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July 27, 1951

EXPENSE ACCOUNT, RAILROAD DISTRICT EXAMINATION (ELKO, NEVADA)

July 16,1951	Plane ticket,round trip.....	$61.53
16	Taxi,limousine.....	3.60
	Excess baggage.....	1.44
	Tips.....	0.50
	Dinner, Elko.....	2.75
17	Breakfast.....	1.25
	Tips.....	0.50
18	Dinner.....	3.00
19	Breakfast.....	1.50
	Tips.....	0.75
	Taxi, Elko.....	0.60
	Lunch,Oakland.....	0.85
	Tip,limousine, taxi.....	3.85
27	White prints, miscellaneous.....	5.00
		$87.12

July 23, 1951

Dr.Chas. Henry White
3440mClay St.
San Francisco

Dear Dr.White:

Last week I made a short examination of the Railroad or Bullion district, SW of Elko, Nevada, for a syndicate with which I am connected. The Mines Handbook for 1926 states that you made a report for the Nevada Bunker Hill Mining Co.

The district seems of some interest,but many workings are caved, data are sparse and those available appear unreliable. I did spend an hour or so in the Standing Elk mine with a lessee who seems to have found an extension of one of the old lead-silver ore bodies.

If you have a copy of your report and feel free to let me see it, I should be exceedingly obliged for an opportunity to do so. The company for which you made it has gone out of existence,but possibly their successor,Aladinn Mining Co., retains legal possession of your report. If you feel it would be unethical to let me see your report, perhaps we could talk informally about the district,in which case I would be happy to meet you at your home or at the Engineers Club.

Stoces book must be about out in London by now. I wrote a short preface for it,at his request,but have heard nothing from him,so perhaps it wasn't acceptable. In any event, I have interested Prentice-Hall in the possibility of their publishing another book by Stoces, stressing princ iples of mining rather than desciptions of methods in detail;they are going to pursue this matter with Dr.Stoces.

With best regards

Sincerely

Edward Wisser

Tectonic Notes.- As explained graphically in the various diagrams of Figure 4, bending of a plate around an axis produces longitudinal tension fissures, bending of the axis itself produces cross fractures. Combining the two gives the "two-way" stretch described in connection with Mogollon, where however, intersections of the fractures of the two sets are rare. At Catorce, localization of ore pipes at such intersections offers strong evidence that the two-way stretch was operative during ore formation.

Baker, a petroleum geologist, expresses in his paper on Catorce astonishment that all ore districts seen by him in northeastern Mexico lie in anticlinal structures, and usually in their crestal portions, where open spaces are most likely to occur because of flexing of brittle strata. Baker believes that the thick shale series overlying the ore limestone at Catorce may have acted as a trap for ore-bearing solutions. The present writer assigns to the shale the role of a lubricant whereby cracking and fissuring of the underlying limestone was greatly expedited. The mechanism has been described in connection with Quartz Hill (p.285-286) and other districts.

Bullion (Railroad) District, Nevada

Sources.-

Clarence King et alii (1878), Geological exploration of the Fortieth Parallel: systematic geology

W.H.Emmons (1910), Reconnaissance of some mining camps in Elko, Lander and Eureka Counties, Nevada, U.S.Geol.Survey Bull.408, p.88-99.

Edward Wisser (1951), Unpublished report and field notes.

The Bullion district, with a production of some $3,000,000 in silver, lead and copper, is located at the north end of the Pinyon Range, a

long and narrow north-south range extending from the Humboldt River about 60 miles outh to the neighborhood of Eureka (Plate 1). The Bullion district is 28 miles by road southwest of Elko.

The country rock in the northern portion of the Pinyon Range consists mainly of Ordovician and Devonian limestones and Carboniferous quartzite, intruded by a granodiorite stock and by dikes, irregular masses and sills of quartz porphyry.

Structure.- The strata have been folded into a broad anticline plunging to the north-northeast and broken along its axis by a steep major fault with downthrow on the west. The mining district lies on the west flank of the anticline, just west of the axial fault, and a mile or so south of where the anticline starts to plunge northward.

West of the mining district and farther down the west limb of the anticline is a body of granodiorite elongated east-west, perpendicular to the axis of the anticline.

The anticline is broken by numerous longitudinal and cross fractures, many of which have been invaded by the quartz porphyry dikes. In places dikes intruded along cross breaks are continuous with dikes invading longitudinal fractures. The dikes, which follow the two fracture sets exclusively, bring out the fracture pattern beautifully.

The east contact of the granodiorite stock is planar and dips east at 55°, toward the axial plane of the anticline. The strike of the contact parallels that of the west-dipping beds, but the dip is normal to that of the beds. Along this contact limestone has been changed to tactite along a zone 100 to 400 feet wide.

Ore Deposits.- Most of the production came from the Standing Elk and adjoining mines, located toward the crest of the anticline between the granodiorite stock and the axial fault. Here chimneys of oxidized silver-lead-copper ore in marbleized limestone were localized along the

nearly vertical lines of intersection of cross fractures with longitudinal fractures. At some intersections each fracture lies along one edge of a quartz porphyry dike.

The Standing Elk chimneys cut across the marble beds, which here, near the crest of the anticline, lie nearly flat; and the chimneys developed most strongly in certain favorable horizons.

Tectonic Notes.- The granodiorite stock seems to have emplaced under guidance of one or more cross fissures, lying normal to the anticlinal axis, and which gave to the intrusion its marked east-west elongation, and under the influence also of a longitudinal tension fissure or antithetic fault, which localized the east edge of the stock, which dips east toward the axial plane of the anticline. This planar edge formed a channel both for tactite-forming fluids and for ore-bearing fluids: the tactite zone along the contact carries sporadically distributed copper, lead and silver.

The habit of the quartz porphyry dikes making along longitudinal fissures to send out branches along cross fissures confirms the principle brought out for Catorce: uplifts producing stretching both parallel with the anticlinal axis and normal to it form fractures, the intersections of which are loci for extreme tension. At Bullion no evidence for dike-formation by replacement appears; the dikes seem to have filled fissures that were widening as the magma entered them. At Bullion a longitudinal dike is joined from the west (but not crossed by) a cross dike, forming one continuous T-shaped dike. Where the stem joins the cross piece of the T the quartz porphyry swells to form a nearly equant pipe 500 feet in diameter. Such phenomena reflect strong tension and the ability of competent limestone to rupture widely.

Channels for the Standing Elk ore-bearing fluids were provided mainly

by dike contacts, both of the longitudinal and cross fracture systems. After intrusion of the dikes the uplift which triggered the intrusion persisted to reopen longitudinal and cross fissures, even some of these now filled with dikes. Reopening being strongest where fissures of one set crossed those of the other, ore-bearong solutions ascended the zone of intersection and deposited the Standing Elk lead-silver ores as replacement pipes.

STRATHMORE BOND
RAG CONTENT 100%

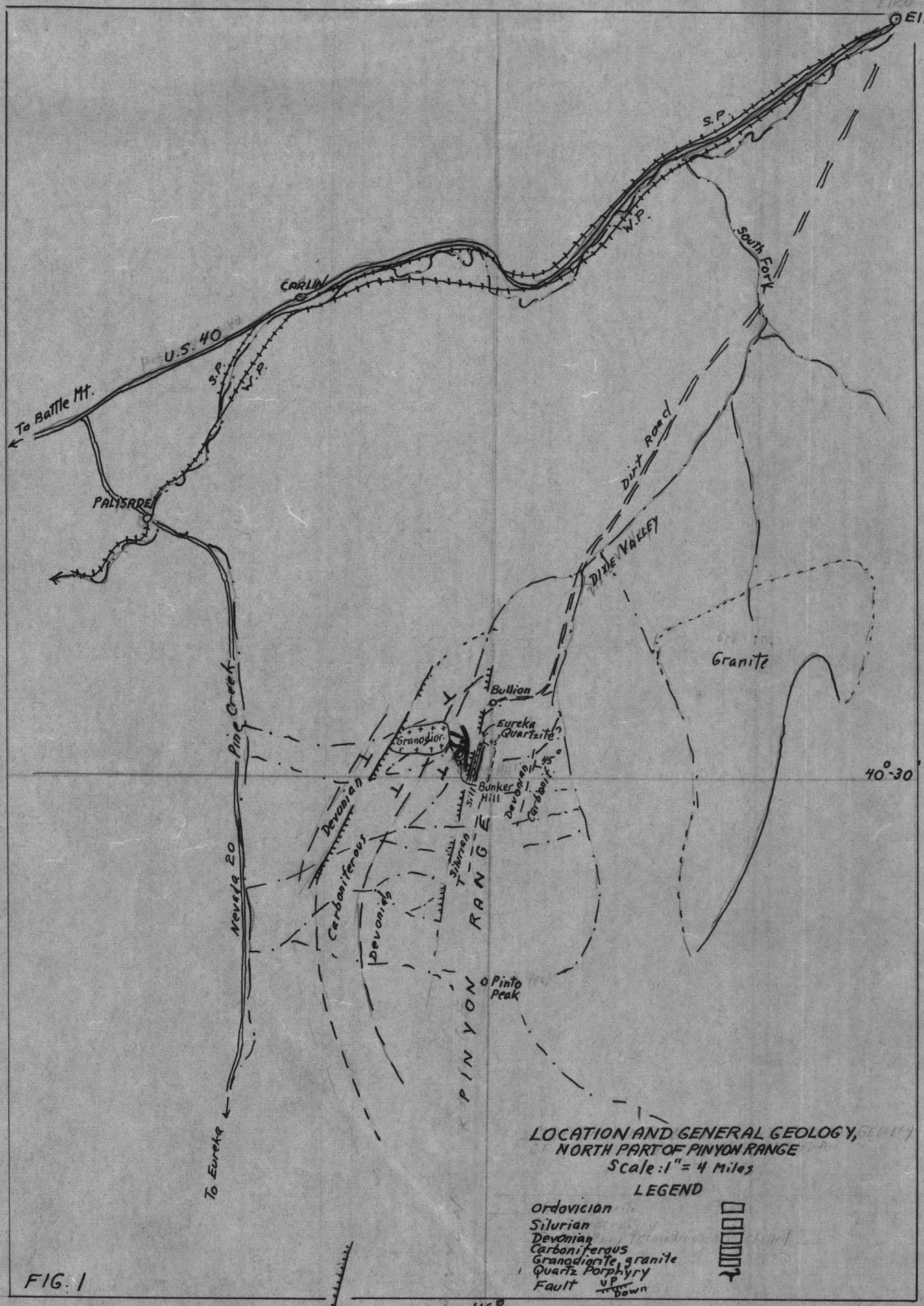
EIKO
S.P.
W.P.
South Fork
CARLIN
U.S. 40
S.P.
W.P.
To Battle Mt.
PALISADE
Dirt Road
DIXIE VALLEY
Granite
Bullion
Eureka Quartzite
Granodior.
Bunker Hill
Silurian
Devonian
Carbonif.
Devonian
Carboniferous
Devonian
Silurian
PINYON RANGE
Pinto Peak
Pine Creek
Nevada 20
To Eureka
40°-30'
116°
LOCATION AND GENERAL GEOLOGY,
NORTH PART OF PINYON RANGE
Scale: 1" = 4 Miles
LEGEND
Ordovician
Silurian
Devonian
Carboniferous
Granodiorite, granite
Quartz Porphyry
Fault
UP
Down

FIG. 1

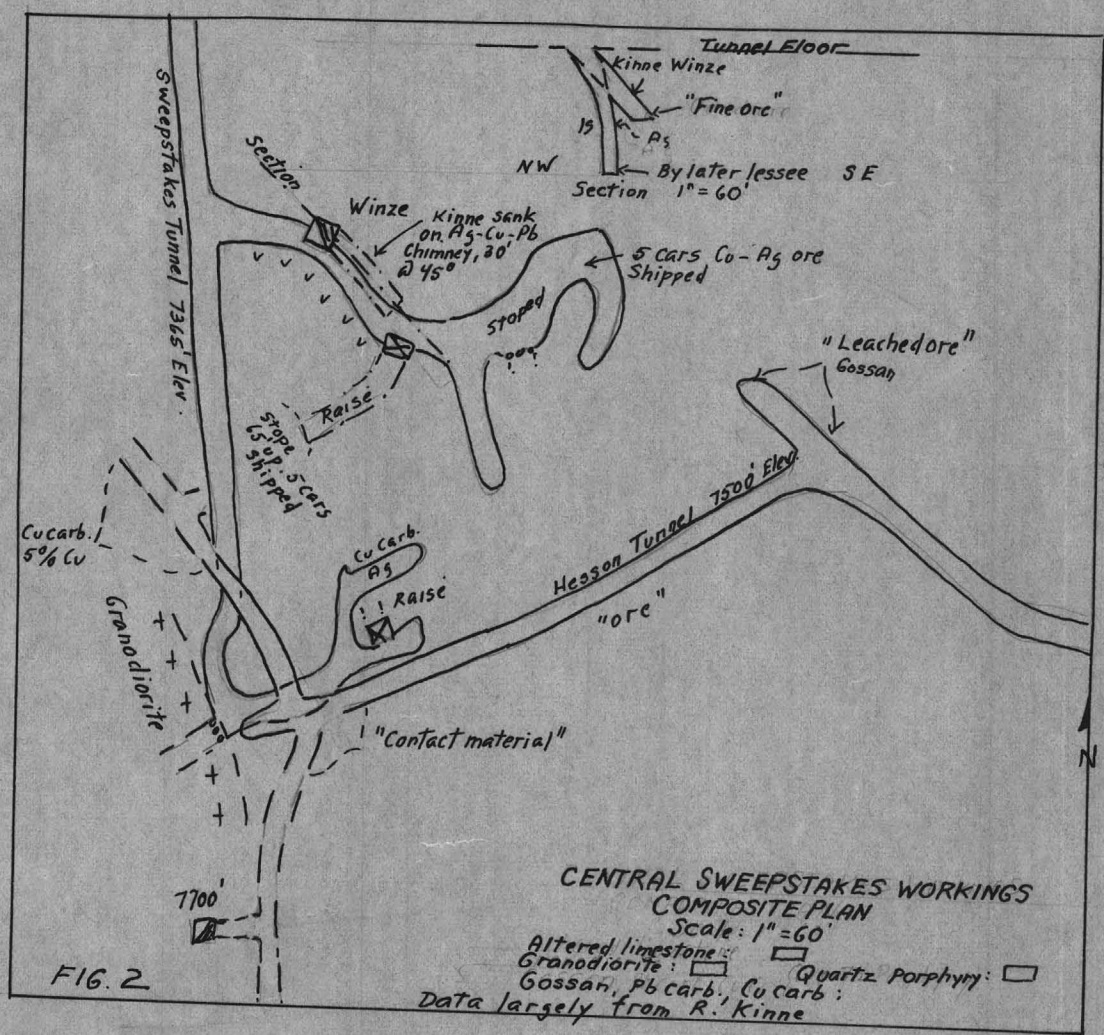
Tunnel Floor
Kinne Winze
"Fine ore"
Ag
NW
By later lessee
SE
Section 1" = 60'
Sweepstakes Tunnel 7365' Elev.
Section
Winze
Kinne sank on Ag-Cu-Pb Chimney, 30' @ 45°
5 cars Cu-Ag ore Shipped
stoped
"Leached ore"
Gossan
Raise
Stope 65 cu. 5 cars shipped
Hesson Tunnel 7500' Elev.
Cu carb. 5% Cu
Cu carb. Ag
Raise
"ore"
Granodiorite
"Contact material"
N
7700'
CENTRAL SWEEPSTAKES WORKINGS
COMPOSITE PLAN
Scale: 1" = 60'
Altered limestone:
Granodiorite:
Quartz Porphyry:
Gossan, Pb carb., Cu carb:
Data largely from R. Kinne

FIG. 2

RECONNAISSANCE REPORT ON THE

BULLION (RAILROAD) LEAD-SILVER-COPPER DISTRICT

ELKO COUNTY, NEVADA

Edward Wisser

August 5, 1951

SUMMARY STATEMENT

The Bullion lead-silver-copper district lies 28 miles by road southwest of Elko, Nevada, at the northern end of the Pinyon Range, composed mainly of Paleozoic sediments. Within the district the sediments, chiefly limestone, have been folded into a north-pitching anticline which has been faulted along its axis. On the west flank of the anticline a mass of granodiorite intrudes the sediments, altering the limestone along its eastern contact to garnet rock. Quartz porphyry dikes, irregular masses and sills also intrude the limestone, largely along tension fissures parallel with and perpendicular to the anticlinal axis.

The bulk of the district production, possibly about $3,000,000 in silver, lead and copper, came from the eastern part of the district, just west of the axial fault. Here ore chimneys formed along intersections between fractures in limestone; one of the two intersecting fractures in each case is commonly along or near a contact with quartz porphyry. A deep tunnel driven below these chimneys has failed to find their downward extensions.

Along the belt of garnet rock next the granodiorite intrusive mass in the western part of the district, sporadic bunches of copper-silver and lead-silver oxidized ore have been mined near the surface. Exploration at depth along the granodiorite contact, beneath these surface ore bodies has exposed mainly gossan with bunches of ore like those mined above but lower in grade and probably smaller.

Chrysocolla has been mined, mainly for flux, at various scattered places, usually close to quartz porphyry dikes. Exploration of the largest such deposit at depth found only fresh marble.

The Bullion district is not thought worth a detailed examination.

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RECONNAISSANCE REPORT ON THE BULLION (RAILROAD) LEAD-SILVER-COPPER DISTRICT, ELKO COUNTY, NEVADA

INTRODUCTION

In the summer of 1950 Mr. Martin L. Reite,who is Personnel Manager of the Key System Transit Lines,presented a well-written summary of the Bullion district, including maps. He emphasized the western portion of the districts,where he owns the claims shown on the accompanying Sketch Geologic Map. His presentation was of sufficient interest to warrant a trip to the district,made by the writer July 17 and 18, 1951. Mr. Reite was on the property at the time,and on July 17 Mr. Ira S. Pearce,owner of the Sweepstakes and Sweepstakes South claims (see map cited) and Mr. Robert Kinne,long aquainted with the district, together with Mr. Reite,accompanied the writer in an inspection of the western portion of the district. On July 18 the 5th Level,Standing Elk mine,was shown the writer and Mr.Reite by Mr.Holman, a lessee,and the Sylvania workings mapped.

Mr.Kinne proved himself reliable; much of the information given below on the Sweepstakes area derives from him; Mr.Reite also demonstrated in the field that his summary of last year was essentially correct with regard to facts.

Information derived from publications and reports is cited below.

LOCATION. TOPOGRAPHY. COMMUNICATIONS.

The Bullion district lies at the north end of the Pinyon Range, one of the long,narrow north-south ranges typical of the Great Basin, and extending from the Humboldt River about 60 miles south tomthe neighborhood of Eureka. The highest point in the range, Bunker Hill or Ravens Nest,is shown on the Sketch Geologic Map. The Bullion district is 28 miles by fair road southwest of Elko,and 16 miles by road southeast of Palisade,the nearest railroad loading point.

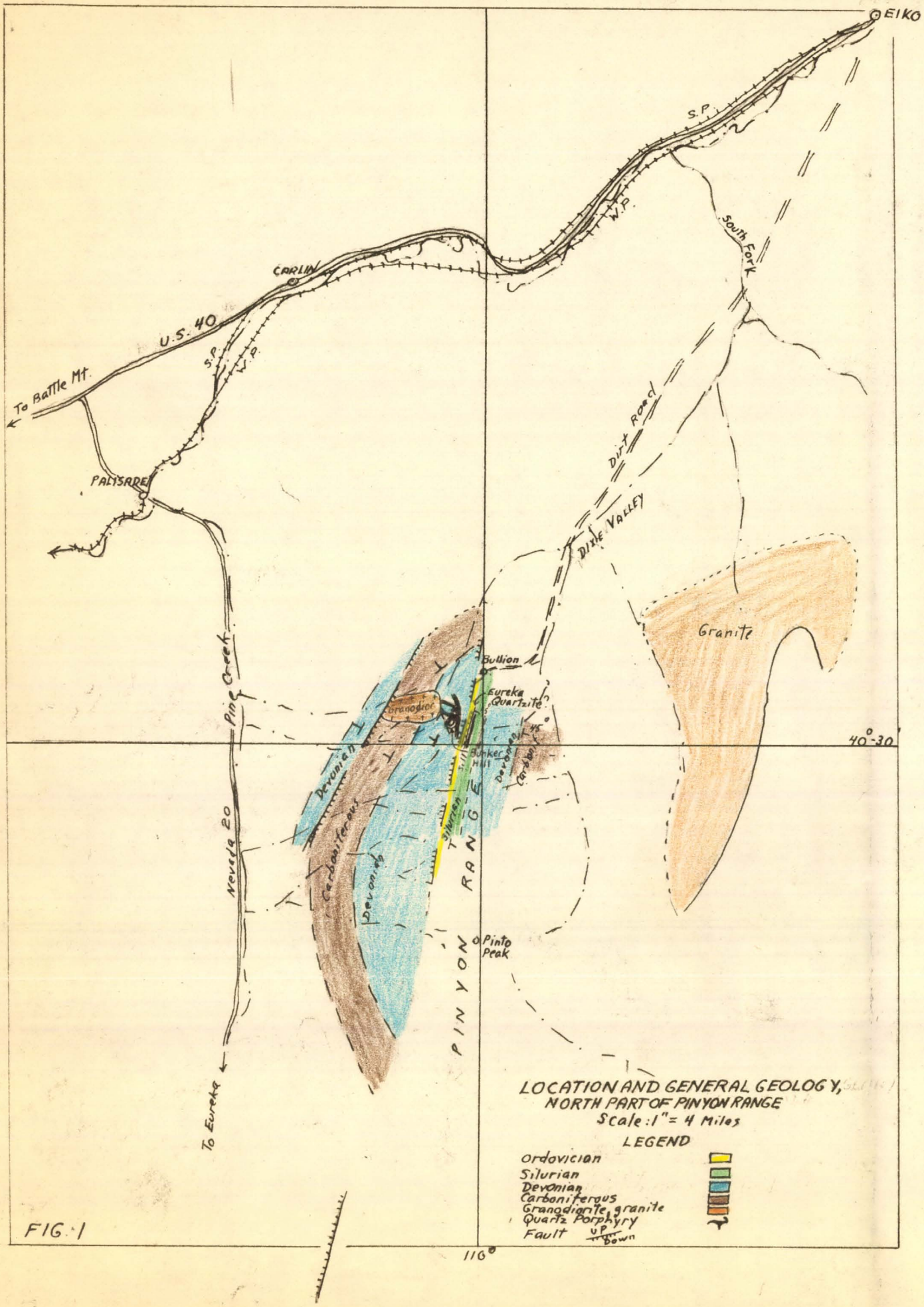

EIKO
S.P.
W.P.
South Fork
CARLIN
U.S. 40
S.P.
W.P.
To Battle Mt.
PALISADE
Dirt Road
DIXIE VALLEY
Granite
Bullion
Eureka Quartzite
Granodiorite
Bunker Hill
Devonian
Carboniferous
Silurian
Devonian
Carboniferous
Devonian
Pine Creek
Nevada 20
PINYON RANGE
Pinto Peak
To Eureka
40°-30'
116°
LOCATION AND GENERAL GEOLOGY,
NORTH PART OF PINYON RANGE
Scale: 1" = 4 Miles
LEGEND
Ordovician
Silurian
Devonian
Carboniferous
Granodiorite, granite
Quartz Porphyry
Fault UP Down

FIG. 1

GENERAL GEOLOGY

Piecing together what geologic data are available[1], the north por-

1. U.S.Geological Exploration of the Fortieth Parallel,1878.
Geology of the Eureka District,Nev.Arnold Hague.U.S.G.Mon.20,1892.
Reconn.of some Mining Camps in Elko, Lander, & Eureka Counties,Nev.
W.H.Emmons.U.S.G.S.Bull.408, 1910.

tion of the Pinyon Range,composed mainly of Paleozoic sediments,is, in its structure, an anticline plunging to the NNE and faulted along the anticlinal axis by a major fault with downthrow on the west. (See Fig.1,facing this page). While the abandoned town of Bullion probably lies just east of this fault,the mining district lies just west of it.

The chief sedimentary rock of the Bullion mining district is limestone,light to dark gray or bluish,commonly marbleized,thin to thick-bedded. According to Emmons(1910 reference) this limestone is of Ordovician age;but judging by a section through Bunker Hill (Ravens Nest) peak made by C.D.Walcott (U.S.G.S. Mon.20,p.201) it is Devonian west of the major fault,with the Ordovician confined to a narrow belt on the east side of the major fault mentioned.(See Geologic Sketch Map,in pocket).

The district is bounded on the west by a body of granodiorite which seems to cut across the Devonian and Carboniferous beds,and has been complexly intruded by dikes, irregular masses and probably sills of quartz porphyry.The major quartz porphyry dikes trend either north, roughly parallel to the anticlinal axis and major fault,or northwest, perpendicular to the anticlinal axis.They probably intruded with or soon after the folding,along tension fissures longitudinal to the fold axis and along tension fissures transverse to that axis (cross-joints). The quartz porphyry is probably later than the granodiorite.

The east contact of the granodiorite dips east at 55°.The limestone next the contact, along a zone 100-400' wide,has been altered to garnet rock. Within this zone occur sporadically oxidized and primary copper, lead and silver ore.

The quartz porphyry has locally accentuated the general marbleization of the limestones, but has garnetized the latter only locally. But the contacts of these dikes and masses have, like the granodiorite east contact, markedly localized ore, in this case, the rich silver-lead-copper chimneys of the east part of the district (Standing Elk area: see below).

MINERALIZATION

The Bullion district, discovered in the late sixties, is said to have produced about $3,000,000 in silver, lead and copper (Emmons, 1910, p.90). Most of this production came from the Standing Elk area (Sketch Geologic Map). Here chimneys of oxidized silver-lead-copper ore in marbleized limestone cropped out and led to the initial discovery. The chimneys were localized along the nearly vertical lines of intersection of east-west or northwest fractures, often coinciding with porphyry-limestone contacts, and north-south fractures, some of which also are along or near porphyry contacts (e.g. Tripoli mine).

There appear to have been two such chimneys in the Standing Elk mine. That to the north, called the Hussey, seems to have been the first major discovery. The early history of its development and mining is described by Rossiter W. Raymond (Statistics of Mines & Mining in the States & Territories West of the Rocky Mountains: Annual Reports, 1872 through 1875). The trend of the Hussey deposit was northwest (Sketch Geologic Map, northwest break near center of Standing Elk claim?).

The ore as first mined near the surface consisted of lead carbonate, copper oxides and carbonates and residual galena; it carried up to 220 ounces or more silver per ton. Coarse crystalline calcite surrounded the ore body, and the finding of such calcite along a stringer, with or without copper stain indicated proximity to ore and encouraged drifting along the stringer. By 1874 a chimney 30 ft. x 30 ft. x 60 ft. high

had been mined above the 210' level.A winze to the 280 proved the chimney to continue to that horizon with about the same cross-section. Here the ore was mainly galena and pyrite and ran 22% lead and 45 oz. silver.

Mr. Holman, a Standing Elk lessee, showed me what I believe is the south fringe of the Main chimney. He had just discovered, one set above the No. 5 Tunnel, a southern extension of this chimney, localized along a WNW, vertical break at its intersection with a north-south break; the ore, which was lead and copper carbonates with galena, seemed to make out from the line of intersection upwards to the east, along the marble beds. No porphyry was seen in the small stope, which adjoins an old raise and a larger, old stope, on the south, but garnetized lime suggests the proximity of porphyry, and since garnet, according to Holman, accompanies the ore, one of the ore breaks, probably the WNW one, probably lies close to a porphyry contact.

The Standing Elk steep chimneys cut across the flat-dipping marble beds, and they ~~xxxxp~~ seem to make strongest in certain favorable beds. Mr. Holman has recognized this fact and plans to raise on a nearby small chimney which pinched going upward, in the hope it will expand in an overlying favorable bed.

Another pair of lessees is gouging out the fringes of the Hussey chimney with poor success. Working above the No.5 Tunnel they shipped in 1950 960 tons averaging 17 oz. silver, 8.4% lead, 5.5% zinc and 3.3% copper.

Ore occurrence at the Tripoli is similar (Sketch Geologic Map). This was also an early discovery; the ore carried 1000 oz. silver near the surface. According to Emmons (1910) the ore occurs along a zone of crushed limestone striking N20°W, dipping 85°W to vertically, close to a north-south porphyry contact. Since the attitude of the beds here is the same as that

of the fissure zone, the latter probably coincides with a limestone bed. Two northeast breaks, dipping steeply northwest, cross the fissure zone; one of these appears on the Sketch Geologic Map. Chimneys of lead and copper carbonates with galena and high silver occurred at or near intersections of the northeast breaks with the N20°W fissure zone. The bottom of a winze, 300' below the surface exposed garnet and tremolite, suggesting proximity to the porphyry. Emmons was told that the ore here ran $25 per ton in lead and silver.

The Mounted Ledge deposit, on the southeast slope of Bunker Hill, is said to lie along the east contact of a north-south porphyry dike or sill that may be the southern extension of the Tripoli porphyry (Sketch Geologic Map).

In the western portion of the district mineralization is concentrated mainly within the belt of garnet rock bordering the granodiorite intrusive on the east (p.3). A series of shallow workings along this contact is shown on the Sketch Geologic Map. The granodiorite contact may be in part a fault or fissure, for while the granodiorite contact swings off to the west in the Sweepstakes South claim, the line of workings continues to the south.

Little can be seen of the ore mined in these cuts, tunnels etc., beside copper and lead carbonates on the dump, some chrysocolla and occassional chalcopyrite. According to Emmons, the metallic minerals were sporadically distributed through the garnet rock, but in places concentrated in low-grade ore bodies of considerable extent, running 3-8% copper with considerable silver. Emmons states that oxidation is not complete, even at the surface in places, and here pyrite, chalcopyrite, bornite, galena and blende predominate over limonite, cerussite, azurite, malachite and chrysocolla.

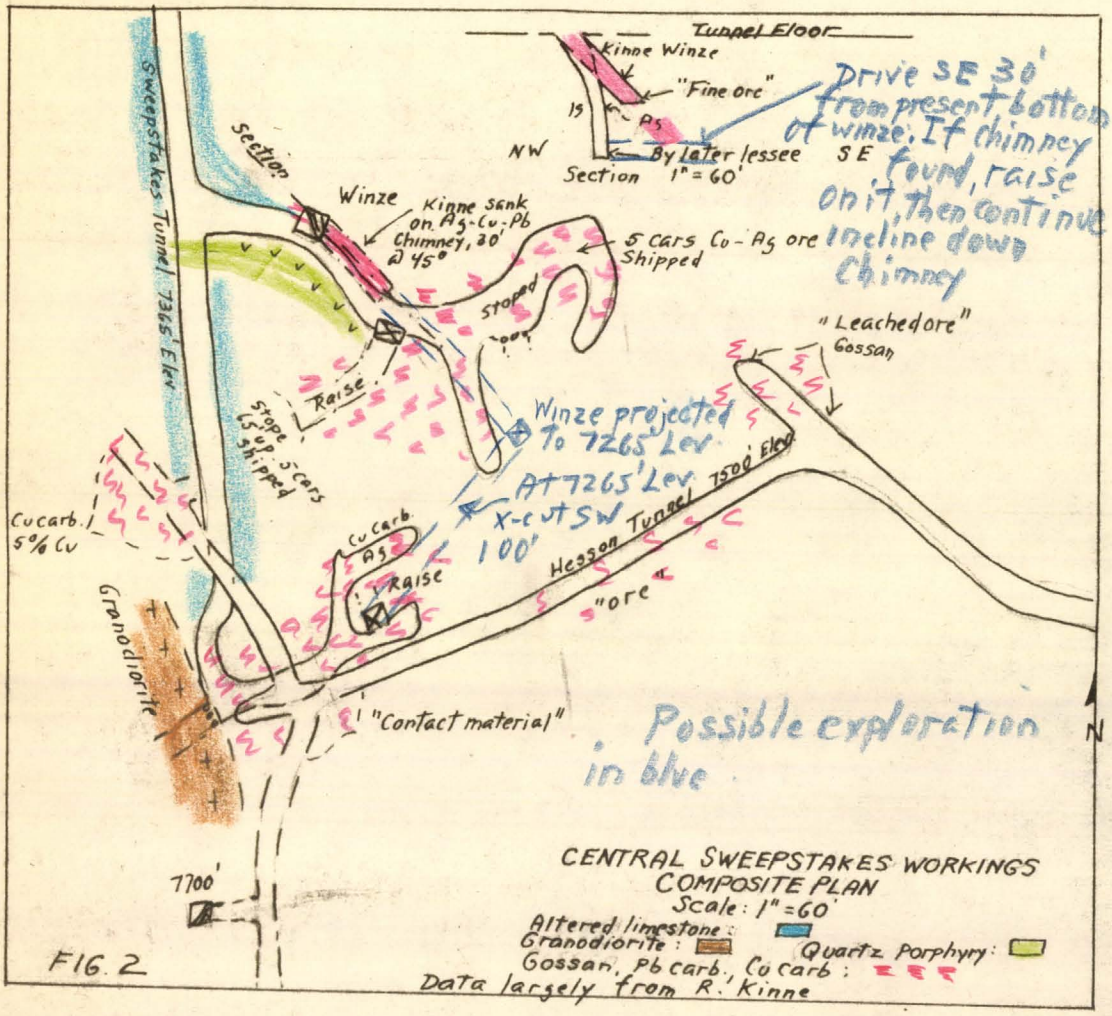

Tunnel Floor
Kinne Winze
"Fine ore"
Drive SE 30' from present bottom of winze. If chimney found, raise on it, then continue incline down chimney
15
Ag
NW
By later lessee
SE
Section 1" = 60'
Section
Winze
Kinne sank on Ag-Cu-Pb chimney, 30' @ 45°
5 cars Cu-Ag ore shipped
Stoped
"Leached ore"
Gossan
Sweepstakes Tunnel 7365' Elev
Raise
Stope 15 up 5 cars shipped
Winze projected to 7265' Lev.
At 7265' Lev. X-cut SW 100'
Cu carb. 5% Cu
Cu carb.
Ag
Raise
Hesson Tunnel 7500' Elev
"ore"
Granodiorite
"Contact material"
Possible exploration in blue
N
7700'
CENTRAL SWEEPSTAKES WORKINGS
COMPOSITE PLAN
Scale: 1" = 60'
Altered limestone:
Granodiorite:
Quartz Porphyry:
Gossan, Pb carb., Cu carb:
Data largely from R. Kinne

FIG. 2

While the Standing Elk No.5 tunnel successfully developed the silver-lead-copper chimneys in that area at a depth of 500 ft.below the the surface,similar exploration in the western part of the district, in the belt along the granodiorite contact, have been failures. The original Sweepstakes discovery (Sketch Geologic Map) is said by Raymond (4th Annual Report, 1872) to have yielded,close to the surface, copper oxide-silver ore running 30% copper. The Hesson tunnel,now caved,was driven under this showing in the nineties,but found only gossan material,with sporadic,low copper as carbonate.(See Fig.2, facing this page). In 1913-14 the Hesson level was driven south along the granodiorite contact zone for 1000',to get under the string of surface workings shown on the Sketch Geologic Map. Although backs of 200 ft.plus existed between this drift and the surface,there is no record of any ore having been found.

Later the Sweepstakes tunnel;135 ft.lower than the Hesson,was driven south,as shown on the Sketch Geologic Map,to get under the gossan discovered in the Hesson tunnel. The writer inspected this tunnel,which exposes the contact zone still highly oxidized,with sporadic bunches and chimneys of silver-copper and lead-silver ore.According to Mr. Reite, lessees shipped,during the eleven years 1949-1950,some 20 cars of such ore,from the workings on and above the Sweepstakes tunnel shown in Fig.2. Mr.Kinne during this period sank a winze on a small but well-defined silver-copper-lead chimney along the northeast contact of a porphyry dike.The chimney pitched flatly southeast;a lessee succedding Mr. Kinne steepened the incline and passed below the chimney, as shown in the Section,top of Fig.2.

Scattered mineralization occurs also in the central portion of the district,localized commonly along the contacts of northwest porphyry

dikes and masses. A mineralized zone, apparently unexplored at depth,extends eastward from the mouth of the Hesson tunnel toward the old Ella chrysocolla open cut.The zone shows clayey manganese oxide, soft unctious clay material called at Bisbee "soap", limonite and copper stain.

The Ella open cut, mined about 1873,carried, according to Raymond (5th Annual Report,1873),chrysocolla,azurite, copper oxide and native copper. The ore body may have been localized along a northwest break carring a narrow porphyry dike. Here again exploration at depth was fruitless,for the Sylvania tunnel (see below) was driven about 1890 to tap this ore body about 150 ft.beneath the open cut. As shown in Fig.3,only barren marble was found,although exploration has not completely accounted for the area beneath the Ella ore body.

Chrysocolla was mined atba number of other places, as shown on the Sketch Geologic Map. Most of the surface workings indicate that the ore was in limestone but close to porphyry.

The Sylvania workings,on Mr. Reite's property,were mapped by the writer. After the abortive 1890 attempt to tap the Ella ore body other operators about 1905 drove south on the knife-edge copper carbonate seam shown in Fig.3 until they encountered the narrow northwest porphyry dike,where they encountered the top of an ore chimney in the dike hanging wall. Following this down flatly to the southwest it soon became apparent that they were following the intersection of the porphyry dike ("N Dike" in Fig.3) with a northeast break,the "Ore Break". They therefore flattened the incline,leaving the N Dike below them,and followed the Ore Break southwest. In doing so,as shown on the Longitudinal Projection, Fig.3A,they passed along the top of the chimney. Later small-scale underhand gouging disclosed ore beneath the drift about 2 ft.wide, lead and copper carbonates.

CHANCES FOR NEW ORE IN THE DISTRICT

Two days in the district permitted only hurried reconnaissance. Data so obtained were pieced out from old publications and reports, and from information furnished by Messrs. Kinne and Reite. A map accompanying a compiled report by F.G. Gibson, April 15, 1951, on the Aladdin Mining Co. holdings, is the basis of much of the accompanying Sketch Geologic Map. This Gibson map was traced in 1947 from a sketch map by Stanley Davis, listed in the Mines Handbook for 1926 as superintendent of the Nevada Bunker Hill Mining Co. (now Aladdin Mining Co.). Conclusions reached in the present report are therefore strictly tentative.

Standing Elk Area.- This, the source of the bulk of district production, merits first consideration. The Standing Elk silver-lead-copper chimneys, while their maximum diameter is only 50' (Emmons) had theoretically a chance for depth extension, since they follow lines of intersection between different sets of ore breaks that extend down indefinitely. The Davis tunnel, started in 1903, was designed to cut the Tripoli and Standing Elk ore structures about 800 ft. below the No. 5 tunnel. A hurried inspection of the Davis tunnel convines the writer that these workings are correctly shown on the Gibson map, transferred to my Sketch Geologic Map.

The straight portion of the tunnel ending in the north part of the Standing Elk claim, shows next to no mineralization. The southeast workings, which are more extensive than shown, do show fracturing, iron-staining, limonite, alteration etc., with possibly a little oxidized copper- lead ore. The downward extension of the Tripoli NNW fissure would be cut in the Davis tunnel; if so, it was barren. The west drift from the southeast workings lies smack below the Standing Elk Main Chimney. This latter work was done by the Newmont Mining Cor-

poration, which had the Aladdin Mining Co.property optioned,1939-1946. Newmont engineers made a mine model,showing ore structures, fracture structure etc. They probably dropped their option because detailed study had convinced them that the Davis tunnel developments made it unlikely that sizable ore bodies existed on that level.

The Standing Elk No.6 and No.7 levels were driven from winzes put down from No.5 tunnel.Exploration on these lower levels is said to be scanty,but there is a hint in Gibson's report that so far as it went it was disappointing. Discounting this possibility,there is plenty of room (about 800 ft.vertically) between the No.5 tunnel and the Davis tunnel for downward extensions of known chimneys or for new chimneys.

Comparing chances for the ground below the No.5 tunnel with the known record of the ground above it,there seems to be a limit to the amount of ore to be expected. Judging by the fragmentary production data at hand,with what I saw of the old stopes, I doubt if 100,000 tons of ore have been mined underground in the entire district. Gibson claims considerable fringe ore around the mined Standing Elk chimneys,some of which could not be mined because of ~~its~~ the high zinc content (up to 35% around the Hussey chimney). The former mining doubtless was selective,picking the high-silver, lead carbonate cores from the chimneys;but it is doubtful if over 150,000 tons of core and fringe ore together were ever developed in the Standing Elk mine between the No.5 tunnel and the surface.

The same amount below the No.5 tunnel,if in the form of sulphides, would make an attractive operation,since the copper, lead and zinc could be separated by flotation. Secondary copper sulphides would make the operation still sweeter;unfortunately none may be expected,since the marble wall rock in the zone of oxidation has precipitated the copper more or less <u>in situ</u>. Oxidation in the Davis tunnel looks fully as strong as in

the No.5 tunnel,so that not even chalcopyrite may be expected,except locally, ~~except locally~~, in any ore found above the Davis tunnel. Even the galena in such ore would probably be mixed with cerussite and the zinc also would be largely carbonate. Such ore is undesirable for shipping and cannot well be milled.

Sweepstakes Area.- Here exploration at depth along the east contact of the granodiorite has revealed only gossan with sporadic copper-silver-lead mineralization in oxidized form. It is true that the gossan in the Hesson tunnel area (Fig.2) and elsewhere is rather extensive and might represent considerable bodies of primary copper ore with some lead;but the socalled "contact metamorphic" copper ore bodies have a bad name, not so much because the average grade of ore in them is low,as because the ore is sporadically distributed,small bunches of good ore being separated by wide stretches of utter waste. Kinne's winze has demonstrated the presence of at least one small lead chimney in this area,and lead carbonate was mined near the surface;but garnet zones in general do not favor lead chimneys,because these are formed by replacement of limestone,and contact-metamorphic silicates are not easily replaced.

Sylvania Area.- Here,as in the Kinne winze,the presence of a lead chimney, with copper,is demonstrated. It could be developed rather cheaply be deepening the incline; drifting northwest and southeast along both contacts of the Main dike,as suggested in Fig.3,might develop "wings" from this chimney,or find new chimneys. But nothing here indicates anything sizable in the way of ore bodies.

Chrysocolla Ore Bodies.- These have nowhere been proved to represent surface expressions of ore bodies at depth. The chrysocolla seems to have derived its silica from decomposition of the porphyry with which these ore bodies appear associated. The copper in chrysocolla often has travelled far from its original source;once converted to silicate it tends to

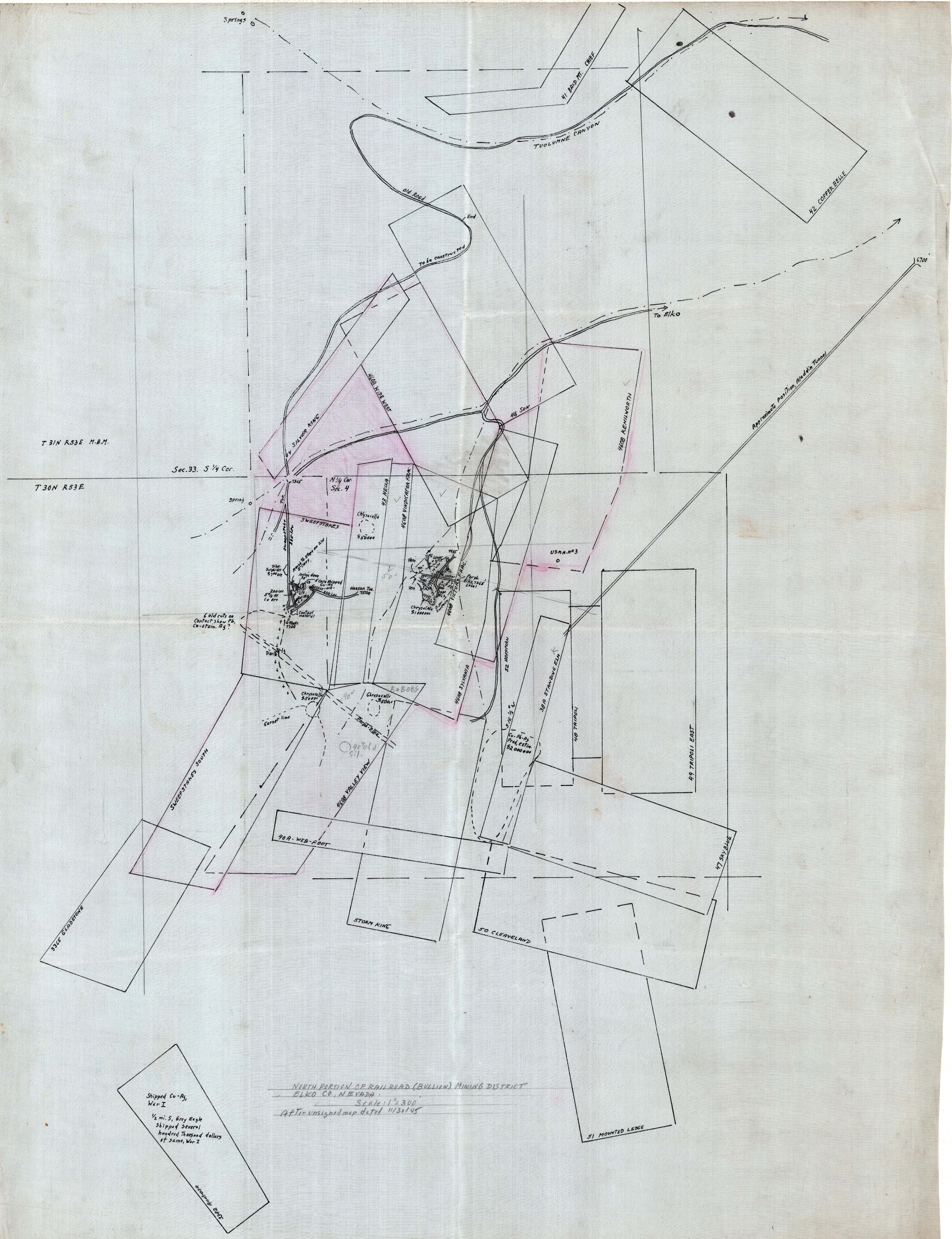
"stay put", being only slightly soluble by ordinary weathering solutions. It is not thought that the numerous chrysocolla showings in the Bullion district have any necessary significance in terms of ore of other type below them.

CONCLUSIONS

The object of this examination has not been to determine whether the Bullion district merits exploration, but only to decide whether a detailed geologic examination is warranted, provided a satisfactory deal with property owners can be arranged. The district is complex enough so that the possibility that detailed study might make it look attractive cannot be ruled out. This type of risk is inherent in all exploration campaigns. With regard to Bullion, the question is not whether it contains accessible, profitable ore bodies which might be found by detailed geologic work, but whether some district with more evident possibilities might not be found, in which to risk exploration money. I think a more promising district can be found, and do not recommend further work in the Bullion District.

Edward Wisser

Berkeley, August 3, 1951 Edward Wisser


Springs
41 BALD MT. CHIEF
TUOLUMNE CANYON
42 COPPER BELLE
Old Road
End
To be constructed
To Elko
6700'
Approximate position, Aladdin Tunnel
T 31N R53E M.B.M.
Sec. 33. S 1/4 Cor.
T 30N R53E
SILVER KING
44 HOB WIDE WEST
46 SUN
46 KENILWORTH
N 1/4 Cor. Sec. 4
43 HECLA
46 VINDICATOR FRAC.
SWEEPSTAKES
Chrysocolla $50000
USM.M. No 3
46 VICTOR FRAC.
Hesson Tun. 7500
Contact materials
Shaft 7700
Diorite
52 HOFFMAN
46 SYLVANIA
38A STANDING ELM
48 TRIPOLI
49 TRIPOLI EAST
Chrysocolla $50000
Garnet lime
Porph. Dike
Cu-Pb-As Prod. estim. $2,000,000
SWEEPSTAKES SOUTH
46 VALLEY VIEW
40A - WEB-FOOT
47 SKY BLUE
33G5 GLADSTONE
STORM KING
50 CLEAVELAND
51 MOUNTED LEDGE
Shipped Cu-Ag, War I
1/2 mi. S, Grey Eagle shipped several hundred thousand dollars of same, War I
3382 Rinconda
NORTH PORTION OF RAILROAD (BULLION) MINING DISTRICT
ELKO CO., NEVADA.
Scale: 1" = 300'
After unsigned map dated 11/30/45

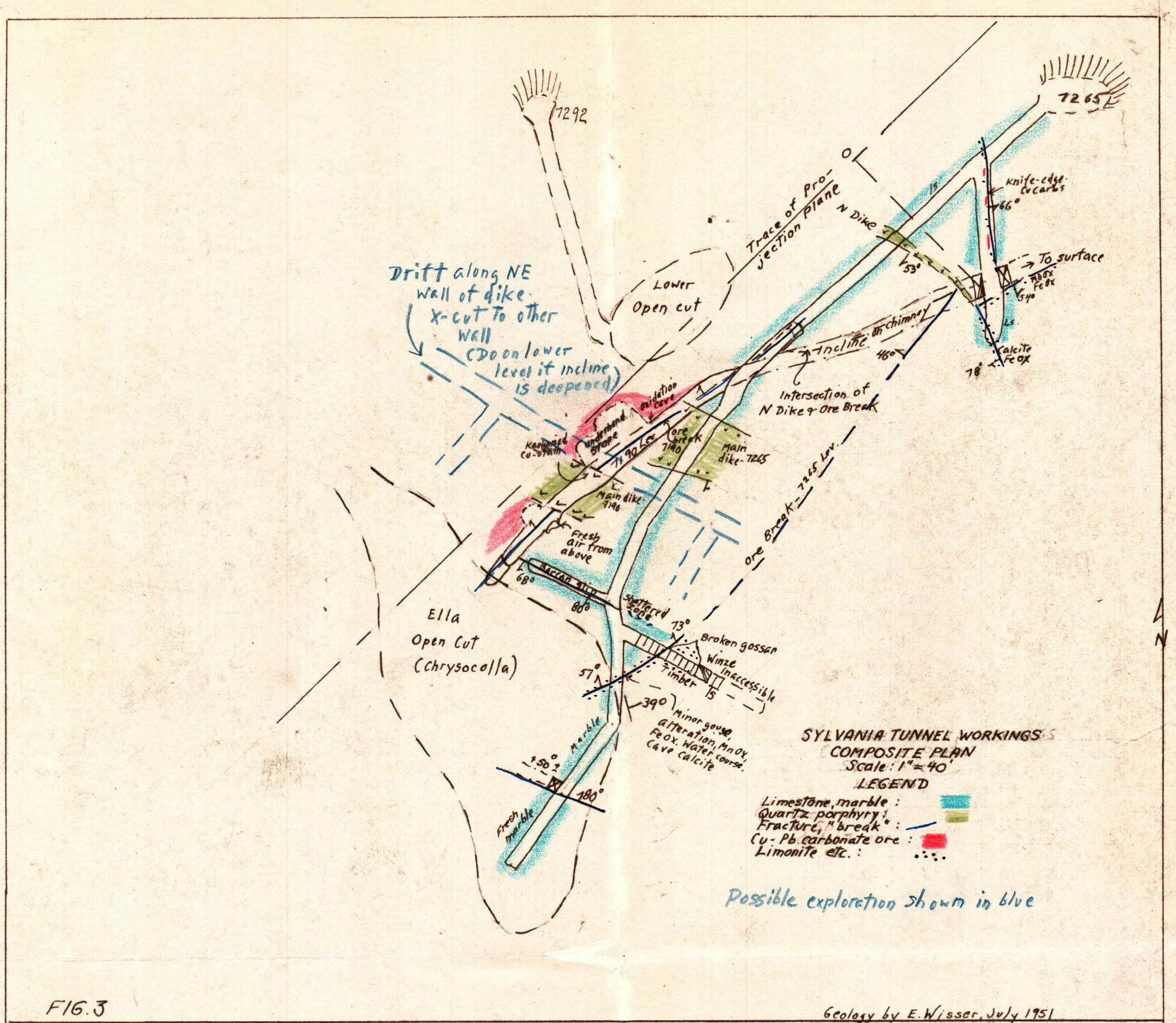
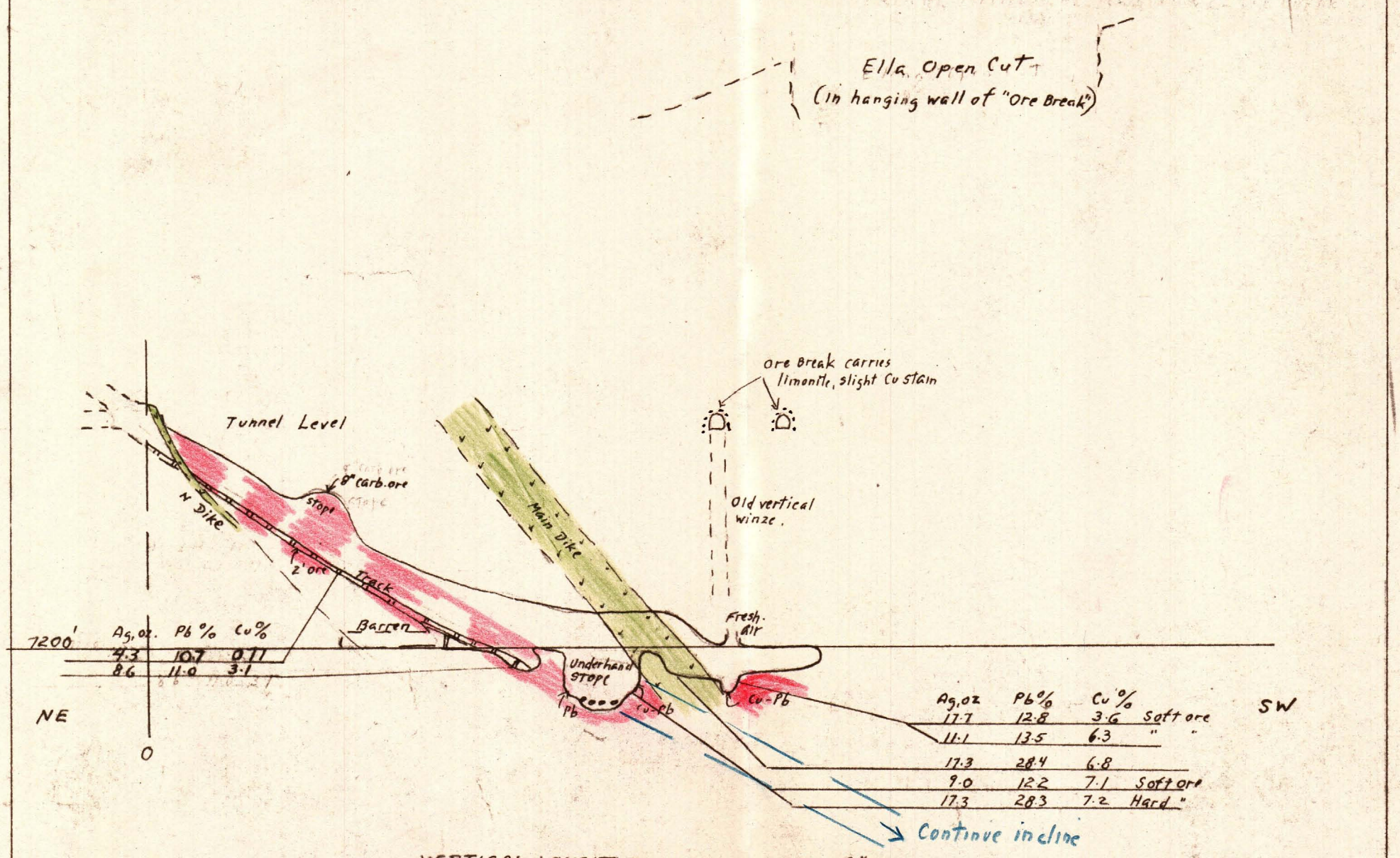


FIG. 3

Geology by E. Wisser, July 1951



VERTICAL LONGITUDINAL PROJECTION of "ORE BREAK"
Scale: 1" = 40'

FIG. 3A

FIG 3. Sylvania Workings

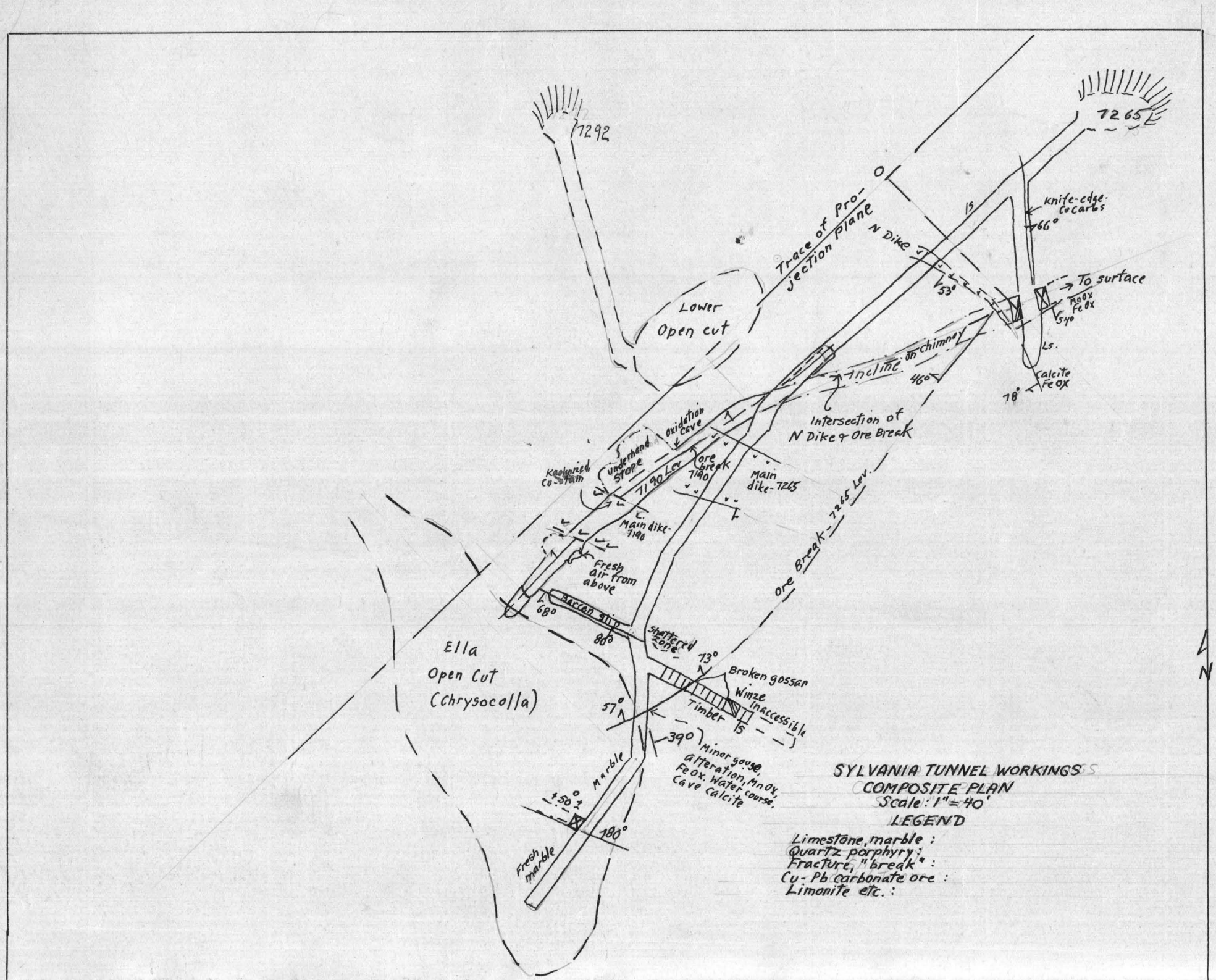
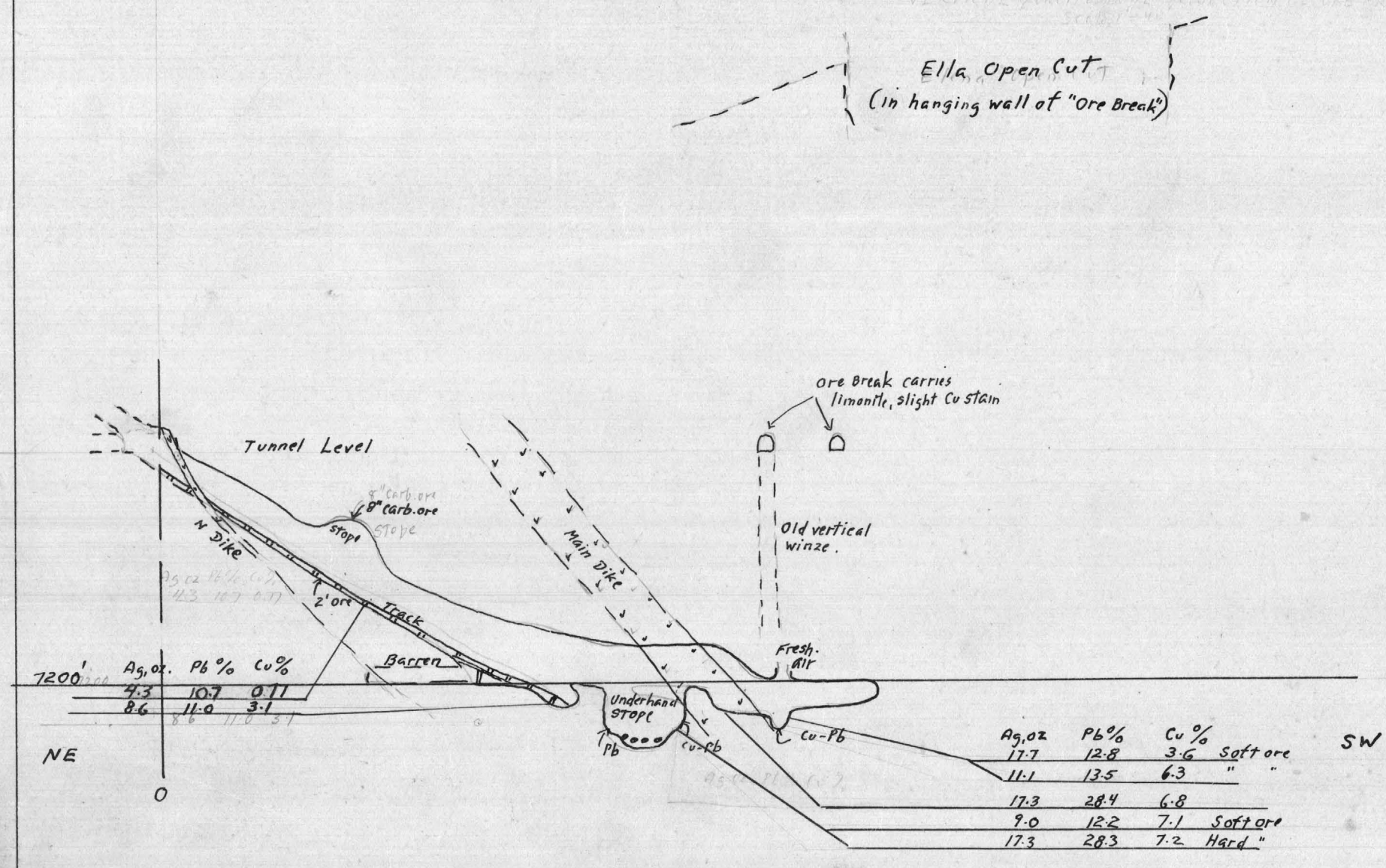


FIG. 3

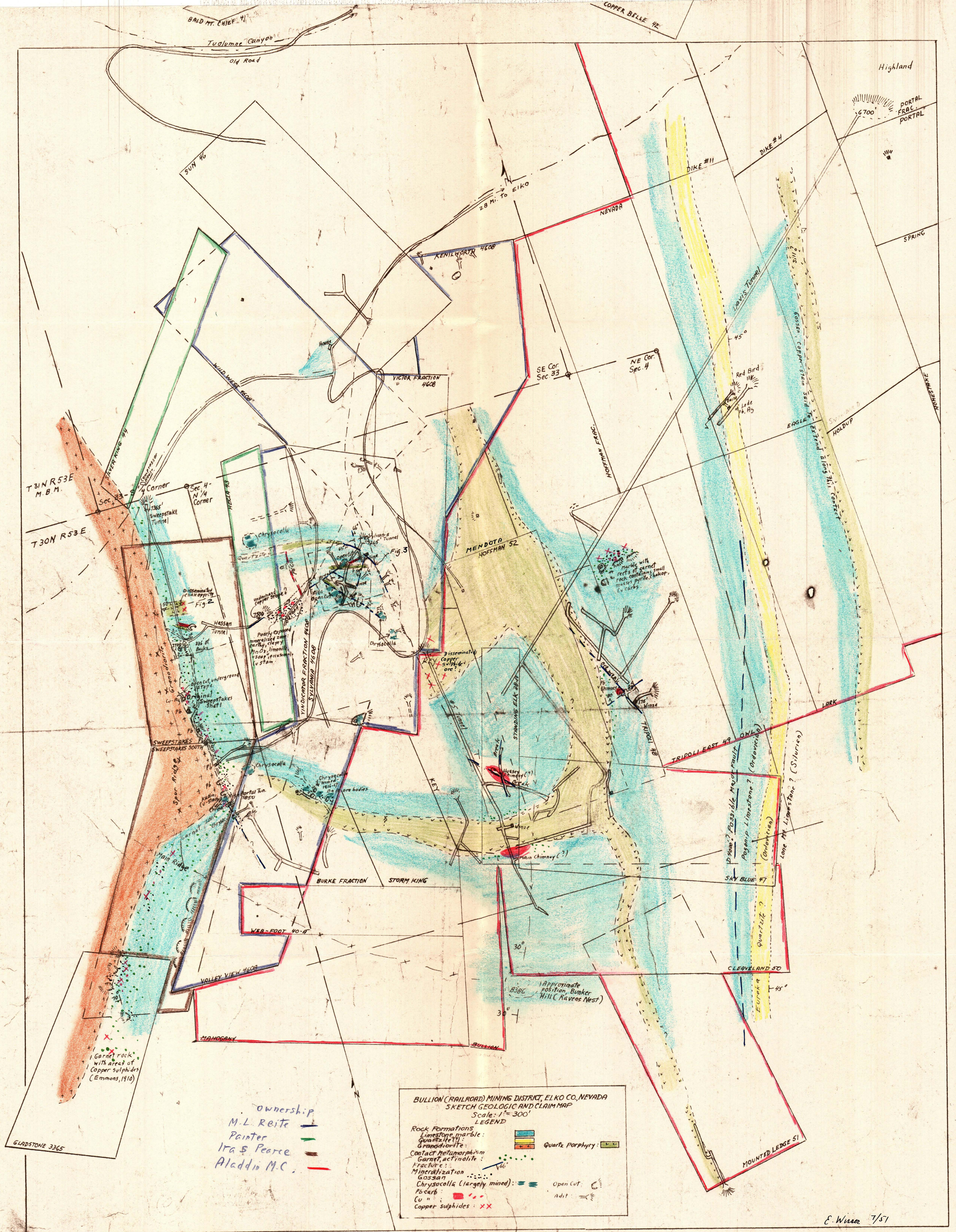
Geology by E. Wisser, July 1951



VERTICAL LONGITUDINAL PROJECTION of "ORE BREAK"
Scale: 1" = 40'

FIG. 3A

BALD MT. CHIEF 41
Tuolumne Canyon
Old Road
COPPER BELLE 42
Highland
6700'
PORTAL
FRAC.
PORTAL
DIKE #4
DIKE #11
SUN 46
28 Mi. To ELKO
NEVADA
KENILWORTH 4608
SPRING
Davis Tunnel
Gossan, Copper stain
45°
House
WILD WEST 4608
VICTOR FRACTION 4608
SE Cor. Sec. 33
NE Cor. Sec. 4
Red Bird
4' Lode Pb, Ag
HORSESHOE
EAGLE
SNOWBIRD
HOLDUP
extend along this contact
HOFFMAN FRAC.
SILVER KING 44
T31N R53E M.B.M.
Sec. 33
4 Corner
Sec. 4 N 1/4 Corner
7365' Sweepstake Tunnel
T30N R53E
HECLA 43
Chrysocolla
Quartzite
Sylvania Tunnel
7265
Open Cut
Fig.
Winze
Disseminated chalcopyrite
Fig.
undermined copper stope?
7500
Hessam Tunnel
Poorly exposed mineralized zone: earthy, clayey Mn Ox, limonite, "soap", occasional Cu stain
335' of Backs
Ella Open Cut
Chrysocolla
YINDICATOR FRACTION 4608
SYLVANIA 4608
HOFFMAN 52
Marble with rects of garnet rock containing small masses pyrite, chalcop., Cu carbs.
Open cut, underground stope.
Original Sweepstakes Shaft
SWEEPSTAKES
SWEEPSTAKES SOUTH
#5 Tunnel
STANDING ELK 28-A
Ore break
Pb
Chimney
80°
85°
175' Winze
TRIPOLI 48
TRIPOLI EAST 49
OWL
LARK
Spur Ridge
Chrysocolla
Chrysocolla mined 1916-17 Ore bodies
Hussey Chimney (?)
Break
KEY
High Portal Tun. 1850
Garnet zone
Main Ridge
Winze
Main Chimney (?)
Dyke? Possible Major Fault
Posonip Limestone? (Ordovician)
Lone Mt. Limestone? (Silurian)
SKY BLUE 47
BURKE FRACTION
STORM KING
WEB-FOOT 40-A
30°
CLEAVELAND 50
Quartzite?
Eureka
45°
VALLEY VIEW 4608
8386
Approximate position, Bunker Hill (Ravens Nest)
70°
MAHOGANY
BULLION
Garnet rock with areas of copper sulphides (Emmons, 1910)
GLADSTONE 3365
MOUNTED LEDGE 51
N
BULLION (RAILROAD) MINING DISTRICT, ELKO CO., NEVADA
SKETCH GEOLOGIC AND CLAIM MAP
Scale: 1" = 300'
LEGEND
Rock Formations
Limestone, marble:
Quartzite (?):
Granodiorite:
Quartz Porphyry:
Contact Metamorphism
Garnet, actinolite:
Fracture:
Mineralization
Gossan
Chrysocolla (largely mined):
Pb carb:
Cu " :
Copper sulphides:
Open Cut:
Adit:


BULLION (RAILROAD) MINING DISTRICT, ELKO CO., NEVADA
SKETCH GEOLOGIC AND CLAIM MAP
Scale: 1" = 300'
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Granodiorite:
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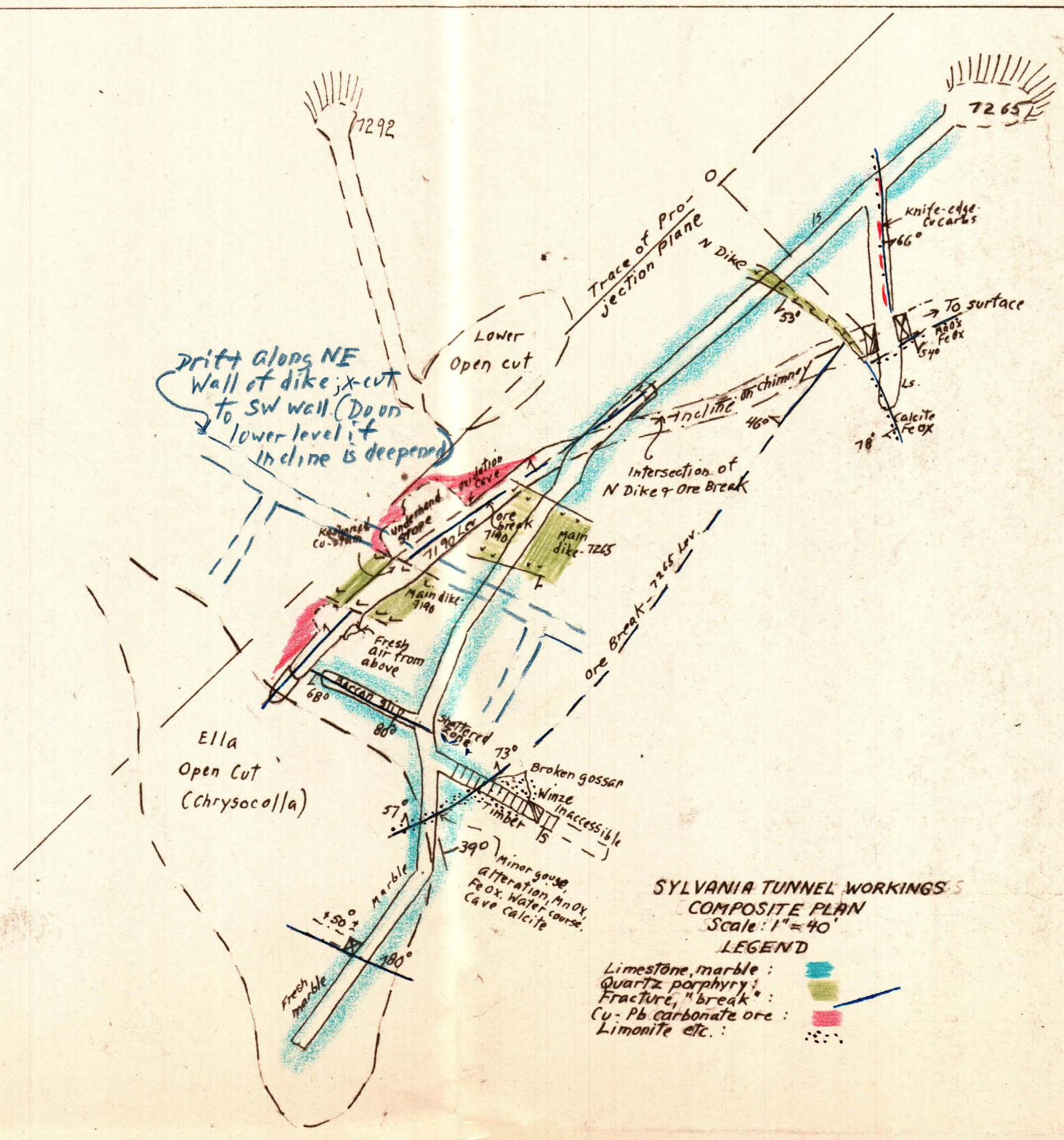
Contact Metamorphism
Garnet, actinolite:
Fracture:
Mineralization
Gossan
Chrysocolla (largely mined):
Pb carb:
Cu "
Copper sulphides:
Open Cut:
Adit:
Ownership
M.L. Reite
Painter
Ira S. Pearce
Aladdin M.C.
BALD MT. CHIEF 41
Tuolumne Canyon
Old Road
COPPER BELLE 42
Highland
PORTAL
FRAC.
PORTAL
6700'
SUN 46
DIKE #11
DIKE #4
28 Mi. To Elko
NEVADA
SPRING
KENILWORTH 4608
Lavis Tunnel
Silo
Gossan, Copper stain
Extend along this contact
45°
House
WILD WEST 4608
VICTOR FRACTION 4608
SE Cor. Sec. 33
NE Cor. Sec. 4
Red Bird
Lode Pb, Ag
HOMESTRAKE
EAGLE
HOLDUP
SILVER KING 44
T31N R53E M.B.M.
Sec. 33
Corner
Sec. 4 N 1/4 Corner
Sweepstake Tunnel
HECLA 43
T30N R53E
Chrysocolla
Quartzite
Sylvania Tunnel
Fig. 3
MENDOTA
HOFFMAN 52
HOFFMAN FRAC.
Marble with reefs of garnet rock containing small masses pyrite, chalcop., & carbs.
Disseminated Chalcopyrite
Fig. 2
Hessan Tunnel
Poorly exposed mineralized zone: clayey earthy, Mn Ox, limonite, soap, occasional Cu stain
YINDICATOR FRACTION 4608
SYLVANIA 4608
Open cut, underground stope
Original Sweepstakes Shaft
Spur Ridge
SWEEPSTAKES
SWEEPSTAKES SOUTH
Disseminated Copper sulphide ore!
KEY
#5 Tunnel
STANDING ELK 28-A
Outcrop
Pb chimney
176' Winze
TRIPOLI 48
LARK
TRIPOLI EAST 49
OWL
Hussey chimney (?)
Creek
High Portal Tun. 1850
Chrysocolla Mine 1916-17 Ore bodies
Winze
Main Chimney (?)
Main Ridge
BURKE FRACTION
STORM KING
SKY BLUE 47
Major fault
Possible Limestone? (Ordovician)
Lone Mt. Limestone? (Silurian)
Quartzite?
WEB-FOOT 40-A
VALLEY VIEW 4608
CLEAVELAND 50
Eureka
8386
Approximate position, Bunker Hill (Ravens Nest)
30°
MAHOGANY
BULLION
Garnet rock with areas of Copper sulphides (Emmons, 1910)
GLADSTONE 3365
MOUNTED LEDGE 51
E. Wurm 7/51

SKETCH GEOLOGIC MAP

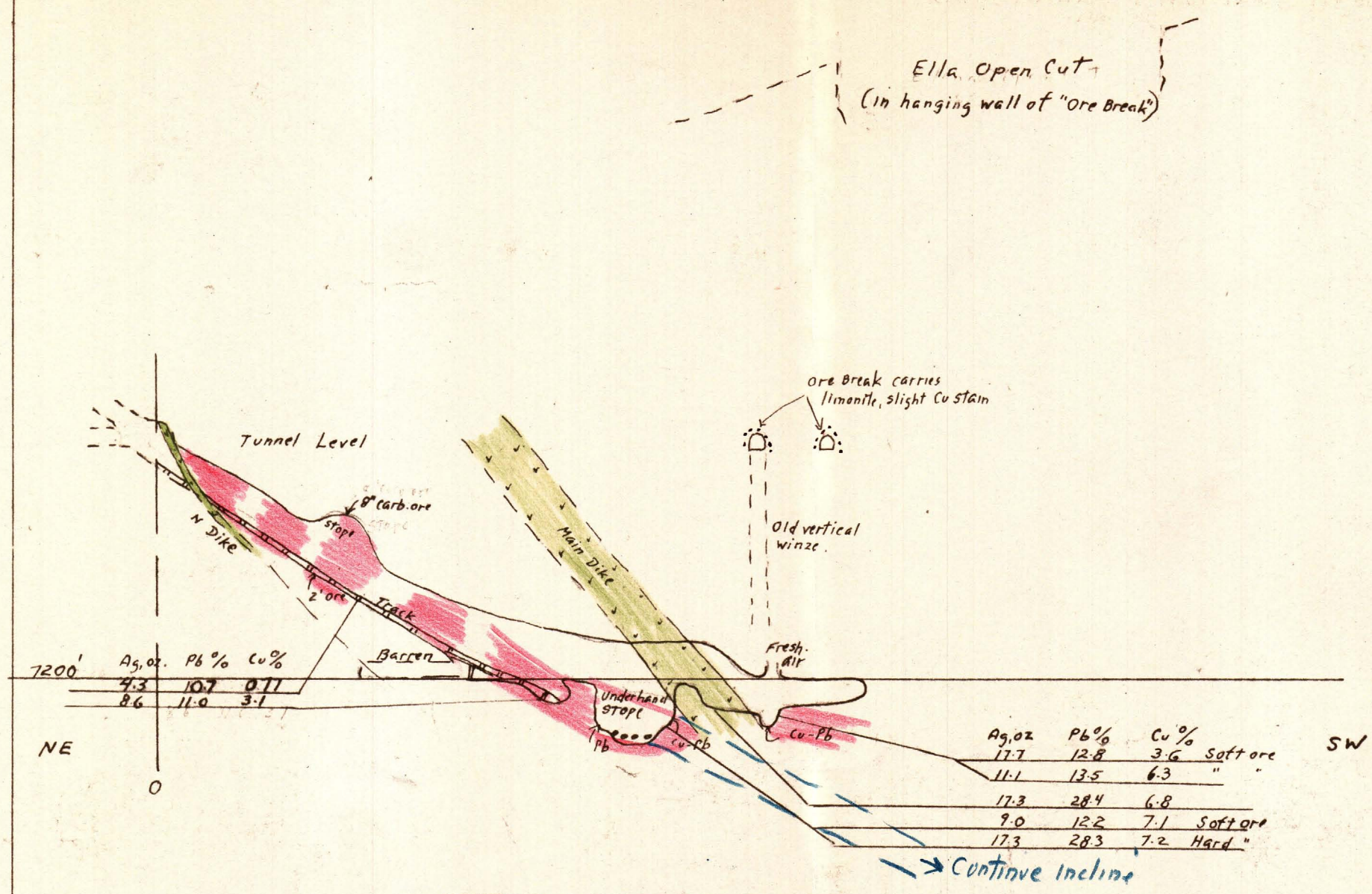
1" = 300'



Possible Exploration in Blue

FIG. 3

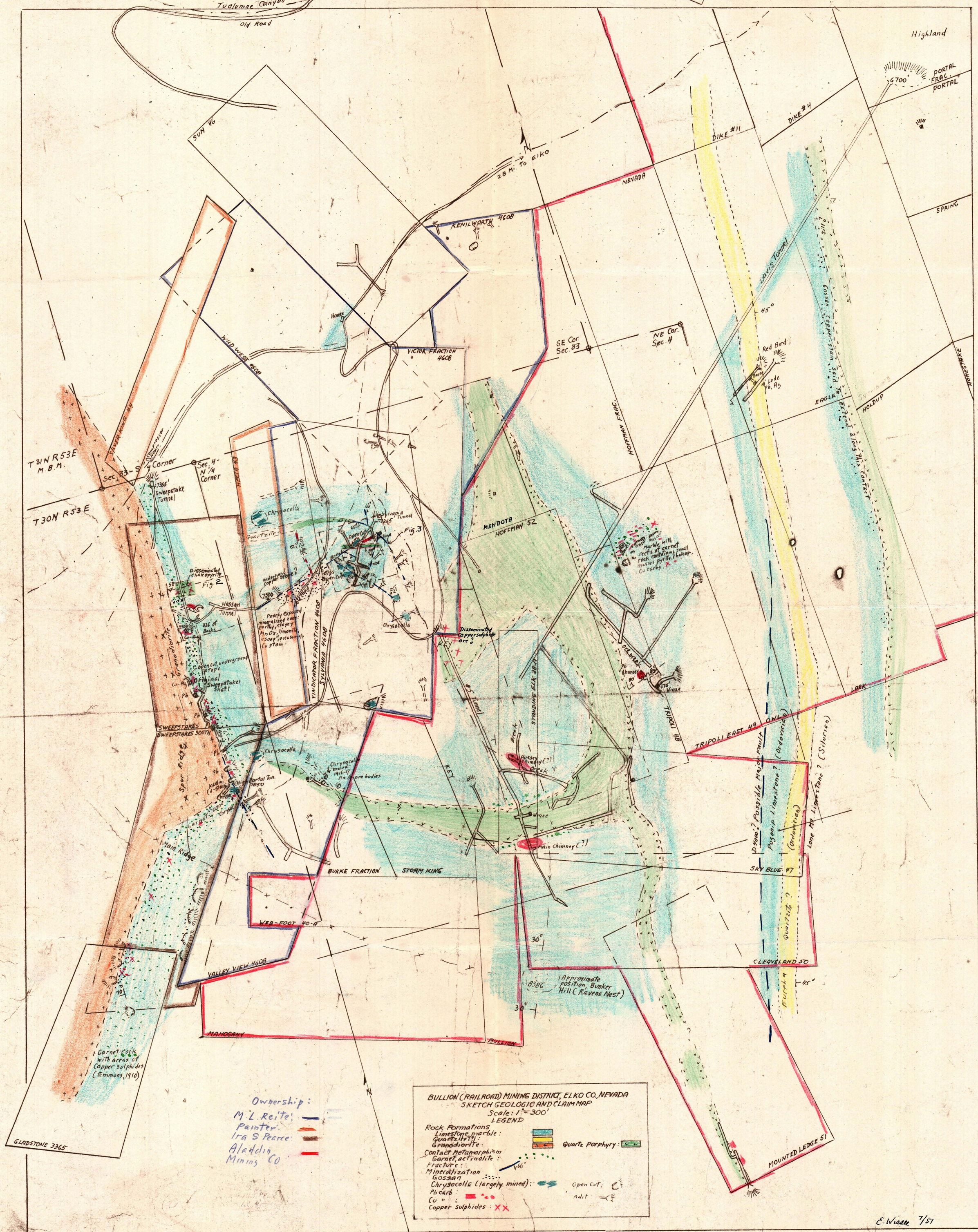
Geology by E. Wisser, July 1951



VERTICAL LONGITUDINAL PROJECTION of "ORE BREAK"
Scale: 1" = 40'

FIG. 3A

Fig. 3 Sylvania


BULLION (RAILROAD) MINING DISTRICT, ELKO CO., NEVADA
SKETCH GEOLOGIC AND CLAIM MAP
Scale: 1" = 300'
LEGEND
Rock Formations
Limestone marble:
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Granodiorite:
Quartz Porphyry:
Contact Metamorphism
Garnet, actinolite:
Fracture:
Mineralization
Gossan
Chrysocolla (largely mined):
Pb carb:
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Copper sulphides:
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6700'
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28 Mi. To ELKO
NEVADA
SPRING
KENILWORTH 4608
Davis Tunnel
Silica
Gossan
Copper Stain
Red Bird
Pb, Ag
EAGLE
HOLDUP
HOMESTAKE
WILD WEST 4608
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HOFFMAN FRAC.
SILVER KING 44
T31N R53E M.B.M.
T30N R53E
Sec. 33 - S 1/4 Corner
Sec. 4 - N 1/4 Corner
7365' Sweepstake Tunnel
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Chrysocolla
Quartzite
Sylvania Tunnel
7265'
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336' of Backs
Poorly exposed mineralized zone: clayey earthy, limonite, MnOx, "soap", occasionally Cu stain
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SWEEPSTAKES SOUTH
Spur Ridge
Main Ridge
Chrysocolla mined 1916-17 Dr. Bore bodies
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KEY
Hussey Chimney (?)
Winze
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OLD STAKE
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E. Wisser 7/51

SKETCH GEOLOGIC MAP
1" = 300'