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2175 FOUR ACES
2175 RIGHT BOWER
2175 LEFT BOWER

2175 TIDAL WAVE
2175 FLORA
2175 SUPERIOR

2175 GOLGONDA
2175 BARRANCA
2175 SHAMROCK
2175 AGARETA
2175 RIM NO. 1
2175 RIM NO. 2

FRONTIER
STEMWINDER
COBRE RICO
WAY UP
ANGEL'S WHISPER
RED HOT
WHAALOTE
TICKET CHOPPER
WHITE MOUNTAIN SHAMROCK
FAIRVIEW
CEDAR
S.P.
J.C.
HAPPY HOOLIGAN
CATHERINE
LAST CHANCE
MOUNTAIN CHANCE
ANDRESI

NATIONAL BANK
PALOCHRISTE
QUAIL
IRON
ATLAS
BLAINE
CALUMET
FRONTSIDE
FRACTION
RIGHT ANGLE
EQUATOR
BIG DIKE NO. 2
BIG DIKE NO. 1
BIG SPARR
BIG TYLE
BACKSIDE

OXIDE
CRACKER
PIVOT
LEXINGTON
CHOCOTAW
EAST SIDE
LAST ROAD OF SUMMER
NEW
WATER
MIDWAY
EQUATOR
BIG DIKE NO. 2
BIG DIKE NO. 1
BIG SPARR
BIG TYLE
BACKSIDE

LOUISIE
LORRAINE
CUBRITE
LITTLE EMMA
PEDRO
UNCLE DAN
H.A.
ATLAS NO. 1
ATLAS NO. 2
LOGAN
GRAND VIEW
MARYLAND
CORAL
HARVARD
VERITAS
FLAWKER
EPELNOTE
FRACTION
CYMBELINE NO. 10
CYMBELINE NO. 9
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OUTLOOK
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NORTH POLE
WHISTLER
HILL QUARTZITE
JUNCTION
BLUE BIRD
OLD HARSEED
O'CARROLL
PIRATE
MID WEST
WILD WEST
INDIAN NO. 1
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In addition to the above group of 36 unpatented claims, Foard and Humphrey have relocated 28 claims and fractions surrounding their property for added protection. Additional unstaked ground is believed to exist on the east.

Immediately west is the Schneider Hill group of claims. This was examined in 1941 by Kenyon Richard and John Hope, Jr., for Consolidated Coppermines Corporation during my absence in Cuba. Mr. Richard recognized considerable merit in this ground and recommended that the property receive a thorough geological examination. He proposed a preliminary campaign of drilling if the examination returned favorable results, provided that reasonable terms could be obtained for acquiring the property. No further action was immediately taken by Coppermines, and wartime activities soon caused the property to be forgotten.

Recently the Schneider Hill ground has been acquired or optioned by Kennecott Copper Corporation and access roads are now being constructed to start churn drilling. The objective of this drilling will apparently be to develop disseminated copper ore in diabase with a grade somewhere around 1% copper and amenable to open pit operations.

I am advised that Kennecott has approached the Tornado Mining Company with the object in view of obtaining 4 or 5 claims from the southwest part of Tornado property. This would provide more elbow room and give apex rights to Kennecott where there is a segment of irregular property line. We do not yet know whether this would also give Kennecott a mineralized extension into Tornado ground at depth.

The Tornado Mining Company has not accepted Kennecott's offer for these 4 or 5 claims because of the low price offered, its desire to keep the property intact, and the wish to retain a fractional interest in the ground. It is also reported that

Kennecott has negotiated directly with the owners and that Kennecott has no doubt made an offer for some or all of the 36 claims now optioned to the Tornado Mining Company if the latter company is unable to make the \$20,000 payment due on September 5, 1948. Even if Kennecott does not buy all or some of the ground, it has been intimated that the present lease and bond to the Tornado Mining Company would not be extended, but at best would be renegotiated on a basis of increasing the purchase price four or five times.

It is obvious that if the ground now controlled by the Tornado Mining Company has any merit, its title should be checked and a deal made prior to September 5, 1948. If we delay, we lose the opportunity of acquisition or the price goes up to \$80,000 or \$100,000.

As previously mentioned, Kennecott's Schneider Hill group is found immediately to the west of Tornado ground. The "79 Mine" of the Shattuck-Denn Mining Company lies somewhat beyond this on the northwest. About 2 miles southeast is the Christmas mine, which is currently producing about 4,000 tons of direct smelting ore per month containing 2.1% copper, according to Mr. Foard. Past production of the Schneider Hill group, from August, 1916, to January, 1919, is reported to be 225 railroad cars of copper ore of a net value of \$129,364. The London-Arizona production from a set of tunnels east of Chilite is stated to be 15,443 tons of ore ranging in tenor from 2.75 to 13 percent copper with an average grade of about 4.5 percent copper. (The above data are taken from U. S. Geological Survey Bulletin No. 771, "Ore Deposits of the Saddle Mountain and Banner Mining Districts, Arizona," 1925, by C. P. Ross.)

The Schneider Hill mineralization is associated with diabase pierced by quartz diorite porphyry, these rocks being intruded in a block of Troy quartzite. On the east the Troy quartzite is overlain by the Martin limestone of Devonian age, and the Tornado Mining Company claims are laid out to cover the outcropping edge (or apex) of the lowermost Martin. At the base of the Martin limestone is a zone 35 feet thick of fractured limestone locally known as the "O'Carroll bed." This is a zone

favorable to the deposition of copper ore and it is from this horizon that shallow tunnels produced the 15,443 tons of ore mentioned above. The O'Carroll bed rests upon a thin quartzite layer just above a thin porphyry sill which in turn overlies a thick shale horizon at the top of the Troy.

The Martin limestone with its basal O'Carroll bed dips moderately to the east and is overlain by the Tornado limestone. The Tornado limestone may be subdivided into the two units which compose it: the lower unit is the Escabrosa limestone of Mississippian age, and the upper unit is the Naco limestone of Pennsylvanian age.

Recent work indicates the following thicknesses for these formations:

| | |
|---------------------|------------|
| Naco limestone | 400-5 feet |
| Escabrosa limestone | 715 feet |
| Martin limestone | 320 feet |

Toward the east, then, the favorable O'Carroll bed is covered by a thousand feet or more of limestone and well to the east the limestone is overlapped unconformably by Cretaceous andesitic tuff and breccia. Andesite porphyry sills and dikes cut the limestone in places. Although these are believed to be pre-mineral in age, they appear to carry very little mineralization themselves. Small intrusions of quartz diorite porphyry are mapped on the northwest.

The ground of the Tornado Mining Company covers a 2-mile stretch of this masked zone under which the O'Carroll bed, mineralized at its outcrop, sweeps. The property is from 4,200 to 6,000 feet wide, and this substantial size offers attractive possibilities. Toward the east, the dip of the beds flattens and the depth to the favorable zone does not continue to become deeper. There are distinctive subdivisions in the overlying limestone. When these are carefully mapped and the fault structure delineated, there should be no difficulty in predicting the depth to the favorable zone at various locations in the property. It is expected that this will range between 1,000 and 1,500 feet.

So far as I could observe there had been no serious attempt to follow the mineralized O'Carroll bed down its dip into the sulphide zone. The reason for this neglect is not apparent. Some 60 short tunnels were driven by leasers to obtain

15,443 tons of ore along a strike length of several thousand feet of favorable bed. Most of the ore was oxidized but some contained a little residual chalcocite.

East of the Tornado claims the Christmas area has produced considerable copper ore over a period of years from favorable horizons in the Tornado limestone. It is said that deep diamond drilling during the war reached the O'Carroll bed at the base of the Marvin limestone and found attractive mineralization. The reports of this exploration have not yet been published by the Bureau of Mines, so I have not been able to confirm this information. Nevertheless, we know that copper mineralization occurs both east and west of Tornado ground and it should be found within it.

It is not expected, however, that ore will persist as a continuous sheet throughout all of the O'Carroll bed in Tornado ground. Mineralization appears to be related to zones of northwest fracturing, and it is suspected that where these fractures cut this favorable bed mineralization will be strongest.

At present the Tornado Mining Company is exploring one of these northwest zones in the Naco limestone high above the O'Carroll bed. They are searching for pockets of lead ore along a fissure zone hoping to make quick shipments to pay for current expenses. They apparently have no plans to explore the O'Carroll bed on the west where it is shallow.

Mineralization along this fracture zone is significant. Ross reports early production of 1,016 tons of lead ore and 51 tons of zinc ore from shallow workings. This might be interpreted as a "leak" of cooler mineralization above a copper-bearing zone in the O'Carroll bed at depth.

I believe that the ground now controlled by the Tornado Mining Company offers a field for legitimate mineral exploration by Consolidated Coppermines Corporation. It is not an "ideal prospect," but it is far better than the average and possesses the following advantages:

- (1) Mineralization is extensively displayed at the surface along a favorable limestone horizon that has not been explored at depth.
- (2) We can probably acquire a dominant interest in some 1,200 acres of ground for \$20,000.

(3) The property is only 5 or 6 miles distant from the mill, smelter, and railroad at Hayden.

(4) Preliminary exploration can be done with relatively shallow drill holes on the west. If these give encouraging results, progressively deeper drilling can proceed eastward.

(5) The Tornado limestone may furnish productive horizons in addition to the O'Carroll bed of the Martin limestone.

It is readily admitted that the property possesses the following disadvantages:

(1) It will not develop into an open pit mine with low labor requirements and cheap mining costs.

(2) The grade may be only 2 or 3% copper, and the favorable O'Carroll bed may be thin and impose serious mining problems. It is, of course, difficult to give its thickness in advance of exploration. Its better portion appears to be 10 or 15 feet. Lower grade mineralization was seen below this and may account for the 35-foot thickness noted on a Geological Survey cross-section. It has been stated that a maximum thickness of 70 feet has been found but I cannot substantiate this. It will take exploration to tell what the thickness and tenor really are.

(3) The grade will probably be uneven in quality.

(4) Initial drilling will be costly because of the need to build access roads and to haul water.

(5) We are faced with the necessity of a quick decision without the benefits of a detailed geological examination.

Considering the serious difficulty now experienced by all mining companies in search of a new mine, I believe that the advantages outweigh the disadvantages and that the property is an attractive prospect. I, therefore, recommend that negotiations be entered into with the owners of the Tornado Mining Company with the object in view of control being acquired by Consolidated Coppermines Corporation. In the

meantime Mr. Hope and I will give the ground some additional attention from the geological standpoint.

Mr. Foard and Mr. Humphrey have told me that they are personally able to make the payment of \$20,000 due on September 5, 1948. They are confident that they can get their money back out of the lead prospect. If they assume this financial responsibility, they will naturally drive a sharper bargain with us.

These gentlemen have stated that they wish to make an arrangement whereby they retain a minority interest in the enterprise. When asked what percentage interest they wished to retain for a "free ride" they said 49%. This I told them was too much, as no mining company would assume the heavy financing for exploration, development, and equipment of a speculative project for the opportunity to retain only 51 cents on the dollar of hoped-for profits. Both Mr. Foard and Mr. Humphrey are shrewd and intelligent men and it was obvious that this was their first asking price in a horse trade.

There are various possible arrangements that can be offered. I believe that the following may be a reasonable approach:

(1) That Coppermines offer to pay the \$20,000 due on September 5, 1948, for an 80% interest in the ground. Foard, Humphrey and associates would retain a 20% interest and a "free ride." They would also be given a lease on the lead area where they are now mining to extend to a depth of 500 feet below the collar of their shaft for a 10% royalty.

Coppermines further agrees to drill not less than 4,000 feet of exploratory holes during the next two years.

If necessary, Coppermines assumes responsibility for assessment work.

Or (2) Coppermines agrees to put up \$10,000 of the necessary \$20,000 for a somewhat smaller controlling interest.

In the meantime, Gynn and Twitty should be authorized to immediately start a search of title.

If Coppermines acquires the property, a detailed geological survey must be started to determine where and to what depth to drill. This will require at

least four months. Future road work can be contracted to Isbell at Ray or Hagen at Globe. Several firms of churn drilling contractors are available if needed, but I doubt if they have had much experience with moderately deep holes in limestone.

There are several other possible advantages to the ground not mentioned above, namely: (1) Kennecott's mineralized diabase on the west might at depth spread into Tornado ground. (2) If we are unsuccessful in exploration, we may be able to reclaim part of our loss by selling some of the claims to Kennecott. This assumes that Kennecott will develop ore and establish an open cut and need more ground for convenience of operations. I am favorably impressed with their area and think this result quite likely.

In conclusion, I recommend the property of the Tornado Mining Company for Coppermines' considered attention within the next few weeks.

E. J. Cunniff

EMP/mg

cc - Mr. Chester D. Tripp
Mr. P. J. Sirkegian
Mr. John Hope

COPY

CONSOLIDATED COPPERMINES CORPORATION

KIMBERLY, NEVADA

July 20, 1948

Mr. Chester D. Tripp, President
Consolidated Coppermines Corporation
310 South Michigan Avenue
Chicago 4, Illinois

Dear Chester:

Enclosed please find a report on the Tornado Mining Company property located near Hayden, Arizona, by E. N. Pennebaker dated July 19, 1948.

Mr. Pennebaker was very anxious to present and discuss this property with me and he seems to be quite enthusiastic about it. The Schneider Hill group of claims lying immediately west of the area, which Mr. Pennebaker refers to, was examined by our Messrs. Kenyon Richard and John Hope during the early part of November, 1941. Mr. Richard at that time wrote Cash a report dated November 14, 1941, in which he expressed some enthusiasm and recommended "that detailed investigation is warranted." This Schneider Hill property is the one that Kennecott is now starting to drill. As I understand Penny and his report of the Tornado group, the Schneider Hill property presents the possibilities of containing a large body of disseminated copper ore in the diabase which, if present in sufficient quantity and quality, may be economically mined today by open cut methods, providing, of course, stripping ratios are within reasonable limits and the ore is amenable to good metallurgical recoveries. The possibilities in the Tornado group seem to be that of better grade ore but deposited in undulating or faulted bed deposits. Of course, if the ore is really high grade, one can always mine by underground methods and make some money but I am very skeptical about 4 or 5% copper ores, even at 21 or 25¢ a pound copper, if they occur in such deposits in this day and age. However, as Penny points out, there may be other favorable horizons other than the O'Carroll bed and there is a possibility that the deposit, if there, may blossom out in great bonanza proportions. Certainly 4 or 5% ore would have to blossom out into bonanza proportions in order to be mined, treated and the copper recovered at a profit in this day and age.

The entree into acquiring an interest in the property, as Penny points out, is, of course, not steep if quick action is taken. The matter of the principals' retained interest, I imagine, could be whittled down considerably more as I would certainly not recommend that they have an interest in toto of over 3 or 4%, particularly if the party who wishes to go in with them must pay some cash down on the line for the privilege of exploring the property. Penny, of course, points out some of the advantages and disadvantages concerning Coppermines' interest in the property. X Personally, I can't seem to get very much enthused. If we had the Schneider

Mr. Chester D. Tripp

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July 20, 1945

Hill group along with this group, it would really have great appeal as far as I can see. However, our corporation did not go into the Schneider Hill group back in 1941 because within a very few weeks our country was at war and all efforts were concentrated here to do the best that we could with our property and get maximum production.

Mr. Pennabaker is leaving this afternoon to pick up his wife in Tonopah and he will start journeying toward Globe, arriving there on the evening of Saturday, July 24th. John Hope has been here several days and he too will be leaving for Arizona at the end of this week. Mr. Pennabaker, as you will note in his report, is quite enthusiastic about the possibilities of finding ore on the property. I join him in this enthusiasm but am awfully damned skeptical as to whether ore found would be commercial today unless, as I have pointed out, great bodies of 4 or 5% ores are discovered. I am sending a copy of my letter and the report to Cash and would appreciate having your reactions in the quickest possible time as I have promised Penny that we would let him know about the time he arrived in Globe, namely, during the end of this week.

With kindest regards, I am

Sincerely yours,

Original signed by
PAUL J. SIRKEGIAN

FJS/ug

Encl.

cc - Mr. C. I. Cook
Mr. C. L. Steeger
Mr. E. H. Pennabaker
Mr. John Hope

Foord &
Humphreys

{ Goudou-Arizona proper
access to Christmas

Glyte

{ Chilito-Schneider }
Hogval ~~hill~~ } Kennecott

Are Deposits of the Saddle
Mountain and Banner Mining
Districts, Arizona.

C. P. Ross

U.S. G.S. Bull #771 - 1925

The Geology and Ore Deposits of
the Aravaipa and Stanley Mining
Districts, Graham County, Arizona.

C. P. Ross

U.S. G.S. Bull - 763 - 1925

U. S. Geol. Survey Geol. Atlas, Christmas
folia (in preparation) W. H. Darton -

XXXXXXXXXXXXX
P. O. Box 2996
Globe, Arizona
July 28, 1948

Mr. C. I. Cook, General Manager
Consolidated Coppermines Corporation
Kimberly, Nevada

Dear Cash:

John Hope and I spent yesterday in further examining the London-Arizona Property near Hayden, Arizona. This was done in order to supplement my observations of July 5, 1948, and determine, if possible, any additional pertinent features of a favorable or unfavorable nature.

Kennecott's preparation of access roads on Schneider Hill seems to be about completed. We judge that they plan on drilling at least six preliminary holes to a relatively shallow depth (roads are not widened at probable set-up sites, suggesting the use of small rigs). From the configuration of the ground, some 20,000,000 or 30,000,000 tons above the level of Chilite Gulch seems a reasonable expectation, provided that drilling reveals material of ore grade to be reasonably widespread. What will be found at moderate depth is, of course, problematical. From our observations on the ground it also seems reasonable to expect that some of the mineralized diabase and porphyry will cross the property line into London-Arizona ground. So far as we could see on the

July 28, 1948

surface, such rocks were not mineralized sufficiently to constitute ore. However, this is no guarantee of the behavior of mineralization at depth.

I am advised that Anaconda (or International Smelting) is giving considerable attention to possible mineralization in the Dripping Spring Range several miles north and west of the Schneider Hill area. This activity is probably caused by Kennecott's acquisition of Schneider Hill where copper mineralization is associated with diabase pierced by small bodies of diorite porphyry. Anaconda is scouting this area to the northwest where similar geological conditions are shown on Ransome's map. In this search I believe they are associated with one of the other important mining groups.

There is another area with similar geological relations a few miles south of Kelvin. Mr. Hope and I plan on putting a field party there within a week or ten days to search for mineralization. We do not know whether Anaconda has already been there or not.

Our check of the London-Arizona ground determined that the O'Carroll bed is mineralized at the surface over a strike length of about 2,500 feet. On the south the mineralized bed is relatively thin, being only a few feet in thickness where exposed. Followed over the surface toward the north, its thickness improves about in line with a strong fracture zone leading easterly from the Schneider Hill area. We judge that there is a strike length of possibly 1,000 feet where mineralization occupies from 10 to 20 feet of stratigraphic thickness. Beyond to the north, mineralization apparently plays out where the bed is exposed at the surface.

July 28, 1948

Much of the iron staining seen at the surface is derived from the oxidation of magnetite, and fresh magnetite is very common within a few feet of the surface. It is now clear that copper mineralization is erratic near the surface and is intimately related to pre-mineral fracturing striking between N20W and N70W.

If worthwhile ore bodies are to be found, it is obvious that copper mineralization must improve down the dip of the O'Carroll bed or that strong pre-mineral fracturing must lead mineralization upward to favorable horizons in the Escabrosa limestone. This makes the project very speculative, but it was the realization of this latter condition that resulted in the superb Campbell ore body in Bisbee under geological conditions of some similarity.

I am still favorably impressed with this London-Arizona ground just now controlled by the Tornado Mining Company. However, I wish to make it clear that I realize and bring forward the speculative nature of such a project. I am convinced that if the mining industry is to find ore bodies in the future, such speculative enterprises must be undertaken because there are few if any "sure shots" to be found. This Tornado property appeals to me because there is some geological similarity with Bisbee and because there is a reasonable chance to gain control of a large area for a moderate expenditure, and I do not believe that we should prejudice our appraisal of the ground by forecasting difficulties pertaining to a theoretical ore body as yet undiscovered. The best we can do is to select geologically favorable ground and explore to see what kind of mineralization is really there.

Mr. C. I. Cook

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July 28, 1948

If this ground were not pre-empted and if it were still open for entry, the location of some 60 claims along with monumenting and location work would cost some \$10,000. With this in mind, I do not think we are paying at a very high rate for the privilege of exploring the property, particularly where there is a fair chance that we can gain control for something between \$10,000 and \$20,000. The really expensive feature will probably be in drilling costs.

I do not think the partners controlling the Tornado Mining Company will entertain a deal whereby they retain only a 3% or 4% interest. However, we could try for this percentage and maybe bring them down from their present inflated ideas.

I again bring forward the speculative nature of this proposal. Only if Coppermines is inclined to gamble against considerable odds for a large replacement ore body in limestone should this project be entertained. I am well aware of the weak points of the ground, but I would be remiss in my duties if I did not forcefully draw your attention to this area.

Yours very truly,

Christmas

70 cash weekly @ 2.1%

Premium for basic flux

Lease & bond on 36
unpatented claims

\$20,000 due Sept 5-'48
10% royalty

28 claims & fractions
staked and by ~~Foad~~

Tornado Mining Co. (Foad
& Humphreys)

Foad 25%

Humphreys 40%

Kilpatrick 15%

24-boys 20%

Partnership - recorded

60
70

1300

Harold Foard

Supt. International Smelt.
& Refin. Co.

Miami - Ariz.

Thomas Z. Humphrey

Tech. Consult

Inter. Smelt. & Refin. Co.
Miami - Ariz.

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I am advised that Kennecott has approached the Tornado Mining Company with the object in view of obtaining 4 or 5 claims from the southwest part of Tornado property. This would provide more elbow room and give apex rights to Kennecott where there is a segment of irregular property line. We do not yet know whether this would also give Kennecott a mineralized extension into Tornado ground at depth.

The Tornado Mining Company has not accepted Kennecott's offer for these 4 or 5 claims because of the low price offered, its desire to keep the property intact, and the wish to retain a fractional interest in the ground. It is also reported that

Kennecott has negotiated directly with the owners and that Kennecott has no doubt made an offer for some or all of the 36 claims now optioned to the Tornado Mining Company if the latter company is unable to make the \$20,000 payment due on September 5, 1948. Even if Kennecott does not buy all or some of the ground, it has been intimated that the present lease and bond to the Tornado Mining Company would not be extended, but at best would be renegotiated on a basis of increasing the purchase price four or five times.

It is obvious that if the ground now controlled by the Tornado Mining Company has any merit, its title should be checked and a deal made prior to September 5, 1948. If we delay, we lose the opportunity of acquisition or the price goes up to \$80,000 or \$100,000.

As previously mentioned, Kennecott's Schneider Hill group is found immediately to the west of Tornado ground. The "79 Mine" of the Shattuck-Denn Mining Company lies somewhat beyond this on the northwest. About 2 miles southeast is the Christmas mine, which is currently producing about 4,000 tons of direct smelting ore per month containing 2.1% copper, according to Mr. Foard. Past production of the Schneider Hill group, from August, 1916, to January, 1919, is reported to be 225 railroad cars of copper ore of a net value of \$129,384. The London-Arizona production from a set of tunnels east of Chilite is stated to be 15,443 tons of ore ranging in tenor from 2.75 to 18 percent copper with an average grade of about 4.5 percent copper. (The above data are taken from U. S. Geological Survey Bulletin No. 771, "Ore Deposits of the Saddle Mountain and Banner Mining Districts, Arizona," 1925, by C. P. Ross.)

The Schneider Hill mineralization is associated with diabase pierced by quartz diorite porphyry, these rocks being intruded in a block of Troy quartzite. On the east the Troy quartzite is overlain by the Martin limestone of Devonian age, and the Tornado Mining Company claims are laid out to cover the outcropping edge (or apex) of the lowermost Martin. At the base of the Martin limestone is a zone 35 feet thick of fractured limestone locally known as the "O'Carroll bed." This is a zone

favorable to the deposition of copper ore and it is from this horizon that shallow tunnels produced the 15,443 tons of ore mentioned above. The O'Carroll bed rests upon a thin quartzite layer just above a thin porphyry sill which in turn overlies a thick shale horizon at the top of the Troy.

The Martin limestone with its basal O'Carroll bed dips moderately to the east and is overlain by the Tornado limestone. The Tornado limestone may be subdivided into the two units which compose it: the lower unit is the Escabrosa limestone of Mississippian age, and the upper unit is the Naco limestone of Pennsylvanian age.

Recent work indicates the following thicknesses for these formations:

| | |
|---------------------|------------|
| Naco limestone | 400-4 feet |
| Escabrosa limestone | 715 feet |
| Martin limestone | 320 feet |

Toward the east, then, the favorable O'Carroll bed is covered by a thousand feet or more of limestone and well to the east the limestone is overlapped unconformably by Cretaceous andesitic tuff and breccia. Andesite porphyry sills and dikes cut the limestone in places. Although these are believed to be pre-mineral in age, they appear to carry very little mineralization themselves. Small intrusions of quartz diorite porphyry are mapped on the northwest.

The ground of the Tornado Mining Company covers a 2-mile stretch of this masked zone under which the O'Carroll bed, mineralized at its outcrop, sweeps. The property is from 4,200 to 6,000 feet wide, and this substantial size offers attractive possibilities. Toward the east, the dip of the beds flattens and the depth to the favorable zone does not continue to become deeper. There are distinctive subdivisions in the overlying limestone. When these are carefully mapped and the fault structure delineated, there should be no difficulty in predicting the depth to the favorable zone at various locations in the property. It is expected that this will range between 1,000 and 1,500 feet.

So far as I could observe there had been no serious attempt to follow the mineralized O'Carroll bed down its dip into the sulphide zone. The reason for this neglect is not apparent. Some 60 short tunnels were driven by leasers to obtain

15,443 tons of ore along a strike length of several thousand feet of favorable bed. Most of the ore was oxidized but some contained a little residual chalcocite.

East of the Tornado claims the Christmas area has produced considerable copper ore over a period of years from favorable horizons in the Tornado limestone. It is said that deep diamond drilling during the war reached the O'Carroll bed at the base of the Martin limestone and found attractive mineralization. The reports of this exploration have not yet been published by the Bureau of Mines, so I have not been able to confirm this information. Nevertheless, we know that copper mineralization occurs both east and west of Tornado ground and it should be found within it.

It is not expected, however, that ore will persist as a continuous sheet throughout all of the O'Carroll bed in Tornado ground. Mineralization appears to be related to zones of northwest fracturing, and it is suspected that where these fractures cut this favorable bed mineralization will be strongest.

At present the Tornado Mining Company is exploring one of these northwest zones in the Naco limestone high above the O'Carroll bed. They are searching for pockets of lead ore along a fissure zone hoping to make quick shipments to pay for current expenses. They apparently have no plans to explore the O'Carroll bed on the west where it is shallow.

Mineralization along this fracture zone is significant. Ross reports early production of 1,016 tons of lead ore and 51 tons of zinc ore from shallow workings. This might be interpreted as a "leak" of cooler mineralization above a copper-bearing zone in the O'Carroll bed at depth.

I believe that the ground now controlled by the Tornado Mining Company offers a field for legitimate mineral exploration by Consolidated Coppermines Corporation. It is not an "ideal prospect," but it is far better than the average and possesses the following advantages:

- (1) Mineralization is extensively displayed at the surface along a favorable limestone horizon that has not been explored at depth.
- (2) We can probably acquire a dominant interest in some 1,200 acres of ground for \$50,000.

(3) The property is only 5 or 6 miles distant from the mill, smelter, and railroad at Hayden.

(4) Preliminary exploration can be done with relatively shallow drill holes on the west. If these give encouraging results, progressively deeper drilling can proceed eastward.

(5) The Tornado limestone may furnish productive horizons in addition to the O'Carroll bed of the Martin limestone.

It is readily admitted that the property possesses the following disadvantages:

(1) It will not develop into an open pit mine with low labor requirements and cheap mining costs.

(2) The grade may be only 2 or 3% copper, and the favorable O'Carroll bed may be thin and impose serious mining problems. It is, of course, difficult to give its thickness in advance of exploration. Its better portion appears to be 10 or 15 feet. Lower grade mineralization was seen below this and may account for the 35-foot thickness noted on a Geological Survey cross-section. It has been stated that a maximum thickness of 70 feet has been found but I cannot substantiate this. It will take exploration to tell what the thickness and tenor really are.

(3) The grade will probably be uneven in quality.

(4) Initial drilling will be costly because of the need to build access roads and to haul water.

(5) We are faced with the necessity of a quick decision without the benefits of a detailed geological examination.

Considering the serious difficulty now experienced by all mining companies in search of a new mine, I believe that the advantages outweigh the disadvantages and that the property is an attractive prospect. I, therefore, recommend that negotiations be entered into with the owners of the Tornado Mining Company with the object in view of control being acquired by Consolidated Coppermines Corporation. In the

meantime Mr. Hope and I will give the ground some additional attention from the geological standpoint.

Mr. Foard and Mr. Humphrey have told me that they are personally able to make the payment of \$20,000 due on September 5, 1948. They are confident that they can get their money back out of the lead prospect. If they assume this financial responsibility, they will naturally drive a sharper bargain with us.

These gentlemen have stated that they wish to make an arrangement whereby they retain a minority interest in the enterprise. When asked what percentage interest they wished to retain for a "free ride" they said 49%. This I told them was too much, as no mining company would assume the heavy financing for exploration, development, and equipment of a speculative project for the opportunity to retain only 51 cents on the dollar of hoped-for profits. Both Mr. Foard and Mr. Humphrey are shrewd and intelligent men and it was obvious that this was their first asking price in a horse trade.

There are various possible arrangements that can be offered. I believe that the following may be a reasonable approach:

(1) That Coppermines offer to pay the \$20,000 due on September 5, 1948, for an 80% interest in the ground. Foard, Humphrey and associates would retain a 20% interest and a "free ride." They would also be given a lease on the lead area where they are now mining to extend to a depth of 500 feet below the collar of their shaft for a 10% royalty.

Coppermines further agrees to drill not less than 4,000 feet of exploratory holes during the next two years.

If necessary, Coppermines assumes responsibility for assessment work.

Or (2) Coppermines agrees to put up \$10,000 of the necessary \$20,000 for a somewhat smaller controlling interest.

In the meantime, Gynn and Twitty should be authorized to immediately start a search of title.

If Coppermines acquires the property, a detailed geological survey must be started to determine where and to what depth to drill. This will require at

least four months. Future road work can be contracted to Isbell at Ray or Hagen at Globe. Several firms of churn drilling contractors are available if needed, but I doubt if they have had much experience with moderately deep holes in limestone.

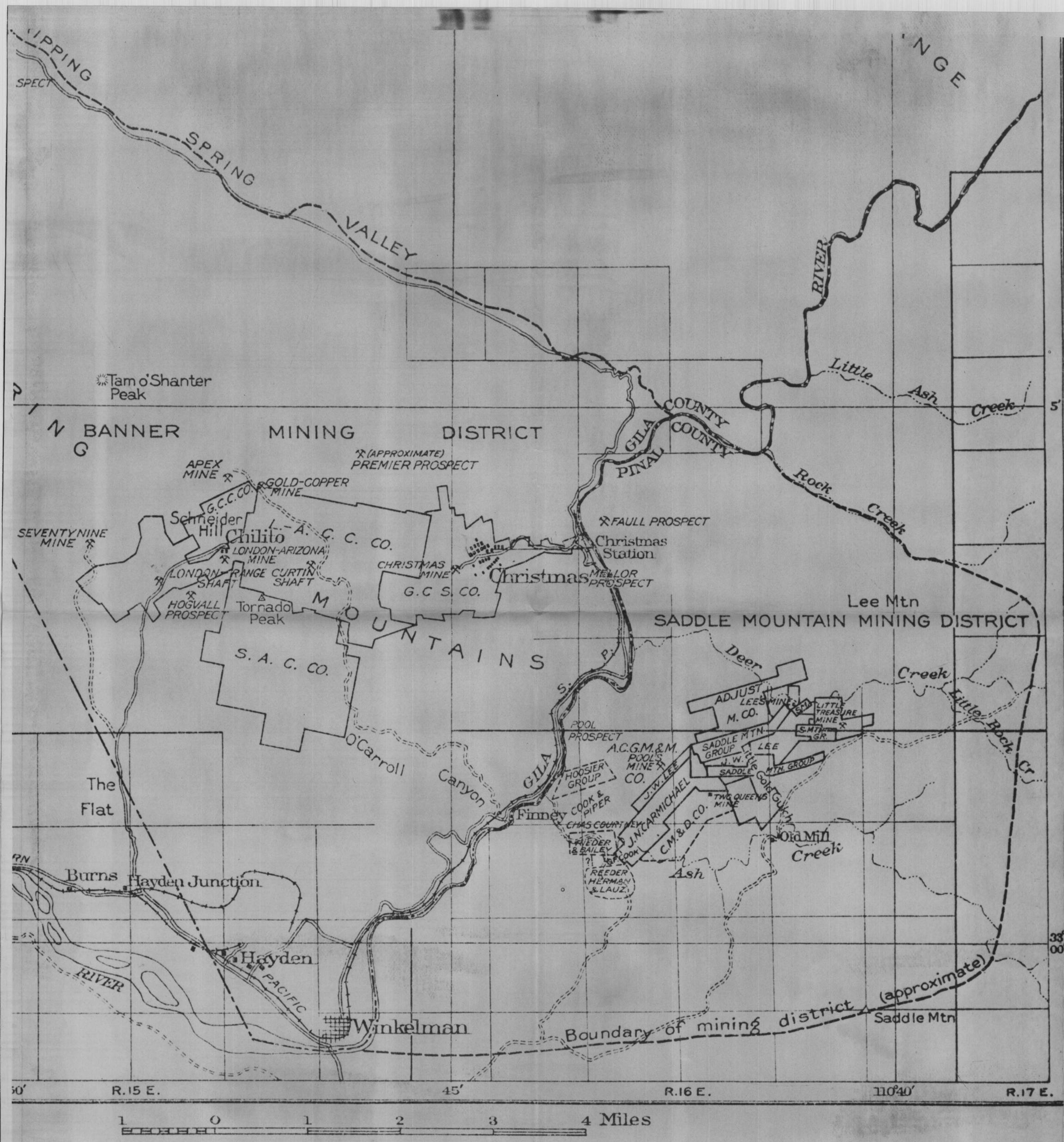
There are several other possible advantages to the ground not mentioned above, namely: (1) Kennecott's mineralized diabase on the west might at depth spread into Tornado ground. (2) If we are unsuccessful in exploration, we may be able to reclaim part of our loss by selling some of the claims to Kennecott. This assumes that Kennecott will develop ore and establish an open cut and need more ground for convenience of operations. I am favorably impressed with their area and think this result quite likely.

In conclusion, I recommend the property of the Tornado Mining Company for Coppermines' considered attention within the next few weeks.

E. N. Pennebaker

ENP/ng

cc - Mr. Chester D. Tripp
Mr. P. J. Sirkegian
Mr. John Hope



RTY MAP OF THE SADDLE MOUNTAIN AND BANNER MINING DISTRICTS

Banner Mining District
TORNADO PEAK STRATIGRAPHY

Sect. By H. P. Peterson.