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Jan. 4, 1992

Dear Walt,

After sending my last letter in which I said that I had no information on the Vulcan, I found a file on it.

Enclosed is what I have and am sorry to say that it isn't much.

You can keep the information if you wish.

It is snowing like crazy this morning. Not exactly weather for pruning sand trees.

Sincerely,

Al

VULCAN MINE

Pima Mining District

Pima County, Arizona

Report by C. J. Sarle

Mining Geologist

December 31, 1928

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Permanent Record
SOUTHWESTERN
TEXAS OIL COMPANY
O.S.A.

VULCAN MINE
Pima Mining District
Pima County, Arizona

PROPERTY AND LOCATION

The Vulcan Mining property lies on the northeasterly edge of the pedimentary slope of the Sierrita Mountains, in the Pima Mining District, in Sections 2 and 3, T. 17 S, R. 14 E., Pima County, Arizona. It consists of four full claims, patented, and two claims and two fractional claims, unpatented. The four patented claims--Vulcan Nos. 1, 2, 3 and 4--are recorded in the office of the U.S. Mineral Surveyor at Phoenix, Arizona, under Mineral Survey No. 15373, June 26, 1901. The unsurveyed claims Vulcan Nos. 5, 6, 7 and 9 are on record at Tucson, in the office of the Pima County Recorder, respectively in Book QQQ, P. 28 and P. 29, Book XX, p. 318, and Book QQQ, p. 30. Together the unpatented ground of 73.40 acres with the unpatented form an unbroken area of about 120 acres.

A plat of the patented mining claims of the Vulcan group accompanies this report, and the Areal Geologic map attached shows the relation of the unpatented ground to them.

ACCESSIBILITY

The Vulcan property lies on the Tucson-Twin Buttes Highway, 20 miles south and a little west of Tucson, the county seat of Pima County and supply center. Tucson could well be made the shipping center for the ore, as the road is excellent and down grade from the property for the entire distance and would give the advantage of loading the ore on platforms directly on the main line of the Southern Pacific Railroad. A shorter truck haul could be had, however, over the graded auto road to Twin Buttes, six miles to the south, which is the terminus of a spur from the Nogales Branch of the Southern Pacific at Sahuarita, five miles easterly. Another route would be directly down the water graded alluvial slope eight miles southeasterly to Sahuarita, a station 17 miles from Tucson. Anyway it might be figured, the cost of getting the ore from the Vulcan Mine onto the main line of the Southern Pacific would be about a dollar and a half a ton.

GENERAL GEOLOGY

The region of the present Sierrita Mountains was once deeply buried beneath early Tertiary volcanic flows--mainly acidic to sub-acidic, though in late Tertiary becoming basic (basaltic)--which rested upon an immensely thick series of Comanchean (Mesozoic) Cretaceous strata--principally arkosic and conglomerates and sandstones, mud rocks, with included horizons of vari-colored shale with some interstratified beds of limestone, these in turn overlying the thick series of Paleozoic strata, principally limestones--including in

descending order Pennsylvania (Naco) limestone, Mississippian Escabrosa limestone, Devonian Martin limestone and Upper Cambrian strata, the latter composed of shales, sandstones and limestones, at the top Abrigo limestone, and of quartzites at the base, Bolsa quartzite. These rested upon a Pre-Cambrian basement including gneiss and schist.

In the late Tertiary time faulting and uplift, accompanied by great upswelling of acidic lava beneath the area of batholithic proportion, produced on congealing and crystallizing a great granite core.

Erosion has since made deep inroads on the original Sierrita Mountain mass, removing much of the old roof rocks and exposed the underlying granite batholith over wide areas. The original cap of Tertiary lava has been reduced to a few flanking remnants, and fault blocks of strata of Mesozoic and Paleozoic age rise here and there as groups of hills out of the outwardly sloping erosional plane, or rock carved mountain pediment, which surrounds the residual erosional axis of the once more widely extended Sierrita Mountain mass.

Volcanic constituents from the heart of the acidic magma, source of the batholith, ascending in highly heated gaseous or fluid form, bearing mineralizing elements, heavily metamorphosed extensive portions of the older overlying formations, forming ore bodies of various forms in them. Where this intrusive contacted limestones it formed contact metamorphic ore bodies near the contact and at a distance in the limestone in zones of fissuring and brecciation, ore bodies by metasomatic replacement; while in less amenable rocks the solutions formed fissure fillings or vein and bodies of interstitial or breccia ores, and in cases disseminated deposits.

Deep erosion has exposed the innermost structure of the Sierrita range and brought many ore bodies to view or within easy reach of the prospector.

That the granite magma was rich in metallic elements is abundantly proved by the many mines and prospects in the Pima Mining district, San Xavier, Mineral Hill, Olive Camp and Twin Buttes of the eastern portion of the Sierrita Mountains and those of the less explored and developed Papago district in the western flank. It is in the San Xavier-Mineral Hill camp in the northern part of the Pima district that the Vulcan lies.

GENERAL FACTS RELATING TO PIMA MINING DISTRICT

The writer has visited many of the mines of the Pima Mining district at one time or another while they were being operated and thus has gained a general conception of their ore bodies and general geologic relations. Time has not permitted a compilation of detailed and concise statistics covering the production of the district. Though there has been no steadily sustained production in any one part of the area, yet there are several properties in each of the camps, into which past mining activities have divided the district, which have been intermittent but large profitable producers.

Mining began in the district in the sixties and seventies and reached a period of general activity in the early eighties. Olive camp, one and a half miles south of the Vulcan mine, was especially active until about 1893 when the demonitization of silver, many of the veins in the Mesozoic strata worked to the level of zinc and increasingly complex sulphide ore, were abandoned. This camp during the past five years, however, has shown renewed activity with the development of the Swastika, Victor Consolidated and Helmet Peak properties. On the Helmet Peak property development has reached a depth of 600 feet, showing the presence of considerable bodies of zinc-copper ore occurring in brecciated areas in diorite. The ore bodies appear to be increasing in number, size and generally improving in value with depth. This property, however, has been closed down within the past few weeks because of insufficient funds for continued exploration and development.

Olive Camp in earlier days is said to have produced lead-silver ores to the gross value of between two and three million dollars.

Through the period of the late World War the Pima Mining district was actively mined. At Twin Buttes, six miles south of the Vulcan property, large tonnages of copper ore were shipped from contact metamorphic deposits occurring in the Paleozoic limestone along or near the granite contact, and for some time after the war or until 1926 active shipping was continued from the Queen Mine of that camp.

During the war the North Star Mine--ores contact metamorphic replacements in Paleozoic limestone--was opened up and a large tonnage of sulphide ore developed; but the property was never operated, as the percentage of zinc occurring with the chalcopryrite prevented possible shipping and at that time the present practical way of milling this type of ore had not been devised.

It is stated on good authority that a number of properties in the Twin Buttes camp have recently been bonded. These include some that in the past have been large producers, the others new which will be developed.

The gross production of the Twin Buttes mines, principally from the Gance, Minnie, Queen and Senator Morgan (mainly contact metamorphic deposits in Paleozoic limestone, though in the Morgan from fissures and brecciated bodies in Mesozoic quartzite) has been variously estimated as between four and five million dollars.

The San Xavier-Mineral Hill camp has had three principal producing mines--the San Xavier, Mineral Hill and Vulcan. The San Xavier opened to the 600 foot level and extensively developed to the 400 foot level, started as a high grade silver-lead producer, but with depth developed into zinc and traces of copper sulphide ore beginning to appear in the bottom. Large bodies of high grade zinc sulphide ore are reported to have been developed.

Major L.H. Manning who once owned this property operated it between 1907 and 1908, shipping about 12,000 tons of silver-lead ore at a time when lead was 3 to 4 cents, the ore having a gross value of \$11.00 per ton. The property had previously had a large production but on this date seems unavailable. Later this property was purchased by the present owners, the Empire Zinc Company, a subsidiary of the New Jersey Zinc Corporation. It is said that this company, after sufficient ore to pay for the property had been shipped, closed down during the latter part of the war, deciding to concentrate on large and intensive production from other properties which could thus be mined more cheaply.

The ore bodies of the San Xavier property so far as present development shows, are metasomatic replacements in the Pennsylvania limestones.

The Mineral Hill property adjoining the Vulcan on the north and east and the San Xavier on the south, has been developed through a number of shafts and drifts to a depth of 700 feet and contains a large tonnage of shipping and milling grade copper ore. This ore occurs mostly as contact metamorphic deposits in the Pennsylvania limestone, near the same contact with the granite the Vulcan workings are on, and in and along fissures crossing the southward dipping beds of limestone away from the contact. The principal ore body opened is over 150 feet wide and consists of alternating beds of higher and lower grade ore, representing layers of the limestone of varying susceptibility to replacement.

It is claimed that 50,000 tons of copper ore from this mine were smelted on the property in early days and that a very large tonnage of ore was shipped before the property passed into the hands of the present owner, the Barnsdall interests of Tulsa, Oklahoma. The latter, after operating the property for a short time and it is reported paying for the property from production, closed down in 1918.

The San Xavier Extension Company's property, adjoining the Vulcan ground on the south, was under development by Ed Bush up to the time of his death in 1921. A large shoot of complex silver-lead-zinc-copper ore was selectively mined and shipped to the gross value of \$25,000.00. At the time development in this mine was stopped a main shaft had been completed to the 500-foot level and crosscutting started.

The Vulcan property has less development than either the San Xavier or Mineral Hill and is said to have had a gross production approaching \$300,000.00.

This Vulcan property was visited by the writer early in 1918 and was given a cursory examination. At that time an outstanding feature in the mine was a strong vein of chalcopyrite which showed in a drift running southerly from No. 1 inclined shaft, the depth being perhaps 200 feet below the surface. Mining at the time was also being carried on at lower levels.

Estimates of production of the San Xavier-Mineral Hill camp range from one to two million dollars gross.

These illy sorted facts have been presented here to convey some conception of the large possibilities of the Pima Mining district and to give a better grasp of the possibilities presented by the Vulcan property.

TOPOGRAPHY AND GEOLOGY OF THE VULCAN PROPERTY

From the Santa Cruz river to the southwestward and east of the Sierrita Mountains the country rises by gentle gradient across the alluvium covered pedimentary slope of the mountain range, gaining in elevation about 1200 feet in a distance of six or seven miles, making the elevation of the Vulcan property approximately 3500 feet above tide. Rising from this rock slope through the alluvium in the region of San Xavier-Mineral Hill camp, with heights varying up to 400 feet above the plain, is a group of residual hills composed of fault blocks of Paleozoic limestone and quartzite. The strata in these blocks tilt in the various directions given them by the once molten, upswelling subjacent granite magma.

The southern base of the Vulcan group includes the northeastern part of what is known as Marble Mountain (see Fig. 2, Plate 1) and reaches across a large wash to the east and a short distance up on the western end of what is known as San Xavier ridge (see Fig. 2, Plate 2)--ground held respectively by San Xavier Extension Copper Company and San Xavier Mining Company. The northern end of the group stretches out onto the base leveled pedimentary lowland to the north and reaches nearly to the Mineral Hill ridge--ground held with that to the east of the Vulcan group by the Mineral Consolidated Copper Company (See Plate 2, Figs. 3 and 4 and Plate 1, Fig. 2).

Much of the lower ground on the Vulcan property is veneered by alluvium. Flash floods, resulting from the occasional sudden heavy fall of rain typical of the region, however, have cut out channels which at several points reach bedrock. These exposures with others furnished by prospect work and mining operations, together with a general exposure of the rock over the more elevated parts, permits of a fairly accurate mapping of the formation of the area.

As shown on the accompanying Areal Geologic Map, approximately two-fifths of the Vulcan ground is floored by a late Tertiary granite, the remainder by sedimentary rock of Paleozoic age.

The granite is often porphyritic containing phenocrysts of feldspar varying up to an inch in length imbedded in a medium coarse groundmass, highly siliceous and carrying besides the usual orthoclase, some plagioclase.

The length of surficial line of contact between the granite and the sedimentary rocks within the limits of the property is approximately 3500 feet and there is no reason to doubt that the granite passes beneath the sedimentary formations and everywhere underlies them in igneous contact, though in places probably at great depth.

The granite extending in upon the property from the northwest and west along its southerly limit is intrusive into a diorite of medium coarse grain and in turn is cut by a diorite of finer stony structure and forms a narrow tongue-like eastward extension which transects the property. (See Areal Geologic Map) To the north, perhaps 1200 feet between the Vulcan new vertical shaft and the old No. 1 inclined shaft, a second narrow eastward extension of the granite cuts into the sediments and forms an intrusive leaf perhaps 60 feet in width which dips steeply to the southwestward in concordance with the bedding planes of the including strata. (See relative position of these shafts Plate 1, Fig. 1)

As indicated on the Areal Map, the sediments partially surrounded by the granite at the north end of the Vulcan property extend eastward and southeastward, where they join with the limestone mass forming San Xavier ridge. These, so far as surface showings on the Vulcan property indicate, are limestone of Paleozoic age.

Over the northern part of the property the limestones are as a whole thick bedded and tilt very steeply to southeast, though portions are much contorted and marbelized. This limestone is relatively pure and free from magnesium and in less altered beds fractured surfaces are steel gray in color, the weathered surfaces usually dark grey to bluish in color. Many of the more massive beds contain gray to brown and black chert concretions in large numbers. Fossils indicate that the limestone in the northern area of this property represent a horizon well up in the Pennsylvania (Carboniferous) series. If the lower members of the Paleozoic series--Mississippian, Devonian and Cambrian--are represented on the northern end of the property they do not show in surface croppings and it is believed that they have been destroyed by erosion.

The northern limestone mass apparently forms part of the large mass composing San Xavier ridge to the Southwest which contains the large ore bodies opened on that property, the entire block resting in a basement formed by the intruded Tertiary granite.

Though some faulting may be expected in the Vulcan end of this mass, from surface indications it is believed that they will be principally cross faults of small displacements.

The mass of limestone indicated on the geologic map as underlying the southern end of the property forms a foothill lobe of Marble Mountain, from which it apparently cut off along its southerly side by a thrust fault having a nearly north-south strike. Many of the beds of limestone in this hill are thinly laminated and zoned with sheets or ribs of whitish chert. The beds are much sheared and the resulting fractures are in many places filled with stringers of vein quartz. The generally metamorphosed condition of this limestone and the absence of all traces of fossils makes it impossible to determine exactly the position in the sedimentary column to which the strata in this fault block should be referred, but it seems most certain that they represent an horizon lower in the series than that of the limestone of the northern end of the property. Apparently this foothill block was raised by the granite intrusion which crops along its northern edge.

It is in these limestones that the ore of the Vulcan and adjacent Mineral Hill, San Xavier Extension and San Xavier properties occurs. (See relative positions of those properties Plate 2, Fig. 3). These Paleozoic sediments play an important part as depositories for ore of the contact metamorphic and metasomatic replacement types in many of the large mining districts of Arizona--for example, Bisbee, Tombstone, Clifton, Dragoon, Gleeson, Silver Bell, Globe and elsewhere.

It appears that nearly everywhere development work has opened up the limestone along its contact with the granite on the Vulcan property ore bodies have been encountered in it from five to fifty feet from the contact. These either lie in the bedding planes of the limestone or form replacement of the layers, or farther from the contact where cross fracturing has permitted ore has taken position across the bedding or replaced brecciated portions of the limestone. It is reported that sulphide ore was also mined in the granite along the contact, if so, indicating that ore deposition continued after the solidification of the marginal portion of the granite.

It is stated that the ores mined near the surface, comprising that first mined on Vulcan ground, were carbonates and oxides or secondary, that is, reconstructed ores; that deeper, the ore generally was a mixture of oxidized ore and the primary sulphides. In the deeper workings and in close ground they became preponderately sulphides.

The ores thus far mined in the northern part of the property have been practically straight copper, averaging about 7%, sometimes carrying a few ounces in silver though usually about one ounce.

PREVIOUS DEVELOPMENT AND PRODUCTION OF THE VULCAN MINE

While there are numerous open cuts and shallow shafts on the property, some of which afford valuable suggestions for future development, these have contributed little to its past production. The principal work is represented by four deep shafts. The relative position of three of these, including two inclined shafts and a vertical shaft situated well toward the northern site of the property, is indicated on Photo No. 1, Plate 1 in the back of this report. The fourth shaft known as the South shaft is located toward the southern end of the property about midway and perhaps 700 feet from its southerly endline, its position being indicated on Photo No. 2, Plate 1.

Nearly the entire production of this property has come from two inclined shafts, although a large glory hole now filled located to one side of No. 1 inclined shaft is said to have yielded an unknown but large number of carloads of high grade oxidized ore.

Inclined shaft No. 1 is in limestone, closely following the granite footwall. As in the case of No. Shaft, it is inclined a little to the east of south and is said to be about 500 feet deep, its bottom being between 280 and 300 feet vertically from the surface. For the first half this shaft has a flat pitch, thence it steepens to about 50 degrees toward the bottom.

Mr. James Pemberton claims to have started this shaft in 1915 when he acquired the property and to have done the work on the first 50 feet or so of it. He further states that it was while working on this shaft and shipping ore that he started inclined shaft No. 2 on a good surface showing in limestone, the shaft quickly passed to the granite contact, and that he finally discontinued work on No. 1, as he was getting ore more easily at a shallower depth in No. 2, which he continued to work till it reached a depth of 40 or 50 feet. He claims to have shipped from a single stope in this No. 2 shaft 25 to 30 carloads of high grade copper ore. His shipments from both shafts he estimates totaled between 9000 and 10,000 tons of ore averaging between 6% and 7% copper.

In 1917 Mr. Pemberton taking into partnership, among others, William R. Ramsdell, turned over the operation of the property to the latter and his brother. Under this arrangement No. 1 shaft was sunk to its present depth and at the same time No. 2 shaft, which has a pitch of 45 degrees, was carried to a depth of 230 feet. As these shafts are both on the granite-lime contact, a 180 foot drift was run from No. 1 shaft northeasterly to connect with No. 2 at a vertical depth of perhaps 180 feet. It is understood that the drift in No. 1 shaft running westerly on the contact, and mentioned earlier as seen by the writer, was extended to a distance of 175 to 200 feet. In the drift between No. 1 and No. 2 shafts a 15-foot winze was sunk and a body of ore said to be six to seven feet wide was encountered running about 7% copper.

The account of location and size of ore bodies encountered and mined and the estimate of tonnage of unmined low grade or milling ore, though stated as large, are neither detailed nor clear. It is claimed that a large body of ore was stoped in No. 1 shaft from a point perhaps 200 feet vertically from the surface and that good commercial ore was opened up to a width of 12 feet at the bottom of this shaft, neither wall or orebody being exposed. Mr. Ramsdell states that he extracted and shipped about 2000 tons of 6% to 7% copper ore from the lower half of No. 2 shaft and that in the two and a half years during which he operated the Vulcan Mine he shipped about 6000 tons of ore averaging 6% to 7% copper. Anything below 4% was left in the mine, and during his acquaintance with the property it produced, he estimates, something over \$200,000 gross. Time has not permitted my checking these reports with smelter records.

Mr. Ramsdell states that water was encountered while working in the bottom of No. 1 shaft and with inadequate equipment for handling it, though pumping was tried and an attempt made to close the water out with a bulkhead, it forced work to higher and higher levels. When the water finally rose to within perhaps 150 feet of the surface and extensive caving occurred in the shaft he gave up further attempts to operate.

It is the assertion of both Messrs. Pemberton and Ramsdell that at the time the water began to flood the mine there were good bodies of shipping ore in sight and that a large tonnage of excellent milling ore has been left in various parts of the workings.

About 1920 parties from Chicago took a bond on the Vulcan property at the price of \$125,000.00, incorporated and worked the property intermittently over a period of a year or two, sinking and timbering at 210 feet, 2-compartment shaft at a point about 300 feet to the south of No. 1 shaft. It was the plan to intercept the extension of the inclined contact at that point. Facing a falling copper market, work was stopped it is said in 1922.

The south shaft earlier referred to is in its present condition inaccessible, although still open. This shaft was described to me by Mr. Pemberton as about 65 feet deep. At the bottom a 20 to 40 foot drift was run to the south, and slope between the 30 and 40 foot levels was worked to a depth of 25 feet to the west. He further stated that one carload of ore was shipped which he remembered ran about 50 ounces in silver, 2 to 3% lead, a few percent zinc and 2% to 3% copper, that the ore was getting pretty zincy at 65 feet.

WATER

Only estimates as to the amount of water which the mine was making at the time work ceased are available. These vary somewhat but the general consensus of opinion appears to be that it was about 60 g.p.m. This information taken with reports as to the amount of water encountered in the neighboring Mineral Hill and San Xavier would indicate the water could be turned from a liability to a distinct asset if milling were undertaken.

EQUIPMENT

There is an excellently constructed headframe over the 210 foot shaft and shaft is well timbered and in fine condition. There is a good hoist and compressor house with concrete foundations ready for the installation of hoist and compressor. This building, a large machine shop and an office building with change room and shower at one end are shown in Photo No. 1, Plate No. 1.

DEVELOPMENT REQUIRED TO PLACE PROPERTY ON PRODUCING BASIS

By either of two courses of procedure the Vulcan property can be brought quickly to the stage of production. One would be to sink the vertical shaft 200 feet more or to the 400 level to intercept the contact at a lower level on the dip and then run drifts and raises. The other would be to sink another 100 feet and crosscut possibly 70 feet to the contact and then by drifting pick up the ore from that level first. Probably this last course would be more practical as it would entail the pumping of a smaller volume of water while the upper levels were being developed and worked.

The result of this work should then largely determine a plan for the future more extensive and deeper development of the property.

As to the development of the southern end of the property, it seems that with the ore showing made by the comparatively superficial work done and the favorable appearance of the dump material the area holds great promise. It should be borne in mind also that the limited

development work on the San Xavier Extension property not more than 600 feet south from the endline of the Vulcan property, disclosed an ore shoot of complex silver-lead-zinc and copper ore which selectively mined is said to have yielded \$25,000.00 gross. A number of structures showing on that property promise the development of other and possibly larger ore bodies with depth.

A consideration of like nature is that the southern end of the Vulcan property is also probably not much more than 600 feet from the main shaft on the Empire Zinc Company property, the San Xavier, which has had a large production and has known large tonnages of ore opened up but not blocked out.

These facts indicate the generally mineralized condition of the southern end of the Vulcan property and contiguous ground.

While as stated, ore of the south shaft promises to be complex and will probably be similar to that of the two last mentioned properties, likely it can be handled to profit by selective mining. Or if a mill is warranted by the northern end of the property, it may be found practical to treat the ore by flotation, insuring that all values in the ore including zinc may be fully realized thereby increasing the commercial output.

SUMMARY

Though but superficially explored and with mines as yet but shallowly developed, the Pima District has had a relatively large production of ores of good commercial grade. The widely distributed evidence of extensive mineralization indicate for this district a future of great activity. In this relation, the Vulcan property is well situated and limited development has shown very satisfactory returns. The geologic conditions are excellent and are shared in common with the adjoining Mineral Hill and San Xavier properties where more extensive developments have given correspondingly larger production and opened up larger known reserves of ore. With over 3500 feet of surficial igneous-sedimentary contact and a subjacent igneous contact with upwards of 80 acres of overlying limestone especially susceptible to ore formation, conditions on this property are more than usually favorable for large contact metamorphic ore bodies along the contact and for the occurrence of metasomatic ore bodies at a distance from the intrusive contact, as at San Xavier, in the overlying limestone mass.

The property is in an accessible position and with good roads the cost of transportation of ores and supplies will be relatively low. There is an abundance of both American and Mexican labor going and coming from neighboring mining districts, and Tucson 20 miles away is an ever ready source of supplies and miners. These conditions, together with ore bodies easily and cheaply mined, a mild climate the year around, ample water for milling assured, compare favorably with those of any other mining property in the southwest.

Last, and not least, the property can be rehabilitated at a very small initial outlay and put on a producing basis within a period not to exceed four to five months.

CONCLUSIONS

In my opinion, the Vulcan property, adequately financed, equipped, developed and efficiently operated affords an exceptional opportunity to make a large and very profitable mine.

(Signed) C. J. Sarle
Mining Geologist

December 31, 1928

COPY

PHELPS DODGE CORPORATION

Copper Queen Branch, Smelter Division

Douglas, Arizona

December 17, 1945

Mr. Edward Foy
Box 21 Ruby Star Route
Tucson, Arizona

Dear Sir:

As requested in your letter of November 16th we give below possible shipments from the Vulcan Mine. Shipments for year 1916 and 1917 appear in the name of W. R. Ramsdell and we have no definite knowledge they were shipped from the Vulcan Mine although shipment made in 1918 from Mr. Ramsdell were from the Vulcan Consolidated Mining Company.

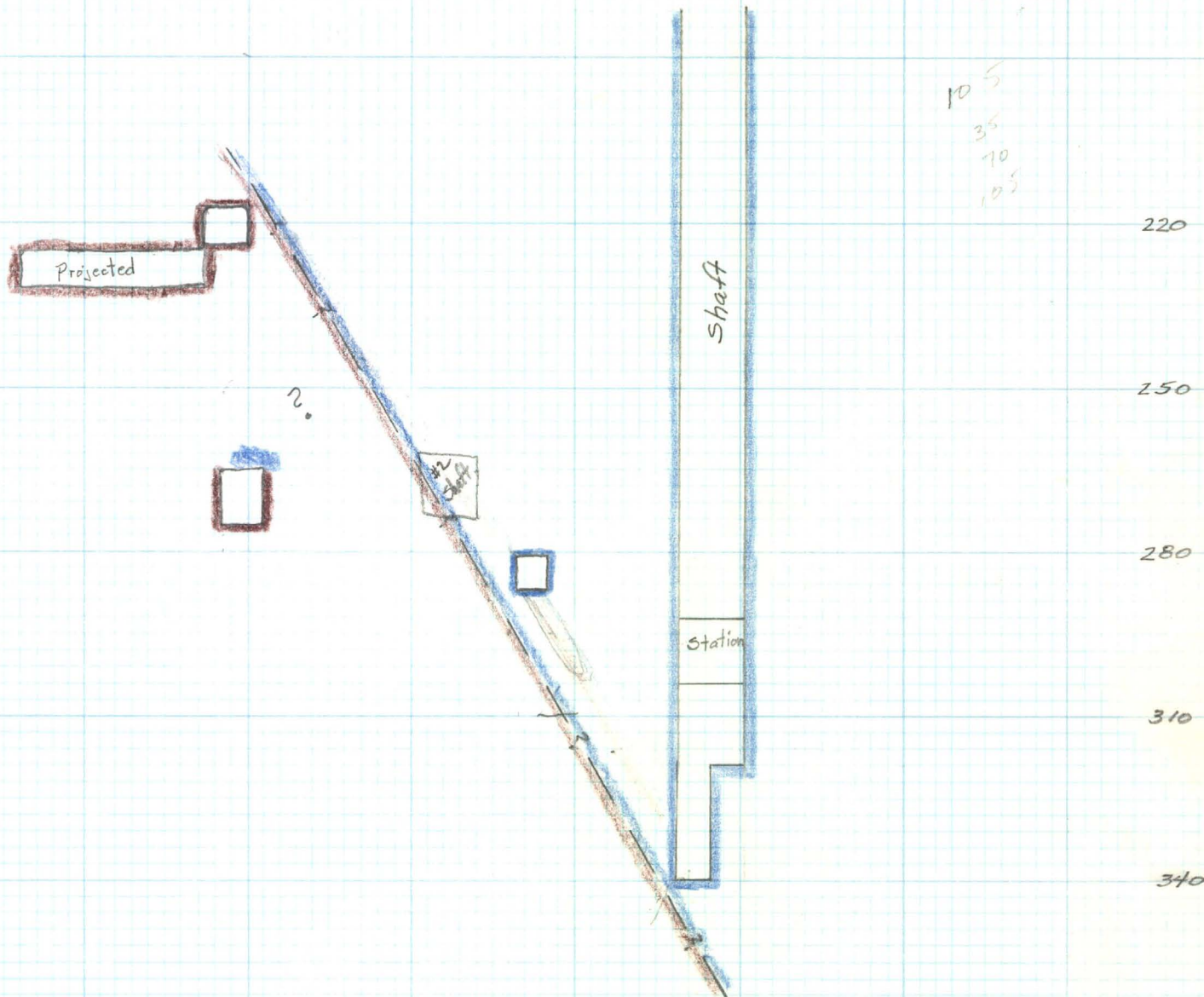
Shipped in the name of W. R. Ramsdell, Tucson, Arizona

	Dry Tons	oz Au	oz Ag	%Cu	%S102	%Al2O3
1917 Jan. to December	3262	tr	1.56	7.80	31.4	6.8
1916 March to December	5167	tr	1.12	6.24	34.0	7.4
1918 Jan. and Feb.	88	tr	1.35	7.92	34.8	7.5
		% Fe	%CaO	%S		
		13.3	16.1	7.2		
		11.4	16.8	5.8		
		12.8	14.2	3.7		

Signed E. W. Beddow
Chief Clerk

A ↑

A' ↑



█ Limestone
█ Granite or Arkose

Section A - A'

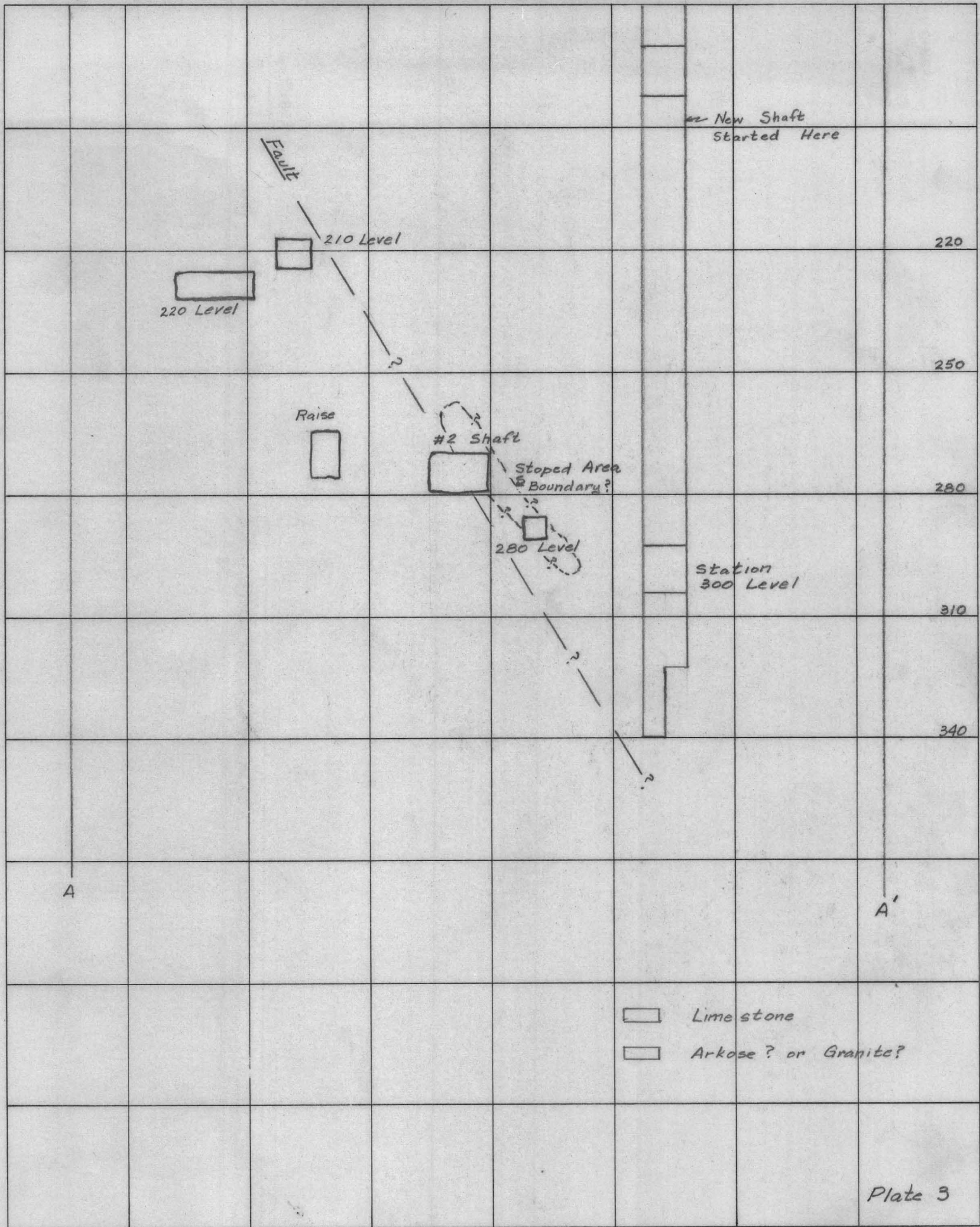


Plate 3

MINE VULCAN LOCATION Pima County, Arizona LEVEL Section A-A'
 GEOLOGY BY A. M. Rugg SURVEY A. M. Rugg DATE 9/26/57 SCALE 1"=30'
 N _____ E _____ EL. _____

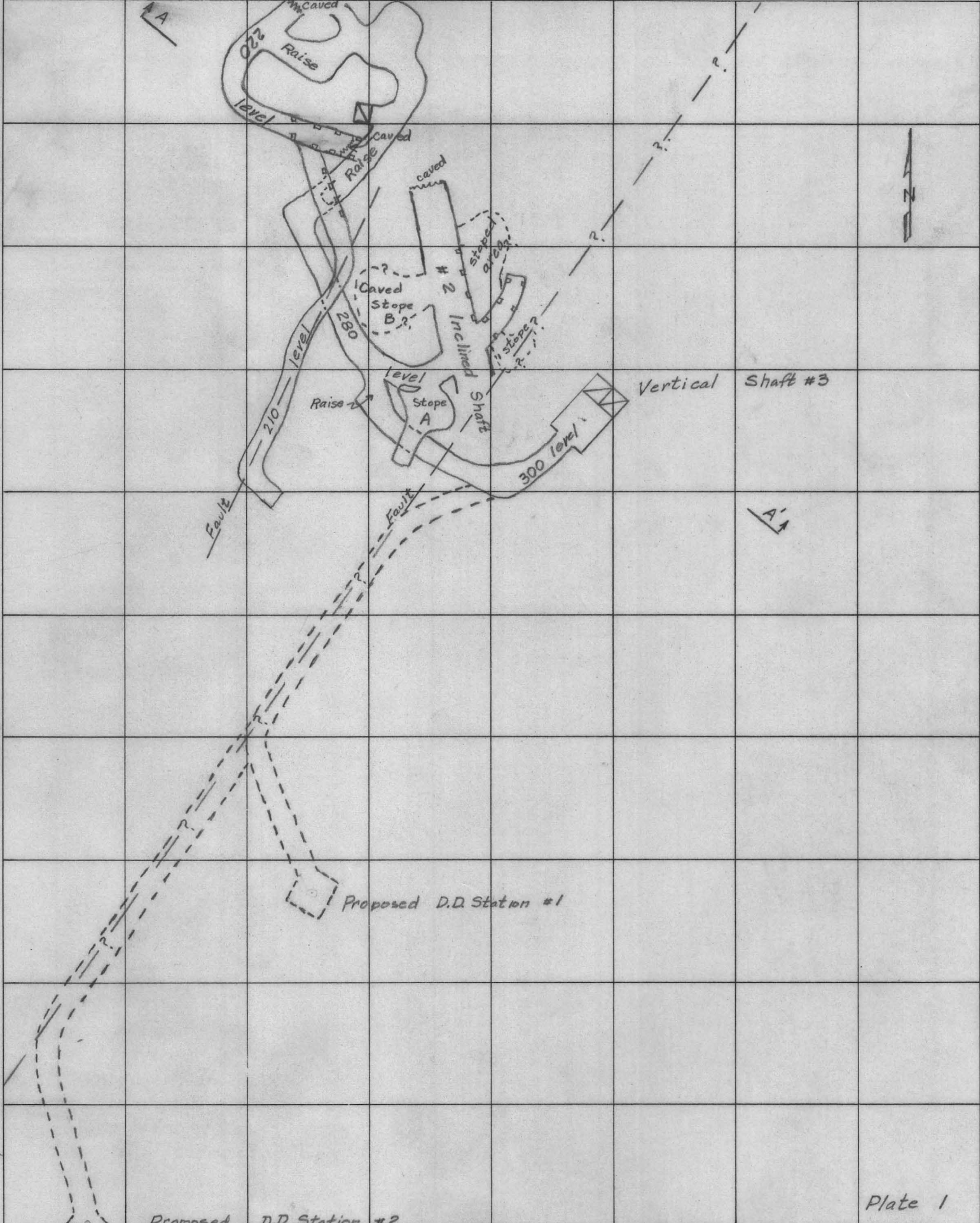
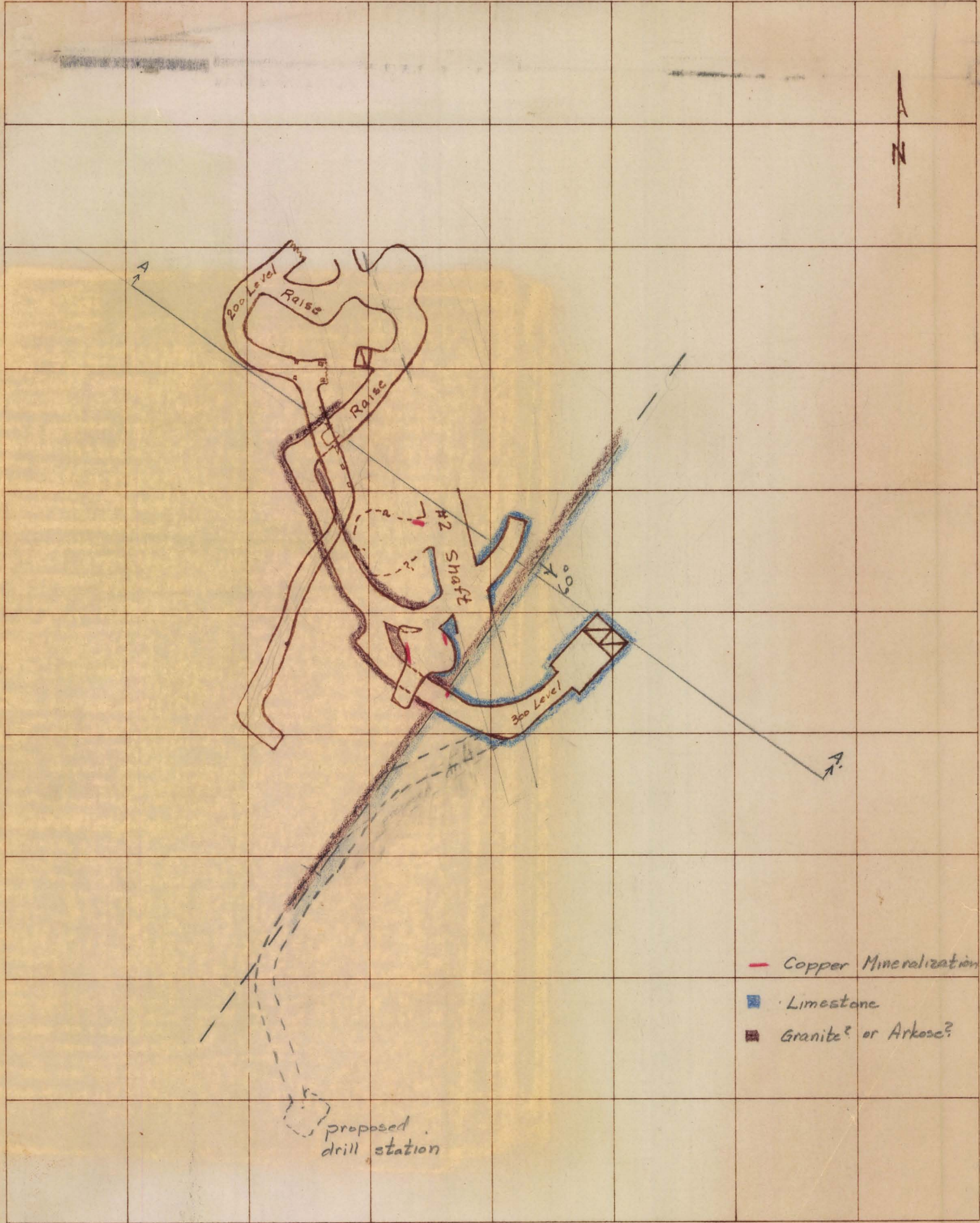


Plate 1

MINE VULCAN LOCATION Pima County, Arizona LEVEL Accessible
 GEOLOGY BY _____ SURVEY A.M. Rugg DATE 9-26-57 SCALE 1" = 30'
 N _____ E _____ EL. _____



MINE VULCAN LOCATION PIMA COUNTY, ARIZONA LEVEL 300 Level
 GEOLOGY BY _____ SURVEY A. M. RUGG DATE 9-26-57 SCALE 1"=30'
 N _____ E _____ EL. _____

□ Limestone
 □ Arkose? or Granite?
 Chalcopyrite (Copper Mineral)

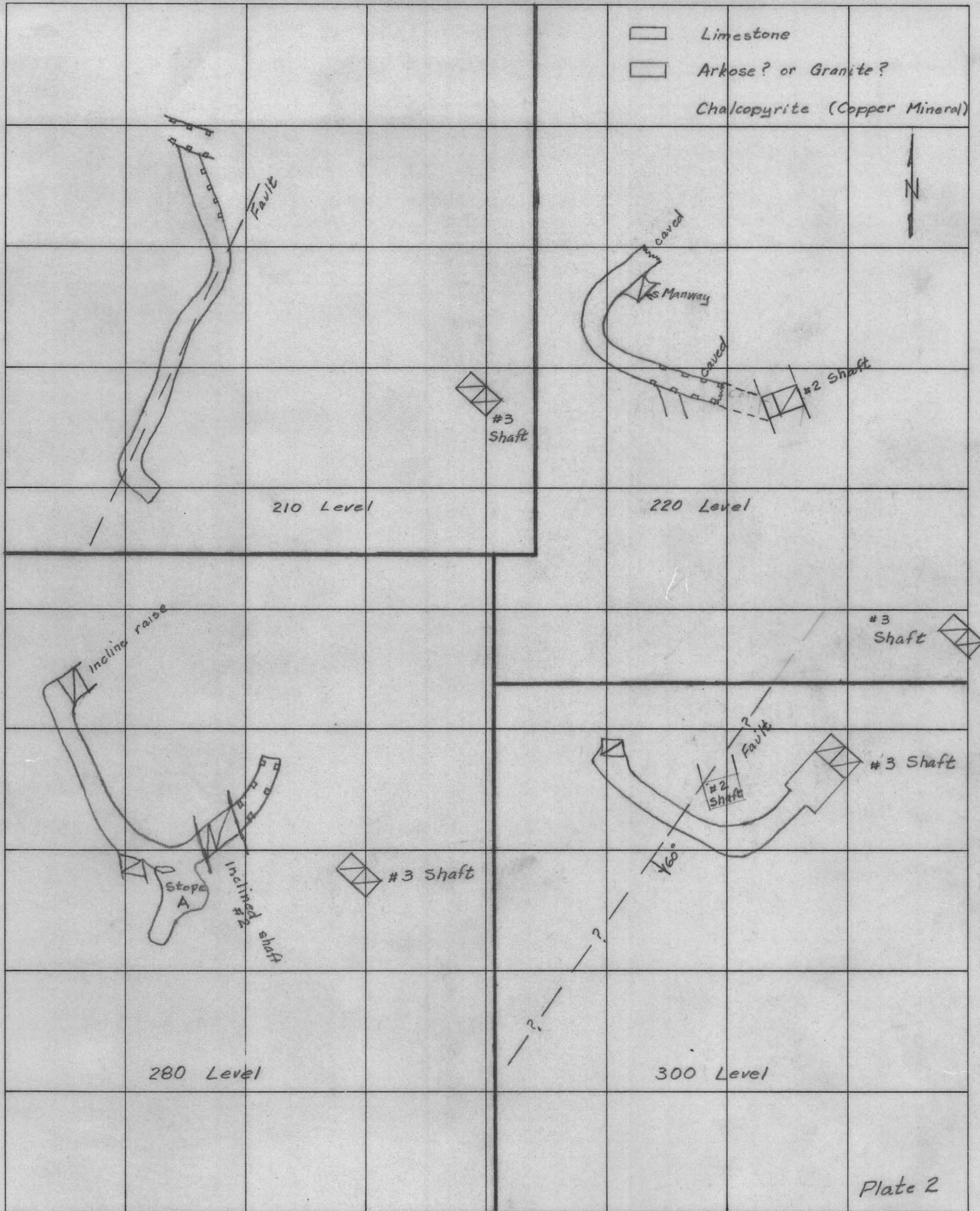
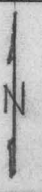


Plate 2

MINE VULCAN LOCATION Pima County, Arizona LEVEL _____
 GEOLOGY BY A. M. Rugg SURVEY A. M. Rugg DATE 9/26/57 SCALE 1"=30'
 N _____ E _____ EL. _____

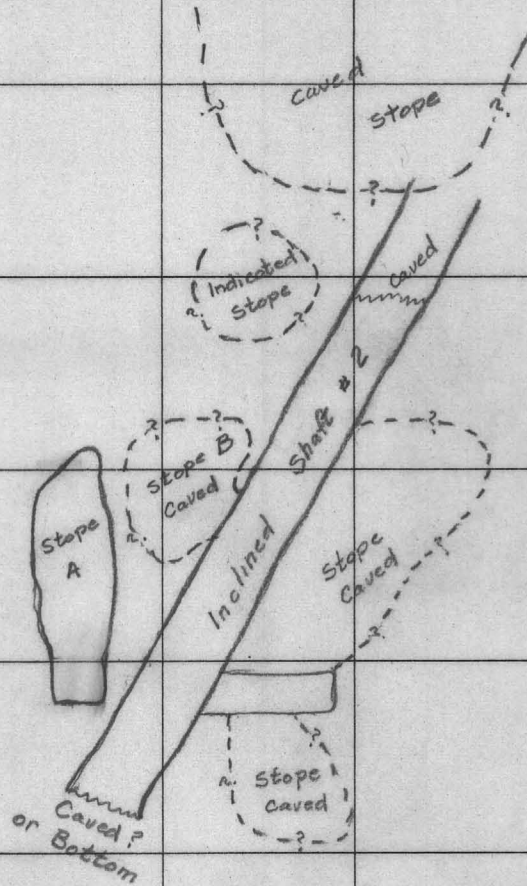
Vertical Elevations

220

250

280

310



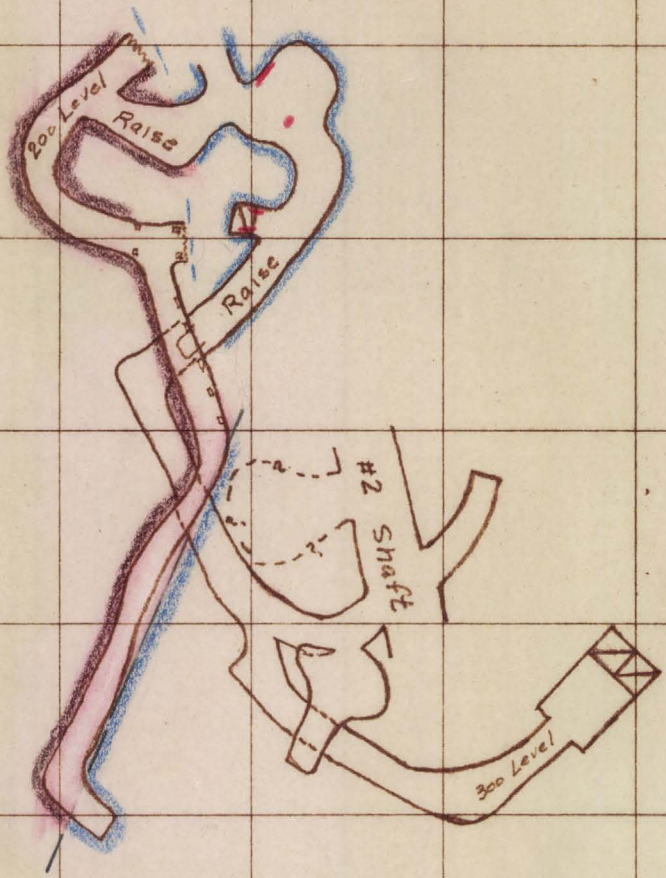
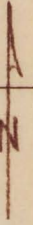
SECTION IN PLANE OF
FAULT SHOWING STOPED
AREAS

Plate 4

MINE VULCAN LOCATION Pima County, Arizona LEVEL _____

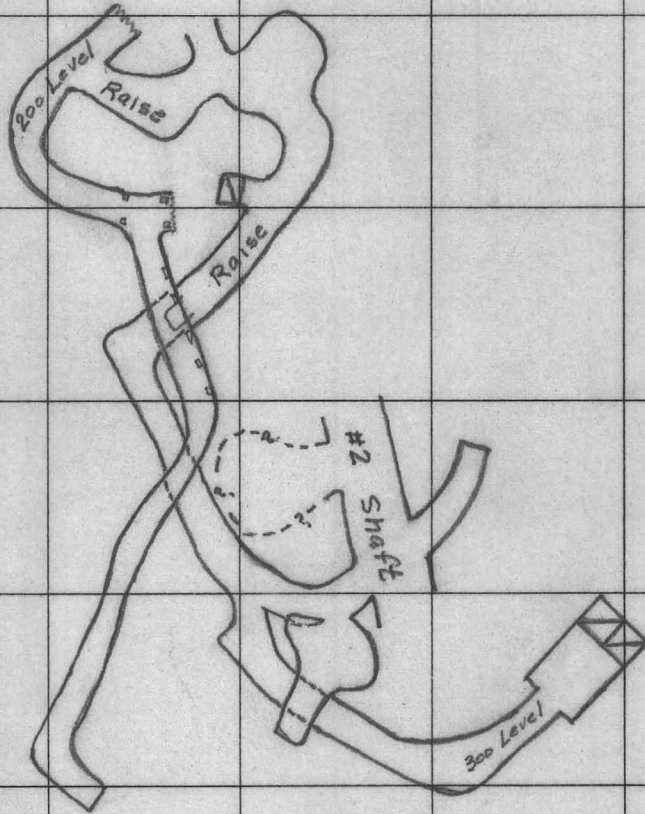
GEOLOGY BY _____ SURVEY A.M. Rugg DATE 9/26/57 SCALE 1" = 30'

N _____ E _____ EL. _____



- Copper Minerals
- Limestone
- Granite? or Arkose?

MINE VULCAN LOCATION PIMA COUNTY, ARIZONA LEVEL 200 Level
GEOLOGY BY _____ SURVEY A. M. RUGG DATE 9-26-57 SCALE 1"=30'
N _____ E _____ EL. _____



MINE VULCAN LOCATION PIMA COUNTY, ARIZONA LEVEL _____

GEOLOGY BY _____ SURVEY A. M. RUGG DATE 9-26-57 SCALE 1"=30'

N _____ E _____ EL. _____

