May 3, 1942.

Mr. Benj. C. Charles,
Charles, Keith and Rivers,
510 West Sixth Street,
Los Angeles, California.

Dear Ben,

I, too, have been reading Ward Smith's recently received paper, 931-C on Majuba Hill with considerable interest. It does not paint an attractive picture, I must admit. Smith, of course, is entitled to his interpretation, as I am to mine.

Attached you will find my reactions to this paper. I apologize for the length I have gone to, but I believe it warranted. This rebuttal represents only my own ideas and should not be construed as representing Freeport's. Since it is all a matter of personal geologic interpretation, I am sure that I have this right to speak my mind. You will find nothing specific, such as assay data; only an individual's observations are being presented.

My hope is that what little I can contribute may show that there is another side to the story. Incidentally, may I suggest that if you are in Reno you contact Prof. V. P. Gianella, the co-author of Bulletin 931-C. I feel that what he might give you verbally, would be a bit more encouraging than the conclusions reached in this bulletin. Soxy knows him well, and so it could be easily arranged. If you want me to drop him a line, I'll be glad to.

Thank you for the kind reference, contained in your letter to Mr. Gray. I appreciate it.

Give my best regards to Doug McKinnon when you write him.

Best wishes to you, Ben, and remember the invitation still stands to try the steelhead on the Rogue.

Sincerely,

David LeCount Evans

Box 190, Grants Pass,
Oregon.

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ITEM 25

☞ Send remittance for reports direct to Superintendent of Documents; send remittance for maps to Geological Survey

Foreign correspondents except from Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Newfoundland (including Labrador), Nicaragua, Paraguay, Peru, Republic of Panama, Uruguay, and Venezuela, should include one-third the cost of the publication to cover postage.

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

PUBLICATIONS ISSUED IN MARCH 1942—LIST 409

REPORTS

Reports are sold by the *Superintendent of Documents, Government Printing Office, Washington, D. C.*, to whom remittances should be sent by money order.

Professional Paper 197–A. Alkalic rocks of Iron Hill, Gunnison County, Colo., by E. S. Larsen. 1942. pp. i–v, 1–64, pls. 1–3, figs. 1–9. ***Price, 40 cents.***

This paper describes the Iron Hill stock and associated rocks of southwestern Colorado. The oldest rock associated with the stock is a dolomitic mass about a mile in diameter; it is believed to be a hydrothermal deposit formed in this throat of a volcano. The oldest intrusive is a very coarse-grained melilite rock. The next intrusive is a pyroxenite, which varies in composition, ranging from a nearly pure diopside rock to an apatite-perovskite rock with local feldspar, nepheline, and varieties of sphene. The pyroxenite is cut by a coarse-grained nepheline-pyroxene-garnet (melanite) rock. The next intrusion was one of soda syenite, which was followed by one of nepheline syenite. The last intrusions were of dikes of nepheline gabbro and quartz gabbro. Hydrothermal reactions were active throughout the history of the stock and produced a number of minerals. The most widespread of these is segerite; others are idocrase, diopside, melilite, cebollite, juanite, soda amphibole, phlogopite, and other minerals. Chemical analyses of many rocks and minerals are given, and the minerals are described in detail. A section of the report describes the rare constituents of the rocks and minerals.

Professional Paper 197–B. Oligocene Foraminifera near Millry, Ala., by J. A. Cushman and Winnie McGlamery. 1942. pp. i–ii, 65–84, pls. 4–7. ***Price, 10 cents.***

This paper records and illustrates 71 species and varieties of a foraminiferal fauna from the Chickasawhay marl at a locality 1¼ miles north of Millry, Washington County, Ala. The composition of the fauna supports previous references of the fossiliferous beds to the Oligocene epoch. The report was prepared in cooperation with the Alabama Geological Survey.

Bulletin 931–C. Tin deposit at Majuba Hill, Pershing County, Nev., by W. C. Smith and V. P. Gianella. 1942. pp. i–iii, 39–55, pls. 9–10, fig. 4. ***Price, 25 cents.***

2

The tin and copper deposits at Majuba Hill, Pershing County, Nev., are in a partly brecciated plug of Tertiary rhyolite porphyry, which is altered nearly everywhere to quartz and sericite and in some places is intensely tourmalinized. The tin mineral, cassiterite, appears to be associated with the alteration, for the single concentration of it was formed by replacement of altered breccia. Brecciated and altered rock is, however, only a general guide to potentially tin-bearing ground and not a specific guide to ore shoots, for most of such rock appears to contain only small amounts of cassiterite, widely and unevenly distributed. The known deposit, which is exposed only underground, is at most 20 by 20 by 10 feet in size, and may contain about 12,000 pounds of metallic tin. The deposit is cut off by a normal fault, which apparently is of small displacement, and the footwall segment has not been found. The copper deposit is in the same normal fault, about 300 feet south of the earlier-formed tin deposit. From it about 4,000 tons of 12-percent copper ore was mined in 1915–18, but none has been mined since, and no copper ore is now in sight. The report contains a geologic map and section of Majuba Hill and a geologic map and sections of the Majuba Hill mine. It is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 931–E. Tungsten deposits in the Sierra Nevada near Bishop, Calif., a preliminary report, by D. M. Lemmon. 1941 [1942]. pp. i–iii, 79–104, pls. 13–19, figs. 7–9. ***Price 35 cents.***

1

Scheelite ore bodies occur at widely separated localities in the Sierra Nevada near Bishop, Calif. The scheelite is found in altered sedimentary rocks at or near the contact between granitic rocks and limestones that are partly changed to silicate rocks composed largely of garnet. Mineralization was closely connected with the intrusion of the granite, the latest of the varied intrusives that make up the rocks of the Sierra Nevada. The deposits in the High Sierra, at altitudes of 10,000 to 13,000 feet, are now the most productive and contain large reserves. They occur along the borders of a discontinuous belt of metamorphic rocks, which extends along the crest of the Sierra Nevada for nearly 50 miles. The great vertical extent of parts of this belt exposed in deep canyons indicates that some of the ore bodies may extend to many hundreds or even thousands of feet in depth. The

Pine Creek mine of the United States Vanadium Corporation now has a milling plant capable of producing annually at least 2,500 tons of concentrate, containing 60 percent of tungsten trioxide, from low-grade ore. The proved reserves of milling ore on the property amount to several million tons. The combined reserve tonnage of all the other deposits described in this report is probably at least 750,000 tons containing about 0.5 percent of tungsten trioxide, and these reserves will presumably be increased by downward development of the known deposits and discovery of new ore shoots. These estimates are based on surface exposures, for most of the deposits are entirely undeveloped. The report contains geologic maps and sections of the vicinity of the Pine Creek mine and geologic maps of the Pine Creek and Tungstar mines and of several smaller deposits. This is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 931–G. Chromite deposits of Kenai Peninsula, Alaska, by P. W. Guild. 1942. pp. i–iv, 139–175, pls. 24–31, figs. 11–15. ***Price, 50 cents.***

Chromite deposits occur at the south end of Kenai Peninsula, Alaska, in two areas, Claim Point and Red Mountain. They are contained in masses of ultramafic rocks, which are intrusive into a complex series of graywackes, slates, and cherts of Paleozoic (?) age. Dunite is the predominant intrusive; pyroxenite, garnet pyroxenite, and serpentine derived from the alteration of dunite are also present. The ore deposits are parts of the dunite and serpentine masses in which chromite has been concentrated by magmatic segregation. These deposits are tabular, strongly banded bodies, which range in size from stringers to bodies containing more than 50,000 tons, and in grade from a few percent to 50 percent of chromic oxide (Cr_2O_3). Analyses of the chromite alone, separated from the silicate gangue, show that it usually contains 54 to 59 percent of chromic oxide and has a chrome-iron ratio of 3:1 or greater. The reserves are estimated to contain 150,000 tons of chromite. About 73,000 tons of the chromite is in shipping ore, containing 40 percent or more of chromic oxide; the remaining 77,000 tons is in some 170,000 tons of lower-grade ore, which will require concentration to produce a marketable product. Transportation difficulties have retarded the development of the Red Mountain area, which is 6 miles from tidewater, and they will add to the cost of mining. Claim Point is easily accessible by boat. The report contains three geologic maps and several detailed mine maps. This is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 931–I. Nickel deposit near Riddle, Douglas County, Oreg., by W. T. Pecora and S. W. Hobbs. 1942. pp. i–iii, 205–226, pls. 37–38, figs. 20–22. ***Price, 20 cents***

The Riddle nickel deposit is on the slopes of Nickel Mountain, about 5 miles northwest of Riddle, Douglas County, Oreg. The deposit is a layered blanket, containing the nickel silicate garnierite which rests upon unserpentinized peridotite. This blanket ranges in thickness from a few feet to a maximum of 60 or 70 but with an average of about 20 feet. It is best developed on terraces, flats, and gentle mountain slopes above an altitude of 2,000 feet. It consists of three layers, a top brick-red soil layer, an intermediate thick yellow limonitic layer with some quartz-garnierite boxwork, and a root layer composed of quartz-garnierite boxwork in nearly fresh bedrock that is a transitional phase between weathered material and fresh peridotite. Nickel occurs in all three layers of the blanket but is most abundant in the boxwork veins carrying garnierite. The darker green varieties of the garnierite contain the highest percentage of nickel. The nickel is believed to have been derived from olivine in the peridotite by decomposition during lateritic weathering, which probably took place during late Tertiary time, before the present regional surface at an elevation of 2,000 feet was dissected. This process formed limonite and nickel-poor garnierite. Under present climatic conditions the original laterite has undergone a change resulting chiefly in a boxwork of quartz and nickel-rich garnierite. About 162 acres of ground are underlain by a blanket containing over 6,000,000 tons of material, 1 to 2 percent of which is probably nickel. Eighty thousand tons have been proved to contain 2 to 3 percent of nickel, and 75,000 tons have been proved to contain 1 to 2 percent of nickel. A new method of treating low-grade silicate material would have to be devised before this large deposit could be utilized. The report contains a geologic map of the vicinity of Nickel Mountain and a geologic and topographic map of the nickel deposit. This is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 931–J. Quicksilver deposits in the Steens and Pueblo Mountains, southern Oregon, by C. P. Ross. 1942. pp. i–iii, 227–258, pls. 39–44, fig. 23. ***Price, 40 cents.***

The Steens and Pueblo mountain ranges, in the eastern part of Harney County, Oreg., contain more than 15 quicksilver prospects and a few that were opened for gold and copper. Most of the area is underlain by flexed and faulted Tertiary lava, but pre-Tertiary metamorphic and igneous rocks are exposed in the southern part. The lavas along the east side of the mountains have undergone rather extensive hydrothermal alteration. At intervals for a distance of about 36 miles they contain mineralized fracture zones, in most of which mercurial tetrahedrite and cinnabar are the principal valuable minerals. The pre-Tertiary rocks in the southern part of the mountains also contain lodes. Although the presence of quicksilver deposits in the Steens and Pueblo Mountains has been known for 40 years, they have been very little explored, and probably less than 10 flasks of quicksilver has been produced from them. The lodes on the whole are of low grade, although they contain rich pockets, some of which may have formed in the zone of weathering. The low average tenor, coupled with the large size of some of the lodes and the metallurgical problems introduced by the unusual mineralogy, suggest that the area may be better adapted to exploration by large, well-equipped organizations than to working by individual operators. If keen demand for quicksilver continues, this region should be considered as a possible source of supply. The report contains a geologic sketch map of parts of the Steens and Pueblo Mountains, and maps of most of the prospects. It is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 931–L. Tin deposits of northern Lander County, Nev., by Carl Fries, Jr. 1942. pp. i–iii, 279–294, pl. 48, figs. 26–28. ***Price, 20 cents.***

Tin-bearing veinlets are exposed in a small area near Izenhood Ranch, 22 miles north of Battle Mountain, Nev. They occur in thick rhyolitic flows of Miocene (?) age. Wood tin, found in the gravels of arroyos that head in the surrounding rhyolite, presumably comes from other veinlets not yet discovered. The exposed veinlets are about 20 feet in maximum length and a quarter of an inch in average thickness. Parallel and reticulating veinlets form lodes 4 to 6 feet thick and 15 or 20 feet long.

Practically no cassiterite is disseminated in t
deposited in fumarolic vents along fissures for
lavas. There is no record of any production
might be produced from the exposed veinlets
rock in the area, however, contains even 0.2 p
would be only a small part of that shown by
enough to be concentrated by ordinary meth
draws that head in the area where the veinlet
of small volume, they could yield only a few
and geologic map of the principal part of the t
minerals investigations, 1941."

Bulletin 931–O. Nickel deposit near
N. Goddard and T. S. Loverin
fig. 37. ***Price, 30 cents.***

The nickel deposit of the Copper King mi
is in the pre-Cambrian rocks of the Colorad
amphibolite in biotite schist of the Idaho Sp
batholith of the pre-Cambrian Boulder Creek
related to the granite, is exposed in the lowe
schist, amphibolite, and gabbro. Dissemina
several nickel minerals have replaced hornb
amphibolite layer. On the basis of developm
25,000 tons of ore blocked out that contains b
tons of ore that will average about 0.5 percent
but the ore-bearing beds are so dislocated by
to project their extensions far beyond the mi
to the pre-Cambrian gabbro dike. The rep
Gold Hill, Colo., and a detailed map and sec
of "Strategic minerals investigations, 1941."

Bulletin 932–B. Geophysical abstract
Ayvazoglou. 1942. pp. i–ii, 41–

Contains abstracts of world literature o
magnetic, seismic, electrical, radioactive, g
methods and topics related to geophysics. I
list of patents granted.

Water-Supply Paper 907. Water le
wells in the United States in 19
Meinzer, L. K. Wenzel, and othe
cents.

The rock formations of the earth are grea
water derived from rain and snow is stored
streams during fair weather. The water lev
showing to what extent they are replenishe
pressures recorded on flowing wells also indic
reservoirs. This report gives records of gro
in the southeastern States—Alabama, Flo
South Carolina, Tennessee, and Virginia, an

Summary of yearly discharge at gaging
pp. i–iv, 125–158, pl. 2. [Reprin
Paper 880, Surface water supply o
15 cents.

Tables summarizing in convenient form fo
mum daily discharge and yearly mean disch
Basin, both active and discontinued, for wh
lected and published. Figures are given bot
years. These tables are intended primarily for
they give also for every gaging station repre
paper in which additional information relati
in connection with more detailed studies.
Idaho, Nevada, Oregon, Utah, and Wyomin

OLDER REPOR

Bulletin 809. Formulas and tables fo
compiled by C. H. Birdseye. 192

The primary purpose of this publication i
jections of topographic maps of standard qu
been prepared with arguments for each meri
rangles, and the data are given in inches for
logical Survey. The bulletin also represents
developed in detail and their use so explaine
knowledge of mathematics can understand a
conic projection of the map of the world is e
the data in meters on the natural scale and

Practically no cassiterite is disseminated in the wall rock. It is believed that the incrustations were deposited in fumarolic vents along fissures formed by differential contraction during the cooling of the lavas. There is no record of any production of tin from the area. Possibly a few tons of the metal might be produced from the exposed veinlets by narrow stoping and hand sorting. No large body of rock in the area, however, contains even 0.2 pound of tin to the ton, and the amount of tin recoverable would be only a small part of that shown by assay, for not all of the tin is in grains of cassiterite large enough to be concentrated by ordinary methods. Placer deposits of commercial grade occur in small draws that head in the area where the veinlets are exposed, but as they are only a few inches thick and of small volume, they could yield only a few tons of cassiterite. The report contains a topographic and geologic map of the principal part of the tin-bearing area. This is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 931–O. Nickel deposit near Gold Hill, Boulder County, Colo., by E. N. Goddard and T. S. Lovering. 1942. pp. i–iii, 349–362, pls. 59–60, fig. 37. ***Price, 30 cents.***

The nickel deposit of the Copper King mine, near Gold Hill, 32 miles northwest of Denver, Colo., is in the pre-Cambrian rocks of the Colorado Front Range. The deposit is in a lenticular layer of amphibolite in biotite schist of the Idaho Springs formation, half a mile west of the border of a small batholith of the pre-Cambrian Boulder Creek granite. A dikelike body of hornblende-quartz gabbro, related to the granite, is exposed in the lower workings, and many irregular pegmatite dikes cut the schist, amphibolite, and gabbro. Disseminated intergrowths of pyrite, pyrrhotite, chalcopyrite, and several nickel minerals have replaced hornblende in the coarser-grained and more calcic beds of the amphibolite layer. On the basis of development work and diamond drilling, there seems to be about 25,000 tons of ore blocked out that contains between 2 and 3 percent of nickel and an additional 30,000 tons of ore that will average about 0.5 percent of nickel. The deposit seems to be comparatively small, but the ore-bearing beds are so dislocated by the gabbro and by pegmatite dikes that it is impossible to project their extensions far beyond the mine workings. The ore appears to be genetically related to the pre-Cambrian gabbro dike. The report contains a generalized geologic map of the vicinity of Gold Hill, Colo., and a detailed map and sections of the Copper King mine. It is one of the chapters of "Strategic minerals investigations, 1941."

Bulletin 932–B. Geophysical abstracts 105, April-June 1941, compiled by W. Ayvazoglou. 1942. pp. i–ii, 41–84. ***Price, 10 cents.***

Contains abstracts of world literature on geophysics, covering studies made by gravitational, magnetic, seismic, electrical, radioactive, geothermal, and geochemical methods, and unclassified methods and topics related to geophysics. Includes a list of new publications on the subject and a list of patents granted.

Water-Supply Paper 907. Water levels and artesian pressure in observation wells in the United States in 1940, part 2, Southeastern States, by O. E. Meinzer, L. K. Wenzel, and others. 1942. iv, 120 pp., 9 figs. ***Price, 20 cents.***

The rock formations of the earth are great natural underground reservoirs in which a part of the water derived from rain and snow is stored to supply wells and springs and to maintain the flow of streams during fair weather. The water levels in wells register the stages of these natural reservoirs, showing to what extent they are replenished in seasons of abundant rainfall or melting snow. The pressures recorded on flowing wells also indicate the extent of depletion or replenishment of the artesian reservoirs. This report gives records of ground-water level or artesian pressure in observation wells in the southeastern States—Alabama, Florida, Georgia, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia, and the District of Columbia.

Summary of yearly discharge at gaging stations in the Great Basin. 1941 [1942], pp. i–iv, 125–158, pl. 2. [Reprinted from Geological Survey Water-Supply Paper 880, Surface water supply of the United States, 1939, part 10.] ***Price, 15 cents.***

Tables summarizing in convenient form for general reference use the figures of maximum and minimum daily discharge and yearly mean discharge and run-off for all stream-gaging stations in the Great Basin, both active and discontinued, for which records of 10 or more complete years have been collected and published. Figures are given both by water years ending September 30 and by calendar years. These tables are intended primarily for statistical purposes and for use in preliminary studies, but they give also for every gaging station represented the number and page of each annual water-supply paper in which additional information relating to daily and monthly discharge may be found if needed in connection with more detailed studies. Prepared in cooperation with the States of California, Idaho, Nevada, Oregon, Utah, and Wyoming.

OLDER REPORT STILL AVAILABLE

Bulletin 809. Formulas and tables for the construction of polyconic projections, compiled by C. H. Birdseye. 1929. v. 126 pp., 9 figs. ***Price, 25 cents.***

The primary purpose of this publication is to provide tables for the construction of polyconic projections of topographic maps of standard quadrangles without any interpolation. The tables have been prepared with arguments for each meridian and parallel represented on maps of standard quadrangles, and the data are given in inches for each of the standard field scales employed by the Geological Survey. The bulletin also represents the theory of the polyconic projection, with the formulas developed in detail and their use so explained that the engineer or topographer with only an average knowledge of mathematics can understand and use them. Finally, the theory of the modified polyconic projection of the map of the world is explained, and tables for its construction are given with the data in meters on the natural scale and in inches on the scale of 1:1,000,000.

U. S. GOVERNMENT PRINTING OFFICE: 1942

A Consideration of the Information
Contained in Bulletin 931-C

TIN DEPOSIT AT MAJUBA HILL, PERSHING
COUNTY, NEVADA

by

Ward C. Smith and V.P.Gianella.

Page 42

"The copper deposit is in the Majuba Fault and, therefore, formed later than the tin."

The Majuba fault cuts through one end of the brecciated area which fosters the copper deposit, but , except for the aid this fault rendered in localizing secondary copper mineralization, had no other influence on the ore body. There is certainly no evidence to support the contention that primary mineralization followed this structure. There is more evidence to support the thought that primary mineralization, followed a greater area of weakness, the breccia pipe, which antedated the Majuba Fault.

Smith attempts to make the tin and copper seperate periods of mineralization. However, in the high grade tin area cassiterite is associated intimately with copper arsenates and carbonates, and in the copper stope area cassiterite is intimately mixed with the chalcopyrite, arsenopyrite, pyrite mineralization.

Since there is much evidence to support faulting of the tin structure, and since it is difficult to interpret the copper area, on any basis of offsetting, it was imperative that Smith establish two such periods.

Page 44

Under 'Breccia' he writes: "some small masses of breccia, exposed on the south side of Majuba Hill probably mark faults."

These small masses of breccia are Smith's only reference to that which the writer has mapped as breccia pipes. Smith apparently considers them of no significance; they are not shown on his surface map.

The largest has a long axis of 400 feet, and a short axis of 200 feet. Drilling followed this one structure down to about 600 feet below its outcrop, which indicates an interesting persistency. Cuts at the surface, in this largest pipe showed angular fragments of rhyolite and tourmalinized rhyolite, cemented by heavy iron oxide, some copper carbonates and arsenates. These can easily be considered mineralization channels and not fault outcrops.

Page 47

Under 'Tin and Copper Deposits' he writes: " This shoot is in the hanging wall of the Majuba fault and the displaced footwall portion has not been found -------."

The Majuba structure is not a simple one-gouge fault. Branch structures with dips into the main Majuba structure can be mapped; these parallel the main structure. Three shoots have been mapped; two existed at the time of Smith's study, but he failed to find the second because of his failure to find and map an intermediate level, 25 feet above the tin shoot he describes, and leading from the 20 foot raise, which he mentions. A third shoot was developed by work done last November. Each of these is out of line with its neighbor and separated by a structure; this suggests something approaching block faulting. It is true that the footwall portion has not been found. The proper crosscutting might extend this tin structure on both the footwall and hanging wall sides.

also-----"The copper ore was deposited later as lenses in the fault, about 300 feet from the tin deposit--etc, etc, etc, -----and their situation onnthe same fault is a coincidence."

Comments regarding page 42 cover this to some extent. It is impossible in my mind to:

(1) accept the cassiterite as a seperate period. This may be prejudice but, nevertheless, in both areas tin and copper have been intimately associated.

(2) believe that the copper of the copper stope area is limited to "lenses in the fault". There were sufficient workings open to permit sampling for a distance of 80 feet normal to the trend of the fault structure. All of this 80 feet was in brecciation and mineralization. Only 15 feet showed cassiterite, but it was far stronger than the few grains Smith mentions with reservations,ie: he shows ' ? Cassiterite' for the copper stope on his maps.

Page 48 " a 20 foot ~~winse~~ raise, a winze -------"

Had Smith climbed a ladder at the time of his investigation he would have found an intermediate level, 25 feetnabove Tunnel 2, in the high grade tin area; this level had about 60 feet of workings, developing two shoots of cassiterite mineralization, seperated by structure, which could be considered two seperate segments of a faulted vein.

Page 49 Mineralogy: rather than consider this, sentence by sentence, this paragraph could be written as follows:

TIN AREA: The ore mineral of the tin deposit is cassiterite and the gangue minerals are quartz, sericite, tourmaline, fluorite, olivenite, chalcophyllite, and to a minor extent malachite and azurite. Some material from

the crosscut is thickly coated with iron oxide, but cassiterite-rich material can be visually distinguished from barren rock by reflection of light from clean crystal fa ces or by a peculiar yellow coating, unidentified but a common companion of cassiterite throughout the mine. Identification in the hand specimen is, of course, quite simple because of the high specific gravity of cassiterite.

Assuming that the tunnel actually crosscuts a vein structure, and is not drifting on a pocket (which has been held by others), actual breadth of all mineralization amounts to 40 feet. Of this 40 feet, 26 feet inthe footwallconsists of pockety course tourmaline, fluorite and some quartz without tin values. The next fourteen feet contains the same gangue mineralization, but is also accompanied by strong cassiterite, which accounts for the 2% tin average mentioned in Smith's paper. Limits of this 14 feet are sharp and not gradational to altered rhyolite as reported by others. Whereas, cassiterite in this 14 feet is in a sense pockety, which causes some startling variations in adjoining samples, the 14 feet with sharp margins or limits is a definite unit, and can be considered the width of a tin vein. Copper values are not limited to the 14 feet, but are found in the 26 foot footwall zone to some extent, and even invade the crackled tourmalinized porphyry, adjacent to the structure in the hanging wall. Since copper is chiefly represented by olivenite, a copper arsenate and secondary, it is conceivable that this secondary distribution of copper could follow any open ground in the general area.

COPPER STOPE AREA

Values to support initial mining were derived from the accumulation of secondary copper minerals next to the Majuba fault. These were cuprite and chalcocite with some malachite and azurite, and an assortment of copper arsenates.

Pockets of primary sulphide can also be found. Whether these represent remnants of the original mineralization, or another period of mineralization is still an open question. Outstanding is the pocket referre d to on page 50 ("a 6' mass exposed in the manway to the copper stope"). This pocket consists of chalcopyrite, pyrite and arsenopyrite to some extent replaced by chalcocite; of particular interest is the cassiterite which accompanies this sulphide and which can be recognized in all hand specimens taken from this zone. Since Smith employs a question mark, in referring to this cassiterite, and then quotes values (D.L.Evans, personal communication #6) "according to reliable assays," I believe it perfectly proper to enlarge upon the data he quotesto this extent---- that channels cut thru this zone gave 15' of 0.9% Sn. All assay data given Smith for his paper were from our initial sampling.

These areas of sulphide may be significan t; they can either:

(1) represent remnants of the original sulphide mineralization and indicate what might be expected at depth

or

(2) represent a second period of mineralization a copper-tin period, which also might indicate what to expect with depth.

Page 50 Distribution of Cassiterite

" all the cassiterite seen in place was in the tin shoot in the middle adit, in the hanging wall of the Majuba fault------".

Reference is made to the above discussion on the copper stope area. Cassiterite was mapped by the writer at two places on the surface, 400 feet vertically above the tin area developed in Tunnel 2. Work in November carried cassiterite to a point 60 feet vertically above tunnel 2.

Page 51 "six specimens----------were crushed and the heavy minerals seperated with bromoform and methylene iodide".

Of the six, four were taken from barren rock unrelated to any structure, and should be of no significance. Two came from Tunnel 1(the uppermost tunnel) in the zone of oxide breccia. Since cassiterite in this structure appeared limited to sulphide areas, it is not surprising that cassiterite was not found in these two specimens.

Page 51 "But they do show that cassiterite is not a constant companion of tourmaline-------".

This is not surprising. It would seem that structural control is far more important than wishful thinking on a widely distributed mass of tourmaline mineralization

Page 52 Size and grade of ore body:

No comment is necessary. The possibilities would appear a lot rosier than depicted. Some basis for speculation exists in preceeding paragraphs.

Page 55 Origin

Here again, rather than a sentence by sentence appraisal this paragraph could be re-written as follows:

The Majuba fault did not localize the deposition of the ore, and was subsequent to primary mineralization. The fault did serve the purpose perhaps of concentrating into a mineable unit, secondary copper minerals.

After the injection of rhyolite into Jurassic slates, and after a period ofmwide spread and general tourmalinization, it is conceivable that 'tail end' mineralization products were confin d to certain channels, these being breccia pipes and vein structures. Characteristic of the first type is the 400 by 200 mass of brecciated and crackled rock. Characteristic of type #2 is the 14 foot vein structure in the so called tin area.

One might lean towards two periods of mineralization, the first cupiferous pyrite, and the second a copper-tin period (consisting of pyrite, chalcopyrite, arsenopyrite and cassiterite.

> Note: The argument against the sulphide areasbeing remenants of original primary mineralization is the insolubility of cassiterite. Should the oxide represent a leached product which in primary form had been chalcopyrite, pyrite, arsenopyrite and cassiterite, it is believed that the tin oxide would have been left behind.

Post mineral structure (the Majuba Fault with its numerous branches) subsequently cut through both types of structure, definitely block faulting the tin vein into a combination of segments, only three of which have been determined. It is believed that there has also been definite displacment of the breccia structure.

Secondary enrichment of the primary mineralizatinn dompletes the story.

Page 55-- Reserves

There is no justification for the dogmatic statement 'there are no copper reserves in sight'. Mining did not exhaust mineralization with ore possibilities.

In conclusion, it might be added, that anyonenna-actually interested in Majuba, coul d consider the hill from the angle of this concluding paragraph----

Significance of Majuba

In many ways Majuba is similar to the tin occurrence at the Cerro Rico de Potosi, Potosi, Bolivia. Both areas are characterized by an intrusion of rhyolite into Jurassic slates; in both cases the cassiterite is associated with complex copper sulphides, with arsenopyrite predominant. Some suggestion of the rich silver that characterized Potosi ores is present at Majuba with an ounce of silver for every percent copper. However, this last is a poor comparison, for Potosi silver is in a class by itself.

From a domestic standpoint, Majuba appears to be the only non-pegmatitic tin possibility associated with

an acid intrusive. All others in this country are either in pegmatitic form (Spokane, Black Hills, North and South Carolinas, Irish Creek-Virginia, etc.) or associated with volcanic flows (Catron County-New Mexico and Izenhood Ranch-Nevada). The one exception is the Cajalco deposit Riverside which can be interpreted in a number of ways.