

REPORTS ON THE GEOLOGY OF AN AREA  
BETWEEN THE MAMMOTH AND STANDARD MINES OF THE  
WESTERN EXPLORATION CO. LTD.

SILVERTON, B. C.

By

Dr. M.C. Robinson

and

C. C. Starr

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DISCUSSION OF ORE POSSIBILITIES ON  
WESTERN EXPLORATION GROUND BETWEEN  
MAMMOTH MINE AND EMILY CREEK

by

M. C. Robinson

INTRODUCTION:

Geological mapping on the part of the British Columbia Department of Mines during the field seasons of 1945, 1946, 1947, and 1948 indicated that ore shoots in the central Slocan area are situated in favourable structural loci. Extension of this work to the Standard-Mammoth area during the field seasons of 1949 and 1950 suggested the presence of such a favourable structural locus in that section of Western Exploration ground lying between the Monarch tunnel and Emily Creek. It was therefore recommended that the Company undertake more detailed geological mapping in this section in order to gain as much information as possible. This work has been completed and the data obtained have been assembled on a plan and a series of sections by Mr. C.C. Starr. This report outlines the writer's interpretation of the data collected by Mr. Starr. A more thorough discussion of the geology is presented in a report by Mr. Starr.

STRUCTURAL CONDITIONS FAVOURING OCCURRENCE OF ORE IN THE SLOCAN:

Slocan ore shoots are made up of sulphide minerals, gangue minerals, and rock fragments. The presence of rock fragments indicates that mineralization took place in breccia-filled sections of lode zones. Geological mapping has shown that such breccia zones have been developed where:

- (a) lodes cut sharply across bedding in sediments of the Slocan Group, and
- (b) movement along the lodes has been at a large angle to the trace of bedding on the lode walls.

The Slocan lode zones strike northeasterly to easterly and dip at approximately 50 to 60 degrees to the south. The hanging-walls have moved down and to the east with respect to the foot-walls. The sediments cut by the lodes strike northwesterly and dip at varying angles to the northeast and southwest. It is evident, therefore, that conditions favourable to the development of breccia are most likely to be present where the lode zones intersect sediments which dip at low angles to the southwest. Beds with such dips are to be found along some limb-sections of recumbent folds which characterize the Slocan area. Such is the case for the Payne, Silversmith, Ruth, Queen Bess, Mammoth and other ore shoots.

STRUCTURAL CONDITIONS IN THE MAMMOTH-EMILY CREEK  
SECTION OF WESTERN EXPLORATION COMPANY GROUND:

The Mammoth lode as it passes westward from the mine area to the Monarch tunnel is bedded. Hence it is filled with gouge and sheared rock which constitute unfavourable ground for ore. This section may therefore be eliminated as potential ore country.

Mr. Starr's detailed plan and sections indicate that a large section of westerly or southwesterly dipping beds should be intersected by the Mammoth lode as it passes westerly from the Monarch tunnel. His data also require that the lode swing out of the bedding within a short distance west of the Monarch tunnel. Hence it is probable that, within a few hundred feet or less of the tunnel, the lode-bedding relationships will be those required to develop breccia and hence an ore zone. Such a relationship may exist for several hundred feet along the lode from the point where it swings away from the bedding.

SUMMARY:

It cannot be stated with certainty that ore is present to the west of the Monarch tunnel at the elevation of the tunnel. It may be said, however, that geological data gathered to date indicate that this is a favourable setting and is comparable with the settings of several other Slocan ore shoots.

Should the officials of the Western Exploration Company decide to explore the favourable ground, the writer would recommend underground work from the Monarch tunnel.

*W. C. Robinson*

REPORT ON GEOLOGY OF MAMMOTH-STANDARD MINE AREA  
OF THE WESTERN EXPLORATION CO. LTD.

By  
Chas. C. Starr

INTRODUCTION:

The purpose of this geological study during the summer of 1951 was to determine whether conditions were favorable for the occurrence of an orebody in the Mammoth vein-shear to the west of the present mine workings, and more specifically between the Monarch tunnel and Emily Creek. The detailed geology was done by me, and based on the Company's topographical map and new surveys by their engineers. This is supplemented by less detailed mapping around the borders of the central area from maps by Dr. M.C. Robinson, and others, who also contributed their very valuable knowledge of the broader aspects of the geological structure.

NOTES ON MAP AND SECTIONS:

Rock outcrops are well indicated on the map by the presence of dip and strike conventions; where none are shown there are no rock exposures.

The Mammoth Vein-shear is covered from the Monarch gulch for some eight hundred feet to the west but is partially exposed at the summit of the Breakover Ridge and for a few hundred feet to the east. West of this ridge it is not exposed until it reaches Emily Creek, where there is an outcrop which has been opened by two small open cuts, from which point it shows at intervals as a strong fault along the tunnels on the Robin claim. The dip of the vein, as shown on the cross-sections, is flatter than the true dip, since the sections cut the vein at an angle of about 35 degrees with the strike. In the Mammoth mine workings the dip is approximately 45 degrees south, but is believed to steepen to approximately 55 degrees south, west of the Monarch tunnel.

No major fault was found in the area studied except that along the Mammoth vein. The throw of this fault is estimated to be around three hundred feet, with the hanging-wall (south) side having moved down and eastward with relation to the footwall side.

A minor fault is exposed near the south-west corner of the Minoru claim. It strikes N 70° E and dips 80° north; the hanging-wall rocks have moved down and westerly something more than a hundred feet. This fault is indicated on Section "F", but, since it could not be traced for more than a couple

of hundred feet, it is not projected far on the plan, nor shown at all on the other Sections.

The structure in the footwall of the Mammoth vein is not shown on the Sections except on Sections "AA", "A", and "B", since the various rock contacts would have to be projected so far as to be quite inaccurate and of little value.

However, the limestone bed shown in the footwall of the vein on Section "B" may reasonably be assumed to contact the vein on Sections "C" to "J" a little higher than the bed of limestone on the hanging-wall side of the vein contacts it.

The plan map shows the surface distribution of the various rock types. These are plotted on the cross-sections by projecting them on their dips and strikes, and by drawing them parallel to the contacts of other rock types exposed on the surface. The contacts as plotted, while not exact, should be, in general, reasonably close to correct, especially those that are fairly close to the surface.

#### THE ROCKS:

The rocks of the area belong to the upper part of the Slocan Series of Triassic Age (Dr. C. E. Cairnes), and consist of argillites, quartzites, limestones and tuffs with occasional porphyritic dikes and sills. In the map area the argillites vary from moderately thin bedded, with thin bands of limestone, to massive. Quartzite is generally comparatively massive with obscure bedding planes. The limestones are often interbedded with thin bands of argillite but have a tendency to be quite massive. Considerable areas of the limestone have been bleached and silicified to the extent that they strongly resemble quartzite. The tuff (consolidated volcanic ash) is a hard, dark rock which weathers to a pock-marked brown; it is often interbedded with a considerable portion of argillite.

These rocks, with the exception of limestone, were originally laid down under water in an approximately horizontal position by erosion from an earlier land surface, and eventually consolidated to rock by heat and pressure. The limestone was formed in place, during periods of little erosion, by coral.

Later, earth movements possibly due to the intrusion of the Nelson granite mass, folded and crumpled the sedimentary rocks while they were still deeply buried; still later movement developed the vein and fault fractures.

#### STRUCTURE:

The area mapped lies in a section folded into the shape of a flattened reversed "S", as is best indicated on

Section "AA" by the limestone member, with the Mammoth mine situated near the upper eastern turn of the "S". The other strata fit well into this pattern, with possible exception of the quartzite near the upper end of the Breakover ridge which, in order to fit the pattern, must be presumed to merge into argillite and lose its identity.

#### STRUCTURES FAVORABLE FOR ORE IN THE SLOCAN AREA:

Provincial geologists who have spent several seasons in the study of the Slocan district as a whole have kindly given me a verbal summary of the conditions under which large bodies of ore occur in practically all of the profitable mines of the district. These conditions may be summarized as follows:-

1. A zone of intense crushing and brecciation to form passages and open spaces through which the mineralizing solutions can penetrate and deposit their contained minerals.
2. Areas in which the bedding of the rocks has a rather flat west dip, where the vein has a roughly east and west strike and a south dip, as most of them do. The reason for this is that most veins were faults before they were mineralized and that the hanging-wall rocks moved down and eastward in relation to the foot-wall rocks, this causing the motion to be across the ends of the broken beds rather than more nearly parallel to them, and therefore tending to shatter them and form a breccia. This action could be roughly illustrated by pressing the ends of two books together, then moving one at right angles to the leaves which would distort the leaves much more than if the movement had been parallel to the leaves.
3. Practically all of the productive orebodies of the district occur where the vein makes an obtuse angle with the bedding of the rocks. Where the bedding planes are bent or folded so that they make an acute angle with the vein, or are parallel to it, the brecciation is absent, a mud-gouge takes its place, and the ore pinches out.
4. No rock type seems especially favorable or unfavorable for ore except that thin-bedded slaty argillites, which do not occur in the area under consideration, are unfavorable.

#### FAVORABLE LOCI FOR ORE IN THE MAMMOTH-STANDARD AREA:

The Mammoth vein in the Monarch tunnel lies in, or nearly in, the bedding planes of the rock and has an abnormal strike of N 60° W, and dips 60° southwest. It seems quite certain that this vein will, within a moderate distance westward, break away from the bedding planes and take its normal

strike of approximately east and west. When this occurs conditions will, I believe, be favorable for the formation of an orebody; say anywhere between a hundred to eight hundred feet west of the vein-crossing in the Monarch tunnel, and at the approximate elevation of the tunnel. (See Plan and sections "D", "E", and "F").

Conditions appear to be even more favorable for ore at Section "I", and only slightly less so at Sections "H" and "J". The drive from the Monarch tunnel to Section "I" would be, roughly, 1700 feet. Section "H" could also be reached by a tunnel, partly crosscut and partly drift, about 600 feet long at the same elevation as the Monarch tunnel, driven from near the vein outcrop in Emily Creek.

#### SUMMARY AND RECOMMENDATIONS:

The Monarch tunnel seems to be at a fairly good elevation from which to prospect the vein and has the big advantage of not requiring a new camp or road to prospect the two favorable areas.

Geological conditions seem to comply well with conditions under which ore has formed in other producing mines in the district, and I believe that the chances of developing important new ore are sufficiently good to justify the driving of at least a thousand feet west along the vein from the Monarch tunnel, and I recommend that this be done.

After the first favorable zone has been explored, it should be possible to gather sufficient further data to confirm, or otherwise, the advisability of continuing exploration through the second favorable zone.

It should be distinctly understood, before it is decided to undertake exploration work, that the geology indicates the strong probability that conditions similar to those under which orebodies occur in the majority of the profitable mines of the Slocan district, also occur west of, and at the elevation of the Monarch tunnel. But the geology does not indicate the presence of a profitable orebody except by inference.

The cost of driving through the first favorable zone (800 feet) I would estimate at about \$20,000; through the second favorable zone (1700 feet, total) at about \$42,500. Your Manager, Mr. A.M. Ham, should be able to give you a more accurate estimate.

Respectfully submitted,

Report accompanied by -  
1 Plan map  
11 Cross-sections.

*Chas. C. Stair*

February 20, 1952.