Preliminary report on the Rip Van Winkle mine, Elko County, Nevada

by
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Introduction

Location and access.—The Rip Van Winkle mine and mill are in the Merrimac (Lone Mountain) district, Elko County, Nevada. Both are in sec. 15, T. 37 N., R. 53 E., about 30 miles northwest of Elko, Nev. in an air line, but about 38 miles by road.

The mine workings above the 300 or tunnel level have not been worked for some years and are in bad condition. The 400, 500, and 600 levels are worked from an underground electric hoist on the 300 level, and the newly turned 700 level is opened by a winze with a small tugger hoist at the south end of the 600 level. The extent of the workings and their relation to one another are shown on the composite mine map. The elevation of the portal of the tunnel is approximately 6,400 feet.

Field work.—T. S. Lovering and W. M. Stoll studied the mine in January, 1943 in connection with explorations by the U. S. Bureau of Mines, which was then engaged in a drilling project at the mine. As the surface was covered with snow at this time, the field work was confined to underground mapping. Mr. Clair Smith, the engineer of the Bureau of Mines, and Mr. Fred Foster, mine superintendent, furnished valuable aid and information, which greatly facilitated the work.

Production and Economics

The total production of the mine is unknown but probably is substantial, judging by the stopes, the rate of production in 1943, and the figures for preceding years. Ore was discovered in the 1860's and mining has been carried on sporadically since that time. The Rip Van Winkle Consolidated Mining Co., financed in large part by employees of the Utah Copper Co., took over the mine a few years ago and built a modern 75-ton flotation mill on the property in 1939. In 1940 an effort was made to mill a large tonnage of ore which was not mined selectively. The grade of the ore thus mined was so low that the operation proved unprofitable and selective mining of a smaller tonnage has been employed since. Nearly 30,000 tons of ore were milled in 1940 but in terms of recovered metal this ore averaged only 2.1 percent lead, 1.6 percent zinc, 0.02 percent copper, and carried 7.5 ounces of silver and 0.0013 ounce of gold per ton./ The

/ Minerals Yearbook, Review of 1940, U. S. Bur. of Mines, pp.389, 395, 1941.

mill was closed for nearly four months in 1941 and the total mine production for that year was 7,376 tons, from which was produced 691 tons of lead concentrate and 554 tons of zinc concentrate./ The lead

/ Minerals Yearbook, Review of 1941, Gold, silver, copper, lead, and zinc in Nev., U. S. Bur. of Mines, p. 18, 1942.

concentrate carried approximately 442 tons of lead, 7 tons of copper, 88,295 ounces of silver, and 13 ounces of gold. The zinc concentrate contained 270 tons of zinc, 2,827 ounces of silver, 3 ounces of gold, and slightly less than 3 tons of lead and 3 tons of copper. If the mill recovered 90 percent of the metals present, this production indicates that the grade of the average ore in 1941 was 0.0024 ounce of gold per ton, 13.7 ounces of silver per ton, 6.7 percent lead, 4.1 percent zinc, and 0.15 percent copper. The figures for the grade of ore for 1942 are probably close to those of 1941.

In 1943 the zinc concentrates were shipped to Amarillo, Tex., and the net return to the company, exclusive of mining and milling costs, was from $20 to $25 per ton of concentrates averaging 50 percent zinc. As mining costs are high, the zinc in the ore pays only a small part of the total cost of extraction; the silver and lead content of the ore make mining possible. The silver in the ore is more closely associated with lead than with zinc and as a consequence "zincy ore" is avoided. There are probably several thousand tons of such "zincy ore" available for mining at present, but it is believed it would be uneconomic to extract this material unless a better net price could be realized on zinc than at present. Although a substantial additional tonnage of lead-silver-zinc ore seems blocked out, its grade is so close to the borderline dividing profit and loss that the monthly operations are sometimes in the red and sometimes in the black. A slight decrease in grade could easily result in a shutdown and, conversely, a betterment of grade would increase the output and guarantee continued operation.

Geology

The country rock of the mine is chiefly cherty shale, granite porphyry, intrusion breccia, and shale breccia. Most of the ore is localized along branching pre-mineral faults, in part as veins that represent filled fissures and in part as a replacement of the country rock adjacent to the veins.

Formations.—Shaly strata comprise the dominant country rocks exposed in the mine workings (see geologic map plan and sections). Listed in the order of abundance the shale variants include nodular and lenticular thin-bedded black cherty shale, medium-bedded siliceous black shale, black clay shale, brownish black calcareous shale, and dark-gray shaly limestone. Because of faulting and lack of crosscuts, the writers were unable to work out the stratigraphy in detail, but portions of the general sequence are indicated in the geologic sections of the mine. No fossils were found in the beds, but the work of Emmons_/ in the

_/ Emmons, W. H., A reconnaissance of some nining districts in Elko, Lander, and Eureka Counties, Nev.: Geol. Survey Bull. 408, 1910.

adjacent region suggests that the sedimentary rocks are cherty shales in the lower part of the formation, the so-called "Lower Coal Measures," which lie above the Diamond Peak quartzite.

The typical igneous rocks present have been examined under the microscope by R. E. Head of the Bureau of Mines and identified as granite porphyry, according to Mr. Clair Smith. The granite porphyry is a moderately fine-grained granular rock containing abundant phenocrysts of orthoclase and some quartz. In places angular fragments of granite porphyry lie in a matrix of finer-grained igneous rock that may be a trachyte porphyry. Shale fragments are locally abundant in both rocks and where the igneous matrix is small in comparison with the fragments of shale and older porphyry the rock is properly called an intrusion breccia rather than conglomerate the term used locally. The intrusion breccias occur as border facies of the granite and trachyte porphyries and as separate intrusive bodies. The intrusion breccias, with a recognizable igneous matrix, grade into shale-porphyry breccias having a fine-grained gray "gougy" matrix whose character is uncertain; this type in turn grades into breccias carrying angular fragments of shale and chert with little or no porphyry present. These shale breccias lack an igneous matrix but in some places probably represent shale broken and moved by an adjacent igneous rock or intrusion breccia, and elsewhere the shale breccia probably resulted from fault movements.

Structure.--The ore zone follows a narrow broken, down-faulted north-south syncline. The main vein strikes slightly west of north and dips steeply west in its productive portion above the 600 level, and is on the eastern limb of the broken syncline. The drag of the shale along the vein suggests that the major part of the pre-mineral movement along it was of the normal fault type and that the western side ia downthrown. At several places there is evidence of early movement with a strong horizontal component and of late movement that is essentially dip slip. It is probable that during the movement which just preceded ore deposition the eastern side dropped slightly while settling took place on several eastward dipping normal faults. Thus the openings at the time of ore deposition in the main vein were those due to reverse fault movement, and the ore widens where the westerly dip decreases and pinches where the vein steepens.

The main vein has many minor branch slips diverging to the southwest at a low angle and a few that branch to the southeast at a small angle. Most of the southwesterly branch slips dip east and most of the southeast branch slips dip west. Late pre-mineral movement broke the main vein fissure along several of the easterly dipping branch slips, dropping the eastern side in step fault fashion (see section A-A). This movement broke the main vein fissure sharply in the ground cut by the southern part of the 500 level but to the north, where the main vein is steeper, this movement apparently was taken up by the main vein fault rather than by the branch slips.

Veins and faults that dip steeply east follow the western limb of the broken syncline. The strong vein exposed in the southwestern part of the 500 and 600 levels is called the 600 vein and contributed much of the production during 1941-42. About 70 feet above the 500 level the 600 vein reverses its dip and feathers out just before reaching a northeasterly dipping branch fault related to the late easterly dipping main vein branch faults (see section A-A and the geologic maps of the 500 and 600 levels). Below the 500 level this vein extends to this fault and there ends abruptly. In the crosscut to the 600 vein on the 500 level this fault is broken by low-angle fractures that contain veinlets of pyrite, sphalerite, and carbonate, indicating that the fault is in large part of premineral age (see sketch on geologic map of 500 level).

<u>Ore localization</u>.--Although a minor amount of post-ore faulting has taken place, the fracture pattern is believed to be essentially the same now as when mineralization took place. Most of the ore was

deposited along the major faults where openings had been created by late pre-mineral movement. The open ground included the portions of the main vein with a marked westerly dip lying between relatively strong brittle walls. The clay shales yielded a tough impervious gouge that discouraged ore deposition, but the silicified breccias, cherty shale, and siliceous shale made favorable walls. Where movement took place on several branch slips, as in the ground at the south end of the 500 level, a wide zone was opened up and replaceable beds locally became permeable for some distance from the main fractures. In such areas metallization was more extensive than where the rock was less shattered, and "blanket" or bedding plane ore formed in calcareous beds. Unfortunately, most of the bedding plane ore found does not mill well and is high in zinc.

A zone of gash veins in the hanging wall of an easterly dipping main vein branch fault was productive between the 500 and 600 levels, and the ore found just north of the fault that terminates the 600 vein on the 600 level may have formed in similar fractures in the hanging wall of this fault, which seems to bend sharply north at its junction with the 600 vein.

Exploration

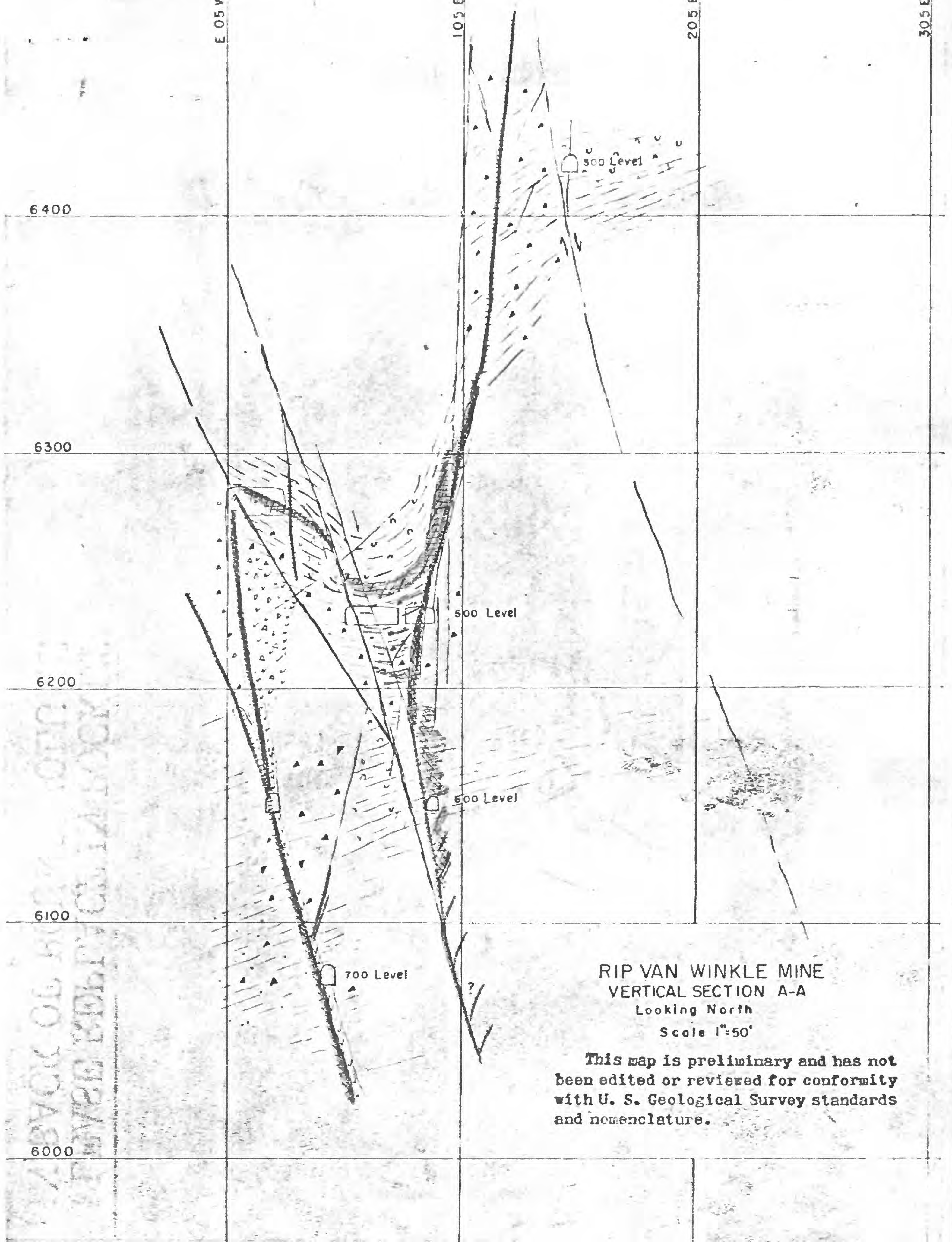
The tenor and width of the veins change appreciably within a short distance, and information on such changes in advance of drifting or sinking will greatly facilitate efficient exploration. For this reason it is believed desirable to drill a flat hole northeast from near the sump of the 700 level to explore the gash vein zone that carries good ore in the northeastern part of the 600 level.

The No. 1 drill hole of the U. S. Bureau of Mines cut a small lead-zinc vein at 57 feet (see geologic map of the 600 level). The strike of this vein is unknown, but it is most unlikely that the vein is the branch from the 600 vein that diverges to the southwest at the winze. Long hole drilling south of the winze seems to have established the course of that branch vein as shown on the map. It would be desirable to know the course of the new vein cut in the No. 1 drill hole and something concerning changes in its tenor and width. This could be done by exploring the area to the north of the No. 1 drill hole.

The workings north of the northwest branch fault, which cuts off the ore in the 600 vein, do not follow this fault northwest. The writers were unable to find convincing evidence of the course of the fault to the northwest, but believe it turns northward where it intersects the 600 vein. However, it is possible that it continues northwest and that it intersects other northerly trending veins. As it is a pre-mineral fault that apparently caused ore to be localized in the 600 vein below it, and as a zone of gash veins was found just to the north of it, nearly in line with the 600 vein, it is believed there is a strong possibility of ore shoots near the intersection of any northerly veins with this fault, if it continues its northwesterly course beyond its intersection with the 600 vein.

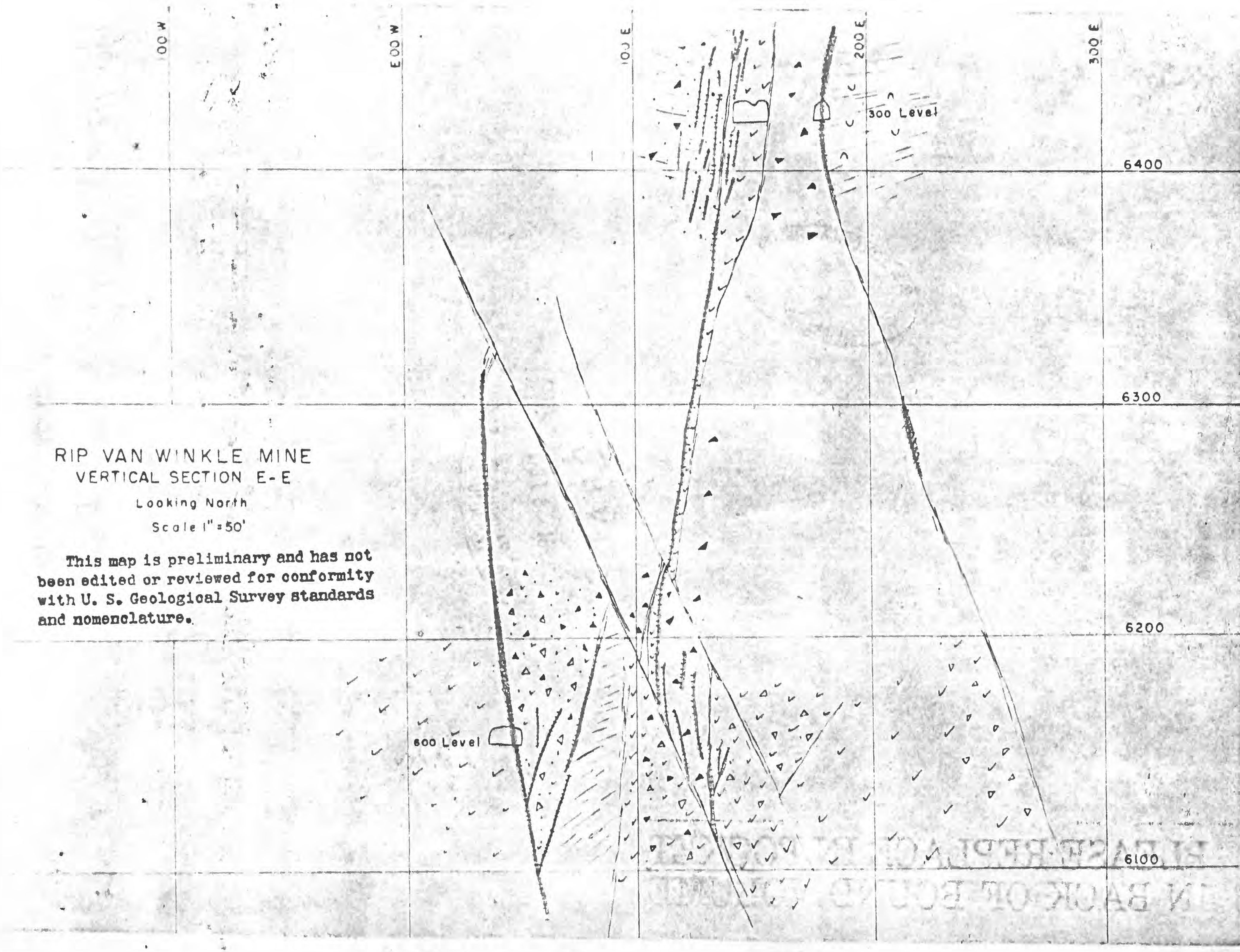
The long "runaround" crosscut that branches west from the 300 level 120 feet south of the portal and rejoins the main haulage drift at the underground shaft station was inaccessible in January, 1943. According to Mr. Foster, it is in porphyry for the first 300 feet, beyond which it was caved in 1939. The primary igneous structure in the porphyry exposed in the main drift suggests intrusion at a low angle; the meager exposures west of the main vein on the lower levels suggest that no large cross-breaking mass of porphyry is present west of the shaft; if the 300 level "runaround" crosscut is largely in porphyry, as reported, this porphyry probably is a sheet sub-parallel to the bedding of the shale. The attitude of the shale on the western limb of the broken syncline, which is the dominant structure of the mine, reverses from an east dip to a west dip about 40 feet west of the main vein on the 500 level. If this anticlinal structure is reflected in a porphyry sheet where replaceable beds cut by mineralized fissures underlie it, conditions would be indicated suitable for bedding plane ore. Mineralized fissures and some related bedding plane ore are exposed in the crosscut extending west from the shaft on the 500 level; thus, what evidence is available points to the probable presence of conditions favorable to localization of some blanket ore beneath porphyry in the northern part of the mine (see section D-D). It is believed that exploration is warranted if directed toward establishing the shape of the porphyry body in the northwestern part of the 300 level and the presence of bedding ore below it if the body is a sill.

Salt Lake City, Utah
January 28, 1943



RIP VAN WINKLE MINE
VERTICAL SECTION A-A
Looking North
Scale 1"=50'

This map is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.



RIP VAN WINKLE MINE
VERTICAL SECTION E-E
Looking North
Scale 1" = 50'

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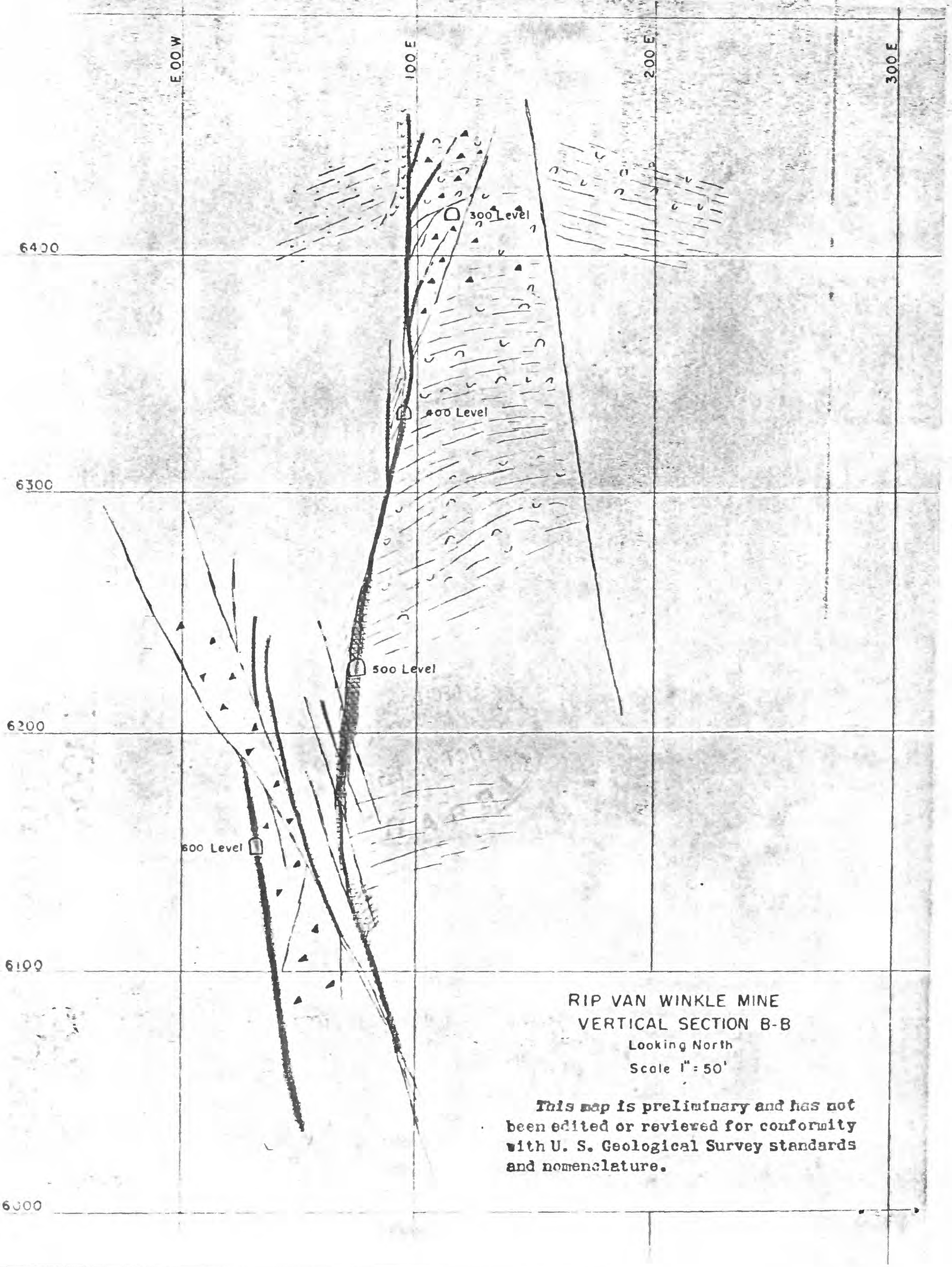

RIP VAN WINKLE MINE
VERTICAL SECTION B-B
Looking North
Scale 1" = 50'

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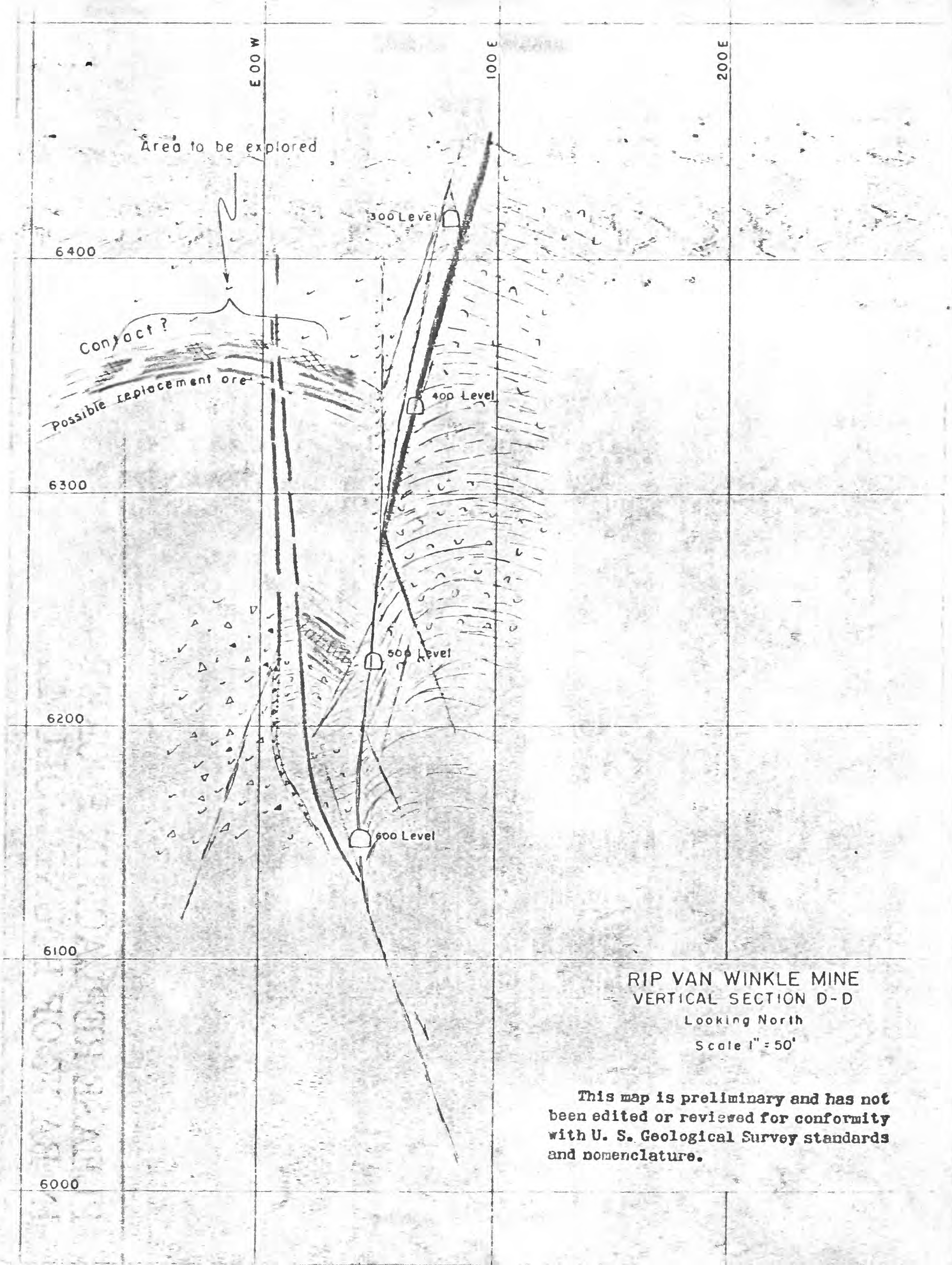

RIP VAN WINKLE MINE
VERTICAL SECTION D-D
Looking North
Scale 1" = 50'

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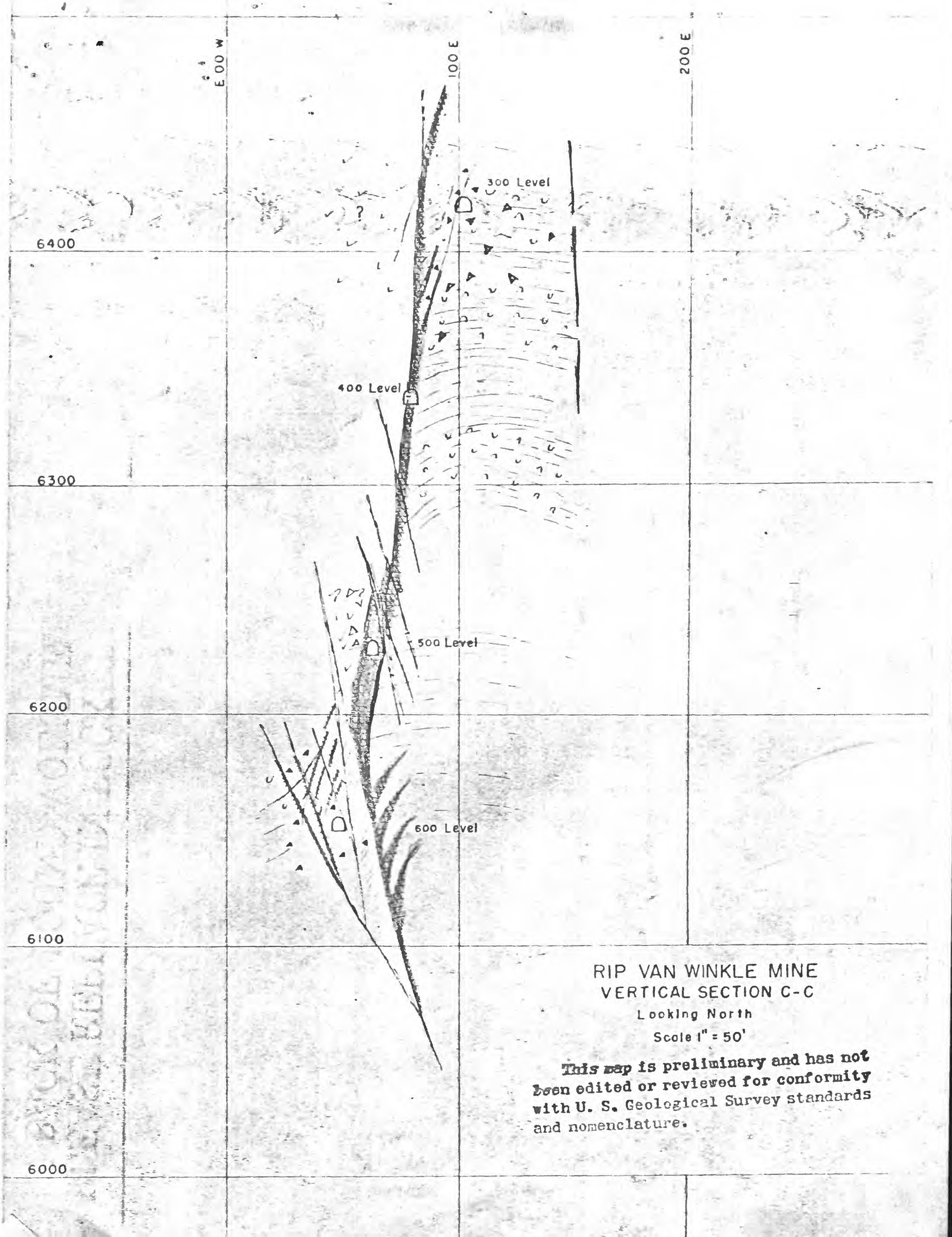

RIP VAN WINKLE MINE
VERTICAL SECTION C-C
Looking North
Scale 1" = 50'

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