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REPORT

RECONNAISSANCE GEOLOGY INVESTIGATION

OF

BONNIE AND ANN CLAIM GROUPS

for

BELL WESTERN CORPORATION

MARCH 1970

by
HEINRICHS GEOEXPLORATION COMPANY
P. O. BOX 5964 TUCSON, ARIZONA 85703

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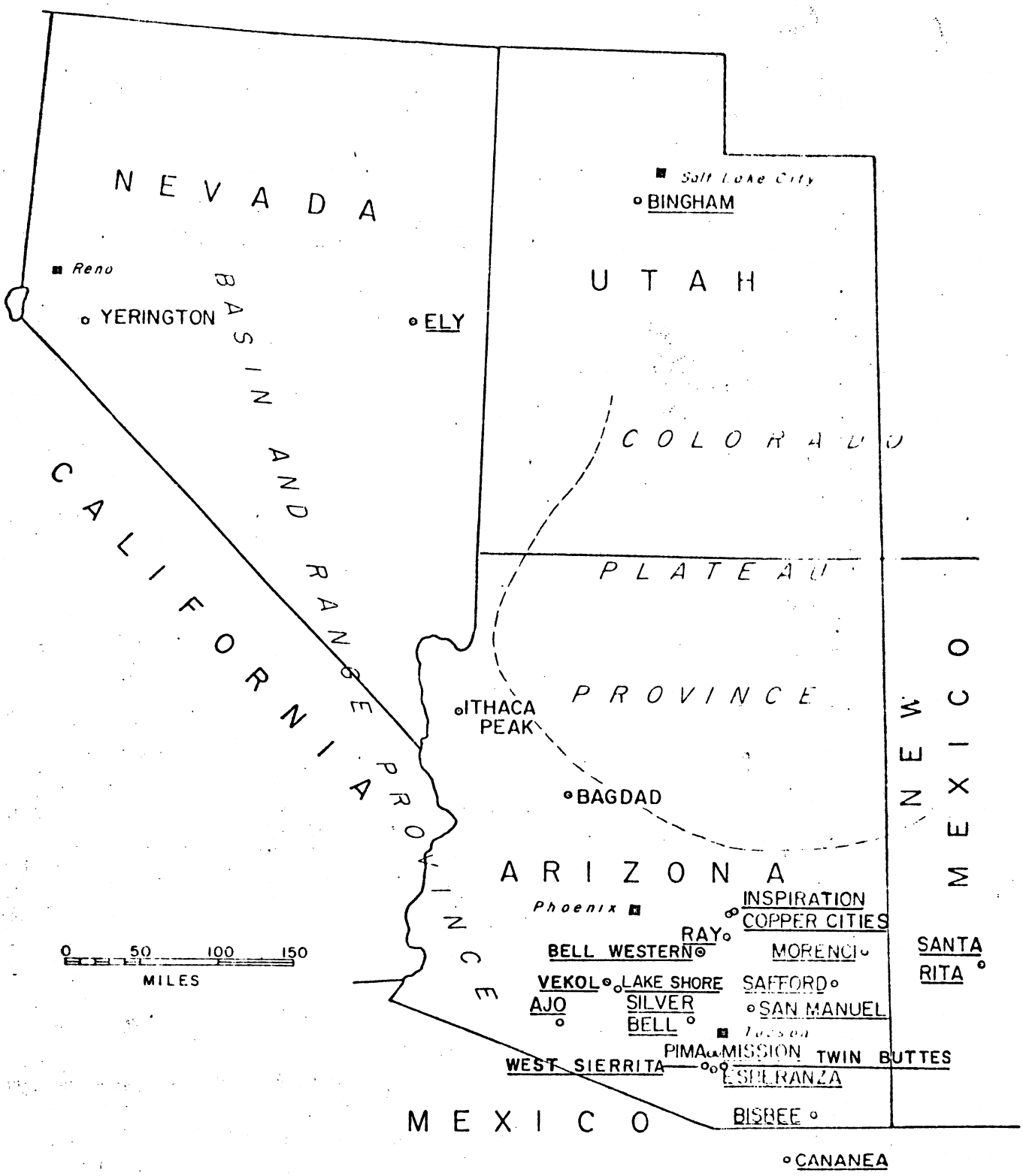
(In separate map tube.)



LOCATION MAP OF MAJOR COPPER DEPOSITS IN THE SOUTHWESTERN UNITED STATES

INTRODUCTION

At the request of Bell Western Corporation, Denver, Colorado and as per the letter of December 20, 1969, Heinrichs GEOEXploration Company, Tucson, Arizona, planned and executed a preliminary geologic reconnaissance program as an aid in appraising the economic potential of a copper prospect known as the Red Hills property some thirteen miles east of Florence, Arizona in Pinal County. This geologic report and the accompanying maps and aerial photographs concludes the present geological reconnaissance portion of the exploration program.

SUMMARY OF OPERATIONS

On November 24 and 25, 1969 Mr. Don Cooley, Chief Geologist for Heinrichs GEOEXploration Company made a preliminary geologic investigation of the Bonnie and Ann Claim Groups, Section 26, 27, 28, 33, 34 and 35, T. 4 S., R. 11 E. Pinal County, Arizona. A report of Mr. Cooley's observations and recommendations was sent to Bell Western Corporation on December 1, 1969.

Following a proposal sent to Bell Western Corporation on December 20, 1969 the following work was completed on the Red Hills property by mutual agreement between Bell Western Corporation and Heinrichs GEOEXploration Company.

1. Color aerial photographs of a scale 1 in. = 1000 ft., providing stereo coverage were taken of sections 26, 27, 28, 33, 34 and 35, T. 4 S., R. 11 E. False color aerial infrared photos were taken over the same area.

2. Color aerial photographs at a scale of 1 in. = 1000 ft. providing stereo coverage and false color infrared aerial photos were taken of the following six sections: Section 4, 5, 6 T. 4 S. R. 12 E., and sections 31, 32, 33 T. 3 S. R. 12 E.

3. To obtain sufficient color quality of the photographs acceptable for geologic interpretation, the above-mentioned areas were reflown and rephotographed once at no additional expense to Bell Western Corporation. This reflying did cause about two weeks delay in the geologic interpretation.

4. Ten sites were located for claim validation drill holes on the Bonnie and Ann claim groups. Drill sites were also located on the basis of geologic indications.

5. A field technician under the supervision of a Heinrichs' geologist collected rock dust samples from an air-track drill and verified the location and depth of nine holes. Most holes were drilled to a depth of 100 feet and samples were collected at 10 foot increments.

6. All samples were taken to Jacobs Assay office, Tucson, Arizona, and analyzed for copper only.

7. The color photographs of the area noted in item (1) were furnished to Bell Western at a scale of 1 in. = 400 ft.

8. An uncontrolled mosaic of the area as noted in item (1) consisting of nine color aerial photographs at a scale of 1 in. = 1000 ft. was furnished to Bell Western Corporation.

9. Existing U.S.G.S. 9" x 9" black and white photos and negatives at a scale of 1 in. = 2000 ft. to include the areas noted in items (1) and (2) and the area between were furnished Bell Western Corporation.

10. Geologic field work and aerial photographic interpretation were completed at the area noted in item (1).

11. A general geologic reconnaissance overlay map, a claim overlay map, and a domestic feature overlay map of the area noted in item (1) are a part of this geologic report. These overlays are at a scale of 1 in. = 400 ft. and are intended to be used with the color aerial photographs of the same scale.

CONCLUSIONS

From the geological examination made at the Red Hills property as presented in this report and on the geologic map it appears evident that the possibilities for developing an ore deposit for a strip-pit leaching operation are good. The most favorable area for locating low grade silicate, carbonate and oxide copper minerals in reasonably continuous structures, would probably occur at the two zones of sheeting and the between zone of conglomerate capping located immediately southwest of the intrusive diorite plug.

The next most probable area for finding shallow deposits of leachable copper ore would be the Red Hills oxidized zone. However, the structure associated with the copper minerals here is probably much less predictable than in the zone of sheeting, therefore making it more difficult to project possible ore reserves if such actually exist.

The area northeast of the Box-O Wash may have some potential as a leachable ore deposit; however, the geologic structure is very complex and makes it difficult to evaluate its economic potential; especially from the reconnaissance observations.

It also appears evident that a deposit of copper sulfide mineralization of economic potential may exist in the central and south central portion of the Red Hills property. This mineralization may very probably be located at a reasonably explorable depth. Another area of less probable interest for the location of economic sulfide mineralization would occur northeast of the Box-O Wash. Again because of the complex structural nature of this area, continuation of sulfide mineralization may be very difficult to predict. This is not to say that such an area could not make a very good host for important sulfide deposits.

RECOMMENDATIONS

Considering all geological data that is presently available, it is recommended that at least one, and preferably several north-south oriented trenches be cut across and into the east-west trending sheeting structure immediately southwest of the intrusive diorite plug. The first proposed trench, as shown on the plan map, should be located in the vicinity of the northwest corner of Bonnie No. 8 claim and adjacent to the recently excavated pit and the New Moon shaft. Ideally, the trench should be approximately 400 feet long, 20 feet wide and should extend at least 10 feet into bedrock. A trench of these specifications requiring dozing, drilling and blasting would provide adequate vertical exposure across the east-west trending, sheeting structure. The exposed face of the trench should be systematically and carefully channel sampled in the horizontal direction at 5 foot increments. Results from these assays should give a good indication as to the potential of a strip-pit leaching operation. Additional trenches of similar size and orientation are also recommended at other locations in this zone, particularly if the assay results from the first trench are encouraging. If the assays from the first 400 foot trench are not continually in the range of 0.4% copper across east-west trending veins selective separation of ore and waste from the sheeting structure may still allow for a strip-pit leaching operation. The question now that can only be answered by the recommended trenching is whether the sheeting structure will provide closely spaced veins of copper mineralization of sufficient grade.

Regardless of the outcome of the bulk sampling assays, it is our strong recommendation that some attempt be made to isolate any possible sulfide source for the "oxide" copper mineralization observed over most of the claim group. We are relatively sure that the sulfide mineralization indicated by the 1958 I.P. survey in the Red Hills area is such as might be expected from narrow, near surface bodies very much like those implied by known surface geologic indications and not the primary source of mineralization.

We reiterate the recommendations in our letter of December 22, 1969 with some modifications based on the geologic data discussed in this report. Because of the quantity of surface "oxide" copper in the area and the idea that this mineralization should have a sulfide source nearby, we recommend that a 1000 foot "a" spacing dipole-dipole I.P. survey be completed using eight reconnaissance lines oriented north-south and spaced not more than 1500 feet apart. This coverage will most reasonably cover the area with fair odds of not overlooking any very large (1500 x 1500 x 1500 feet) ore bodies buried less than 500 to 1000 feet. We estimate that this will cost on the order of $10,000.00 and require about one month to complete.

It is virtually certain that at least one I.P. anomaly will need detail follow up work as a result of the reconnaissance survey. Depending on what type and how much follow up is indicated, an additional $5000.00 to $10,000.00 might be needed to adequately define drill targets.

RECONNAISSANCE GEOLOGY INVESTIGATION

The aerial and field geology interpretation of the Red Hills property is classified as general reconnaissance in nature. This geologic interpretation along with the geological over-lay map at a scale of 1 in. = 400 ft. (see enclosed reconnaissance map) is believed to be adequate for this phase of the Bell Western Corporation exploration program. Encouragement from trenching and bulk sample operations as preliminary to developing a leach mining operation would justify the requirements for a full time mining geologist at the property to make detailed geologic investigations.

Geologic History

The oldest geologic rock unit of the Red Hills property appears to be a Precambrian granite porphyry which extends throughout the 180 claims. This granitic host rock has been heavily fractured, intruded by later igneous rock units and covered in part by semi-consolidated and unconsolidated sediments. The granite consists of abundant orthoclase with phenocrysts of dimensions up to one and one-half inch. In places where considerable weathering has occurred these phenocrysts show noticeable relief as they are surrounded by the finer grained and more weathered orthoclase and minor amounts of plagioclase. In addition to predominate orthoclase and abundant quartz, minor amounts of biotite, plagioclase and hornblende occur in the granite porphyry. The granite porphyry also has local differences in texture and mineral content varying from a granodiorite to a quartz monzonite in various locations throughout the property. In several locations and primarily in the south-central portion of the property considerable amounts of copper-stain coat the interfaces of the plagioclase crystals in the granite

(granodiorite) and are usually associated with chrysocolla filled fractures.

The geomorphic feature known as the Red Hills which extends some 100 feet above the surrounding desert in the southwestern quarter of the property also appears to consist of a granite porphyry of the same age as the surrounding country rock. As a result of considerable injection of quartz rich veins and what appears to be extensive quartz silicification, the Red Hills have resisted weathering and subsequent erosion. The color of the Red Hills is derived from hematite and limonite concentrations that are probably associated with sulfide mineralization. No sulfide minerals as such were observed in the Red Hills , but an abundance of iron stained gossan with thoroughly developed box-work and fine lacy openings, was noted in place, generally associated with quartz rich veins.

The Red Hills oxidized zone has been thoroughly prospected with shallow pits and trenches. One shaft of unknown depth (possibly 75 feet) is situated in the approximate center of the oxidized zone. The pits and trenches throughout the area were probably prospect in nature, however, some silver and/or copper may have been mined on a high grade basis. The majority of some fifty or so pits and trenches in the Red Hills oxidized zone show some chrysocolla, occasional traces of malachite, and abundant iron rich gossan. Many of these pits and trenches are associated with the iron stained quartz veins.

Another zone of iron oxidation and moderate silicification exists east of the Box-O Wash and in the northeast portion of the property. In this area the granite porphyry is intensely fractured and intruded with many aphanitic to intermediate grain-size dikes ranging from diabase to aplite. Extensive iron stained quartz veins are also common. Gossan

rich with hematite and showing some chrysocolla are frequently found in shallow pits, trenches and some small mine workings in this area. The gossan probably derived from the weathering of sulfides, appears to be associated with the quartz veins and the more acidic dikes.

Sometime after the granite porphyry was formed there appears to have been an intrusion of quartz diorite porphyry that probably occurred during the Precambrian. A major outcrop of this rock type is located east of the Red Hills and just west and adjacent to the Box-O Wash in the southeast quarter of the property. The outcrop appears as an igneous plug extending some 140 feet above the desert. The quartz diorite appears to be completely surrounded by the earlier granite porphyry. The weathered surface of the quartz diorite appears as a grayish tan with white phenocrysts of partially weathered plagioclase up to quarter inch in dimension.

The finer phaneritic minerals consists of quartz, plagioclase, hornblende and biotite with traces of epidote. The quartz diorite has been moderately fractured and intruded by intermediate to fine grained diabase and aplite dikes. There appears to have been only a small amount of silicification in the quartz diorite intrusive, however, to the west and immediately adjacent to the quartz diorite outcrop, where the contact with the earlier granite porphyry is observed, more quartz veins and silicification appear to be present. A few shallow prospect pits are found in the west portion of the quartz diorite and appear to be associated with iron stained quartz veins. Some traces of chrysocolla and specular hematite are found in these shallow excavations. The general iron staining that provides the weathered grayish-tan color of the quartz diorite is essentially from the decomposed ferromagnesian minerals in the diorite. There are a few

porphyritic andesite dikes that have intruded the Red Hills oxidized zone that are possibly the same age as the quartz diorite. There was no apparent association of these dikes with copper-iron mineralization.

At some period after the intrusion of the quartz diorite porphyry and the porphyritic andesite dikes a series of diabase dikes intruded the granite and diorite host rock. These dikes vary up to 150 feet in width and three-quarter of a mile in length. The dikes generally trend east-west and are most commonly observed in the Red Hills oxidized zone, the quartz diorite plug and in the zone of oxidization and silicification east of the Box-O Wash in the northeast portion of the property. A few of the longer diabase dikes trend in a north-south direction and appear to have been dissected by east-west strike slip faults. The general dip of the dikes appears to be vertical. The diabase has the classic ophitic texture and is composed of lath-shaped plagioclase crystals up to three-eight inches long surrounded by pyroxene. In a few areas such as due south of the quartz diorite plug and in the northeast portion of the property east of the Box-O Wash there appears to be some association of iron staining, chrysocolla and quartz stringers with the contact between the diabase and granitic host rock. This association however, does not appear to be as significant as the association of copper mineralization and the more acidic, aplite and monzonite dikes. A few prospect pits showing chrysocolla and copper stain have been excavated in, and adjacent to, some of the diabase dikes.

Sometime after the injection of the diabase a period of acidic dike intrusion occurred. These aphanitic and intermediate grain-sized aplite and monzonite dikes appear to have a strongly preferred east-west orientation. One major aplite dike some 100 feet in width and trending

east-west is intermittent and traceable for about two and one-half miles. The dike appears to have a vertical dip and dissects the Red Hills oxidized zone where it is offset some 250 feet by a north-south trending fault. The dike continues through the quartz diorite intrusive plug, and extends to the east of the Box-O Wash for some 1200 feet. A number of shallow prospect pits are generally located in the north contact between the aplite dike and granitic host rock. Chrysocolla and hematite rich quartz stringers appear in these pits in the Red Hills oxidized zone and to the east of the Box-O Wash. Other thin east-west aplite and monzonite dikes up to ten or so feet in width and dipping vertically are oriented parallel to each other and appear as a sheeting structure. This sheeting is most pronounced in two zones. One zone is southeast of the Red Hills oxidized zone and the other is south of the quartz diorite intrusive plug. These two zones of sheeting are separated by a cover of conglomerate capping up to 15 feet in thickness. From all surface indication and exposure from prospect pits this sheeting structure is continuous under the conglomerate. This area of sheeting has many prospect pits cut into the outcrops where the dikes are exposed along incised north-south stream channels. Many of these pits show considerable chrysocolla, traces of malachite and abundant hematite quartz veins and stringers. Most of these features appear to be oriented east-west, parallel to and included in the dike structure. Four shafts of varying depths have been sunk in this sheeting structure and from the surface indications of tailing dumps some limited production of high grade copper and/or silver probably occurred during the past fifty years. Other east-west trending dikes of aplite and monzonite also occur in the Red Hills oxidized zone, in the northeast portion of the property, and to a lesser extent in

the quartz diorite intrusive plug. Many of these dikes appear to be associated with iron-rich quartz veins and from color aerial photographs they are easily confused with the dark colored diabase dikes. Many of the prospect pits excavated in oxidized quartz stringers in these acidic dikes show some chrysocolla, abundant hematite and iron oxide stained gossan. All of the dikes appear to have close to vertical dips.

After the injection of the monzonite and aplite dikes there appears to have been an intrusion of diorite into the Precambrian granite to the northeast of the property. Isolated areas of the diorite varying from a few hundred to several thousands of square feet are completely surrounded by the granitic host rock. The northeast corner of the property probably represents a broad horizonal contact zone between the diorite and the Precambrian granite. Small zones of this diorite occur to the west as far as the Box-O Wash. There is no indication that this diorite has been faulted and fractured to any extent; therefore making it a poor host for iron and copper mineralization. The diorite is medium grained with plagioclase phenocrysts up to quarter inch in the longest direction. Some smaller quartz phenocrysts are also present with orthoclase and minor amounts of hornblende and pyroxene.

This diorite appears lighter in color and somewhat finer grained than the older quartz diorite plug to the west. On color aerial photographs the younger diorite appears as a grayish-blue and the older diorite appears as a grayish-yellow. This color variation is due to the smaller amounts of ferromagnesian minerals in the younger diorite.

It is postulated that the energy necessary to mineralize the Red Hills and adjacent areas may have been derived at about this time, possibly from the parent magma of the diorite intrusion.

After a probable period of faulting and subsequent uplift to the northeast of the property, sediments were transported from that region and deposited over the Red Hills area. Consolidation and cementation took place forming a semi-consolidated conglomerate. A significant deposit of this conglomerate some fifteen feet in thickness is presently located between the Red Hills oxidized zone on the quartz diorite intrusive plug. This conglomerate has covered much of the underlying structure which is only exposed by a few prospect pits and outcrops from incised cuts made by north-south trending stream channels.

Following this cycle of sedimentation recent unconsolidated alluvial sediments have accumulated along the north-east trending stream channels.

Structure of the Red Hills Property

A significant period of structural activity appears to have taken place in the Precambrian granite during the time of the quartz diorite intrusion. At this time the thermal stresses from the intruding diorite plug probably produced the sheeting structure later injected by dikes to the southwest of the plug and the annular structure in the north-east portion of the property, east of the Box-O Wash that was later injected by aphanitic dikes and quartz silicification.

Prior to the intrusion of the diabase dikes there appears to have been some general fracturing of the granite and diorite trending in both east-west and north-south direction. It is through these fractures that the diabase was apparently injected.

Another period of northeast trending faults and fracture appears to have occurred after the injection of the diabase dikes. In several locations north of the Red Hills oxidized zone, dissection and horizontal

displacement of the diabase up to 350 feet is observed.

Another period of faulting appears to have taken place before the intrusion of the younger diorite and after the injection of the east-west trending aplite and monzonite dikes. This faulting pattern generally trends northwest and is followed by the present day northwest trending stream channels. The faulting was probably dip slip rather than strike slip as very little evidence of horizontal offset has been noted. However, some of the fault-dissected dikes appear to be slightly warped along the vertical plane. The presence of phlogopite and chlorite found in shallow pits along a "fault zone" may have been produced by local metamorphism or the mica schist may have occurred as a xenolith or pendant of Pinal Schist that moved upward with the advancing granite intrusion. From the limited occurrences of this schist as noted on the property no satisfactory conclusion can be made as to the origin or significance of the schist. It is suspected that it may be a local metamorphic feature associated with the fault zone. The most prominent northwest trending fault line is followed by the Box-O Wash of some 400 feet wide and 100 feet deep. The prominent north-south trend is also characteristic of the other minor drainage channels west of Box-O Wash which also appear to be fault controlled. The zone of conglomerate between the Red Hills oxidized zone and the diorite intrusive plug also has a northwest trending drainage pattern and possibly represents a zone of northwest shearing.

Mineralization of the Red Hills

The Red Hills property has been thoroughly prospected with surface pits and trenches and six or so shafts of depths up to 300 feet. A concentration of shallow workings, a few possibly of the Spanish occupation period are located in the Red Hills oxidized zone. Most of these excavations were probably prospect in nature, however, some may have had a limited production of high grade copper and/or silver. The majority of the excavations show chrysocolla and abundant hematite. Many of the pits exhibit a box work with openings grading from quarter inch in dimension to a fine lacy type texture. The color of stains varies from dark maroon to lightly yellow. The more equidimensional box work openings are probably the casts of small pyrite cubes. There is much evidence of secondary mineralization of iron and copper associated with veins of iron-stained quartz.

Another area with a moderate concentration of pits and trenches is located in the sheeting zone on either side of a zone of conglomerate capping immediately southwest of the diorite intrusive plug. Pits appear most frequently in aplite or monzonite dike outcrops along the sides of north-south trending stream channels. Most of these excavations show some chrysocolla, abundant hematite and some iron stained gossan. A recently excavated pit in the northwest corner of Bonnie No. 8 shows considerable chrysocolla and some traces of malachite. Many of the plagioclase crystals in the granite (granodiorite) host rocks are copper stained between crystal interfaces often giving the entire rock a blueish color. The floor of the recent excavation shows what appears to be east-west trending veins, corresponding to the sheeting structure, that assayed approximately 0.52% copper over a channel sample length of some four feet taken approximately at right angles to the vein. Other assays

of channel samples along the face of the excavation in the granitic host rock parallel to the vein structure varied from 0.14% copper to 0.27% copper. These samples are probably representations of the host rock and not the vein structure.

An area that shows a smaller concentration of pits and trenches then in the above-mentioned areas is located in the northeast corner of the property east of the Box-O Wash. Distribution of the prospect pits and shafts is limited to a few structurally controlled iron-stained quartz veins. Generally these prospects show some chrysocolla, hematite and a general dark reddish-brown color. The quartz veins appear to strike northwest with essentially vertical dip. Several of the veins are arcuate in plan. This area of silicification and oxidation has a more complex structural pattern with much less continuity of traceable dikes and mineralization than other mineralized zones west of Box-O Wash. This fact may be in part responsible for the minor amounts of previous prospecting done in this area.

During the initial drilling of claim validation holes essentially on the west, south and east perimeters of the Red Hills property, dry dust samples taken from the drill cuttings were assayed for copper. Ten drill holes were located primarily with regard to claim validation purposes and secondarily to geologic interest. The drilling of the 10 holes was done with a pneumatic percussion, track mounted drill and in most cases the holes were drilled to a depth of 100 feet. Samples were taken from the dry dust that was blown out of drill holes at 10 foot increments. All samples showed at least a trace of copper and most of the assays indicated about 0.04% copper. The samples are not believed to be representative because of probable dilution or concentration of the air blown material. These

samples only serve to help confirm that extensive copper mineralization occurs throughout the property. Traces of pyrite and copper sulfide mineralization were observed in one location off of the Red Hills property about 300 feet south of Ann No. 1 claim. The Red Hills property appears to be generally mineralized with copper throughout its extent with more significant concentrations of chrysocolla and traces of malachite in the east-west trending sheeting zones at the south central portion of the property. Deposits of copper sulfide may very likely occur at a reasonably explorable depth in the central and south-central portion of the Red Hill property.

NOTE: April 14, 1970

Small amounts of chalcocite have been located at the bottom of a recently excavated trench, 110 feet long by 12 feet wide by 16 feet deep, in the vicinity of the northwest corner of Bonnie No. 8 claim.

Respectfully submitted,

HEINRICHS GEOEXPLORATION COMPANY

James E. Sherman
Geologist

Paul A. Head
Geophysicist

Approved:

Walter E. Heinrichs, Jr.

President and General Manager

December 22, 1969

Mr. H. H. Odiorne, President
Bell Western Corp.
Suite 305
200 Fillmore
Denver, Colorado 80206

Re: Proposal for I.P. Survey
488

Dear Mr. Odiorne:

In accordance with our recent telephone conversations, I have made a more detailed analysis of the 1958 induced polarization data, especially along "Base Line". Contrary to my initial impression, the data indicates at least seven zones of probable sulphide occurrence. The more intense being at 52.0 N, near the northeast corner of Section 33. This correlates with the power line as well as some of the old workings. Line 2400 E does not have a similar anomaly at the power line, leading me to the conclusion that the anomaly must be of sulphide (metallic) origin.

A pessimistic view of the data indicates a higher resistivity rock associated with the I.P. anomaly, at 52.0 N, possibly indicating less altered and less permeable rock. Such material may not be a good host for mineralization. A more reasonable possible viewpoint is that the I. P. response is due to sulphides at least 300 ft. below surface and which are the source of the chrysocolla observed on surface. The resistive character of the rocks might be due to silicification and emplacement of "oxide" copper minerals, causing the rocks to become less porous. In reading through the older reports, particularly by Lylander and Gilmour, we find a common point of agreement; the Red Hills, per se, are most likely not precisely the best place to explore for a disseminated sulphide zone. These reports also indicate that the topography of Red Hills is in part controlled by silicified rock and also suggest that this silicification may be due to significant mineralization NEAR the Red Hills area.

Now, as to the probable use of additional I. P. to aid your over all project, it should be first of all understood that any eventual leaching project would probably not be immediately and directly aided by I.P. We recommend thorough and meticulous bulk sampling as the ONLY final method to establish the feasibility and value of a leaching property. However, the by-products of an I. P. program can be of direct use. The resistivity survey will delineate non-outcropping areas of silicified rocks which may be the best leach material in this area. Self potential data may reveal the presence of actively oxidizing sulphides.

Of course the prime reason for I. P. work is to delineate covered sulphide bodies and a program such as outlined below will probably locate any large body to a depth of at least 500 ft.

Since our last telephone conversation I have had second thoughts about the proposed reconnaissance program to the extent that we will almost certainly want to rerun the 1958 survey with modern and more precise instruments. I would further modify my thoughts to use the funds needed on an east-west line which you discussed on the phone, to detail the anomaly in the vicinity of 52 N.

My best recommendation to date is to obtain very broad reconnaissance coverage using a spacing equal to the 500 ft. over the entire claim group with four lines consisting of five spreads each, as described in the enclosed "Basis of the I. P. Method" and obtaining n=4 data throughout. By cutting back on the total quantity of reconnaissance data in this manner, we will have expended only $5,800.00 which includs all expenses and report. We further recommend that approximately $3,500.00 would then be expended at the rate of $375.00 per field day detailing any I. P. anomalies. We expect that the resulting data will demand at least five drill holes 750 ft. deep to confirm the cause of observed anomalism. In the event that no significant anomalism is detected on the initial four lines, the $3,500.00 should be used on eight spreads of a=1,000 ft. dipoles, two on each of four lines placed midway between the first four lines placed.

The object of the 1,000 ft. dipoles would be to explore the claim group to a depth of at least 1,000 ft. Please note that the 1958 survey did use 1,000 ft. dipoles but did not cover your claim group. The old I. P. anomaly was detected in Section 3, T. 5 S. which is now being drilled by Kaiser.

We consider this proposed I. P. program to be minimum coverage for such a large area and that small ore bodies near surface can easily be overlooked. By way of comparison we consider that lines spaced every 1,500 ft. using 500 ft. dipoles, to be normal reconnaissance density. Detailed work would require lines no more than 500 ft. apart. This would be 26 lines across your claim group to completely detail the area to a depth of about 500 ft. and would cost in the neighborhood of $28,000.00 To convert this thinking to 1,000 ft. dipole coverage there would be 13 lines and the cost would be about $12,000.00.

You can see from these figures that money can be saved by a reconnaissance survey and follow up detail where needed. Although in one respect, a blanket, routine, detailed coverage will many times write off the possibility of large sulphide ore bodies with little additional work needed if no anomalism is detected. Ideally, all anomalies should be examined by drilling and therein is the real expense.

The red Hills prospect will certainly show anomalism (based on the 1958 survey) and we have therefore tried to design an I.P. program to take advantage of this fore knowledge. In the event that Bell Western elects

not to pursue the leaching or mining possibilities of Red Hills, for whatever reasoning, the absolute value of the claims could be greatly enhanced by any completed exploration with encouraging results. A prospective buyer would be particularly intrigued by a wholly controlled block of claims having past production and showing favorable geophysical work not completely drilled out.

I trust this rather long letter will suffice to sell your board of directors on the value of an I. P. survey on their area and that the total cost of even a very detailed survey is only the cost of three diamond drill holes, which might not result in one tenth of the useful and saleable data.

Sincerely yours,
Heinrichs GEOExploration Co.

Paul A. Head
Geophysicist

PAH:jh

cc: Mr. O. Hill.

cc-82

REPORT
ON
THE LITTLE GOLD GULCH PROSPECT

Saddle Mountain Mining District
Pinal County, Arizona

Hanna Mining Company, through Arthur R. Leger, a geologist attached to their Tucson office, presented to Essex a proposal for a joint venture on a mining property approximately three miles southeast of the Christmas Mine of Inspiration Consolidated Copper Company. A field examination was made on March 8, 1972.

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An induced polarization survey shows an anomaly located between the two drill holes and may represent stronger sulphide mineralization at depth. Geochemical rock chip samples show a small molybdenum high centered on the intrusives, and a somewhat larger ring-like copper anomaly partly surrounding the intrusives.

This prospect has some of the characteristics of porphyry copper mineralization, and a wildcat chance exists for replacement mineralization in the Paleozoic sedimentary rocks at a depth of 3000 feet or more. However, alteration and mineralization is too weak and confined in extent to define a high priority target at this time. At some future time targets such as this may warrant more serious consideration, but participation by Essex is not recommended at present.

J.K. Jones

March 10, 1972

JKJ:td

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CHRISTMAS QUADRANGLE
ARIZONA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 CHRISTMAS 15' QUADRANGLE

3850 II NE (EL CAPITAN MTN.)
3850 II NE (COOLIDGE DAM)
3850 II NW (MESCAL WARM SPRING)
3850 II SE (HAYDEN)
3849 IV NE (WINKELMAN)
3849 I NW (SADDLE MTN.)
3849 I NE (BRANDENBURG MTN.)
3850 II SW (JERUSALEM MTN.)

110°45′ — 33°07′30″ — 524000m E. — 330 000 FEET (EAST) — 525 — 527 — 42′30″ — 528 — 530 — 531 — 40′ — R. 16 E. — R. 17 E. — 533 — 890 000 FEET (CENTRAL) — 110°37′30″ — 33°07′30″

T. 3 S. — T. 4 S. — T. 5 S.

3664000m N. — 770 000 FEET (EAST) — 3664 — 770 000 FEET (CENTRAL)

3662 — 3661 — 5′ — 3660 — 3659 — 3657 — 3656 — 2′30″ — 3655 — 3654 — 3653 — 3652000m N. — 730 000 FEET (EAST)

730 000 FEET (CENTRAL) — 33°00′ — 110°45′ — 524 — 860 000 FEET (CENTRAL) — 525 — 526 — 527 — 42′30″ — 528 — 530 — 531 — 40′ — 532 — 350 000 FEET (EAST) — 533 — 534000m E. — 33°00′ — 110°37′30″

GLOBE 25 MI. 22 MI. TO U.S. 70

TUCSON 69 MI. WINKELMAN (ARIZ. 77) 2.1 MI.

4 MI. TO ARIZ. 77

BM 2210 — Dripping Spring Wash — Well — Wells — Young Ranch — WT Well — BM 2080 — Reese Ranch — Tailings Ponds — Water Tank — Conveyor — Copper Canyon — Christmas — WT — Mine — Tailings — Dripping Spring Mts — Apache Spring — O'Carroll Canyon — BM 1982 — BM 2074 — GILA CO / PINAL CO — GILA RIVER — JEEP TRAIL — Cottonwood Spring — Rock Creek — Mine — Lee Mountain — PACK TRAIL — Deer Creek — Lees Mine — Pooles Mine — Two Queens Mine — Old Mill (Ruins) — Gold Gulch — Corral — Spring — BM 2420 — Ash Creek — Little Ash Creek — Porphyry GRANITE — Gulch BASIN — Corral Mountain — REED BASIN — The Tablelands — Rock Creek — Spring — Little Deer Creek

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1968

Polyconic projection. 1927 North American datum
10,000-foot grids based on Arizona coordinate system, central and east zones
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

Where omitted, land lines have not been established

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
GN — MN — 0°10′ 3 MILS — 13½° 240 MILS

SCALE 1:24 000
1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DOTTED LINES CROSSING RIVERS REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Heavy-duty — Light-duty — Unimproved dirt — State Route

ARIZONA
QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1971

CHRISTMAS, ARIZ.
SW/4 CHRISTMAS 15' QUADRANGLE
N3300—W11037.5/7.5

1968

AMS 3850 II SW—SERIES V898

PETROGRAPHIC DESCRIPTION OF LGG-1

Hand Sample: Dark gray, fine-to medium-grained, porphyritic. Appears banded with some zones being coarser-grained than others.

Thinsection texture: Fine- to medium-grained porphyritic. Subparallel alignment of phenocrysts indicating flow.

Mineralogy	Approx. %
Plagioclase	60
Hornblende	20
Biotite	15
Augite	
Chlorite (?)	
Magnetite	
Pyrite	
Chalcopyrite (?)	
Quartz	
Orthoclase	
Calcite	
Sericite	

Plagioclase occurs as zoned euhedral phenocrysts ranging in size from less than 1mm to 2mm. Most of the plagioclase is fresh but some of the larger grains are altering to what appears to be sericite. The more altered grains also contain small areas of orthoclase. Hornblende phenocrysts average 1-2mm in length and are subhedral to euhedral. Most are fresh. Augite is present in the center of one mass of hornblende. Biotite is greenish-brown and occurs as very fine-grained masses up to almost 1mm in diameter. More commonly it occurs as smaller masses making up most of the groundmass in some areas. Fine-grained magnetite is fairly abundant in the groundmass. Pyrite is disseminated throughout the rock but in one case it is more concentrated along a small fracture. A few grains appear brighter yellow in reflected light and may be chalcopyrite. Chlorite, if present, is a very minor mineral as is calcite. In the coarser-grained areas quartz is fairly abundant as irregular finely crystalline masses. It is

much less abundant in other parts of the rock.

Texturally, the rock resembles the andesites from Safford. No hornblende was present in any of the Safford samples that I saw, however some of the masses of epidote and chlorite were probably replacements of original hornblende. The fine-grained biotite in the groundmass of LGG-1 is quite similar to some of the deeper samples from EG-1. The plagioclase phenocrysts show about the same alteration as those from the deeper parts of EG-1. Chemically, the rocks are probably very similar.

Jim Smith

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Jim Fouts

The Hanna Mining Company

(Coastal Mining Company)

2020 EAST 13TH STREET, TUCSON, ARIZONA 85719 (602) 624-4639

March 6, 1972

Mr. Ken Jones
Regional Geologist
Essex International Inc.
1704 West Grant Road
Tucson, Arizona

EXM
MAR 7 1972
RECEIVED

Dear Mr. Jones

Coastal Mining Company (Hanna Mining Co.) is contemplating a joint venture to continue exploration at its Little Gold Gulch prospect. The location of land Coastal now controls and the proposed Area of Interest is shown on the attached map. Coastal has under option to buy 22 patented lode claims and 1 millsite. In addition, a prospecting permit has been granted by the State of Arizona to Coastal Mining Company on 564.94 acres of state land.

Coastal has been working in this area for several years and, to date, has spent approximately $70,000 in mapping, geophysics, geochem analyses, drilling, and land payments. Further work is believed to be justified and we are offering you an opportunity to earn a 50% interest in Coastal's position by paying 90% of future expenditures until you have equalled Coastal's then expenditure total. Part of the work must be drilling and the matching expenditure must be completed by December 31, 1973.

If you are interested in seeing the detailed information, we ask that you please agree to keep it confidental within your organization for at least two years from the date you enter this agreement by signing in the space below. Please return one copy to me and arrangement to see Coastal's information can be made by contacting the undersigned.

You should understand that Coastal's offer of this joint exploration agreement is subject to prior sale. After you have seen the data, and if you wish to proceed, details of a future business arrangement can be worked out between us.

Sincerely yours,

Arthur R. Leger

Arthur R. Leger
Exploration Geologist

I agree to the terms as set forth:

By: _____

Ken Jones, Essex International Inc.

By: Arthur R. Leger

Arthur R. Leger, Hanna Mining Co.

VICTOR OPPENHEIM
CONSULTING GEOLOGIST & ENGINEER
FIDELITY UNION LIFE BUILDING
DALLAS, TEXAS

Ken,
Geology & interp. may be questionable but this area is in region I note north of Little Gold Gulch.
art.

REPORT ON THE OLD SHEPHERD MINING CLAIMS AREA, PINAL COUNTY, ARIZONA.

Contents.

Enclosures:

1. Geologic Sketch of the Gila and Pinal Counties area, Ariz.
2. Plat showing mining claims and locations of borings.
3. Map of Arizona Christmas Quadrangle.
4. Map of the State of Arizona.
5. Photographs.
6. Copy of letter by W. Wagnon.

VICTOR OPPENHEIM
CONSULTING GEOLOGIST & ENGINEER
FIDELITY UNION LIFE BUILDING
DALLAS, TEXAS

REPORT ON THE OLD SHEPHERD MINING CLAIMS AREA, PINAL COUNTY, ARIZONA.

INTRODUCTION.

The Old Shepherd mining claims area in Pinal County, Arizona, comprises also the adjoining mining claims known as New Years and Eastern. These claims covering approximately 2000 acres are situated about 2 miles East of the important Christmas mine and are now the property of Dr.W.J.Langley of Dallas, Texas. The Christmas mine of the Inspiration Consolidated Copper Company and the Anaconda Copper Company is about 11 miles Northeast of Winkelman on Highway 77 Northeast of Tucson, Arizona. The claims are located East of the Gila River and North of its tributary, the Deer Creek.

The Christmas copper deposits are well known and have been mined intermittently since about 1905. Thus, between 1905 and 1943 the Christmas mine produced 1,268,964 tons of ore which yielded a total of 55,337,298 pounds of copper. The ore mined in 1942 averaged 2.16 per cent copper and about 30% lime. The history of the mine, the mine workings and its geological setting are described in several publications (See bibliography).

The undersigned visited the area of the claims and the mine in June of 1966 and in preparation of this report some unpublished information as well as published data were freely perused. Thus the undersigned is indebted to the Arizona Bureau of Mines for assistance in the matter.

GEOLOGY.

Topographically the area is situated at the Southeastern end of the Dripping Springs Mountain Range. The elevations vary from about 2100 feet to 3280 feet above sea level and the topography is rather rugged. The U.S.Geological Survey mapped the area and it forms part of the Arizona Christmas Quadrangle published in 1915.

The surface geology of the area of the claims proper consists of volcanic rocks: andesites, tuffs, breccias and agglomerates. Their thickness can only be estimated by inference or adequate borings. From the known geological setting of the Christmas mine area,where numerous borings and extensive underground development work have largely revealed the geological composition and structure of the area, it is possible to draw inferences as to the geology of the adjoining terrains. In broad lines the geological sequence of the area of study and within a few miles in radius (See Geological Sketch) consists of the following formations:

Basement rocks - Troy quartzites - of Cambrian age appear in extensive outcrops to the West, East and North of the area, outlining a old Paleozoic basin. The Troy quartzites are overlain unconformably by Devonian, Martin limestone which is shaly and dolomitic in its lower part. The Martin limestone is about 340 feet thick and is in part mineralized. A Mississippian formation,the Escabrosa limestone, about 550 feet thick overlies the Martin limestone. It consists of some fossiliferous beds with crinoids, dolomitic layers and in parts with cherty nodules. It is also partly mineralized. The Escabrosa limestone is followed by the uppermost Paleozoic formation, the Naco limestone of Pennsylvanian and Permian age. It is made up of pure gray

limestone with thin layers of calcareous shale. The middle part of the Naco limestone was extensively mineralized in the Christmas mine. The total thickness of Naco limestone may exceed 1000 feet, however the thickness of this formation as well as the other limestone members of the Paleozoic series varies considerably at depth as has been verified in the numerous core borings at the Christmas mine. All the mentioned Paleozoic formations of the area are well exposed and can be measured and studied at the Tornado Peak,about 2½ miles West of the mine. In the drilling cores they appear to be much thinner than measured at the Tornado Peak outcrops. This may be due to metamorphism or shrinking as the result of compaction,(Peterson and Swanson, 1956), also (Ross, 1925).

Overlaing the Paleozoic limestones are Cretaceous intrusives and extrusive volcanic rocks - mostly andesites of brown or dark gray color, fine grained and weathering to a reddish color. These volcanic rocks, flows and breccias cover the Christmas sedimentary basin with an unpredictably thick layer,which if measured along the neck of a laccolith could reach several thousand feet, yet in an area of a marginal magmatic flow could be only a few hundred feet thick.Their thickness would also vary with the topographic features of the area and the position of the underlaing sedimentary formations. Thus the exact thickness of the volcanic rocks in a given locality can only be measured by drill holes. The shaft No.4 at the Christmas mine cut through 1600 feet of quartz-diorite and could have opened through the core of the intrusive body, marginal flows of these volcanic masses should prove to be much thinner.

Varieties of diorites, grano-diorites and quartz-mica diorites, from porphyritic to fine-grained in petrographic character traverse the area in numerous dikes, sills and intrusive plugs. These rocks are apparently older than the andesites and are associated with the mineralization in the area. The mineralization is generally found in the Christmas workings in zones of contacts with these intrusives.

Generally the surface of the area is covered with a rather persistent deposit of alluvial materials, erosional debris of varying thickness and ages from Tertiary to Recent. This cover obscures many outcrops, however, because of very sparse vegetation the area can be easily examined.

The geological structure of the area of study can only be infered from regional geological data and such information as has been made available from the development work and borings at the Christmas mine. The regional dip of the Paleozoic limestone series is generally 10° SE however it is affected by the numerous local intrusives and faults. Faulting in the Christmas area reflects the faulting pattern of the Dripping Springs Range which is traversed by numerous NW-SE trending regional faults. The age of this faulting is evidently post-Paleozoic and probably Laramide. It can be related to the dioritic, mineralized intrusives and apparently preceded the younger andesite penetration. In the mine area a large Christmas fault traverses it in a NW-SE direction with an estimated throw of 1770 feet, dipping 70° E. It apparently is a regional fault extending over several miles (Ross, 1925). The underground workings have established that the fault is post-mineral, however, the mineralization conditions in the down-thrown block East of the Christmas fault and in the contacts of diorites and andesites

apparently remain unknown (Knoerr and Eigo,1963). The available information and underground maps show numerous smaller faults in various directions traversing the sedimentary section in the contact zone with the intrusives. One of these - Joker fault - runs Northeast between the Christmas fault and the McDonald shaft. Thus, it can be said that the faulting pattern in the Christmas area is quite complex and apparently resulted from several diastrophic cycles producing fracture zones, many of them mineralized, in an unpredictable pattern.

MINERALIZATION.

During the brief field examination of the Old Shepherd claims the undersigned located three conspicuous outcrops of intrusive dikes bearing copper carbonates (See location plat). In an open cut near a 70 foot deep abandoned shaft some 3 tons of malachite ore were in a stock-pile apparently mined from the outcrop. The other outcrops were less mineralized. The mineral bearing solutions in all these outcrops must have ascended from deeper sitting ore bodies along fractures and fissures associated with the dikes. They could not have come from above or laterally. Although by themselves these outcrops have no economical value, they may indicate larger ore-bodies at some depth below the andesitic cover or in the contact zones with the underlying Paleozoic limestones. These should be found at a varying depth from the surface in adequately located test borings.

The mineralization of the Christmas area proper has been studied over a period of many years in deep borings and underground development stopes and it has been described by Peterson and Swanson (1956).It is of pyro-metasomatic character and due to replacements of limestone in contact with quartz diorite intrusives. Thus most of the ore forms

deposits in contact zones with the Naco, Escabrosa and Martin limestones. The degree of mineralization and the size of the ore-bodies depends largely on the distance from the mineral-bearing intrusives and extent of the contact zone. The primary copper ores in the Christmas mine are chalcopyrites and bornite averaging about 2% Cu. or better. The other metalic minerals in the ore are pyrite, magnetite and specular hematite. Small amounts of sphalerite, galena and molybdenite have been found in the higher levels of the mine. Magnetite has been found in large amounts at the 800 foot level and deeper. The present tenor of the copper ore mined at the 1600 foot level and deeper has as yet not been made public. The character of mineralization at these presently developed deeper levels which are being mined in the last few years has not been fully described. These latest discoveries of ore deposits below the 1600 foot level in the lower Devonian limestones indicates that the potential of the Christmas area is considerably larger than originally expected in this old area. The fact that the Inspiration Consolidated Copper Company spent in excess of $12,000,000 on development work at the mine between 1954 and 1962 (Knoerr and Eigo, 1963) is a good indication of the magnitude of the newly discovered deposits.

PAST EXPLORATORY WORK.

Beside the 70 foot shaft and the open cut excavation on the property which produced several tons of carbonate ore, 3 drill holes were drilled by Dr.Langley in the last two years. One reached 300 feet and the other two only 40 feet. According to Mr.Roger Harrold of Tucson, Arizona, who supervised the drilling, the deeper hole cut sulphide ore below 50 feet. Unfortunately reliable cutting were not preserved.

CONCLUSIONS.

The field examination of the area and the perusal of available published information on the Christmas area lead the undersigned to the following conclusions:

1. The extensive outcrops of Paleozoic limestone formations to the West, East and North of the Old Shepherd claims area indicate that this sedimentary section should be found at some depth under the cover of surface volcanic rocks.

2. The quartz-diorite intrusives are the main mineralizing elements in the region. Copper ore is found principally in the contact zones of these intusives with Paleozoic limestone beds. However, it would appear that mineral deposits could be found in the area due to other processes than pyro-metasomatic replacement.

3. In the light of all the information available to the undersigned, exploratory core borings on the Old Shepherd claims would be justified. If such are carried out, they should be located near the Gila River and supervised by a geologist and the cores or cuttings adequately studied and preserved.

Victor Oppenheim
Consulting Geologist & Engineer

Dallas, Texas
July 5, 1966

VO/pl

BIBLIOGRAPHY.

* Ross,C.P., 1925 - Ore deposits of the Saddle Mountain and Banner mining district,Arizona: U.S. Geol. Survey Bull.771

Elsing,M.J. and Heineman,R.E.S., 1936 - Arizona metal production: Ariz. Bureau Mines Bull.140.

* Tainter,S.,1948 - Christmas Copper Deposit: U.S.Bur. Mines. Report of Investigation 4293 (Unpublished).

* Peterson, N.P. and Swanson, R.W., 1956 - Geology of the Christmas Copper Mine, Gila County, Arizona: U.S.Geol. Survey Bull. 1027 - H.

Knoerr,A. and Eigo, M., 1963 - Arizona Newest Copper Producer. Eng. & Mining Journal, Vol.164, No.1 pp.55-67.

(ENCLOSURES)

VICTOR OPPENHEIM & ASSOCIATES
CONSULTING GEOLOGISTS AND ENGINEERS
FIDELITY UNION LIFE BUILDING
DALLAS, TEXAS 75201

GEOLOGIC SKETCH OF THE GILA AND PINAL COUNTIES AREA, ARIZONA.

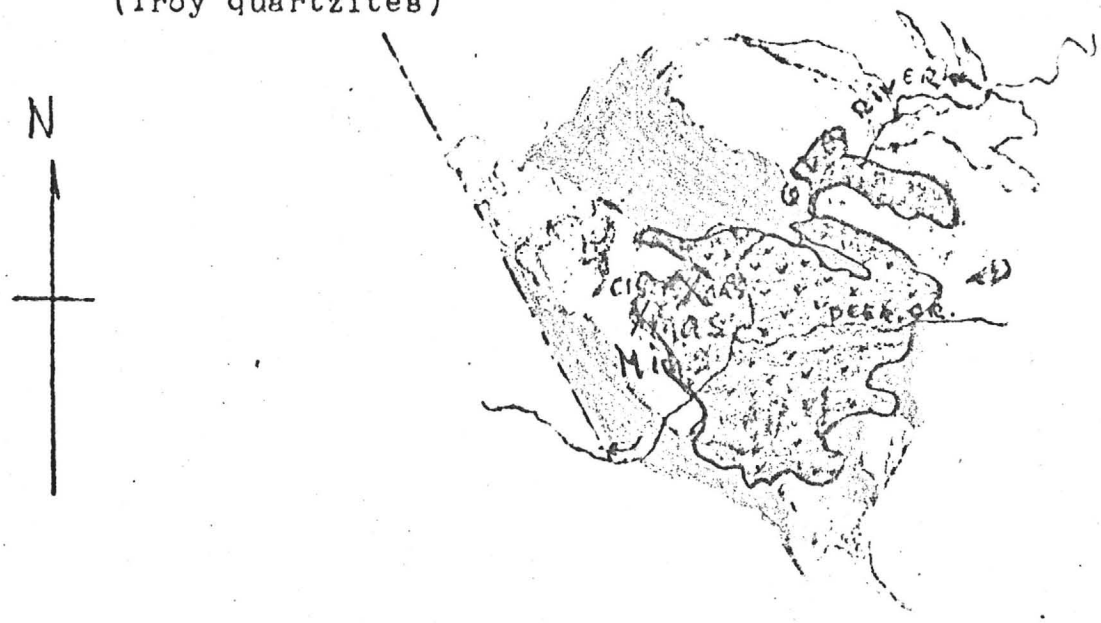
Quaternary and Tertiary.
(Sands, gravels & conglomerates)

Cretaceous (Laramide Rev.).
(Andesite, tuff, agglomerate)

Cretaceous.
(Intrusive Diorite dikes)

Paleozoic (Devonian to Permian).
(Martin Lmst., Escabrosa Lmst., Naco Lmst.)

Cambrian
(Troy quartzites)



CC-82

7-72

REPORT
ON
THE LITTLE GOLD GULCH PROSPECT

Saddle Mountain Mining District
Pinal County, Arizona

Hanna Mining Company, through Arthur R. Leger, a geologist attached to their Tucson office, presented to Essex a proposal for a joint venture on a mining property approximately three miles southeast of the Christmas Mine of Inspiration Consolidated Copper Company. A field examination was made on March 8, 1972.

Hanna has an option on 22 patented mining claims and one mill site in Sections 2, 3 and 9, T.5S., R.16E., and Sections 34 and 35, T.4S., R.16E. A prospecting permit has been granted to Hanna by the State of Arizona on 564.94 acres in Section 2, T.5S., R.16E. Surrounding this property is the San Carlos Indian Reservation. Negotiations with the Apache Tribe have proven difficult in the past. Hanna has spent approximately $70,000 on the project and will grant a 50% interest to a partner who would match their expenditures. Hanna would require that $30,000 of this total be spent this year.

Gently dipping Cretaceous volcanic flows and agglomerates are intruded by quartz latite porphyry and granite porphyry dikes. The dikes strike northeasterly through the area, but expand and appear to form small, irregular pipe-like bodies in the vicinity of Little Gold Gulch. Extending several thousand feet from the intrusives is limonite stain and scattered areas in which several percent pyrite is exposed at surface. Several old, small mines in and scattered about the margins of this stained area produced minor quantities of gold, copper, lead and zinc. Near the center of this stained zone Hanna drilled a 2353 foot diamond drill hole that encountered several percent pyrite and copper values in the range of 0.007 to 0.05 percent in altered volcanic rock. Copper values appear to diminish at depth. A 3209 foot diamond drill hole by Inspiration Consolidated Copper Company was located about 1/2 mile southeast of the Hanna hole, and encountered similar rock types and mineralization. Near the bottom of the Inspiration hole sedimentary rocks that may represent the upper portion of the Paleozoic section were cut.

An induced polarization survey shows an anomaly located between the two drill holes and may represent stronger sulphide mineralization at depth. Geochemical rock chip samples show a small molybdenum high centered on the intrusives, and a somewhat larger ring-like copper anomaly partly surrounding the intrusives.

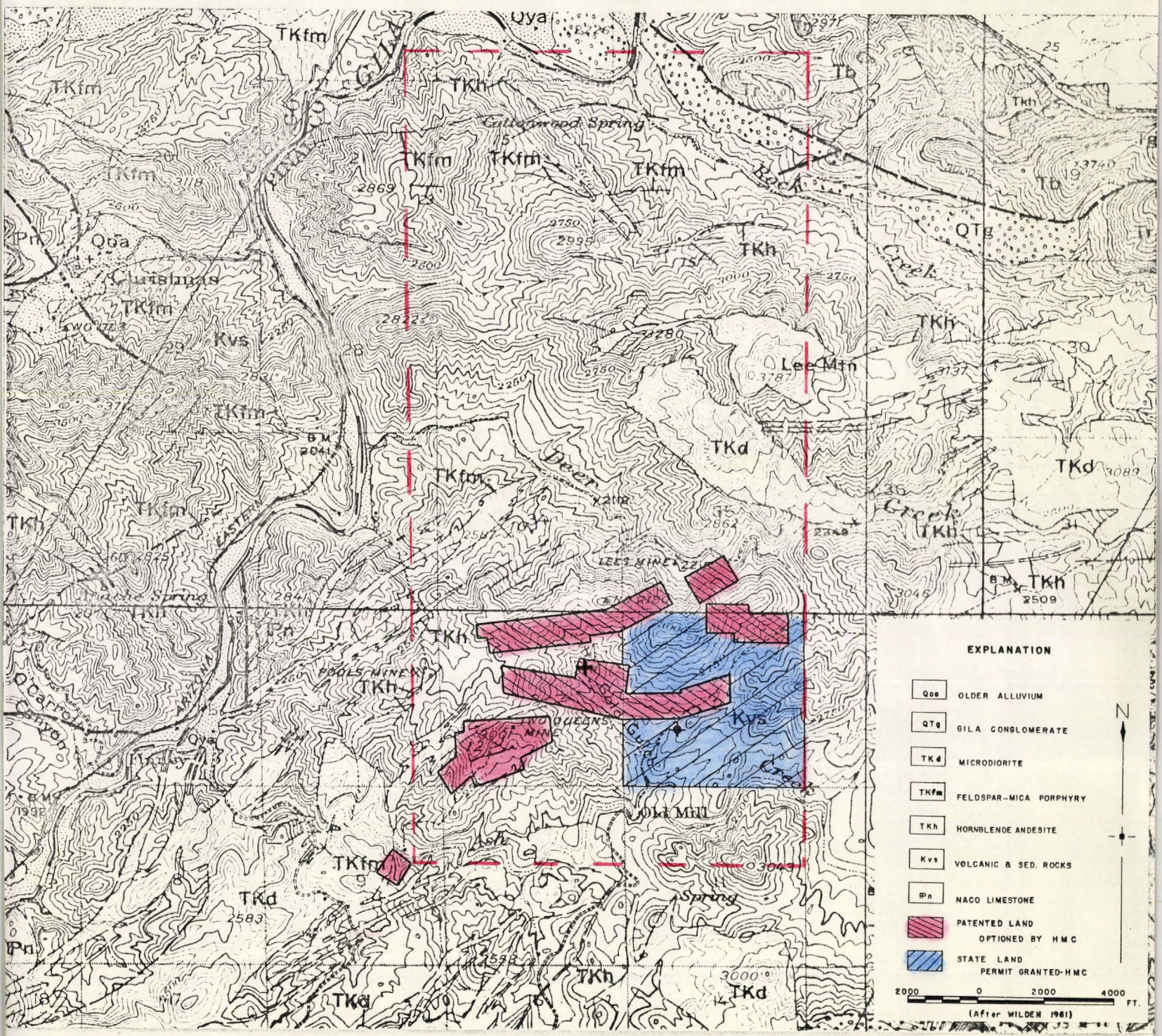
This prospect has some of the characteristics of porphyry copper mineralization, and a wildcat chance exists for replacement mineralization in the Paleozoic sedimentary rocks at a depth of 3000 feet or more. However, alteration and mineralization is too weak and confined in extent to define a high priority target at this time. At some future time targets such as this may warrant more serious consideration, but participation by Essex is not recommended at present.

J.K. Jones

March 10, 1972

JKJ:td

Christmas, Ariz.
Quadrangle



Location map showing proposed Area of Interest and Henna Mining land

LITTLE GOLD GULCH PROSPECT

Art Leger called Mar. 2, 1972 about possible joint venture with Hanna on The Little Gold Gulch area 2 1/2 to 3 miles southeast of The Christmas Mine.

Hanna has 22 patented claims surrounded by The San Carlos Indian Reservation and obstinate Apaches. Surface is characterized by alteration (propylitic with local sericite zones), quite a bit of pyrite, local chalcopyrite and molybdenite. At surface are altered Cretaceous volcanics cut by porphyry dikes. at depth are Paleozoic sediments. Hanna has spent about $70,000 on mapping, option payments, a 2300 foot drill hole, and an I.P. survey. I.P. was run after the drill hole was completed and suggests other target areas with speculative correlation with The Christmas Mine mineralization several miles away. Hanna is taking a very conservative approach and wants a partner for financial help. Partner would spend $30,000 this year for another drill hole toward a total required of $70,000 to earn 50%.

Hanna paid The Apaches about $1600 for access rights, and They want $25,000 front money for option on 2000 acres surrounding The patented claims.

This could be a good prospect. Will get more information from Leger.

JKL
3-2-72