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MINING 111A- 3-B-3A: AUSTIN,NEVADA

Source.- Geology & Ore deposits of the Reese River District,Lander Co . Nevada. C.P.Ross, USGS Bull.996,1953.
Some Mining Districts in Northeastern Calif. & Northwestern Nev., J.M.Hill. USGS B594, 1915

Production.- About $20,000,000,mainly in silver. Class of Goodsprings, Piochе.

Location.- W slope of N-S Toiyabe Range.

Rock Formations.-

Paleo Seds.: N part of district,extending far beyond district limits. Similar rocks present to E and S. Massive,gray,granular slightly micaceous qtzite.,in part;in most placesIB with shaly layers,now graphite, qtzite etc. Qtzite also metamorphosed,qtz as interlocking mosaics,granular texture largely lost/.

In N part of mapped area,beds dip in general about 20N. Probably Cambrian.

Quartz Monzonite.Main CR. Uniform composition,texture. Aplite,lamprophyre dikes fill joints. No evidence as to age of plutonic rocks. Assumed Nevadian,but geographical locations suggests they are later in age.

Volcanics.-Laid down after pluton bared by erosion.Dacite and more siliceous flows;welded tuff. Felsite dikes cut pluton. May be 2000 ft.thick. Dip E,down E flank of Toyabe Range. Volcs.may be Miocene or early Pliocene.

Structure.-

In pluton.- No contact dips gently north with dip of Cambrian quartzite .Widespread although small sedimentary inclusions in the pluton where it crops out indicate that erosion has not cut deeply into the monzonite.

Pluton is intensely jointed (See (see Reese River and Regional Plans). In S part of mapped area most dikes,along which veins commonly occur,strike east of N and dip either E or W. A set of flat-dipping joints strike N of W;most dip N (main veins) but some dip S.

In the N part of the district,toward the contact of the pluton with the Cambrian quartzite, a strongly-developed set of joints strikes NW; most of these dip SW.The NNE set persists into this area.

Structure of Toiyabe Range.- The Regional Plan is taken from J.M. Hill: Some mining districts in northeastern California and Northwestern Nevada, USGS Bull.594,1915,Plate 13,with Ross's mapping added. Range is anticlinal,trending E of N;Silurian(?) slates with Cambrian qtzite form core,flanked E and W by Carbonif.ls. Linear intrusions of quartz monzonite invade the anticline along its core and may have caused the folding. QM of Reese River district looks like a cuplola on the main mass,the cupola having elongation E of N,and the shape of a doubly-plunging anticline,

The NNE set of joints parallel the axis of the anticline.(Longitudinal joints). The NW joints,dipping steeply SW in the N part of the pupola lie perpendicular to the northward-plunging axis of the anticline and are

cross joints. The NW flat-dipping joints are streckflaechen or flat-dipping normal faults.

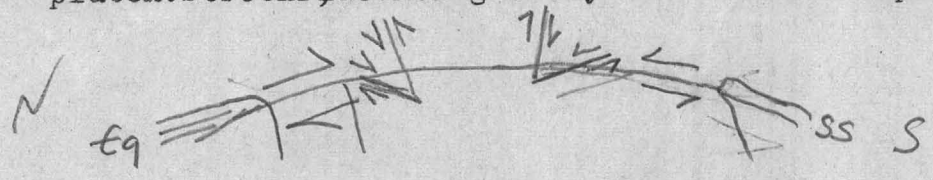
For longitudinal joints in plutons see

Robert Balk:Structure Elements of Domes, AAPG Bull.vol.20,1936,p.62-63 and Fig.10;Balk, Structural behavior of igmeous rocks,GSA Mon. 5,1937, p.73,Fig.27.

Cross joints:Balk,Structure elements of domes,p.57-58,Fig.7;Structural behavior of igneous rocks,p.27-31;97-101.

Streckflaechen:Balk,Structure elements of domes,p.58-59;Fig.11. Structural behavior of igneous rocks,p.106-108,Fig.37.

These fractures form during closing stages of an intrusion,when the mass begins to solidify and flow is no longer possible. Cross-joints are tensional, due to bending of the igneous mass or its upper surface. Longitdinal joints may be true joints,in which case they are like cross-joints,tension joints,due to bending around the axis of the igneous anticline;or they may be faults,graben and antithetic faults,dipping either way like those of Austin.In either case they aid lateral expansion of the pluton.Streckflaechen greatly aid lateral expansion due to their flatness.



Streckflaechen are throught to be synthetic shear planes set up by stretching at the top of the pluton,the shearing strain being induced by frictional resistance of the cover. Normal streckflaechen would be tight and not conducive to ore penetration. That the north nose of the pluton stretched is proved by 100' of schistose qtzite at base of that series.

Ore Deposits.-

Hill:

Veins,very narrow,from mere seams to 2-3';pay streak usually 2-3". According to S.F.Emmons,Mining & Milling at Reese River:US.Geol.Expl.40th Parallel,vol.3,1870,p.349-393,quoted by Hill,p.103-104,there are two sets of NW veins,one dipping NE at 15-20,the other dipping NE at ~~80x70x~~ angles up to 70.According to Hill (p.104) the steeper veins are more persistant,and the flat veins run into these at depth,so that the number of veins at depth is far less than near the surface.(Emmons,p.351).

Gangue:white and dark qtz.and rhodochrosite;true banding.Narrow qtz band fo frozen to walls;inside,layer of rhodoch.& qtz;centers filled with white qtz.. Ore minerals in bands inside the outer qtz,s.t.in center.Pyragyrite,proustite, stephanite,polybasite,tetrahedrite,argg~~aa~~.,ZnS,ccpy.py.

Veins faulted by N-S,west-dipping normal faults.Some lamprophyre dikes have same attitude,hence faulting very soon after mineralization(?). GN-S faults appear to have localized ore shoots,which therefore pitch to NW paralle to line of intersection.

~~Ross:~~

Ross:

Some qtz,flamboyant;calcite,rhodochr.and ankerite.Rhodochr.esp.in rich Lander Hill veins.

1st stage of vein filling: qtz as moszics of milky white grains,dusty with inclusions.Sparse py.cubes.
(latter the latest)/
Later qtz flamboyant or banded./Bands conspicuous near ore.Bands due to filling of parallel cracks in earlier qtz.
Stibnite among the sulphides.

Qtz on the narrow veins is lentocular,but width extremely small in relation to length. Veins along sheeted zones. N-S faults seem to dip very flatly ~~xxxxx~~ east,or some do.

Much intramineral movement.Successive lowering of T and P as vein filling proceeded,

Tectonic Notes.-Streckflaechen formed soon after consolidation of magma;ore deposits are epithermal,probably long after consolidation.(Tourmaline and rutile in the veins prove the 1st point). Streckflaechen must have opened,although slightly,to admit ore;little or no replacement ore.

Ore deposits suppoed to have formed immediately after consolidation of pluton-magmatic theory.Nothing to prove this. Hill's sections show Tv also arched up in Toiyabe Range,less than Paleozoics. Recorded attitude of Tv,also distribituion on regional map suggests later axis of arching more N-S or even W of N. Tv barren of ore deposits but may not be post-mineral;or new arching may have commenced before extrusion. Arch may even have been peneplained before extrusion,then renewed arching,same axis.

Preexisting streckflaechen would in such a case be oriented as antithetic faults dipping into the arch core. Their narrowness and intramineral sheeting giving fine banding checks this notion. Further,late pre-mineral,intramineral and/or early post-mineral north-south faults are oriented in accord with the late arching suggested. Those dipping steeply west would be synthetic faults;those dipping flatly east,antithetic. Since these faults would have been set up by the late arching,they would function strictly as faults. The streckflaechen,preexisting structures not oriented strictly as antithetic faults,would probably tend to gape slightly.

Bull. 594

95 Reese River Dist, Lander Co Nev

96 Productive part underlain by granitoid rock intrusive into qtzites & shales

102 Total Prod about $40,550,000

103 Production 1902-1911

Au	Ag oz	Cu	Pb
$44000	258500	16000#	142000#

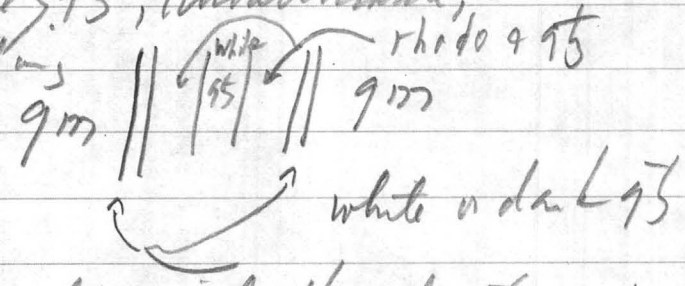
20)44000(2200
40
40

2200)258500(115
22
38
22
105

Veins small - NW, dip NE, 15-20 to and 60-70
From seam to 2-3'. Pay streak 2-3", max 5"-6"
for short distances

104 Steeper veins more persistent. Flat veins join these at depth. Much fewer veins at depth.

Gangue - white qtz, rhodochrosite, s.t. cal. -
True vein banding



Ore minerals usually in bands inside the outer qtz, s.t. in center. Usually assoc. with the white qtz. Not in carb. gangue, tho sulfide bands are present on both sides of the rhodo. streaks.

Pyrargyrite, proustite, stephanite, polybasite, tetrah., Ag - PbS, ZnS (+Ag) ccpy, py.

Paragenesis - py, ccpy, arsenop., PbS, ZnS, wurtzite

105 Tetrahedrite rich in silver. The py, ccpy & arsenop IG & surrounded by PbS, ZnS. Tetrahedrite forms about the other minerals & in cracks in them.

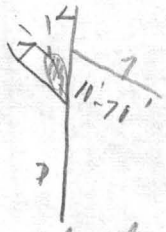
All sulfs carry Ag, except possibly ZnS.

H.T. alt. of QM. Very local - a few inches to 10" Seric, sil.

BURROUGHS CORPORATION TODD DIVISION THE Hadley LINE Form G550 REPRODUCIBLE

Faulting – N flts, displace veins, dips W medium or fairly steep.

Normal movement



106 Ore shoots – Distinct, from a few ft to 300' max. length. Ave 150-200'. Located near junctions of veins with N-flts – so that the shoots pitch to NW

107 Thin clay selvage on HW in most of the ore shoots. In many shoots narrow bands of crushed qtz & rhodoch. rich in Ag mins.

Arg. least common. Stephanite not abundant. Polybasite often seen as good XX in cavities lined with drusy qtz & in specks thru the richer ore. Proustite as thin plins on fracture planes in ore.

Pyrargyrite seems to replace tetrah

108 – Grade – Rich chloride ores $200 ft. Below H_2O, ave. for 20 yrs $200.

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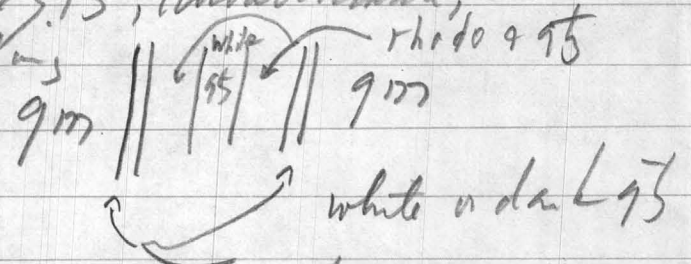

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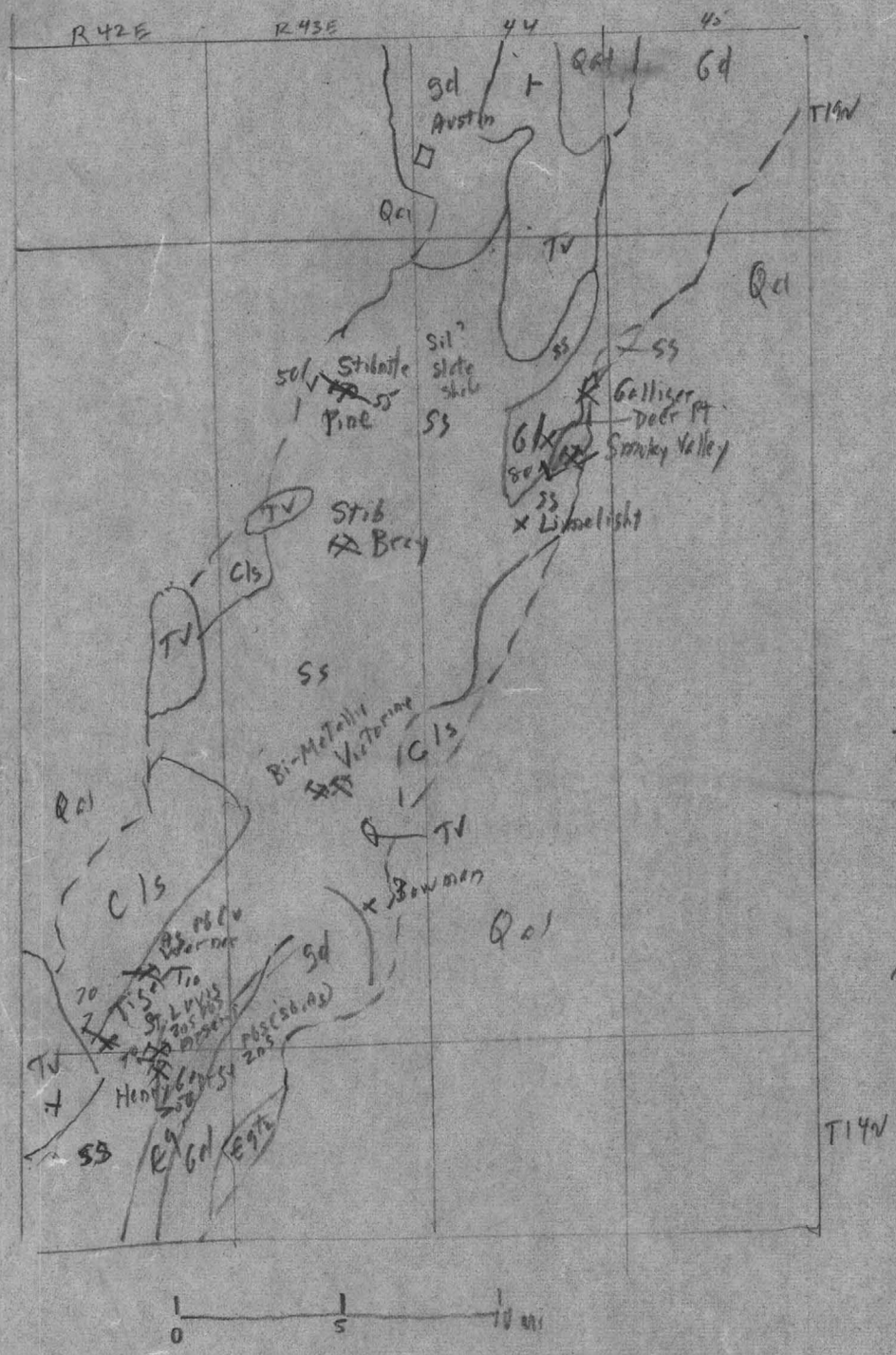
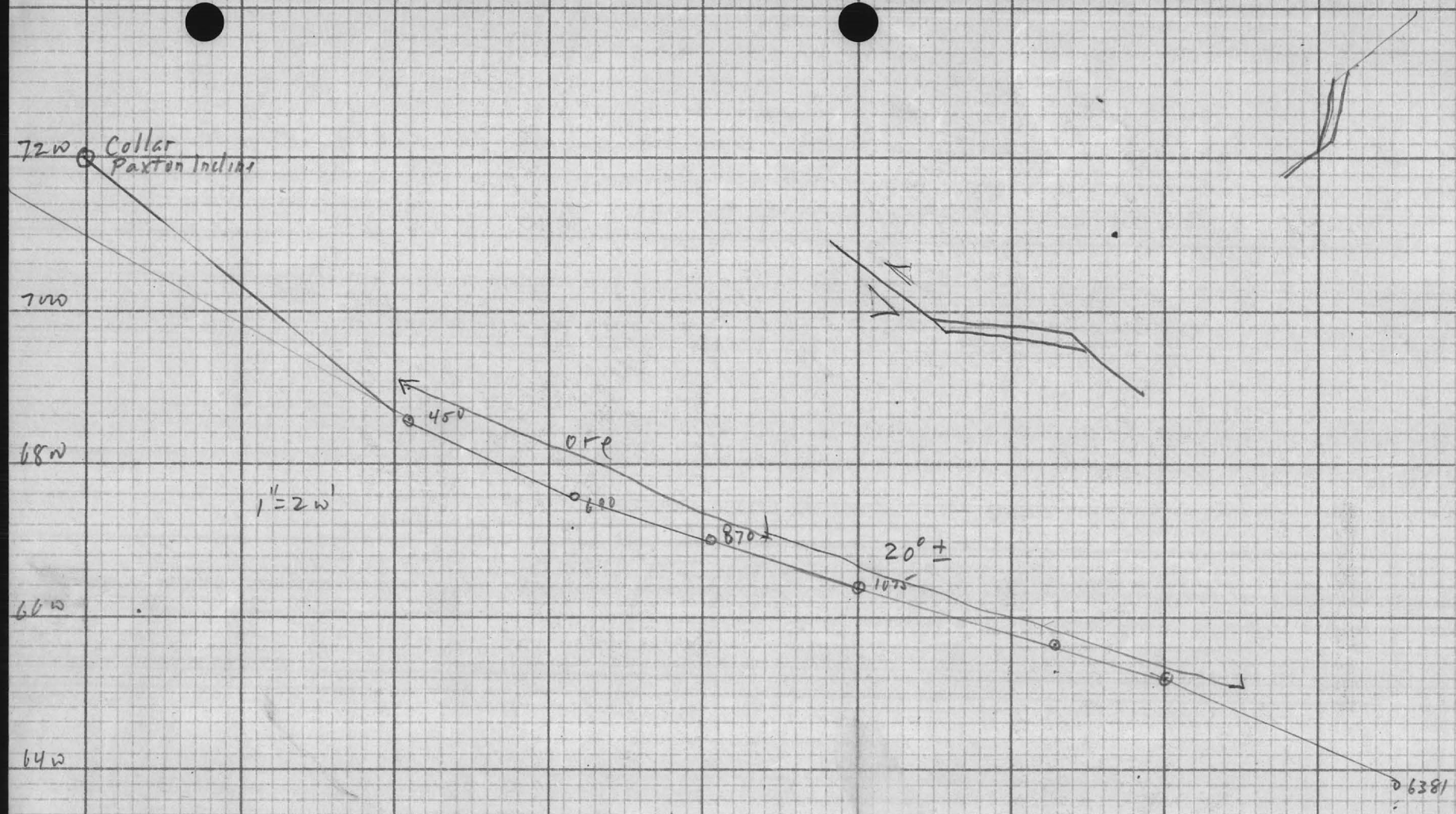


Tv = largely rhy.

Might be epithermal

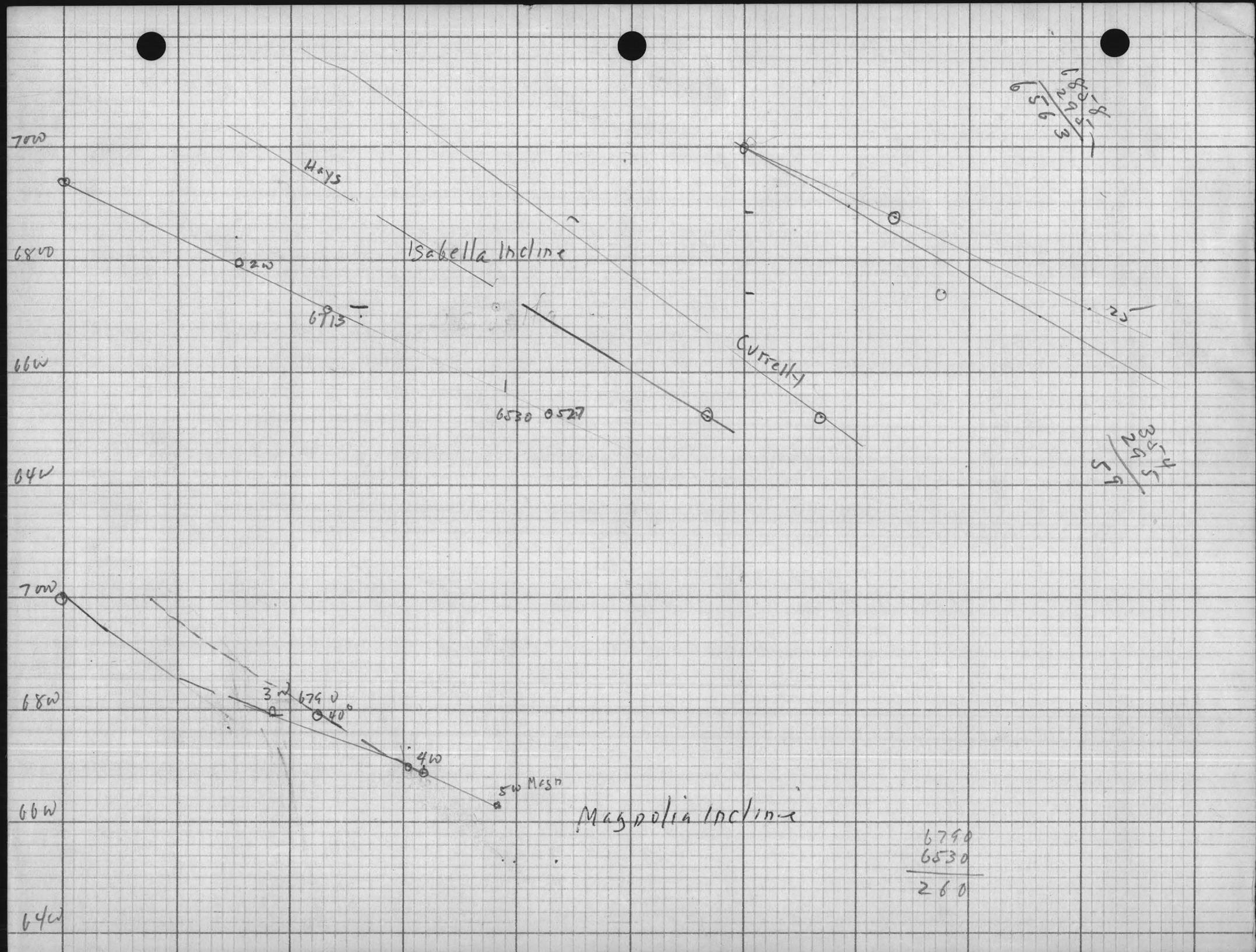
Bull 594 Pl. 13

Toyabe Range S of Austin



Section thru Paxton Incline

1" = 2W'



7000
6800
6600
6400
Hays
Isabella Incline
2W
6713
6530
0527
Currelly
25
6858
295
6563
354
295
59
7000
6800
6600
6400
3W
6790
40°
4W
5W Magn
Magnolia Incline
6790
6530
260

TOIYABE RANGE SOUTH OF REESE RIVER DISTRICT

J.M.Hill, Some mining districts in northeastern Calif.& northwestern Nevada, USGS Bull.594,1915,p.114-129.

To qtz-olivine gabbro

Structure described under Austin. QD dikes on E side of range trend NNE parallel to range (longitudinal fissures).Cut both QM and seds.In seds some dikes follow bedding,but several are nearly vertical. One such dike on W side range. These probably correspond to Ross' lamprophyre

Glassy dikes of Hill probably Ross aplite.

Ore Deposits.-PbS with some Sb;tetrahedrite with Ag;maramatite,local c ccpy. Some argentite. Gangue vitreous qtz,usually whote.

Veins deposited in open fissures, crustification common in all. Some stockworks along fractures;netwrook of intelacing qtz veinlets, common in contorted shales. "True veins" range in thickness from a few inches to 2'. Lodes in contrast(stockworks) 25-250'.

Pine: Ledge N55W,50SW;40' wide.CR dark silic.shales,slates,strike NW, dip SW at medium angles.(Transverse to anticlinal attitude of range;check S plunging nose of Austin cupoloa).

p.122

Ledge a silicified fault breccia cemented by white qtz.IG with stibnit Ore in the fault breccia seems controlled by N-S vertical fractures.Slick ensides faces parallel to dip of the ledge occur within latter,esp. along SW or HW side.

Ore white qtz and stibnite.N-S fractures open,have cellular grayish qt at surface.

Bray.- Near crest of zone of folding and faulting striking N20W. Says N20E at another place,latter more lilely. Stibnite stockworks.

Werner.- In Silurian? lime-shale and qtzite.N of OB is small elliptic all mass of GD. Seds.strike N of E,dip flat N. Qtz in E-W,10 S fracture. Body is a qtzite breccia recemented b qtz. Gray copper,PbS.Argentite?

Tiger.- Shales strike N57W dip 70N.

Henry George.-N-S vein, 50E,cuts W-dipping shales. White vitreous qtz frozen to walls.Sb-Pbs plus Ag,IG with marmatite,py--.

St.Louis & Richmond.- Vein N15E,dip 70W.Parallels bedding.4-14" wide,in ls. bed.Vein well banded,sulphs next walls,then bands calcite,siderite, central band of drusy white qtz. Py,dark ZnS,PbS,arsenop. All IG.

Smoky Valley.- OB,white qtz.,cal.-, lies 200ft.SE of and parallel to the GD-shale contact.Arsenop.

Deer Point.-GD here has two joint sets,:(1) N65E,vert.(2) N20W,dip fla W. Narrow qtz stringers along some joints,py,PbS,ZnS.

Bull Dog Jack: Black meta-shales carry two vein sets(;) N85E,77S,(2) N15W,steep E. Ag-Pb prospect.

Victorine.- Pockets of qtz in bed of silic.ls in the blacks sh.,sl. Seds E-W,5-35N. Qtz.,oy,PbS,tetrah. Arg.

Bowman.- Black slate IB with dark ls,qtzite. rumpled to schist along N-N25E zone of crusing. Two N-S basic dikes. Stockwormlarger veins strik N-S,dip flatly E or W. 4 oz.Ag,whole OB.

REESE RIVER MINING DISTRICT
Scale: 1" = 2000'

Plate 1 of Ross