact.

On the west side of the limestone block, a 350-foot shaft reportedly passed through a granite sill but a 600-foot vertical diamond drill hole from the bottom of the shaft was in limestone. If this latter report is to be believed, the limestone on the west side of the block may be 1,000 or more feet in depth.

There is a similar detached block of the limestone across the gulch to the northwest, and another, larger block farther east. See Fig. 2-B. Both have a contact metamorphosed zone against the granite to the north but no zinc replacement areas have been noted in either.

Zinc Ore

Zinc ore has been mined from a replacement of more or less silicified limestone within a small area near the center of the limestone block. The ore body has a general attitude approximating that of the limestone beds. The stope was opened by an old inclined shaft and a level adit. Some mining was done here in the early 1900's and again in 1936.

Under the stimulus of war prices and premiums, the present owner cleaned out the old stope, hand-sorted a carload or so of ore from the waste, and extended the stope to the limits of commercial mineralization. A total of 1791 tons of ore was shipped, having an approximate grade of 16 percent zinc, 2 percent lead, 0.5 percent copper, 9 ounces of silver, and 0.05 ounces of gold per ton.

The stope has been opened down dip from the surface for about 80 feet and for a maximum strike distance of 80 feet, with greatest height of stope at least 20 feet. (See figures 4 and 5). Minor faults and fractures within the mineralized area probably are largely responsible for the localization of the ore which was irregularly distributed, both laterally and vertically. On the northwest side of the mine the hanging wall of a northeast-trending fault is granite; a 50-foot drift to the southwest, parallel to this fault is in barren limestone, as are two short drifts to the west and northeast; a 25-foot drift northward is in barren marbleized limestone. The walls and back of the main stope show only irregular, low-grade mineralization.

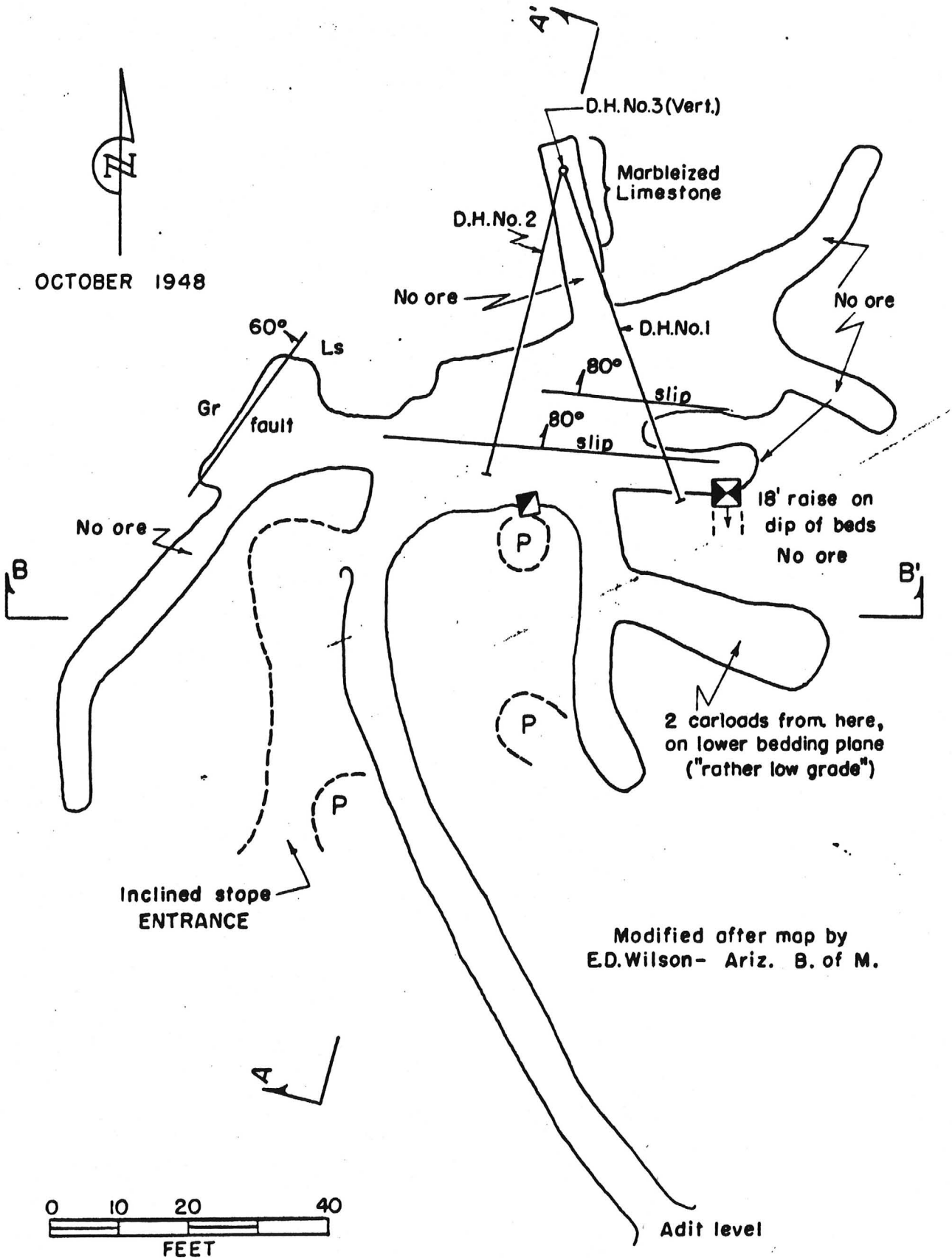


Figure 4.– Plan – State of Texas mine.

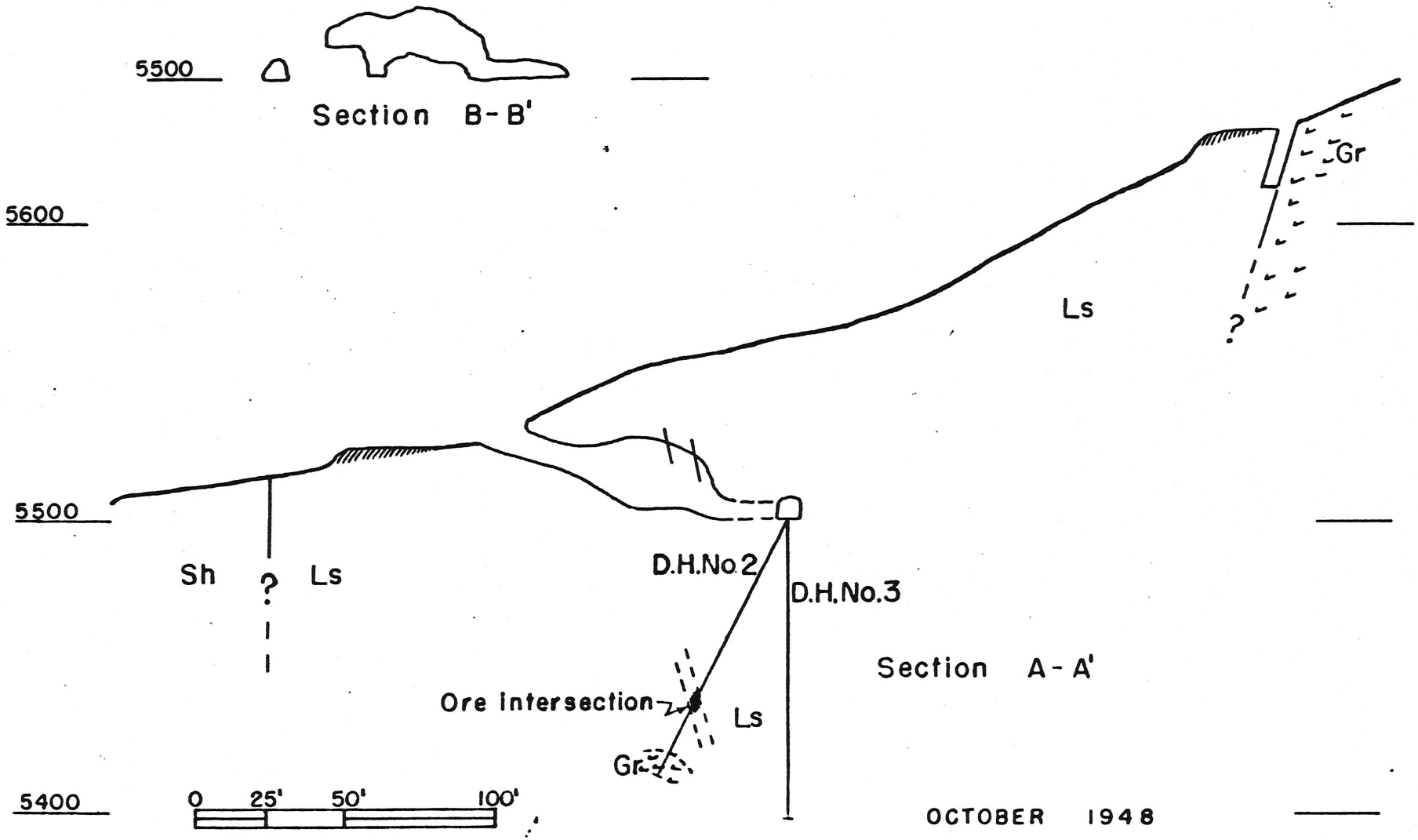


Figure 5.- Sections – State of Texas mine.

The War Minerals Report of December 1943 and an earlier report by the Reconstruction Finance Corporation indicate that the ore body was cut off on the north by an east-west fault with steep dip. Development work since that time has shown that it actually was a minor slip, to the north of which some ore was found.

A considerable tonnage of broken ore remains on the stope floor and in the dumps, but it is below shipping grade.

Other Development

In addition to the stoping on the zinc ore described above, some very old work, consisting of several comparatively shallow shafts and open cuts, with probably a little stoping at one place, was done in the contact metamorphic zone to the north. This mining probably was for gold ore.

A vertical shaft was sunk near the northwest granite-limestone contact, 160 feet northwest of the zinc ore stope. This work was done about 1904; the shaft is now caved at the collar and is inaccessible. There is so much variation in the data found in various reports that little credence can be placed in any one report.

This subject is discussed only for the reason that it may have some bearing on near-contact copper ore deposition and on the depth of the limestone. Even the depth of the shaft is uncertain, variously described as from 250 to 350 feet. Under the heading

"Mitchell Development Co.", the Copper Handbook[5] states in part "Main shaft is down about 250 feet, cutting a 3- to 4-foot wide vein of ore at a depth of about 200 feet, this showing chalcopyrite, bornite, chalcocite, and occasional native copper, the ore assaying up to 12.5 percent copper and 4 ounces silver per ton, with traces of gold". Volume V (1905) repeats the same statement and Vol. VI (1906) has only this notation - "Liquidated, 1906. Fully described in Vols. IV and V."

From numerous letters and old reports furnished by the owner, there seems to be a general agreement that the shaft is 350 feet deep; that there was up to 300 feet of lateral development from the bottom; and that 3 holes were diamond drilled from this level. There is a general agreement that copper ore was cut in the shaft and in the drill holes, but the accounts are too garbled to even approximate the thickness or grade. If the description of the vertical hole is accepted, there is limestone for 600 feet below the bottom of the shaft.

There is a small pile of sorted ore near the collar of the shaft in which can be seen sphalerite, chalcopyrite, copper carbonates and magnetite. This may or may not have come from the shaft. From a cursory examination the dump material appears to be virtually all limestone; some of it is garnetized and epitotized. Detailed examination of this dump might disclose evidence of the copper mineralization said to have been cut in the shaft.

[5] Vol.IV, 1904. Horace J. Stevens, publisher, Houghton, Mich.

PRODUCTION

There probably was some small unrecorded early day production of gold from pockets along the granite-limestone contact. According to one report, dated 1914, operators previous to that time had built the "Hermitage mill" on the open desert some 3 miles from the San Pedro River. Ore was trucked 7 miles to this concentrating plant which had the usual crushing units and a battery of Hartz jigs. Separation of the lead and zinc was not successful and the project was abandoned after a 10-month run. Another report states that 1,500 tons of oxidized lead-zinc ore with high silver values was mined and shipped in 1936.

The present owner re-opened the mine late in 1942 with a class "B" loan from the Reconstruction Finance Corporation.

During the period of 1943 thru 1946 shipments were made to the Shattuck Denn mill at Lowell in the amount of 35 carloads aggregating 1791 tons of ore. Miss Sparks seemed reluctant to show the settlement sheets for these shipments, but furnished a tabulation of high, low, and average assays for the first 22 cars shipped, as follows:

		Average	High	Low
Zinc)		15.90	19.65	10.70
Lead)	percent	2.15	5.25	1.42
Copper)		(The figures obviously were in error)		
Silver)	oz./ton	9.09	15.60	3.50
GoldP		.058	0.18	.010

From another source, a record of the mineral content was obtained for the first 12 cars (626.47 dry tons) from which the weighted average values are as follows:

Oz./ton		Percent		
Gold	Silver	Copper	Lead	Zinc
0.03	8.42	0.46	3.21	14.48

This represents approximately one-third of the total shipments and subsequent shipments probably averaged about the same grade. The gross value of the recovered metal from these 12 carloads of ore was $15,803.01, and the net mill payments, after deductions amounted to $6,221.10, which would average $25.23 and $9.93 per ton respectively.

An example of the deductions is shown by the following tabulations for a 2-carload lot of 103.552 dry tons.

	Percentage paid for	Price paid (July 1943)
Gold	73.76	$32.48 per oz.
Silver	83.73	.6933 per oz.
Copper	50.83	.0559 per pound
Lead	71.51	.0494 " "
Zinc	76.51	.0796 " "

Freight, concentrates	$173.42
Treatment, concentrates	743.24
Transportation tax	8.25
Milling	336.54
Processing fee	314.25
Switching	16.32

The ore was trucked 24 miles to Don Luis and loaded onto railroad cars at a cost of $2.75 per ton. The Shattuck Denn mill is only a few miles beyond Don Luis. It was necessary to transfer

the ore from trucks to railroad cars for this short haul because there was no truck ramp, loading bin, nor scales at the mill.

According to the War Minerals Report on this property "A special premium of 2.75 cents per pound of zinc is paid by the Metals Reserve Company, in addition to the regular premiums on zinc, lead, and copper. Metals Reserve premiums amount to $14.12 per ton on the average grade of ore."

DIAMOND DRILLING BY THE OWNER

The owner had a geophysical survey made in August 1947 that reported a vein 12 feet wide, 120 feet long, more than 400 feet deep, dipping 63° N and striking N 75° W. Following a recommendation in the report, the owner diamond-drilled 3 shallow holes from one set-up in the north drift; 2 holes inclined under the stope each cut approximately 7 feet of fair zinc ore about 60 feet below the stope level; the third hole was drilled vertically 102 feet and did not strike ore.

With only 2 intersections it is impossible to determine the dip, strike, and normal width of the ore. If the ore was along limestone bedding planes it should have been cut by the vertical hole. Apparently the ore occurs in a vein that dips north at an angle which brings it somewhere below the bottom of the vertical hole. The floor of the stope is covered with several feet of waste, so no study could be made of any exposure on the stope floor.

There are several westerly trending slips or fractures across the stope within the mineralized area. The ore-bearing solutions probably arose along this fractured zone and spread out within the present stope area, due to a combination of fracturing and bedding in favorable limestone.

The following generalized logs were made from an examination of core; the assays, furnished by the owner, were on very small, selected pieces of core and do not represent the average tenor of mineralization.

Hole No. 1

Bearing, S 20° E
Inclination, - 52°

EX core

Drilled July 1947
Depth of hole 81 feet.

From	To	
0	47	Used old R.F.C. drill hole 47 ft. deep
47	52	Marbleized limestone
52	60	Marbleized limestone, slightly garnetized
60	62.5	Zinc sulfide mineralization, heavy at top of interval.
62.5	65	Garnetized limestone.
65	70	Zinc sulfide mineralization, heavy at 67 to 67.5 and 69 to 70 ft.
70	71.5	Slightly mineralized limestone
71.5	81	Barren limestone, except for a few slight bunches of sphalerite.

	Oz./ton		Percent		
	Au	Ag	Cu	Pb	Zn
At 67.5 ft.	0.02	2.80	0.09	0.2	27.6
At 69.5 ft.	.06	9.00	4.16	.3	45.2

Hole No. 2

Bearing, S. 15° W
Inclination, -63°

EX core

Drilled July 1947
Depth of hole, 97 feet

From	To	
0	55	Limestone and garnetized limestone. Core not properly marked. (Could not follow sequence)
55	64	Garnetized limestone.
64	71	Zinc sulfide mineralization, heavy at 64 to 66 and 67 to 68 feet.
71	81	Barren limestone, except for slight specks of sulfides.
84	89	Limestone
89	97	Fine-grained granite.

	Oz./ton		Percent		
	Au	Ag	Cu	Pb	Zn
At 64 ft.	0.02	2.20	0.05	0.1	25.1

Hole No. 3

Vertical

EX core

Drilled July 1947
Depth of hole 102 ft.

From	To	
0	19	Marble
19	28	Limestone, some garnetization
28	102	Limestone with some garnetized zones.

NO. 2 "C"

Return to:
STATE OF TEXAS MINE
Grace M. Sparkes, owner-operator
Star Rt - Hereford, Arizona.

STATE OF TEXAS MINE

Geophysical Survey - by Harold Ferrin
Grass Valley, California
August 12, 1947

Results: Diamond Drilling by Bones and Sparkes into Geophysical Area.

Copy - Harold Ferrin's Check on Diamond Drilling
July 3, 1948

Bid - Harold Ferrin - to complete Diamond Drilling
December 18, 1950 (Sierra Diamond Drilling Co.)

--0--

COPY

STATE OF TEXAS MINE
Grace M. Sparkes, owner-operator
Star Rt - Hereford, Arizona.

RADAR GEOPHYSICAL SERVICE

Security 1st National Bank Bldg
Alvarado & Pico Blvds
Los Angeles 6, Calif.

Harold Ferrin
August 12th, 1947

Grace Sparkes
P O Box 1099
Bisbee, Arizona.

Dear Miss Sparkes:

I hereby submit the following report of the Geo-physical Survey made and completed on the State of Texas Mine between August 4th and the 12th, 1947.

Very sincerely yours

(signed) Harold Ferrin.

COPY

RADAR GEOPHYSICAL SERVICE

Security 1st National Bank Bldg.,
Alvarado & Pico Blvd
Los Angeles 6, Calif.

I N T R O D U C T I O N

-0-

The purpose of this Geo-physical survey was to determine the extent of the undeveloped ore bodies on the State of Texas property, and the approximate tonnage by sub-surface scientific surveys, using three different methods, known as gravitational and radio active methods, also another system developed, used and known only to ourselves, from which we have been obtaining results far superior to the present known methods.

GEO-PHYSICAL SURVEY RECORDINGS

We have made a complete survey of the State of Texas property and the recordings indicate the following:

At the No. 1 workings, on the State of Texas Patented Claim, Illustrated on the attached Plat, an ore body in place, was recorded twelve (12') feet in width, between walls, one hundred and twenty ft. (120') in length along the strike of the vein, dipping about 63 deg. to the north, near the surface and striking north 75 deg. west. By using heavy power and about fifty thousand (50,000) cycles, we were able to record the mineralization to a depth of four hundred (400') feet. Recordings indicate the mineralization will be rather gobby or spotted but continuous down the course of the shoot. This is no doubt a continuation of the ore exposed in the stope.

The No. 2 workings illustrated on the attached Plat was surveyed and a mineralized zone recorded, seventy-two (72') feet long and five to six feet in width and approximately three hundred (300') feet in depth along the incline.

COPY

REPORT OF THE STATE OF TEXAS MINE.

LOCATION:

The State of Texas group of claims are on the northern wall of Montezuma Canyon, in the southern end of the Huachuca Mountains, west of Naco, along the Mexican Border, and twenty-eight miles westerly from Bisbee, Cochise County, Arizona.

PROPERTIES AND TITLES:

The State of Texas property consists of one patented claim, three full sized unpatented claims and a fractional claim, held by location, in accordance with State and United States laws, also a camp and mill site.

ACCESSIBILITY:

Transportation facilities are good. The Bisbee and Ft. Huachuca paved highway No. 92 runs within seven miles of the property, at a point 21 miles from Bisbee, and the remaining distance is accessible over a graded county highway which is kept in excellent condition. Southern Pacific railroad and a good airport also serves the district.

CLIMATE:

The climate is ideal for year around operations, being typical of the southern Arizona arid districts, with mild, pleasant winters. However, the elevation of 5,100 feet, consequently puts it up beyond the intense heat during the summer months.

WATER SUPPLY:

There is an ample supply of good water for camp and mining purposes. Additional water can easily be obtained, through development, on the property for milling purposes.

HOUSING FACILITIES:

The mine has a fine camp, with four separate buildings for bunk and boarding houses, offices and living quarters. It is also equipped with a good tool and compressor house up at the mine, with change room and shower.

COPY

REPORT OF THE STATE OF TEXAS MINE

GEOLOGY:

The general geology at the south end of the Huachuca mountains resembles that of the Bisbee districts, and has no doubt been a part of the extensive Naco limestone plain, which covered the Cananea, Mexico, Tombstone and Mexico districts, before the gigantic faulting and elevating took place. Evidence of this fact can be seen on the south wall of Montezuma Canyon where the limestone is exposed, capped by the cretacious glance conglomerates, which are in evidence in all the above districts. The Huachuca Mountains, a massive granite core has been thrust up through the limes tilting the limestone away from it in various positions during the upheaval. The ore occurences are along the granite-limestone contact, where copper deposition is evident and in the metamorphosed garnet and lime gangues where lead-zinc ores predominate.

MINERALOLOGY:

The mineral is formed in a highly re-crystalized replacement in the limestone, impregnated with garnet crystals in the form of sphalerites and galenites, a zinc and lead sulphide. In spots, a chalcopyrite, or copper sulphide, is present. However, it predominates in zinc. To my knowledge, a flow sheet has never been made on the ore to determine the proper treatment, although about two thousand (2000) tons has been milled by flotation methods at the Shattuck Denn Mill, Lowell-Bisbee, Arizona successfully.

PRODUCTION:

The property had some production by former owners, of which I have no record. However, by the present owners, the production has been as follows:

During the years 1943 to 1946, thirty-five cars were shipped from the property totalling:

Gross Tonnage shipped	1,791.07
Average value per ton	$32.31
Total Gross Receipts	$68,694.99

The ore ran in comparison, about two-thirds its value in zinc and one-third in lead, with approximately 8 ounces per ton in silver.

DEVELOPMENTS:

The ore has been developed by two different workings illustrated on the plat map as No. 1 on the State of Texas Claim, where the production has been and No. 2 on the State of Texas No. 2 Claim where an ore shoot has been exposed by a thirty foot shaft. At No. 1 an incline was run down seventy(70) feet along the plane of the mineralization exposing the ore before zinc had any value. A 125' (foot) cross-cut tunnel was run into the vein forty (40') feet below the

COPY

REPORT OF THE
STATE OF TEXAS MINE.

surface outcrop, then turned at right angles and drifted east with the vein fifty (50') feet. They stoped out the thirty-five (35) cars along the fifty (50) feet, plus piling hundreds of tons of mill ore on the dumps.

No. 2 workings is situated about a thousand (1,000') feet to the north west of No. 1, and approximately three hundred (300') feet higher in elevation, right on the granite-limestone contact. A thirty (30') foot vertical shaft was put down and exposed a vein of lead-zinc ore, also azurite and malachite, copper carbonates are present in the ore.

ORE RESERVES:

As near as can be measured and estimated, there are more than (5,000) five thousand tons of good mill grade ore in the dumps, surrounding the stope and piled around in the stope, on the floor, as they were breaking out the highgrade shipping ore. This ore is all in sight above the tunnel level and a large portion of it is all broken inside and out of the mine. An additional five thousand (5,000) tons of ore is available above the present tunnel from a drift extended fifty (50') feet east in the east end of the stope. The ore outcrops the entire length on the surface and is exposed in the drift. Sufficient assays have not been taken to determine the exact values of this block. However, it is no doubt a mill grade of ore.

The Geo-physical Surveys indicate forty thousand (40,000) tons in the mineralized zone below the tunnel level. The grade of ore is entirely unknown at present.

On No. 2 workings the Geo-physical Survey indicates about nine thousand (9,000) tons comprised in the mineralized body.

COPY

REPORT OF THE
STATE OF TEXAS MINE.

RECOMMENDATIONS:

Due to the dip of the vein and the slope of the hill, and the absence of any deep canyons on the dipping side of the vein, it is very difficult to drill from the surface. However, the merits of the property are far too great to abandon. Therefore, I recommend three short diamond drill holes from the end of the north drift, dipping back to the south at angles of 50 deg., 70 deg., and 90 deg., All three holes are illustrated on the vertical cross section sketch attached, and would not require more than three hundred (300') feet of drilling. The valuable information acquired from the above drilling could establish the continuation of the mineralization, its exact position, and give a positive assay across the mineral zone one hundred (100') feet below the present working, adding 10,000 tons to the known reserves.

CONCLUSIONS:

In view of the tonnage already in sight, and the possible ore that can be developed, I do not hesitate to recommend the further developing of the property. With the equipment and expenditures already made, a small amount of capital would determine the value of the property.

(signed) Harold Ferrin

EM Harold Ferrin

Dated August 12, 1947
F/G

COPY

DIAMOND DRILLING REPORT OF RADAR GEO-PHYSICAL SERVICE SURVEY
Made by Harold Ferrin, geologist and geophycist.

STATE OF TEXAS MINE - Cochise County, Arizona
Address - Star Rt - Hereford, Arizona (formerly P. O. Box 1099, Bisbee, Arizona)

-0-

HOLE NO 1

STRIKE - S 20 E
DIP - 52 deg (recommended for 50 deg drilled at 52 deg.)
LEVEL - End N drift in War Stope.

DEPTH OF HOLE - 81 feet.

(Depth of starter hole 47'. Used old diamond drill hole, which was not collared for standpipe and therefore difficult to get accurate sludge recovery.)

EXACT AMOUNT ORE CORED: 10' 3".

DEPTH ORE ENCOUNTERED: Between 60' and 62'.

ASSAYS:

	Sample No. 1 (taken 5' 6" below where ore was pierced)	Sample No. 2 (taken 25½" from Sample No. 1)
	Assays by Arizona Bureau of Mines	
AU.	.02 oz	.06 oz
AG.	.28 oz	9.0 oz
CU.	.09 %	4.16 %
PB.	.2 %	.3 %
ZN.	27.6 % (8' of ore)	45.2 % (2' of ore)

GEOLOGY:

FORMATION		
Starter Hole	47'	
Went through 16" marble to blue lime	1' 4"	
Then 3' 6" blue lime	3' 6"	
" 7' garnet and garnetized lime	7'	
		58' 10"
Pierced ore		60' to 62'

Ground up core and sludge make differences
From ore to Bottom 81' (ft) hole garnetized lime, slightly mineralized.

REMARKS: According to measurement on feed screws, after encountering soft, heavy, black sulphide ore, pierced 2' high grade, which would not core. Sludge heavy, carrying heavy black sulphide cuttings. Formation very favorable at 81' meriting more drilling. Cores in Box 1.

DRILLER: Perry L. Bones

HELPERS: Grace and
Billy Sparkes.

COPY

DIAMOND DRILLING REPORT - RADAR GEO-PHYSICAL SURVEY --
Made by Harold Ferrin, geologist and geophycist.

STATE OF TEXAS MINE - Cochise County, Arizona
Address - Star Rt., Hereford, Arizona (formerly Box 1099 Bisbee, Arizona.)

-0-

HOLE NO. 2

STRIKE - S 15 deg W
DIP - 63 deg (recommended for 70 deg drilled at 63 deg.)
LEVEL - end North drift War Stope.

DEPTH OF HOLE - 97 feet.

EXACT AMOUNT OF ORE CORED: 6'.

DEPTH ENCOUNTERED - 64' to 70'.

ASSAY: SAMPLE No. 3
(taken at 64')
Assay by Arizona Bureau of Mines

AU.	.02	oz
AG.	2.2	oz
CU.	.05	%
PB.	.1	%
ZN.	25.1	%

(6' of ore)

GEOLOGY FORMATION

Beddings of garnets and garnetized lime
from start of hole to 64'
at 26' - sludge panned sulphides
at 32' - light sulphides panned
Ore from 64' to 70'
70' to 75' - highly mineralized lime and garnets
75' to 89' - blue lime
at 79' - some sulphides - mineralized
at 84' - mineralized
89' to 97' - porphyry granite
at 93' cemented hole - used chopper.

REMARKS: Cores in Boxes 2-3-4-

DRILLER: Perry L Bones

HELPERS:
Grace M and
Billy Sparkes

COPY

DIAMOND DRILLING REPORT - RADAR GEO-PHYSICAL SERVICE SURVEY
Made by Harold Ferrin, geologist and geophycist.

STATE OF TEXAS MINE - Cochise County, Arizona.
Address - Star Rt., Hereford, Arizona (formerly P O Box 1099, Bisbee Arizona)

-0-

HOLE NO. 3

DIP 90deg.

LEVEL - End North drift War Stope.

DEPTH OF HOLE - 102'

GEOLOGY

FORMATION

From start at hole 19' marble
19' to 28' - garnetized lime
at 25' panned some sulphides.
28' to 102' - bottom of hole - in and out of garnets and garnetized lime, showing some mineralization.
at 28' - 31' panned some small sulphides.
at 55' - 60' panned little sulphides.

CORES IN BOXES Nos. 5, 6, and 7.

REMARKS: Mr Ferrin's statement after checking drilling and cores July 4, 1948: "Necessary to drill this hole 25' (twenty-five feet) deeper to hit ore body and footwall.

Note: We were obliged to return diamond drill and equipment at 102'. Reamer gone. Unable to contact Mr. Ferrin in time to get his check-up to continue drilling and owner needed his drill and equipment. Mr. Ferrin arrived one week later for examination of our work.

DRILLER: Perry L Bones

HELPERS: Grace M and
Billy Sparkes.

COPY

SIERRA DIAMOND DRILLING CO.
Grass Valley, California
P O Box 462

July 3, 1948

State of Texas Mine
Att'n Mr Perry L Bones

Dear Sir:

I have returned to your property and rechecked the drilling program, I recommended in my report of August 12, 1947, and find you have completed in detail the two first holes outlined and positively cutting ore with both holes, thus proving beyond any question the continuance of the State of Texas Mine ore body.

The third hole, while successful and correct in its angles in striking the hanging wall of the vein and proving the continuance at that depth, due to the parallel position of the drill hole, and the established fact that the ore shoots lie along the footwall in this property, and from the angle of the drill hole, it will therefore be necessary to drill twenty-five (25') feet deeper to encounter the ore body and the footwall.

While the second hole was recommended for 70 deg., it was drilled at 63 deg., however, that makes no appreciable difference, in the results as you could not miss an ore body of this magnitude.

On the basis of all the values of ores you shipped from this property, these two short drill holes you have completed have conservatively added $50,000 worth of block ore to your ore reserves.

Results of the geo-physical survey that I made on the State of Texas Mine, and the positive proving of the geo-physical report by the above described drill holes, of which you have cores in evidence, and which I have examined most carefully, proved beyond any shadow of a doubt that there is no existing fault cutting off the ore as has been presumed by geologists and engineers in the past. This further absolutely proves the error of interpretation of all past geology on the State of Texas Mine.

Yours truly

(signed) Harold Ferrin

Dated at the
State of Texas Mine.

COPY

Harold Ferrin
Arivaca, Arizona - Gen'l Del.
Dec. 18th, 1950

State of Texas Mine
Att'n G Sparkes and P. L. Bones
Star Rt - Hereford, Arizona.

Dear Perry:

As per your request I am submitting a bid on the remaining diamond drilling necessary to complete the geophysical survey that was made some time ago.

Namely to complete the 90 degree hole by drilling another 25 feet which would core thru your ore body, presuming it continues at the same dip below the 50 foot level.

Also the drilling of a second hole of the same depth paralleling the vein structure and tilting to the East at 78 degrees. This drilling with what you have already done would definitely prove your ore body to the 125 foot level and length of approximately 100 feet.

The two underground holes of approximately 150 feet, I will drill for $3.50 per foot, or a total of $525.00 providing, your compressor furnishes the air power.

In the event you should want to prove greater depth, it would be necessary to set up a surface drill just below the road by the ore bin and drill at a 30 degree angle 325 feet cutting the vein approximately 250 feet below your present workings.

However, up on the #2 Claim it would be necessary for a surface gas drill which would have to wench its ownself up the side of the mountain, also a pipe line would have to be laid and a pump installed to put water up the mountain side for drilling, which would require quite a loss of time and expense. Two hundred feet of drilling would prove your ore bodies depth on #2, and I would drill this for $5.00 per foot, furnishing my own power which would total $1,000 for the surface drilling.

Trusting this is the information you requested.

Very truly yours

(signed) Harold Ferrin.

August 1943

Zinc Deposits of the State of Texas Mine, Cochise County, Arizona

A preliminary report

by Arthur Richards and A. L. Brokaw

Introduction

The State of Texas mine is located in Montezuma Canyon near the south end of the Huachuca Mountains and about one mile north of the Mexico border. The property consists of one patented clai two full-sized and one fractional unpatented claims, and a millsi totalling approximately 70 acres. Title to the property is in th name of T. J. Sparkes (deceased) and Burdett Moody of Herford, Arizona. Mapping of the mine and surrounding area was carried on as a part of the War Minerals investigations of the Geological Survey.

According to a report dated October 29, 1940, by J. S. Coupa Director of the Department of Mineral Resources, State of Arizona "It is reported from authentic sources that in excess of 1500 ton of ore was mined" (from the State of Texas Mine). The date of th production is not known.

Since February 1943, at which time the mine was reopened aft being abandoned for many years, six cars of ore totalling about 330 tons have been trucked to the Shattuck-Denn mill at Lowell. At the time of the writers' visit in June 1943, returns on the first two cars had been received by the operators. The first shipment consisting of 57 tons which was taken from the dump of the inclined stope (see figure 1) and assayed .045 ounce of gold to the ton, 8.90 ounces of silver to the ton, 0.36% copper, 5.25% lead, and 17.00% zinc. The second shipment consisted of 54 tons and was mined from the lower part of the inclined stope. It

assayed 0.2 ounce of gold to the ton, 8.50 ounces of silver to th ton, 0.28% copper, 4.05% lead, and 10.70% zinc. Although no assa were available on the more recent shipments at the time of the wr examination, some of this ore was still at the mine when the writ first visited the area and was excellent ore, probably assaying 20% zinc. These last shipments were mined from the stope shown on figure 4, section C-C'.

Geology

Rocks in the vicinity of the State of Texas mine consist of Paleozoic limestone which is intruded by granite. Some dark red Cretaceous shale and sandstone are present south of the mine and in this vicinity are faulted down against both the Paleozoic lime stone and the granite. This fault extends along the north side of the canyon from the mouth of the canyon at least as far west as the crest of the Huachuca Mountains, a distance of several mil The Paleozoic limestone is largely recrystallized to a light grey to white marble. The limestone has a general eastward strike and dips on the average at about 40° to the north but both the strike and dip are quite variable.

Along the north limestone-granite contact, in the vicinity of the abandoned shafts (see figure 1), jasper and hematite are abundant, but in the southern part of the area the limestone contact is garnetized and jasper is absent.

According to a map prepared by D. F. Campbell, R.F.C. Engine in August 1942, the ore body is cut off by a fault striking N. ~~10~~ 80 E. and dipping 85° N. (fig. 3). At the time of the writers' visi the short drift north of the winze on the tunnel level and the winze itself had been backfilled so that the fault was not exposed This fault is plotted on the accompanying illustrations as shown

on the R.F.C. map. The fault is said to be a normal fault, but neither the evidence for this nor the displacement is known. If this fault is projected to the surface at the dip given on the R.F.C. map, no trace of it is present. However, the dip could flatten to connect to the fault dipping 45° to the north at the surface as shown on figures 4 and 5 as other faults in the mine show rapid changes in dip (fig. 3).

Ore deposits

The zinc deposits are replacements in the Paleozoic limeston The mineralized outcrops are rather irregular in outline, but the largest is elongate roughly parallel to the strike of the beds. The ore minerals are sphalerite, galena, and chalcopyrite. Oxidation has affected only the upper 10 feet of the deposit and local sphalerite is present at the surface.

In the inclined stope the main ore body is from 3 to 7 feet thick and dips to the north parallel to the bedding. The average assay of 14 cut samples collected from the inclined stope as show on the R.F.C. map is: .02 ounce of gold to the ton, 6.51 ounces of silver to the ton, 0.31% copper, 3.84% lead, and 11.99% zinc. The cuts varied in length from 2.4 to 7.7 feet and averaged 5 feet.

In the east stope on the tunnel level the ore body is much larger. The back of this stope is 20 feet above the tunnel level and the back and walls are almost entirely in ore (section C-C', figure 4).

Small amounts of low grade sulphides are present on the dump of a shaft 200 feet northwest of the entrance to the inclined stope. A grab sample of sorted material from this dump is reported by D. F. Campbell to assay 6.15% zinc. There is very litt

material of this grade on the dump, however. The shaft is repor to be 250 feet deep. At the present time it is caved at a depth of about 100 feet.

The abandoned shafts along the north contact are from 10 to 60 feet deep. There is no ore present on the dumps of these wor ings.

Reserves

No measurable ore is present. The indicated reserves under the mineralized outcrop between the present workings and the eas edge of the main mineralized outcrop. This distance is approxim 80 feet. The distance from the surface to the east-trending fau that is said to cut off the ore is approximately 80 feet. An av thickness of 5 feet for the ore zone can reasonably be expected, which would give 3,000 tons of indicated ore estimated to run 12 zinc and 1% lead.

Recommendations

The present operators of the mine are drifting to the east from the tunnel level and are in ore. They expect to raise to the surface a short distance east of the end of the drift shown on the tunnel map (fig. 3). By following the ore to the east and by raising through the mineralized zone the extent of the ore bod south of the fault will be fairly well determined. However, sinc the fault which is reported to cut off the ore body was not seen by the writers, the possibility of more ore north of the present workings is uncertain. The fault is reported to be normal but no certainty exists as to its character, offset, or direction of movement.

If the area where the fault has been concealed by backfillin was cleaned out, either by the owners or the Bureau of Mines, the

nature of the fault could be studied. The hazzards of drilling for possible faulted extensions will be greater if more information is not obtained on the reported fault. The 45° fault (figures 1, 4, and 5) might offset the ore as well as the 85° fault and either fault might cut out the ore body or make interpretation of drilling difficult.

Even though the nature of the fault is not known, the dip extensions of the ore body, faulted or not, are well worth exploration as the ore now exposed is good, the ore "bedding" is continuo to the depth of the present workings, and the ore body has increase in size with depth.

The writers recommend the exploration of the region below the blocked out area shown on figures 1 and 5. Since the position of the faulted extensions of the ore is not known with certainty, this area could be prospected by vertical drill holes from the surface. Such holes would determine the presence of any faulted extensions regardless of their position. No difficulty in drilling this ground is anticipated and the ore should core well.

? $100,000 + shipping ore in WWII & many 1000's of tons of mill-grade ore left in the stope & on dump

Good discussion of Geology & Mineralization

REPORT ON

GEOLOGIC AND MINE EXAMINATION

OF THE

STATE OF TEXAS MINE

October 17, 1946

(Submitted to the
U. S. Bureau of Mines by
Grace M. Sparkes
c/o P.O. Box 178
State of Texas Mine
Bisbee, Arizona.)

BY
J. Bryant Kasey
PRESCOTT ENGINEERING COMPANY

REPORT OF THE STATE OF TEXAS MINE

The following report should be considered in the light of a general, undetailed one, because of the short period of time spent in going over the property and also the lack of time to traverse the surrounding area for some distance to observe the possible relationship of its geology to the geological conditions at the STATE OF TEXAS MINE. Consequently, the conclusions arrived at may not in some instances coincide with those obtainable from a broader point of view of the observed phenomena. However, with the aid of some quantitative and qualitative test work made on samples taken during the examination, a much clear picture of the train of the periods of ore deposition has resulted, which in turn has been suggestive of the recommendations for seeking additional orebodies.

LOCATION, ACCESSIBILITY, CLIMATE, AND OWNERSHIP

The STATE OF TEXAS MINE is located in Moctezuma Canyon, one of the many canyons of the Huachuca Mountain Range, and within the Coronada National Forest. It is about three miles westward from the canyon entrance, in the Hartford Mining District, Cochise County, Arizona. The mine is easily reached from Bisbee, 28 miles to the east, via a paved state highway and a graded county road of seven miles. Climatic conditions are excellent all year round though the property is at an elevation of 5,400 feet. There is a small snowfall during the winter months, but not sufficient to impede operations or travel.

The property consists of one patented clai, THE STATE OF TEXAS, a 5-acre millsite, and several unpatented claims, all in one group. It is owned by GRACE E. SPARKS, formerly of Prescott, Arizona.

LIVING QUARTERS AND WATER SUPPLY

Living quarters consist of four well-built and vermin-tight cabins bordering the graded road which switchbacks to the west to the divide and continues westward to Lohiel.

Ample water is had for culinary and mine purposes, although, because of the high bicarbonate of lime content and consequent corrosive and lime-depositing characteristics of the well water to mine equipment, provision has been made for impounding surface flows in a dammed drift at a higher elevation than the mine workings.

Development of sufficient water for a small mill of 25 to 50 tons capacity should be possible by means of one or more wells sunk near the only wash in the canyon, as there is a watershed of at least 8 to 10 square miles. The wash gradient is quite steep, but with one or two low rock dams to hinder rapid drainage, enough water could be held back to tide over dry spells.

EARLY HISTORY

Historically, discovery of the mine dates to the 1880's, or the Tombstone period, and there is much evidence of prospecting especially where the limestone strata contacts the igneous intrusive. Copper was the metal sought for rather than any zinc or lead, as there was a ready market for this ore. Many shafts and pits were sunk on the contact iron outcrops with the hope of striking the secondary zone of enrichment. Success in this direction was not attained in any prospecting venture, although a few small bunches of ore were found and shipped. Faith in the property did not diminish however and with changing economic trends, the known zinc-lead deposit was exploited, especially since the property passed into the hands of G. M. Sparkes heirs, who have taken over one hundred ($100,000) thousand dollars worth of shipping ore out of one stope during World War Two and have many thousands of tons of mill grade ore left on the dumps and within the stope.

THE GEOLOGY OF MOCTEZUMA CANYON

Geologic conditions which determined the course and shape of Moctezuma Canyon and the ore deposits contained in the limestone belt are the after effects of the Huachuca Range Uplift. As only a part of Moctezuma canyon was studied, only the immediate geologic exposure of the intrusive and intruded strata can be considered in determining possible salient points of ore deposition and the erosion to form the present shape of the canyon.

During the intrusion of the somewhat lenticular granitic body of rock which now forms the northern wall of the canyon, the overlying limestone and other sediments were raised slowly to a point where the cohesive force w was exceeded, causing the strata to rupture in many places parallel to the axis of the intruding magma. Ruptures were of consequence greatest in extent at the contact of the intrusive.

With the cessation of the uplift the formerly horizontal strata but now inclined at a steep pitch were easily and rapidly eroded, for their limestone composition offered little resistance to solution and mechanical disintegration. As the strike of the uplift is almost east and west and Moctezuma Mountain the highest point at the present mouth of the canyon, the overlying strata crumpled and broke badly, thus forming the nucleus of a water shed. Erosion and solution have since been advancing continually westward at a much greater pace than from either southern or northern side of the canyon, as limestones and limestone breccia and talus conglomerates are still the predominant rocks in the canyon.

After the sedimentary uplift and sharp angular slope but before erosion and solution progressed westward from the present canyon mouth, blocks of limestone, shale, etc., from small to large sizes rolled down the slopes to accumulate as talus which subsequently was cemented with soluble lime into what is now a variegated conglomerate. A considerable thickness of this conglomerate can be seen as ridges southwest of the mine and reaching the top of the divide.

GEOLOGY RELATIVE TO ORE DEPOSITION

The presently observed geologic exposures serve as a clue to what ore deposition may be due directly to the effect of a hot intruding mass upon a brittle, partially-consolidated, sedimentary mass and indirectly to ore deposition prior to intrusion.

The geology of the northern side of the canyon is relatively simple in that a light-colored, moderately-coarse, crystalline granite of the variety termed ALASKITE intruded and upturned horizontal strata of limestone and shale to an almost vertical position, the metamorphic effects of the intrusive being asserted for only a short distance as its heat content was only moderate. This is evidenced by observed metamorphic effects in the limestone which were sufficient to marblize a good portion of its thickness but not affect the succeeding shale. Fossil imprints or remains in the limestone were not observed, as, in all probability, they were destroyed during the metamorphism.

That the limestone layer in contact with the Alaskite was so thick that the intrusive did not break through appears to be substantiated by the fact that there are remnants of limestone on the upper flanks of the intrusive ridge and also probably in irregular basins on its summit. This would indicate a thickness of many hundreds of feet. The shale in contact with the limestone and exposed below the mine workings has a width of a hundred or more feet. An alternate limestone strata is in contact with the shale on its southern side, extending up the southern slope of the canyon to where it is covered by the limestone-shale conglomerate.

Further to the south and probably cutting through the above conglomerate is a high ridge of orbicular quartzite which strikes in a northwest-southeast direction. What the relationship of this quartzite may be to ore deposition, or its origin, is unknown.

At the contact of the limestone and Alaskite epidote masses up to 3 and 4 feet thick have been formed in localized areas; elsewhere, small crystal aggregates and dispersions of epidote are found near the contact and in the limestone. There is also what appears to have originally been massive copper-iron sulphides in veins 5 to 25 feet thick but which now are almost destitute of copper and only massive, dense hematite remains. Several outcroppings of this nature border the contact. Whether they are all part of one single contact vein of what might have been chalcopyrite, bornite and other copper minerals is not certain.

The writer is inclined to believe, however, that in all probability there were more than onevein. Present exposures at different elevations appear to substantiate this view. Also the conclusion arrived at that rupturing of the limestone took place in an east-west direction or along the longitudinal axis of the intrusive Alaskite, which direction is the strike of the veins, adds to this belief.

With regard to the origin of the copper mineral filling these ruptures, the fact that the residual, massive hematite has not been changed to magnetite, which would have been the case if the vein had been formed prior to the intrusion, and as will be illustrated later in this report, favors the view that these copper veins are a result of exomorphic contact metamorphism. After the conclusion of the intrusion and rupturing of the limestone, hot circulating solutions derived most of their metallic content from the cooling magmatic mass and deposited their load in the ruptures of the favorable limestone host rock. At the same time the formation of epidote progressed and it is observed unaltered along the borders of the residual hematite and limestone.

Since the formation of these copper-bearing veins and the subsequent erosion and removal of the overlying sediments from the flanks of the intrusive, weathering agents along with probably ferric sulphate solutions and small amounts of sulphuric acid attacked and dissolved the copper sulphides, adding ferric oxides to the iron oxides remaining after leaching of the copper. The soluble copper salts were carried in solution to lower depths probably along the steeply inclined footwall flank of the Alaskite. This view seems the more probable as the epidotized limestone alongthe contact would act as an inert barrier between the unaltered limestone and the copper solutions, thereby allowing the copper solutions to migrate downward and out of the oxidizing zone to be most likely precipitated as Chalcocite in a secondary zone of enrichment.

At what depth this deposition may be relative to the present surface is difficult to predict. The pitch of the Alaskite is untrustworthy not only because of local pediments which have been shown to exist in the 360 foot shaft and also in the floor of the zinc-lead orebody but also because a local observation is generally insufficient to arrive at any factual conclusion. For these reasons a broader base must be considered to make possible a clearer estimate of the probable contour of the Alaskite underlying the limestone. Further search to the south for an intrusive outcrop may reveal whether the Alaskite in Moctezuma Canyon is synclinal--trough shaped--or flattens out to a more or less horizontal position. Its form and the water table will determine fairly closely the point and depth of secondary enrichment. A more positive but quite expensive method of location would be a geophysical survey.

Referring to the view that the heavy hematite contact veins are post-intrusive because their iron oxides have not been changed to magnetite, quite the opposite is true for hematite which existed prior to intrusion. This is readily illustrated by the abundance on the dump at the 360 foot shaft of massive pieces of magnetite crystal aggregates intermingled with epidote crystals and loosely cemented with lime and lime silicates.

These were mined from a horizon in the shaft when sinking was in progress. Since magnetite is the product obtained when hematite loses one-ninth of its oxygen under the influence of a high enough temperature, it becomes evident that hematite was present as such in the limestone

before intrusion and became altered to magnetite by the heat of the intrusive. Epidote and other contact minerals such as Vollastonite--Calcium Silicate--etc., where formed during the cooling of the magma, so that these minerals appear in the magnetite aggregates.

Records of the shaft log show that it passed thru about 100 feet of the Alaskite pediment as sinking progressed, emerging again into limestone. The proximity of this hot pediment to the limestone with its grains of hematite is unquestionably the cause of the transformation of the hematite to magnetite. Qualitative tests for commercial metals were negative.

In addition to the usual contact minerals present in the sump material from the 360-foot shaft, search with an ultra-violet ray lamp disclosed the presence of bluish-white crystals of a fluorescent mineral which by laboratory test of hardness, gravity and chemical identification proved to be the tungsten mineral, SCHEELITE--Calcium Tungstate.

A quantitative determination of tungsten was not undertaken, as the specimens worked with were select. Upon securing a representative sample of material, testing it quantitatively, and if an appreciable amount is found, the value of the property will be enhanced by a proportionate amount.

RELATION OF THE GEOLOGY TO THE STATE OF TEXAS MINE ZINC-LEAD-SILVER OREBODY

In dealing with the main stoped area on the STATE OF TEXAS claim, which has yielded practically all of the production up to the present time, the aforementioned deductions have a direct bearing on the origin of the lead-zinc-silver orebody and also explain the presence of Franklinite, a zinc-manganese ferrate, and the fluorescent minerals Willemite--zinc silicate--and calcite. Observations and known facts of the proximity of the intrusive within the stoped area reveal that all three minerals border and undoubtedly follow roughly the outline of the still hidden Alaskite pediment which a shallow-diamond drill hole at one point in the floor of the stope disclosed. As one moves away from the northern or intrusive side, the fluorescent minerals and Franklinite diminish, ceasing almost completely at the central pillar of high grade, massive sulphides of lead-zinc carrying up to eighty-five (85) ounces of silver per ton. The quantity of fluorescent minerals south of the pillar is insignificant, with red-fluorescing calcite and green Willemite only as coatings.

These fluorescent minerals and Franklinite being found only where contact metamorphic effects are present indicate the existence of unaltered sulphides of zinc, iron, and manganese, and limestone prior to the intrusion of the limestone. It is evident, therefore, that this body of ore was most likely a replacement of the limestone and that the proximity of the intrusive had only an effect on the conversion of already oxidized zinc, manganese and iron to Franklinite and not on the formation of the

orebody or its possible enrichment. It may be noted at this point that the Franklin, New Jersey, zinc mine was also the scene of intensive contact metamorphism of the same nature, yielding all of the same contact minerals, though lead is nearly absent and as are sulphides.

In the light of these facts the search for other similar bodies of ore resolves itself to the identical problem which exists in all other limestone replacement areas. As most replacement deposits in limestones may or may not be connected by evident narrow solution channels prospecting becomes more of a matter of geophysics with complementary geological observations.

However, in view of the fact that fluorescent minerals are present in any quantity only where sulphide mineral existed or still exists, prospecting with an ultra-violet ray lamp may disclose indirectly the existence of a partially-covered orebody. Another determinant which may be used is the dark manganese oxide color of the limestone capping immediately above an orebody. A dark capping such as this occurs about 400-500 feet west of the present orebody. A prospect hole sunk on this will probably reveal the same type of commercial ore as that already mined and possibly in as great or greater quantity.

For the unexposed orebodies which may be in this contact line belt a geophysical reconnaissance is necessary, followed by diamond drilling to determine grade if at any great depth. Any of several geophysical methods can be used. Since magnetite and magnetically-permeable minerals are present, especially near the Alaskite contact zone, a magnetometric method can be used. This method, however, may not necessarily indicate a zinc-lead orebody, as magnetic minerals are present in the 360-foot shaft and at some distance from the zinc-lead orebody. Most likely to be successful in discovering and outlining the borders of an orebody is an inductive method such as the Radiore Company or Fischer M-Scope utilizes, whereby a high frequency current from an outside source induces a current within the hidden orebody and the difference in impedance between conductor and non-conductor is measured by the intensity of the signal in a set of earphones or by means of recording devices.

SUMMARY OF RECOMMENDATIONS

1. Further geologic study to the south is required to determine certain structural features of the intrusive Alaskite to enable a more accurate estimate of the point or horizon at which secondary copper enrichment may be expected. An alternative and possibly a more definite method available to accomplish this is a geophysical survey followed by diamond drilling to determine grade if the enrichment zone is at considerable depth. In the latter case covered zinc-lead deposits in the overlying limestone may offer difficulties by their individual reactions and proximity. However, the discovery of a zinc-lead deposit can hardly be termed unfortunate.

2. In any effort to locate zind-lead orebodies in the limestone belt advantage should be first taken of available means of so doing and the indications of ore. The association of fluorescent zinc and lime minerals with the sulphide ores of the big stope is an excellent indication for finding another such body with the aid of an ultra-violet ray lamp during the hours of darkness. By the abundance or scarcity of fluorescent mineral, a rough estimate of what ore can be expected is thereby obtained. However, care should be exercised in the case of scarcity as only a small part of the orebody may be close enough to the surfact to yield a small amount of fluorescent mineral.

Another indication of ore which should be used is the dark shade of color exhibited by a limestone capping over an orebody, where sufficient erosion has progressed to make this observable. Trenching or sinking a shaft at such a point would be well worth the effort and expense. The same type of vegetation growing over similarly-exposed orebodies is also indicative.

A still other, existence of residual green fluorescing Willemite on the flank of the Alaskite northwest of the 360 foot shaft should be utilized in searching for other such coatings on the exposed granite and then following them on the dip into the limestone where not covered with overburden as lead and zinc carbonates may be found as secondary depositions. A plotting of such areas may give some clue as to the probable average distance of barren limestone between orebodies.

3. Where the aforementioned primary methods have yielded all that can be expected and what orebodies may still exist but are hidden too deep to detect by the above means, the geophysical means of probing the limestone becomes necessary. This prospecting can then possibly accomplish a two-fold purpose--detection of both zinc-lead orebodies in the limestone and copper enrichments at or near the limestone-Alaskite contact.

PRESCOTT ENGINEERING COMPANY

By /s/ J. BRYANT KASEY

October 17, 1946

(Seal)

Registered Metallurgist
Certificate Expires
J. Bryant
Kasey
December 31, 1946
Arizona, U.S.A.

Submitted to the U. S. Bureau of Mines
by Grace M. Sparkes
c/o P.O. Box 178
State of Texas Mine
Bisbee, Arizona