



CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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Paul E. ✓
EGH ✓
JH

Nail Keg
Safford AREA F

P.O. Box 872

Douglas, Arizona, 85607
March 13, 1971

Mr. Walter Heinrichs
Heinrichs Geoexploration
Box 5964
Tucson, Arizona, 85703

Re: GEOX Job # 616

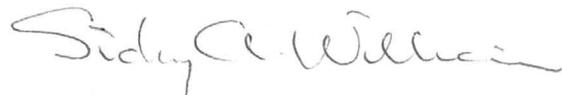
DEPT OF GEOLOGY
GEOX
Cable: GEOEX
REC'D MAR 15 1971 REC'D
BOX 5964 TUCSON, ARIZONA 85703
Phone: (AREA 602) 623-0570

Dear Mr. Heinrichs:

Enclosed are descriptions of the two samples you sent. I hope we read the labels on the rocks correctly. They are being returned under separate cover with the slides.

Sample 10-G shows only "dry" thermal metamorphism. In 36-E, however, this is superimposed with K-metasomatism. Alteration in this sample, though weak, is encouraging and reminiscent of that at Safford (for one example).

Sincerely,



Sidney A. Williams

saw/bj

10-G

The specimen is a meta-andesite originally composed of phenocrysts of plagioclase and hornblende set in a matrix of slender plagioclase laths showing fluidal structure. The epizonal metamorphism has been mild.

The most notable change is complete replacement of hornblende by coarse, prismatic epidote along with lesser amounts of pennine, quartz, calcite, and sphene. Tiny pennine flakes are also abundant in the interstices of the plagioclase microlites where there may initially have been glass. The plagioclase is but slightly altered to calcite, sericite, and occasionally, epidote.

Mineral percentages are estimated as follows: plagioclase 70%, epidote 8%, pennine 17%, quartz 1%, calcite 2%, sphene 0.5%, sericite 0.5%, magnetite 0.5%, and apatite tr.

36-E

The specimen is a meta-andesite with phenocrysts of plagioclase and hornblende set in a microcrystalline and directionless matrix of plagioclase - The rock shows evidence of rapid chilling. Cognate xenoliths are widely scattered - most are coarser grained than the host. Epizonal metamorphism has been accompanied by K-metasomatism.

Original hornblende has been replaced by loose aggregates of stubby epidote prisms, quartz, pennine and calcite. This assemblage is in part replaced by extremely fine grained hydrobiotite. The place of chlorite in the matrix in 10-G is taken here by hydrobiotite also. Plagioclase is flecked with sericite and epidote. Thin, sinuous veinlets of sericite and epidote cut the fabric.

Minerals appear in the following estimated amounts: plagioclase 61%, epidote 5%, sericite 4%, pennine 2%, quartz 1%, calcite 4%, sphene 0.5%, hydrobiotite 22%, and apatite and magnetite in trace amounts.

HOLT, INC.

Mining & Mineral Exploration Consultants

~~199 N. Stone - Suite 200~~

~~Tucson, Arizona~~

818 W. Miracle Mile
Tucson, Arizona 85705

MEMORANDUM REPORT ON THE GENERAL
GEOLOGICAL RECONNAISSANCE AND EVALUATION
OF EXPLORATION POTENTIAL ALONG THE GILA MOUNTAIN
FRONT NORTH OF SAFFORD
GRAHAM COUNTY, ARIZONA

GH

Scanned 10/25/07 YP

DATA BY:

Raymond F. Robinson

DATE:

March 15, 1971

FOR:

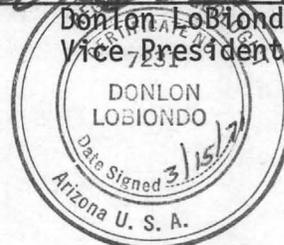
Essex International, Inc.

APPROVED BY:

Robert E. Holt
President

or

Donlon L. Biondo
Donlon L. Biondo
Vice President



In compliance with the request of Mr. Paul Eimon, Exploration Manager of Essex International, Inc., Tucson, Arizona, the writer spent five days in the San Juan, Lone Star, and Sanchez mining districts reviewing the geology and exploration potential of these areas from March 1 through March 5, 1971. Special emphasis was placed on the San Juan district and specifically on the claim groups which had recently been offered to Essex International by the owners as sites for exploration work. The claim groups included the Nail Keg, Key, Bardwell, Ben Hur, and Lulu Bell. Certain high-risk exploration targets, which are totally concealed by postmineral cover and are considered "longshot" types, are residual in the area. The Nail Keg claims have such targets. The Melody claims adjoining the Nail Keg group have the same potential and, although they have not been presented to Essex International, they are logically a part of any land package that would be put together to explore these targets. The Key, Bardwell, Lulu Bell, and Ben Hur claims probably have no interest for Essex International, Inc., at this time because the most easily demonstrable mineralized occurrences are in relatively narrow, though well-mineralized veins, and lenticular fault and shear zones of short persistence on strike. Some possible potential for extremely deep, low-grade, large-tonnage mineralization can be envisioned for the latter areas, depending upon the validity of an untested geologic theory concerned with stratigraphic control of mineralization and alteration, an extremely tenuous hypothesis at present.

If a land position is secured here, a program involving aeromagnetic surveys, induced polarization surveys, and drilling is warranted.

The Nail Keg claims are located in parts of sections 3, 4, 9, and 10, T. 6 S., R. 26 E., and sections 33 and 34, T. 6 S., R. 26 E. The Key, Bardwell,

Lulu Bell, and Ben Hur claims lie in parts of sections 25, 26, 35, and 36, T. 5 S., R. 26 E.

The Nail Keg claims and Melody claims are contiguous with those of Phelps Dodge and the Tuab claims of Producer Minerals Company. The latter two groups lie on the northeast and northwest boundaries of the former ones. The Safford deposit of Phelps Dodge and the San Juan ore body of Producer Minerals lie northeast of the Nail Keg and Melody groups, from which they are separated by the postmineral Butte fault. These claims are situated in the hanging wall of the fault and lie as close as 2,000 feet southwest of the two known ore zones.

The Key, Bardwell, Lulu Bell, and Ben Hur claims lie on the northeast side of the Phelps Dodge property and northeast of the Tuab claims, about 6,000 feet northeast of the Phelps Dodge ore zone and 3,000 feet northeast of the San Juan open pit mine of Producer Minerals Company. They are also contiguous on their east boundary with the northwest side of the Kennecott Copper Company claims which contain their Safford deposit, or about 4,000 feet northwest of their copper-mineralized zone which they defined in 1956 through 1960.

The known mineralized zones in the area offer a measure of the targets which might hopefully lie in the areas of current exploration interest. Unofficial announcements indicate that the Phelps Dodge zone contains about 180,000,000 tons of rock with a copper content of around 0.8 percent. The Tuab or San Juan zone is reported to have in reserve around 15,000,000 tons containing about 0.5 percent copper, mainly oxide. The published data on the Kennecott zone suggests that it contains tonnages in excess of half a billion tons of undisclosed grade. The Sanchez zone is said to contain about 60,000,000 tons of around 0.5 to 0.6 percent oxide copper content.

The geologic environment in which the known ore reserves of the districts occur is similar and consistent in type and pattern for all of them. These occur within fine-grained andesitic host rocks which have been intruded by small plug-like masses and dike swarms of intrusives, with compositions including quartz diorite, granodiorite, quartz monzonite, dacite, latite, and rhyolite, and texture ranging from equigranular to porphyritic. The ore zones lie within alteration halos of secondary biotite surrounding smaller zones of sericitic alteration, the latter being best developed within the intrusive rocks. The ore zones are, in most instances, confined closely to the intrusive contacts, with the bulk of the sulfide within the andesitic rocks. The Kennecott Safford deposit appears to have the valuable sulfides extending outward from the intrusive rocks much farther than the others, with the possible exception of the Phelps Dodge Safford deposit, about which little detail is known. Shear zones in part control the emplacement of ore and the configuration of the ore zones. The larger mineralized zone at the Safford deposit of Kennecott Corporation lies along an elongated linear shear zone which also controlled part of the intrusions. At the San Juan and Sanchez deposits, the shearing has a multiple radiating pattern about the point of a relatively small circular intrusion, and linearity is less extensively developed. A radiating pattern of fracturing is suggested at the Phelps Dodge deposit. Metal values tend to show a concentric, rather symmetrical pattern about the smaller intrusives, decreasing rather abruptly outward from the zone of maximum fracturing at the intrusive contacts. Metal values decrease outward in the large Kennecott deposit along the shear zone in a less symmetrical pattern. In all areas the intensity of the shearing decreases roughly in the same pattern as the mineralization (copper).

Ore mineralization is known to be confined to within 500 to 750 feet of the intrusive contacts of the smaller intrusive bodies at the San Juan and Sanchez zones; far greater distances are involved at the Kennecott Safford deposit and possibly at the Phelps Dodge deposit. It would then appear that in the Nail Keg and Melody claim areas, the finding of another intrusive center beneath the postmineral cover along the faulted segments of the principal shear zones would offer the best chance of finding ore mineralization.

Aside from the general features mentioned above, the problem of possible stratigraphic control, which has not yet been resolved, is involved with exploration problems in the San Juan district. It has at least a theoretical bearing on the exploration targets at the Nail Keg and the Melody claim areas. It also leaves room for geological conjecture regarding deeper exploration at the Key, Bardwell, Lulu Bell, and Ben Hur claims.

Rimming the biotized, mineralized areas of the San Juan and Phelps Dodge deposits on the north and northeast sides is a large, extensive, thick belt of epidotized, chloritized, very coarse-textured andesitic flow breccia and agglomerate. This was indicated on the field map previously submitted. The limited drilling that has been accomplished in it in the past and the geologic relationships about its margins suggests that it normally overlies the fine-grained andesites that contain the proven ore mineralization in other areas. The demonstrable thickness of the breccia-agglomerate formation is from 2,500 to 3,000 feet. The present configuration of the formation is a function of the pedimentation processes in the area, and the formation must have once extended over the present alteration zones containing the ore bodies, prior to the Butte fault movement and subsequent erosion. Whether

or not the alteration and mineralization extended up into the breccia-agglomerate formation over the present ore zones is unknown.

The postmineral Butte fault severs the Phelps Dodge and San Juan mineralized zones and presumably displaces them. The dip slip component indicated by the relative position of the late Tertiary basalts is on the order of several thousand feet. The lateral component, if any, is undetermined to date. Drilling done on both sides of the fault in past exploration programs indicates that it is probably not in excess of 5,000 or 6,000 feet and could be much less. Furthermore, the movement appears to have been hinge-like, with the southeastern section opposite the Kennecott area being much less depressed than to the northwest opposite the Phelps Dodge area. On the Nail Keg claims, the breccia-agglomerate formation occurs in erosional windows in the Tertiary basalt and Gila conglomerate, and it is identical in characteristics to that at the Walnut Springs area. This portion of the area is considered to be the site of a prebasalt topographic high, and it possibly contained a greater thickness of the older formation than areas to the northwest or southeast.

If the displacement of the Butte fault is essentially a dip slip movement, the faulted segment of the Phelps Dodge ore zone should lie, at least in part, within the Nail Keg claims. The fact that only the epidotized breccia-agglomerate is known to occur there suggests that either a large strike slip component was involved, unknown in direction or magnitude, or the 2,500 to 3,000 feet of breccia-agglomerate that occurred there did not carry the expression of the alteration and mineralization upward far enough to be exposed in the upper part of the formation. Although Phelps Dodge held this claim group under option some years ago and drilled several

rotary drill holes, there is no data on the results. It cannot be determined if the drilling was deep enough to have reached the critical, finer grained andesite horizons which contain the disseminated type of ore in the area. The depth to this horizon is unknown because the amount of erosion here is not determined; it could easily be at least 1,500 to 2,000 feet deep.

For the Melody claims, there are two areas which indicate that there may be a deep, concealed exploration target. As shown on the field map previously submitted, diamond drill holes T-3, T-7, and T-9 were drilled in the hanging wall of the Butte fault in 1956-1957 by Bear Creek Mining Company. Biotized andesite encountered beneath the basalt cover contained anomalous copper values up to 0.3 percent in drill holes T-3 and T-7. T-9 was not completed due to problems encountered in badly faulted ground at depths comparable to the mineralization found in the prior holes and to an abrupt termination of the option. Since these results represented better copper values than existed between these drill holes and the San Juan stock, it appeared that a different zone of mineralization had been encountered. The area was considered to have been incompletely evaluated.

In the premineral window southeast of these drill holes and northeast of the basalt-capped butte, the epidotized agglomerate shows some fine-grained, incompletely exposed dark alteration, which suggests fringing secondary biotization. This is being checked by thin section study. If this is the case, the permissive zone for exploration extends to this point and north and northwest to the boundaries of the property. There is considerable room for either a Phelps Dodge or San Juan size ore body within this area. It is unknown whether this zone is merely a relatively undisplaced segment of the San Juan shear zone, a manifestation of the displaced segment of the Phelps Dodge zone, or a separate mineralized zone.

The mineralization that might be found in the Nail Keg and Melody claims would be undoubtedly deep and amenable only to underground mining methods. The approach to finding this is necessarily an indirect one, and the detection of sulfide zones at depth is a primary step. By analogy, the best copper mineralization would most likely be found about additional intrusive bodies or even in the extension of the existing one at the Phelps Dodge deposit. Lengthy continuous sulfide distribution of economic value along shearing from known mineralized centers is not likely to occur. If this type of a target is acceptable to Essex International, Inc., and if a land position is secured, exploration here should have two initial approaches. An aeromagnetic survey should be made in the area to attempt to define concealed igneous bodies. Induced polarization surveys should be conducted with dipole arrays designed to get maximum depth penetration. Targets defined will require deep and expensive drilling.

If a larger range of interest in the total area is developed, the aeromagnetic survey might be extended to cover the pediment area from Sanchez to the San Carlos Indian reservation. Many copper occurrences exist along the junction of the Gila Mountain front and the pediment which have not been closely examined north of the San Juan district. Since the pediment is totally gravel-covered, nothing is known of its geology north of the San Juan district or southwest of the Gila Mountain front. Presumably other intrusive and copper mineralized centers could exist in it, but are completely covered. The only clues to such might be recognized if intrusives could be defined. Reconnaissance induced polarization, which is randomly oriented, is too costly to be used to evaluate such a large area. The known copper occurrences are too small and poorly exposed to guide exploration in such an area.

If the relationship of the breccia-agglomerate formation to the finer-grained andesite alteration and mineralization is found to be as envisioned as a result of the work done on the Nail Keg or Melody claims, then deep exploration of the Key, Bardwell, et al., claim area may be in order.