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Claims

# B AND B MINES

Kollsman Mineral
And Chemical Company

Fish Lake Valley, Esmeralda County
Nevada

## AN ANALYSIS

January, 1969

DAVID LECOUNT EVANS, CONSULTING GEOLOGIST

**FOREWORD:**

A program of mapping, drilling and sampling, started on May 13, 1968, and, the completion in late December of some 1300 analyses, provide the detail for this analysis.

Estimated size and approximate grade of reserves were provided ownership in late November.

Indicated are ultimate reserve possibilities, greater than those established by the Kollsman 1968 program. Continued efforts, extending mineral intercepts and building upon partially resolved geological reasoning should add to an already-attractive ore reserve

Our written text is supported by plan maps and cross sections, reference to which is urged. Note that these have been presented according to major areas, to wit: (1) the original B and B mine, (2) the Camp Site deposit, (3) the Geering South reserve, and (4) Geering North area. The first three offer established reserves, and the last offers reserve plus other targets.

All are listed in our Index. Following the text are divisions, providing per-hole geological details and assay results.

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## PURPOSE OF ANALYSIS

Kollsman Mineral and Chemical has been especially interested in the size of ore reserves and a geological picture to serve as the basis for development and continued exploration. Such were the major headings requested.

To provide a factual, geological analysis of B and B and Goering properties, and to list reserve figures--based on geological guidance and controlled drilling--- are the prime purposes of this report.

Our analysis is draped around the usual, standard, major headings and sub-headings, not the least of which are 'Conclusions' and 'Recommendations', listed on this page and page 3.

No analysis can be considered complete without some description of mining and treatment methods, the values of ores treated, recoveries, et cetera. Our economic treatment must be considered as the catalyst, intended, leading the reader to today's active mining program and an efficiently operating treatment plant, and a more profound evaluation of the economics.

## CONCLUSIONS

We conclude that

(1) the four areas, shown in red on the "Properties" map ( Plat B ) offer a minimum of 821,000 tons of ore reserve, with grade of about 1.65 pounds of mercury per ton.

(2) the three areas, outlined in green, indicate an additional target of at least 575,000 tons, with estimated grade of about 1.43 pounds.

(3) other areas for profitable exploration exist, in the recognized, mineralized area ( such as East B and B, circled in yellow), and on its extensions to the northeast and southwest. Within five miles 13 additional possibilities have been reported which would merit eventual study.

(4) all reserves can be mined, using cheap open-pit methods; and the indicated 1.6 pound grade can be upgraded, before shipment to mill by simple screening, or by primary crushing and then screening at mine-site.

## RECOMMENDATIONS

This analysis recommends that

(1) the four areas be completely considered on the bases of size of reserve, location and transportation, and winter versus normal operating conditions, to assure systematic exploitation by bench mining, using the best engineering controls;

(2) drilling be continued, especially in those areas outlined in green, as time, need and weather indicate;

(3) the region, as an whole, be studied for future ore possibilities.

## PROCEEDURES

Surface mapping was started in the Goering area on May 13, with the first period completed on May 20. We returned to Goering mapping on August 2, completing a brief, preliminary report on August 8. Efforts were concentrated on the B and B, and Camp-Site

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areas, for the periods August 21 through 29, and September 4 to September 7. Drilling of property was divided into two periods, the first, September 7 through September 17, and the second, October 15 through October 30.

All surface observations have been tied in with Brunton compass-taped control. Occasional surveying closures were close, indicating accuracy. The use of the Brunton percent-grade scale in conjunction with measured distances provided elevations, the basis of contour maps and adequate profiles. Our Properties map, connecting B and B with Goering areas is also a taped-Brunton survey.

Eventually, a more precise map, using air photos or plane-table, should be considered. But for immediate purposes and with time of the essence, the added expense and time required was not recommended.

Drilling, using the Becker Hammer Drill, penetrated volcanic layers and broken chert zones with satisfaction, recovering good samples, although the possible loss of extreme fines and values, with fines being blown into zones of extreme porosity and permeability, continues to be an unresolved possibility. All samples were cut to five pounds of material, using a large Jones splitter at drill site. Samples were, then, placed under cover to await assay.

Loss of fines-with-value in zones of fines-mixed-with-chert, necessitates the use of a factor to estimate true value.

## LOCATION

Properties lie east of Boundary Peak, on the west flank of Fish Lake Valley, Esmeralda County, Nevada. B and B claims fall in section 6, Township 1 South, Range 34 East and section 1, Township

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1 South, Range 33 East; and the Goering group occupies section 31, Township 1 North, Range 34 East, and section 36, Township 1 North, Range 33 East. Reference is made to the Index Map, Plat A.

## GENERAL AND LIMITING CONDITIONS

**Access:** 30 miles of excellent road ( 6 miles gravelled and 24 miles paved) connects the property with Coaldale Junction. Coaldale is 200 miles southeast of Reno, Nevada, via paved highway. The mine road is always clear, except for a few winter storms which may close the road for not more than 24 hours.

**Power:** Five miles of transmission line, brings power to the B and B and Goering areas.

**Water Supply:** Adequate supply has always been available from underflow in Trail Canyon, delivered through two miles of line to mill and camp-site areas. Currently additional supply is being added to the system, thanks to a second Trail Canyon well.

**Timber:** Scrubby Pinon pine, with no mine value, covers the area.

**Labor Supply:** Supply has always been sufficiant for size of operation (250-350 TPD). Skilled labor has been harder to recruit and retain, despite good accomodations and a very superior boarding house.

**Mill:** A multiple-hearth, Herrschoff furnace, capable of treating 450 tons per day, reduces ores. Recoveries are through condensers of special design. Plant has, recently, been put into excellent shape, through a program of repair and some change of design.

**Tailings:** Disposal of tailings is behind a series of small retaining dams, in the canyon east of mill site. Enlargement of area and capacity must be anticipated.

**Climate:** With camp-site at 7900 feet, mill at 8050 and both mine areas at 8200 feet, climate is an high desert-arid variety, assuring hot summer days but cold nights; and cold but not frigid winters. We estimate a total precipitation of not more than 7 inches. Winter snows are light, causing little inconvenience, and assuring daily surface operation.

**Miscellaneous:** Property roads are excellent, living conditions very good and the camp is serviced by phone

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## LEGAL TITLE

With reference to Plat B, "Properties" map,

(1) The Goering ore area is covered by five claims, namely, Red Dog, Mountain View #1, Mountain View #2, Chop-Chop West Extension, and Chop-Chop East Extension.

(2) The old B and B mine deposits are within a block of four claims, namely, Valley View Lode, Valley View #1, Valley View #2, and Valley View #4. The block is flanked on the north and northwest by five claims, ie: Valley View #3, and Ibex claims 1, 2, 3, and 4; and bordered on the east by two claims, the Ibex Extensions 1 and 2.

(3) The Camp-Site deposit occupies Valley View Claim #5, with north side line common with the south sdie line of Valley View #1 and west end line common with the east end line of Valley View #4.

The seventeen are all standard mining claims, having 1500 feet of length and 600 feet of width, and are maintained by annual assessment work .

For purposes of security, the six Valley View claims were relocated in October 1968, and have been remarked. They were re-recorded in the Esmeralda County Courthouse, at Goldfield, on December 6, 1968.

Title to all claims is in the name of Mr. Paul Kollsman, 1441 Angelo Drive, Beverley Hills, California. Mr. Kollsman is sole owner of Kollsman Mineral and Chemical Company, which operates both B and B and Goering operations.

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## HISTORY OF PROPERTY

As reported in University Nevada Bulletin #41, the B and B was discovered in 1925, and the B and B Quicksilver Company was organized in 1927. Production for 1927 amounted to over 100 flasks from four D-retorts. In 1928 and 1929 rotary furnaces, providing 110 tons of daily capacity were added. Having produced 2,467 flasks up to June 1931, the company declared voluntary bankruptcy.

After a series of unsuccessful leases, the property was acquired by the Nevada Mineral Company (Chicago interests), in 1942. Nevada Mineral recovered 28 flasks in 1943.

The Goering ( the old F and L mine )discovered in 1934, recovered 30 flasks from hand-sorted ore in 1936 and 1941. Efforts by Kollsman Mineral and Chemical have, since September 1968, recovered in excess of 300 flasks from the Goering.

The B and B was acquired in 1955 by the Kollsman Mineral and Chemical Company, and the Goering, a few years ago.

Total production exceeds 6,000 flasks. The break-down through 1965, on good authority, appears to be as follows:

| | |
|---|---|
| B and B Company | 2,600 flasks |
| Lessees | 100 |
| Goering | 30 |
| Kollsman | 3,100 |
| Total thru 1965 | 5,830 flasks |

ESTIMATE - 1960-1970 - 5000

± 12,000 TOT. FIGURE

Significant is the fact that the 3,100 flasks were from low grade ores, remaining in the old B and B pit area, above and west of the mill. Kollsman production dates from the installation of the Herrshoff furnace about six years ago.

3/28/71

NOTE: Continued mapping since DATE OF THIS REPORT - NECESSITATES - A SLIGHT REVISION OF GEOLOGY; RESULTS WILL BE OF BENEFIT & NOT DETRIMENTAL

D. L. Evans

## GEOLOGY

### Resumee:

Cinnabar occurs in a white, volcanic series of rhyolitic flows and ash, lying atop dark red, andesitic breccias and probable flows, at both B and B and Goering deposits. The mines are 4500 feet apart, but for this distance, 2000 feet is without rhyolite section, the unit having been lost to erosion.

The two ore areas, on a N 38° E regional alignment, suggests a like structural control. However, structures, per ore body, cut the apparent trend at an angle, placing the two en echelon to each other.

Cinnabar favors rhyolitic members, producing two distinct types; the one, soft and "ashy", probably a weak cinnabar replacement of, originally, very porous and permeable volcanic ash beds; and, the other, a so-called "opalized" unit or units, with beds first replaced by white, opaque to translucent chert, and then further mineralized by more chert, carrying disseminated cinnabar, and cinnabar following cracks and other openings in the original chert.

In both areas, ash replacement appears to lie above lower 'opalized' units, with the former close to an overlying, impervious rhyolite capping; and the latter as high as 40 feet below the ash replacement, to as deep as the very base of the section, in contact with underlying andesite at the Camp-Site area.

All areas have been complicated by post-mineral faulting.

Reference is made, not only to Surface Geological plats B, B-1, CS-1, G-1 and G-2, but also to that section,

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following text, giving a geological description per hole.

Setting:

B and B and Goering bodies occur on the major, regional structural trend of the Furnace Creek Fault, extending northeast from the Death Valley region, through this area and, conceivably into the Walker Lake depression on the northeast.

Whereas, this report concerns itself only with the B and B group properties, thirteen other possibilities, meriting consideration, all with reserves that might contribute feed to the Kollsman mill, exist. Either after the B and B--Goering complex has been completely mapped and drilled, or, concurrently with such effort, we urge that Kollsman Mineral and Chemical consider neighboring properties seriously, by having company personnel examine all possibilities. Outlying properties have been reported as follows:

| Order | Property | Distance From B & B | Comments |
|---|---|---|---|
| 1 | Red Rock | 2.5 miles S | Pockety high grade 2500 flasks prod. |
| 2 | Container | dto | Adjoins R.Rock. Small? |
| 3 | McNett | 5.5 miles | Opalite; undeveloped |
| 4 | Patsy | 5.5 miles | " ; E of #3 |
| 5 | Sundown | 2.5 miles | Opalite |
| 6 | Lucky | 2.0 miles | Large low grade poss. |
| 7 | Windy | 1.5 miles W | |
| 8 | Lost Valley | 2.0 miles | |
| 9 | Kennedy | 3.5 miles | |
| 10 | Lower Flat | 2.0 miles E | |
| 11 | Upper Creek | 2.0 miles west of but btw B&B and Goer. | |
| 12 | North Extension | ? | North of Goering |
| 13 | Pinchot Valley | ? | North of #12 |

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The above listing of properties is not to infer any personal knowledge or past study. Conceivably, an examination of all might produce good regional understanding and a map, undeveloped reserves of immediate or future interest, and regional, geological consistencies, usefull in the search for more ore.

B and B - - Goering [illegible]

Petrography ( rock types)

Summary:

For all properties volcanic rocks persist; but except for this, properties have marked petrographic differences.

All appear to be underlain by andesite breccia; B & B and Goering deposits occur beneath impervious rhyolite breccia and flows, but the Camp-Site has no apparent rhyolite cap; black basalt borders the B & B on the south and early reports mention basalt actually on top of the B & B; basalt in the Goering area is limited to a few spots in otherwise rhyolitic material; in all three, so called "opalite" ore is dominant; on the other hand, the Goering deposit with better values in opalite zones, also has extensive lower values in ash above the opalite; the mineralized opalite of B & B and Camp-Site is at the base of the rhyolite section at the contact with the andesite, but in the Goering it is close to the top of the section, 40 feet below the ash member; and the Camp-Site opalite zone with excellent values is bordered by a thickness of 0.8 pound material, possibly a product weathered from the opalite.

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To continue with differences, a more recent, bedded ferruginous deposit of interfalated cherts and muds or silts, suggesting a mud flow, exists at the Goering, but not at the B & B or Camp Site.

Earlier reports refer to a series of mineralized beds, each a replacement, lettered from A through K. Assuming each can be readily recognized, such would be an help, both in mining and interpretation. Our efforts, to date, fail to confirm or condemn this orderly arrangement. In view of the amount of faulting mapped in all areas, and the indicated repetition of beds, systematic numbering seems impractical until faulting results can be resolved.

Goering Area ( Youngest to oldest )

A. Ferruginous member

With reference to plans and sections this unit is colored light buff and marked by inclined cross-hatch.

Layered, with chert fragments elongate from weathering and probable abrasion, layers are flat to very slightly inclined. Existence of the white chert and low values from particles of cinnabar suggest that the unit is post-mineral. Had the bed preceeded mineralization it is believed that its excellent porosity would have provided an ideal reservoir. The unit has been effected by post mineral faulting. It is considered a volcanic mud-flow.

B. Rhyolite flows:

White, compact and well bedded, the formation provides a talus with platey fragments. The bedding provides a key for structural interpretation. The rhyolite flows overlie a rhyolite breccia. Total thickness has not been measured. The formation is marked with the " x " symbol and colored lavender.

C. Rhyolite breccia: colored brown on maps and sections and marked with the " + " symbol, 30 to 40 feet of brecciation occurs at the base of the impervious "cap rock" rhyolite section. Dominated by colored

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iron stained to black glassy chert, the entire unit is hard and without economic values; however assaying indicatesthat low values do exist. The formation is red to brown, easily mapped and has been the cause of some difficulty because of its resemblance to the basal andesite breccia.

D. Rhyolite ore section:

The unit is white to gray, consisting of rhyolitic volcanic ash, probably porous volcanic flows and even breccia. Whiteness is attributed not only to the original rock, but also, to the results of alteration which, in some cases, has developed a powdery sericitic to talcy host rock, basically a pure white, but locally a light pink where cinnabar has been added; and, in other cases, where white cherts have replaced beds. The latter, where accompanied by cinnabar, is the "opalite" type ore.

On plan maps and sections, light stippling represents the sericitic, white unit, and the usual triangle symbol marks the white chert addition. Where the former has been sufficiently mineralized to produce a persistent and mineable unit, the trend is colored orange; where the white chert body has been sufficiently mineralized to become an ore-trend, the triangle symbol is accompanied by heavy stipple and the unit is colored red.

Total thickness for this unit in the Goering area has not been drilled. 140 feet of thickness is indicated in the B and B area.

E. Andesite breccia:

With basal andesite breccia established and mapped at the B & B and Camp-Site bodies, and with andesites exposed in the valley south of the Goering deposit, 340 feet vertically below the rhyolite breccia, it is assumed that andesite underlies the Goering deposits.

B and B Area

A. No Goering-type mud flow section exists at the B and B.

B. Rhyolite flows

Impervious rhyolite flows, bordering B and B mineralization on the north flank, are considered identical to the same 'cap' unit of the Goering.

c. Rhyolite breccia:

Not present in the B and B and Camp-Site area.

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D. Rhyolite ore section:

Rapid mapping provides the impression that B & B and Goering sections are similar, and reference is made to the Goering description. Future work may provide differences. Hole 968-9 (see B & B section D-D'), entering andesite at 122 feet, indicates a true thickness of 140 feet for the unit.

Probably the best example of "opalite" replacement occurs at the base of the unit. At the contact with andesite, much of the white chert is mixed with reddish chert, probably from andesite 'ghosts'. Above the contact all is typically-white "opalization".

E. Andesite breccia:

With reference to B & B Section G-G' (Plat B-2), note the 300 feet of 'Lower Tunnel', 200 feet below the B & B pit area. The tunnel is in andesite throughout. The unit is a dark red volcanic breccia, without the hardness of the rhyolite breccia.

Camp Site Deposit

A. Recent weathered unit

Most recent material is a loamy to sandy, brownish unit, carrying fragments of white chert and cinnabar in the loamy-sandy matrix. At the center of the mineral trend, material caps massive "opalite" mineralization; away from the center it flanks the opalite, and at greater distance it is in conformable contact with underlying andesite.

Position of this iron-colored unit and the suggestion that it appears to be the product of weathering of opalite and andesite might make it comparable to the Goering 'ferruginous' unit.

B. Cap Rock

No true rhyolite cap rock exists in the area. However, with massive basaltic rocks flanking the deposit on the south, basalt may have capped the Camp-Site deposit at one time.

D. Rhyolite ore section:

The major and better grade portion of the ore zone consists of opalite, similar to that observed at the contact with andesite, on the B & B, up slope and to the west

Crushed zones:

Below the rhyolite, opalite section and above solid andesite, some holes have penetrated as much as 25

feet of section, consisting of mixed chert and andesite, with minor cinnabar, in a sandy matrix, followed by clay-gouge; or solid gouge without any preceding thickness of mixed material.

Both are considered the product of fault movement and not a part of the petrographic sequence. Stressed is the observation that some holes have penetrated the andesite, directly, without encountering mixed or gougey materials.

E. Andesite breccia

The deposit is underlain by red, compact andesite breccia. Thicknesses of clay, encountered in some holes, and exposed in the ravine, are not a part of the andesite lithology, as inferred by others. The clay is a fault gouge. Its bearing on the overall picture remains conjecture.

9/8/11
1970 WORK INDICATES A Thick Gouge zone with Regional Continuity - underlying ore in apparently "Thrust" PLANE
DLE

We do not concur with the U.S. Bureau of Mines and others that the deposit was formed by a 'land-slide' from the main B & B on the west. The deposit has its definite units and continuity. Its position at the contact with andesite, the indication of a true, straight-line trend, and association with structure (as indicated by the thick gouge) suggests that a true understanding of the Camp Site anomaly could resolve many of the questions regarding origin, and guide operators to new reserves.

Mineralisation:

Our description is limited to the obvious, Values are linked with the mercuric sulphide, cinnabar. Despite the fact that the characteristic pink turns to dark gray, when exposed to sunlight, this is con sidered only a superficial effect from certain rays, and not a change to the resinous-black meta-cinnabarite, also a mercury sulphide, with identical formula.

Throughout the study no other sulphides were recognized.

The major component of B & B --- Goering mineralization is white chert, loosely described as "opaline" with the term "opalite", favored by prospector and miner alike.

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It is believed that initial chertification was accompanied by some disseminated cinnabar; and it is evident that following crackling and breaking of the original chert, mercury mineralization persisted, accompanied by more silica, possibly in part glassy and perhaps opaline.

Heavy brown iron oxides characterize cap rock, the result of a reduction of iron sulhides or silicates; and iron oxides occur, eratically, throughout all parts of the described petrographic section.

Any detailed consideration of the mineralogy must await microscopic study, should such be con sidered a necessity.

## Structure

### Pre-Mineral

As stated above, ore concentrations appear to be bedding-controlled. No positive mineralized structure has been observed. However, it is believed that in due time structural controls will be found which guided mineralization into the replaced layers.

The sharp margins of the higher-grade center of the Camp-Site ore body and its straight-line trend are suggestive but not positive.

The N38°E bearing between B & B and Goering areas, as suggested under 'Resumee', is a trend meriting consideration as exploration continues.

And finally, the premise that structural growth continues to favor the same, original lines of weakness must be kept in mind. In short, the many parallel faults, crossing the Goering area, could have originated as mineralized lines of weakness. Such thinking could also apply to the B & B area.

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## Structure

### Post-Mineral

All areas have been greatly effected by post mineral faulting.

#### Goering Area:

During initial mapping, post-mineral faulting was first suspected because of the erratic distribution and changes of trend in the rhyolite-breccia cap rock.

Suspect became fact with the exposure of actual fault faces, with gouge and polished and slickensided surfaces, as exploratory, shovel and dozer work proceeded. Added confirmation has been provided by the repetition of units, the cutting of cap rock, at depth, after crossing gouge zones, the recognition of good, crushed ground and actual gouge on lines of faulting, as developed, et cetera.

Assurance is given that this study was not initiated with any pre-conceived idea that faulting would be involved. The pattern grew, as mapping and drilling progressed. In retrospect, without the pattern and without the movements involved, much of the distribution of mineralized units would be without satisfactory explanation.

With reference to surface Plats G-1 and G-2, Goering South and Goering North respectively, note that (1) five faults, A through E, have been traced from southwest to northeast, (2) faults are parallel, and (3) faults, striking at N70E at the western limit of Goering south mineralization, gradually curve and swing to the north, with bearing roughly N10E, in a distance of 1100 feet.

Dips, where observed, varied from 57° to as steep as 80° to the southeast and east. Sections, however, have been adjusted to balance widely spaced observations .

Admitted is the expectation that sections and plans will need adjustment with increasing information. Our simplicity of interpretation will be effected by probably other parallel lines of movement, and perhaps changes in dip.

Nevertheless, this analysis considers the overall picture basically correct and a reliable guide for answering future mining problems.

With movement per fault "normal" movement ( downward displacement on hanging wall side) indicated in an original dome or anticline, which has been broken into a series of segments by five normal faults. An original large anticlinal structure, with zones of permeability and porosity would provide an ideal reservoir for mercury charged waters and gases moving upward from one or more of the structures, now post-mineral faults.

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## Structure:

### B & B and Camp Site areas:

Considering Plat G-1, B & B Surface Area, the effect of post-mineral movement is evident. The pattern is based on (1) broken and gouge zones exposed in mined areas, (2) local shifts in the position of mineralized units after crossing zones, (3) overall pronounced changes in the trends of established mineralized units, (4) changes in strike and dip, as observed in the thinly layered rhyolites, et cetera.

Very obvious are:

(1) the northwest-southeast trend of the Antenna Hill ore body, as contrasted with the northeast-southwest trend of the Upper B & B unit;

(2) the opalite zone between Kollsman Plant and ore bin, its parallelism with post-mineral structure, and the repetition of this opalite zone to the southeast, as it encounters parallel post mineral structure;

(3) the trend of the Camp Site ore zone, as it approaches the B & B from the southeast, at a right angle to the B & B opalite trends

3/25/11

Reference is repeated to the heavy gouge, encountered beneath Camp-Site mineralization, reflecting strong post-mineral structure, with significance still to be determined.

Plat B (1) establishes the fact that East B & B mineralization can be tied in with the B & B area, via the trend of post-mineral struxture; which again suggests the possibility that these same post-mineral lines may have, at an earlier time, guided mineralizing solutions; and (2) shows that Goering and B & B lines of movement, although not in line with each other are, at least, parallel.

GEOLOGY ( concluded )

Significance:

The above geological observations and comments

(1) have been the bases for interpretation in establishing the blocks which make up our submitted ore reserve;

(2) suggest that continued exploration consider

(a) the distribution of porosity in the rhyolite member;

(b) the significance of bleaching and other exposed alteration;

(c) the possibilities at depth, along structural trends, even though observed movement is post-mineral;

(d) all cap rock and what might lie beneath it.

DEVELOPMENT AND EXPLORATION:

Goering:

An 82 foot shaft in the North Goering area; 170 feet of tunnel 45 feet beneath current open pit mining at the Goering South; four benches exploring both ore types on the Goering South; scattered trenches throughout both Goerings, and three programs of drilling throughout the two properties provide details for plans and sections.

Withnthe exception of drilling completed in late 1968, details are not enumerated in text. Goering exploration has suffered, to some extent, from the usual B and B complaint of the incomplete recording of results; too, for some of these listed, without maps locations cannot be determined.

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B & B and Camp Site areas

Tunnels and benching up to 1943 are described in the U. S. Bureau of Mines (pre-Kellsman) study of the property, summarized as follows in University of Nevada Bulletin No. 41, "Quicksilver Deposits of Nevada", December 1944:

> " The principal workings consist of a glory hole about 350 feet by 150 feet and 35 feet deep, a branching haulage adit about 800 feet in length extending under the glory hole, and a second open cut about 175 feet by 75 feet and 25 feet deep lying several hundred feet lower on the hill and below the furnace site, and two barren adits on the slope, midway between the two open cuts."

Except for a lower 300 foot tunnel, driven in andesite, workings are caved or destroyed by more recent mining.

Drilling of flat to slightly inclined-up holes from the face of the 300 foot tunnel, and extensive drilling from the B & B surface, and considerable sampling of exposures, all, have been completed since the USBM study, but no records can be found, regarding results or locations. The loss of such detail is to be regretted. A continued search of file records is urged.

Late-1968 drilling:

5,022 feet of drilling was completed in September and October 1968. Of the total, 4,872 represent development and exploration, and 150 feet were completed, as an assist to Goering South open-pit mining. The 4,872 feet were distributed as follows:

| Area | Feet |
|---|---|
| Camp Site | 930 |
| B&B; Antenna Hill | 318 |
| Goering South | 2467 |
| Goering North | 1157 |

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Holes were cut by the Becker Hammer Drill, with equipment and crew of two contracted for out of Denver, Colorado, for a charge of $50 per hour, plus the cost of mobilization and demobilization. The rig operates on the principle of a pile-driver, pounding casing into rock and blowing cuttings to surface with air pressure. An alloy-steel cutting 'shoe', with teeth always in direct contact with the bottom of the hole, affixed to casing of same diameter, chips and breaks the material from the solid. There is no turning of bit and casing.

Cuttings reaching surface are recovered by a 'cyclone' at hole-site. Ground, too compact and hard for hammer drill penetration, can be cut by drilling an hole of smaller diameter, using a rotary rock bit, through the center of the larger casing, with casing resting on bottom.

This equipment, designed for the drilling of sands, gravels and other surface detritus and rubble, was ordered on the chance that it could penetrate broken cherts, as well as the softer tuff sections, which appeared to pose no problem.

The equipment cut a good hole but doubts remain, regarding the accuracy of samples, retrieved from certain types of ore.

Operating details are summarized as follows:

| Days | Hours | Total Holes | Total Feet * | Ft/Hr | Ft/Day | $/ft ** |
|---|---|---|---|---|---|---|
| 30 | 270 | ~~79~~ 81 | 5022 | 18.6 | 167.3 | 2.93 |

* Exploratory 4,872
Operational 150

** Using $50 per hour and approx. $3000 for mobilizaton and demobilization

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Analyzing B & B area results, Becker equipment must be recommended because:

1. Clean samples are provided; there can be no up-grading from 'salting'; except for fines blown into porosity (probably less than 1%) recoveries are complete.

2. Progress is very satisfactory, even in cherty formations, which have been slightly broken.

3. The easy change to drilling with rock bit assures deeper progress, until porosity is encountered.

4. A direct operating cost per foot of less than $3.00 is far below average.

5. Coarse cuttings insure rapid and positive sample identification.

6. Samples from homogenous material seem to provide precise assay determinations.

But to further analyze, the problem of recovering all 'fines' as explored, below, under #7, if not corrected, will defeat the main purpose of exploration, unless corrected:

7. Samples from mixed materials appear to be unreliable. With the bulk of values associated with 'fines' and a rock column a mixture of fines and hard cherts, the loss of fines ( by being blown into porosity ahead of the advancing hole) does not recover all of the HgS, and values from such sections seem to be consistently low.

Although theoretical, the reasoning receives some support from drilling results in an area of production which had also been sampled before mining. Five holes were drilled in the area, providing the following comparisons:

| Ore Type | # of holes | Pounds Hg per ton | | | |
|---|---|---|---|---|---|
| | | Becker | Vacuum Holes & Surf. Samps | Production Avg. Screened | In Place |
| Mixed cherts and fines | 3 | 0.87 | 2.31 | 2.08 | 1.74 * |
| Tuffaceous | 2 | 0.91 | 1.29 | 0.94 | 0.94 ** |

* Oct.17-Nov.13 ; factor 1/2 ** Dec. 10-15 in fringe area Fact: 1/1

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We consider significant the results of drilling an identical section with rotary and then Hammer drill methods. Hole 968-44 was drilled to 29 feet with standard Hammer drill. From 29 to 44 hole was advanced with rotary drilling, using a tri-cone rock bit, with samples recovered for the 15 foot interval. Rock bit was withdrawn from hole, and on the premise that hammer drill would now progress by breaking rock to the smaller-diameter hole, hammer drilling repeated the 15 foot interval, again with samples being recovered. Assay results from the two types of drilling are as follows:

| Hole | Interval | #/T Rotary | #/T Hammer | Ratio |
|---|---|---|---|---|
| 968-44 | 29-44 | 0.29 | 0.42 | 1/1.45 |

Conclusions:

Both support the reasoning of observation # 7.

The first, considering drilling in the area being mined, is self-evident.

The second suggests that by pulverizing cherts and fines with rock-bit drilling, all fines and their values were released and then partially lost in the porosity of the 15 feet of open hole. The coarser fragments from hammer drill did not experience as great a loss.

This analysis [illegible]dies that if the Becker Hammer Drill can be equipped with a vacuum-type of sample lift, its use in future exploration be continued; this, despite the fact that slower advance would be anticipated.

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## SAMPLES

As reported, material recovered from the Becker Hammer Drill cyclone was split to a five pound sample, at four foot intervals, using a Jones splitter at hole site. The four foot, standard interval was exceeded only during initial experimental drilling or in the case of rare contingencies.

Total samples sent to laboratory, on a four foot basis, would amount to 1218, for exploratory drilling, and 19 for blast hole drilling, taken at 8 foot intervals. This total of 1237 has been slightly reduced by losses between well sites and laboratory. Carlessness by company personnel, no longer in company employ, is suspected, because of losses, mismarking and, in some rare cases, unbelievable results.

However, the overall picture, discounting a few samples and acknowledging questionable results where adviseable, because of Becker item # 7 ( see page 21 ), are considered realistic.

Analyses have been determined in the K.M.C. & C. laboratory, using a LeMare type apparatus ( a refinement of the Le Mare Mercury Sniffer), providing direct readings of mercury-charged vapor, from the retorting of one gram ( or ½ gram or ¼ gram for high grade) samples. Direct reading has been made possible by diluting the vapor before its entry into the 'sniffer'. Batteries have been circumvented by using line electricty and a voltage control. Results have been checked, periodically, against standard titration.

Assay results are listed on a per hole basis, on pages 77 through 104, following our written text.

Averages are shown on attached cross sections.

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## ORE RESERVES:

### Foreword:

Reference is made to Table A, Ore Reserves, and Table B, Upgrading by Screening, both on page 25.

The division of a reserve into the three categories, Positive, Probable, and Possible, is the purpose of any analysis.

Positive ore, blocked out on four sides; Probable ore, indicating positive mineralization but with the lesser development of control on two sides, and Possible ore, based on even less development and limited assay control but with mineralization which fills out a growing geological pattern, are the units and rules behind their determination. Ore, of course, is that material which can be mined at a profit.

The rules developed with underground mining when, working through shafts, or winzes from tunnels, drifts and crosscuts per level, conveniently provided the upper and lower limits of a block, as well as the easy access for the vertical raises ( or inclined ) and drill holes which established the sides.

With B and B development and exploration geared to the drilling of vertical holes from surface, the difficulties of conforming to the above guide lines are obvious.

We believe that the three categories can only be considered on the bases of (1) the overall distribution and frequency of drill holes, (2) the diameter of the circle of influence for each hole, as determined by subsequent mining, and (3) ore intercepts of sufficient number and evenly spaced, permitting

## ORE RESERVES

Table A

| Mine Area | Positive & Probable | | Possible | | Positive, Probable, Possible | | Target Tons | | Grand Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Tons | lb/T | Tons | lb/T | Tons | lb/T | Tons | lb/T | Tons | lb/T |
| Goering North | 143,600 | 1.79 | | | 143,600 | 1.79 | 87,000 | 0.85 | 230,600 | 1.43 |
| Goering South | 197,000 | 1.73 | 209,600 | 1.48 | 406,600 | 1.59 | 78,000 | 0.91 | 484,600 | 1.48 |
| Camp Site | 282,800 | 1.56 | | | 282,800 | 1.56 | | | 282,800 | 1.56 |
| Antenna Hill | 62,000 | | | | 62,000 | 2.00 | | | 62,000 | 2.00 |
| Upper B & B | 136,000 | 1.50 | | | 136,000 | 1.50 | | | 136,000 | 1.50 |
| Mill Area # 1 | | | | | | | 100,000 | ± 2.00 | 100,000 | 2.00 |
| Mill Area # 2 | | | | | | | 100,000 | 1.56 | 100,000 | 1.56 |
| All Areas | 821,400 | 1.65 | 209,600 | 1.48 | 1,031,000 | 1.62 | 365,000 | 1.37 | 1,396,000 | 1.56 |

## UPGRADING BY [redacted]

Table B

| Percent | Tons | lb/T | Pounds Hg |
|---|---|---|---|
| 80 | 1,117,120 | 1.85 | 2,066,672 |
| 20 | 279,280 | 0.40 | 111,712 |
| 100 | 1,396,400 | 1.56 | 2,178,384 |

the determination of tonnages and value by any one of several geometrical methods.

In "Surface Mining", the 1968 AIME Seeley Mudd volume, paragraph 2.3, considering "Preliminary evaluations of surface mining prospects" confirms our feeling regarding the inevitable continuity of some kind of evaluation; " if not continuously, then intermittently over the full span of exploration and early stages of development."

With reference to the Goering South deposit, except for the cluster of holes on sections 300E, 350E, 400E and 450E, abiding by the rules, one would hesitate to employ the term, "Positive".

But, on the other hand, in the case of the B and B and Goering areas, aware of the ease with which ores have been opened up, followed and successfully mined, from isolated 'shows', and in view of the fact that mapping and drilling have confirmed continuiuty from point to point, the easy solution of placing all tonnage in a "Possible" ore category is rejected.

Our attempt at compromise, by using the three groups:

(1) Positive-Probable

(2) Possible

(3) Target tonnage

reflects the writer's confidence in the reserves, as stated, and at the same time acknowledges the probabilities of differences of opinion.

Reliance on continuity has, in the past, protected the B and B operator. Without going to the added expense of com-

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pletely drilling out blocks to positively establish tonnage and grade, he has been able to supply the plant with a steady flow of ore. We do not anticipate that B and B operators will alter this practice, except to drill those few holes which will confirm continuity and verify trends.

Reserve Groups:

With reference to Plats G-1, G-2 and B-1, Positive-Probable is outlined in dark-red, Possible in green, and Target areas in black.

Positive-Probable:

Goering areas and Camp Site body:

Well placed and adequately spaced holes show persistent values and no change in lithology, in plan and section. The ore masses have not been disrupted by post-mineral faulting. Grade, based on a few surface samples, vacuum-recovered hole samples and adjusted Becker Hammer drill samples, conforms to production values, as shown under Table C-comments.

Antenna Hill Area:

The ore is exposed along the north rim of the open pit, west of the Kollsman Plant ore bin; vertical holes complete the picture. In view of the high grade exposed in accessible outcrops, the two pound average is considered conservative. An undetermined volume of screened, two pound plus, dump material has not been included in calculations.

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Upper B and B Block

Mapping establishes continuity, and cinnabar has been observed over 50 feet of vertical exposure. Our estimate of 1.5 pound grade isin line with grade of ore, sent to mill from this area, as reported by Mr. Gardiner. It has not been drilled.

Possible:

Limited to the South Goering area, the category includes:

(1) reasonable extensions of Positive-Probable zones based on:

(a) exposures of strong mineralization in line with projections;

(b) intercepts of mineralization and/or values in holes at 50 foot intervals in line with projections, and,

(c) encouraging values and mineralization, in drill holes, not in line with projection but prognosticated on a premise of faulting.

Target Areas:

Target areas are suggested by projections into undeveloped areas in line with trends; they are confirmed, in part, by a few isolated holes with encouraging values, or the existence of surface alteration, especially opalization.

Analysis of Drilling:

Foreword:

Results from all pre-Kollsman-1968 drilling are not available. Records for a considerable footage in the B and B area have never been located. Mr. Gardiner

did provide details or rough-evaluations for all holes in the Goering area and five holes ( of a greater number ) completed in the Camp Site reserve.

Detail:

The 117 holes supporting this study are listed onsa per group basis, as follows:

| Category | Number of Holes |
|---|---|
| Gardiner; pre-1968 Goering | 25 |
| Goering; early 1968 Gardiner | 11 |
| Gardiner;Campsite 1962 | 5 |
| Kollsman; late 1968 | 76 |
| Total Holes | 117 |

Of this total:

| | |
|---|---|
| Holes with ore values influencing reserves | 49 |
| Holes without values, providing geological detail only | 68 |

Factors:

With reference to our consideration of Becker sample reliability, at the bottom of page 21, note that that the ratio is 1 to 2 and 1 to 1, for mixed cherts-fines and soft 'tuffaceous' ores, respectively. Production samples, however, represent a much larger area than that surrounding the five holes employed.

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A comparison of Becker results with those averages, adjacent to holes, provides the 2.65 and 1.4 factors which have been used in assay adjstments for the two varieties of mineralization.

Analytical Methods:

For all blocks vertical cross sections have been used in calculating tonnage and grade.

(1) Evenly spaced cross sections, cutting the ore-trends at right angles, explore each block;

(2) By taking the area in ore, per cross section, then averaging the area per the two cross sections involved and multiplying by the interval between sections, ( ie: Goering South- 50 feet, Goering North-[illegible] and Campsite-- 45 to 60 feet ), the volume per unit between sections was determined; cubic feet per unit, divided by a factor of 11.5 cubic feet per ton, provided tons.

(3) Grade per unit is the average of grades per section, as determined by weighted averages from drilling , supplemented by some surface sampling. For those sections without hole control, a value per section has been estimated from the nearest section with control or from an average of nearest sections.

Reserve Totals:

Reference is made to Table A, on page 25.

Repeated is this report's total of 1,396,000 tons, averaging 1.56 pounds of mercury per ton, itemized on page 31 .

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## ORE RESERVE SUMMARY

| | Per Category | | Totals | |
|---|---|---|---|---|
| | Tons | Grade | Tons | Grade |
| Positive-Probable | 821,400 | 1.65# | | |
| Possible | 209,600 | 1.48# | | |
| Posit-Prob-Poss | | | 1,031,000 | 1.62 |
| Target Tonnage | 365,000 | 1.37# | | |
| Total Reserve | | | 1,396,000 | 1.56 |

During the progress of this analysis and on the basis of detail, as it accumulated, estimates were made and reported as such, to keep interested parties advised.

For purposes of comparison, our final reserve compares with a November estimate, as follows:

| | This Analysis | | November Estimate | |
|---|---|---|---|---|
| | Positive Probable* | | | |
| | Tons | Grade | Tons | Grade |
| Goering S | 406,600 | 1.59# | 355,000 | 1.70# |
| Goering N | 143,600 | 1.79# | 210,000 | ** |
| Campsite | 282,800 | 1.56# | 227,000 | 1.59# |
| Antenna Hill | 62,000 | 2.00# | 62,000 | 2.00# |
| Upper B & B | 136,000 | 1.50# | 136,000 | 1.25# |
| Totals | 1,031,000 | 1.62# | 990,000 | ** |

* And Possible ** Grade not estimated

Note: This analysis by employing sections, as described.

Our November estimate by using a series of projections to plan maps, at 20 foot intervals.

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TREATMENT METHODS:

As indicated under "Purpose of Report", our objectives in this analysis have been to provide the basic geology and a factual ore reserve figure.

Our recommendation # 1, urging "the best engineering controls", is to ask that mining methods and milling procedures be given the detailed consideration, not attempted in this report.

Except for a daily appreciation of the problems involved, no effort has been made to assemble all of the facts and figures, required to treat this major heading, with the detailed approach, used above.

Suffice it to say, that all ore has been mined by power-shovel, assisted by bull-dozer, in open cuts, without the help of drilling and blasting.

Initial considerations, regarding future bench mining, indicate future waste to ore ratios of from 0.88 tons waste per ton of ore to 2.54 tons waste per ton of ore. Nothing approaching the latter enters our ore reserve picture. This analysis anticipates a 1/1 ratio.

We do believe that screening, as practiced, should be continued, but with an open mind towards adjustment. We continue to believe that great improvements in efficiency and costs would be possible, using drilling and blasting for the opalite unit, and preceeding screening with some initial crushing at mine sites.

All mining should be done under the supervision of a competent shift boss or engineer.

Today's operation screens all material at mine site; roughly 80% is sent to mill and 20% pushed over the slope, where it will,

undoubtedly, interfere with future mining.

Screened mine-run is crushed and then treated in a ten hearth Herrshoff furnace, with mercury recovered by condensers of special design. Transportation to plant, over 1½/ miles of good road is by truck.

In order to compare the grade of material mined with the grade of block, as determined by drilling, figures for one month of Goering operation were assembled and summarized, with results listed in Table C, below.

Factors entering into this analysis are as follows:

1. Period: October 16 through November 13,1968. 28 days.
2. Tonnages: Measured by weightometer at mill.
3. Screening: reported at 80/20
4. Moisture factor: 10%
5. Grades: Waste screened out assayed 0.4% Hg
6. Marketed: 160 flasks or 12160 pounds Hg.
7. Recovery: reported at 95%

MILLING BACK TO MINING — Table C

| Comments | Wet Tons | Dry Tons | Flasks | Pounds | lb/T |
|---|---|---|---|---|---|
| As shipped | 6,837 | 6,153 | 160 | 12,160 | |
| In place, using 95% recovery | | 6,153 | 168.4 | 12,800 | 2.08 |
| Mining | | 7,690 | 1537 (20%) to dump<br>6153 (80%) to mill | | |
| In short: | | | | | |
| Mined | | 7,690 | | 13,414 | 1.74 * |
| Screened | | 1,537 | | 614 | 0.40 |
| Shipped | | 6,153 | | 12,800 | 2.08 |

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From Table C it is apparent that:

1. 275 dry tons are being mined per 8 hour shift, providing 220 dry tons per day to mill.

2. Production amounts to 40 flasks per week or 5.7 flasks per day.

3. Placing the plant at its capacity of 450 tons per day would assure 11.65 flasks of mercury per day.

4. The 1.74# head value compares most favorably with the 1.73# value, placed on the 197,000 tons of Goering South Positive-Probable ore.

One must bear in mind that the values above represent Goering mining at its best; in short the operation, for that period, was centered in the best zone, as shown on P at G-1.

Mining for the period December 10 through 15, averaging 0.95 pounds of mercury per ton, represented material from the soft, tuffaceous marginal member, shown in orange, without help from the opalite center, shown in red; and without benefit of pre-screening.

METAL PRICES:

Following this written text is Table D, a curve showing the monthly average mercury price from August 1963 through December 1968.

Obvious are the usual 'mercurial' fluctuations to mid-1966, in contrast with the steadier price, starting in October 1966.

One school of thought attributes recent steadiness to the start of trading in 'futures' on the New York Commodity Exchange, in January 1967.

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But probably the main deterrent to high mercury prices has been the selling from GSA stockpiles. However, with sales of 22,000 flasks from stockpiles in 1967, and only 20,435 flasks remaining in late January of 1968, the GSA reserve is about depleted. It is generally held that production from Cominco's Canadian Pinchc mine, starting in January 1969, will balance out the loss of GSA sales.

Probably, as in the past, the future of mercury prices depends on Mercurio Europeo, the cartel which controls production from Spain's Almaden district, Jugoslavia's Idria area, and Italy's Monte Amiata. Regarding any one of the three, there are constant rumors re: dwindling and lower-grade reserves, the drawbacks of trying to produce efficiently under national-socialistic controls, or even, that all production is remaining in Europe or going behind the Iron Curtain.

The fact that Almaden only produced 50% of what had been predicted for 1967 does suggest difficulties.

Certainly, the price curve speaks well for the future, and provides the hope for a future $500 per flask minimum.

PROFIT OR LOSS

A grade of 1.62 pounds for Positive-Probable ores provides a gross of $11.34 per ton of ore, on today's price of $530 per flask.

Current estimated mining cost of $1.00 per ton, should not exceed $2 per ton.

Treatment costs of from $3 to $4 per ton should keep the total basic production costs under $5 per ton. Our rough consideration indicates a very profitable operation.

For the same reasons, outlined above, no detailed cost analysis has been attempted.

RECAPITULATION:

Reserves appear adequate to underwrite 8 years of operation on a 450 ton per day program.

Normal expectancy suggests additional reserves for current mining areas. The district's other possibilities, with its many undeveloped small properties and 'shows', listed on page 9, cannot be denied.

Reiterated is our understanding that this analysis' chief concern was to be the geological and reserve picture. The efforts, above, should be supplemented with comparable studies of mining and milling procedures, as well as a planned program for both.

The opportunity to be of service, by preparing this analysis, has been greatly appreciated.

Respectfully submitted,

D. L. Evans.

David LeCount Evans
Consulting Geologist

Reno, Nevada
January 20, 1969

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MUD FLOW - ABOVE ORE & POST MINERAL

MUD FLOW — MINED? MILLED(?)

600 N

80'

BENCH - 140' ABOVE MINED LEVEL

TOE 6/13/69

TOE 6/13/69

ROAD

1

2

3

TUNNELS

SCREEN PLANT AS OF JUNE 13, 1969

SURFACE 1968-1969 DUMP

SOUTHEAST LIMIT OF DUMP REMOVAL JUNE - 1969

POWER POLE WITH CONTROL BOX ▲937

550 E

500 E

450 E

400 E

350 E

300 E

250 E

200 E

150 E

100 E

50 E

0

50 W

# GOERING S.
## SURFACE

1" = 50'

D.L. EVANS 6-15-69

1860 0063

FAULT

LOWER GRADE ?

GOOD GRADE ?

MUD FLOW COVER

995

995

ROAD

600 N

N

POLE

50W

0

50E

100E

150E

200E

250E

300E

350E

400E

450E

500E

550 E

# GOERING S.

# 1 BENCH 995

1" = 50'

D.L. EVANS 6-15-69

1860 0063

600N

965

965

N

POLE

50W

0

50E

100E

150E

200E

250E

300E

350E

400E

450E

500E

550E

# GOERING S.

## # 2 BENCH 965

1" = 50'

D.L. EVANS 6-15-69

1960 0063

600 N

945

TUN

945

DUMP

N

POLE

50 W

0

50 E

100 E

150 E

200 E

250 E

300 E

350 E

400 E

450 E

500 E

550 E

# GOERING S.

## # 3 BENCH 945

1" = 50'

D.L EVANS 6-15 64

1860 0063

18600063

600N

N

4B

4A

927

925

925

50W

0

50E

100E

150E

200E

250E

300E

350E

400E

450E

500E

550E

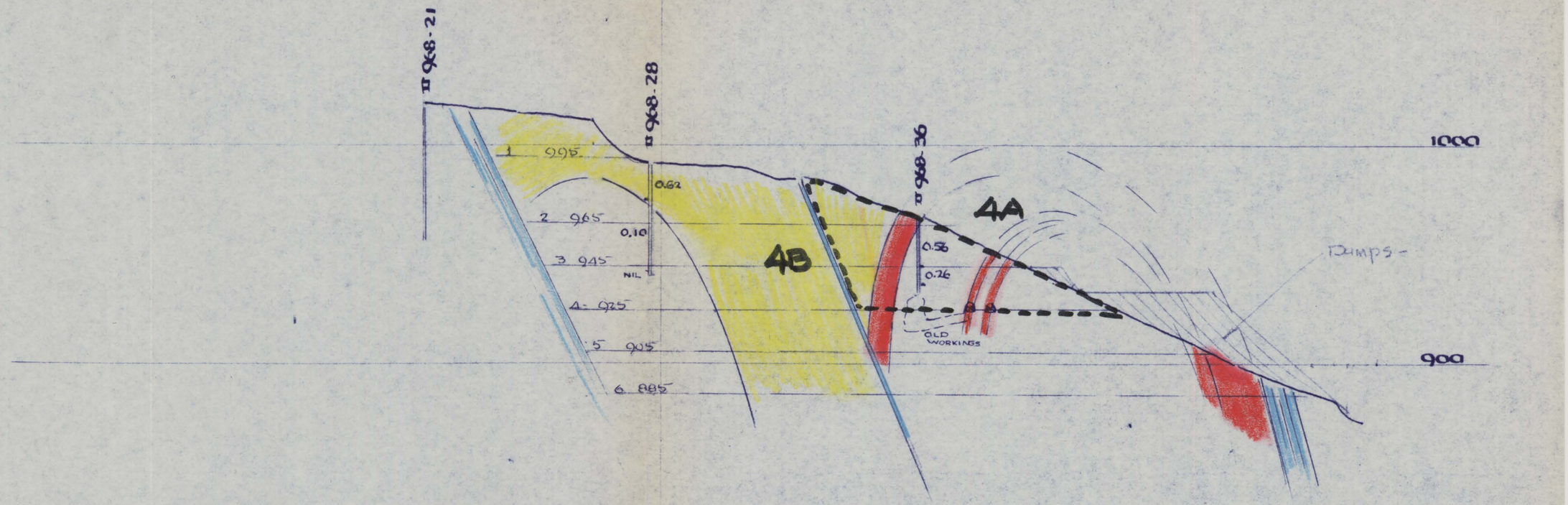
# GOERING S

# 4 BENCH 925

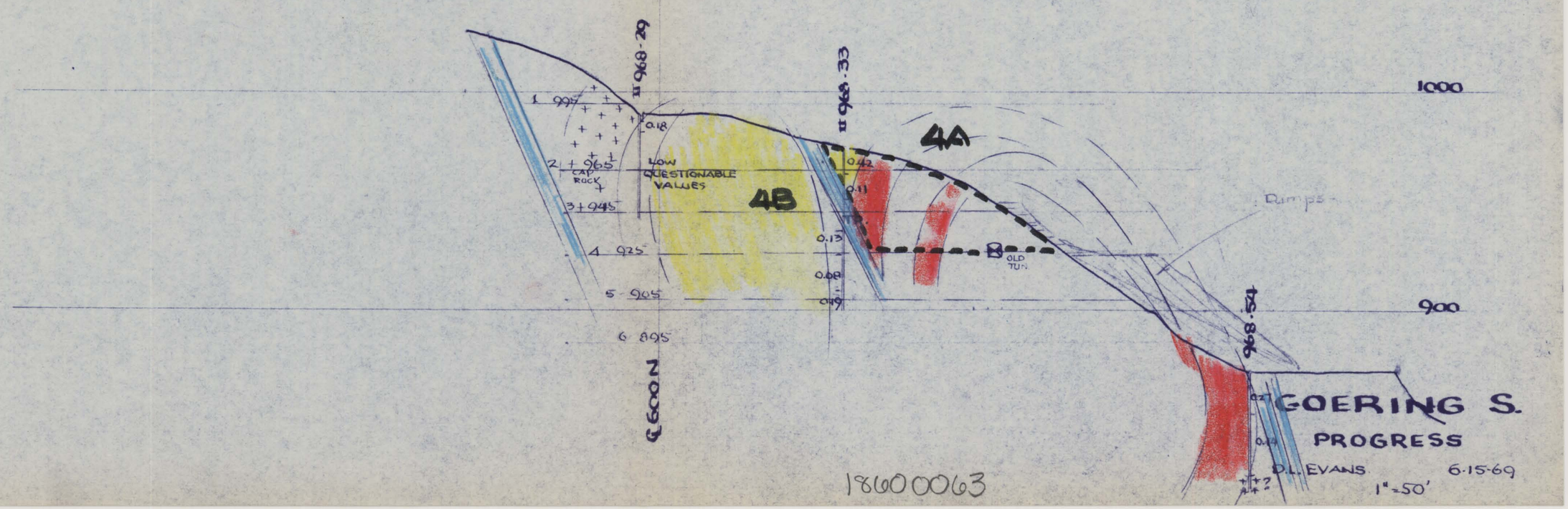
1" = 50'

D.L. EVANS 6-15-69

100E




50E




GOERING S.
PROGRESS
D.L. EVANS 6-15-69
1"=50'

18600063

200E

#968-24

#68-13

SURFACE JUNE 1968

#68-14

#968-51

1000

Dumps

#10

900

0.14
0.87
0.08
0.00
0.20

1.46
0.51
0.23

1 995
2 965
3 945
4 925
5 905
6 885

BASE OF OBVIOUS VALUES

Samples Lost

0.46
0.10
0.65
1.56
0.35
0.40

Rhyolite Cap Rock Cherts

Rhy. Cap Rock Cherts

"WASTE"

150E

#968-25

968-20

#968-53

968-37

#2

1000

900

0.12
1.22
0.12

0.26
0.90
0.19

1 995
2 965
3 945
4 925
5 905
6 885

0.47
1.40

0.50
TR
0.87
0.22

OLD WORKINGS

OLD TUNNEL

"LOW GRADE"

Dumps

6600 N

GOERING S.

PROGRESS

D.L. EVANS 6-15-69

1" = 50'

1800 0063