INVESTIGATION

OF

POSSIBLE RE-OCCURRENCES

OF

PREMIER BONANZA TYPE OREBODIES

AT DEPTH.

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SILBAK PREMIER GOLD MINES LTD.

Introduction

Reports entitled "Assessment of the Premier Area" and "The Premier Mine, 1954" were forwarded on May 25, 1954 and August 25, 1954 respectively. These form the background for this report, and it is assumed that their content is recalled before this report is read.

The possibility of the re-occurrence of bonanza type Premier orebodies at depth led to an investigation of the west workings in the Premier Mine. Previous workers had shown that the orebodies mined were richest in a porphyritic rock called the Premier porphyry and became marginal where the ore zone entered greenstone at depth. A preliminary study of Premier records indicated that geological mapping had been concerned chiefly with vein structure, and that no concentrated and detailed study had been made to separate the various rock types and to determine the lithological structure of the mine area. Thus one possibility remaining is that a large body of the favourable porphyry host rock might re-occur at depth. The present report deals with a brief investigation in the west part of the mine, of this one possibility. No attempt was made to study the northeast part of the mine or other ore deposits in the area to determine their structure or relation to rock type. An area of 40,000 by 40,000 feet of surface was mapped, and about 500 drill holes were logged. No underground mapping was attempted. The examination was somewhat hasty and limited in scope, thus the conclusions are drawn from incomplete evidence.

Summary and Conclusions

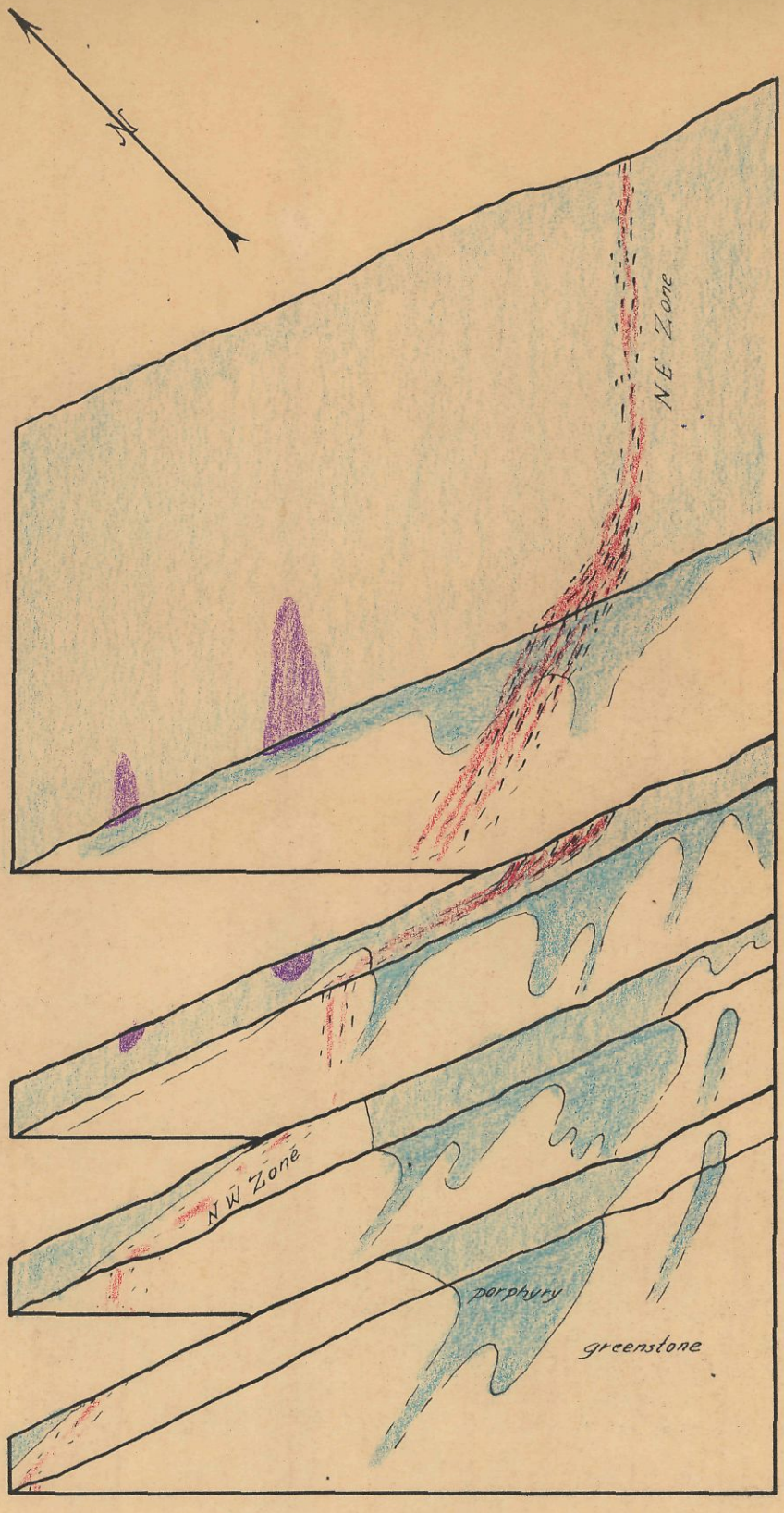
The surface mapping shows two zones of porphyry. The northern zone appears conformable to lenticular bodies of "purple Tuff", which are

used as horizon markers. The southern porphyry zone is composed of a number of bodies similar in strike but dipping more steeply west than the "purple tuffs."

The southern bodies may be dikes or sheets feeding the northern zone which is probably a flow or sill. The junction of the northern and southern zones forms a bulge of porphyry. It is in this porphyry bulge that most of the bonanza type Premier ore occurred. The ore became marginal where the mineralized zone passed into greenstone at depth below the prophyry bulge.

The mineralized zone was richest at and near a reported 'junction' of a 'shear' trending northeasterly and dipping about 45° north-westerly with a second 'shear' trending northwesterly and dipping vertically. This examination indicates that the mineralized structures include shearing locally, but are more likely zones of brecciation and fracturing than through-going strong shearing. The attitude of the north-east trending zone is substantiated by a multitude of observations. The reported attitude of the northwesterly trending zone is questionable. It appears to be formed by a number of smaller zones of different attitudes, perhaps related to small shear zones and/or greenstone-porphyry contacts. However, the stope maps do indicate that this northwest-trending zone does, in general, dip vertically. It does not seem to have the strength of the north-east trending zone. Both zones appear to decrease in strength with depth, the obvious reason being a change in host rock type from the porphyry to greenstone.

The major orebodies thus occurred where the 'junction' of the two 'shear' zones passed through the porphyry bulge, and the ore became lean in the greenstone below the bulge. The structure shown by the



SKETCH of STRUCTURE

accompanying maps and sections is such that a further bulge of porphyry at depth on plunge of the ore zone is not predictable. The chances of finding further bonanza type ore deposits in the west section of the mine are thus reduced. Further, work based on the possibility of a second intersection of the Premier ore zone 'junction' with porphyry is not recommended.

LITHOLOGY

Greenstone

Aphanitic Greenstone - The colour is predominantly green, but ranges greatly in shade from green-grey to grey-green to purplish-green to almost black. The fracture tends to become conchoidal in the purplish and almost black varieties. The rock is in part fragmental, and probably more detailed core logging would disclose more fragmental rock than has been recorded in this preliminary survey. The greenstone is, in places, amygdaloidal, particularly in the "Northern Light" area. The rock in places shows flow structure.

Fine-grained Greenstone - This rock type includes greenstone with grains ranging from the lower limit of visible granularity to about 1/32 of an inch. The rock is, in many places, fragmental and has the same ranges in colour as the aphanitic greenstone excluding the purplish and blackish types. No amygdules were noted.

Chert

A few sections of core contained tan and green chert. These sections are too small and widely spaced to be useful as horizon markers unless further data are gained by underground mapping. The chert showed fine crenulated banding.

Purple Tuffs

The 'purple Tuff' should be named more accurately "purple breccia". The fragments range in diameter from a few tenths of an inch to greater than one foot. They are composed of mauve, purple, and purlish-orange fragments (many of them purple porphyry) in a matrix of purple tuff, greenish tuff, and purple porphyry. The bulk of the rock is closely packed ovoid fragments. In a few places however aphanitic purple rock shows no fragments. The borders of the purple tuff lenses, where observed, grade into greenstone; the purplish rock grades into patchy purple and green, and thence to green.

Porphyry

The Premier porphyry is composed essentially of orthoclase phenocrysts in an aphanitic or fine-grained andesitic matrix. The rock is generally green with greyish alteration. Its fracture is more blocky than that of the greenstone. Two ranges in size of phenocrysts are apparent. One lies between the approximate limits of 1/32" to 1/8", and the other between limits of 1/4" to greater than 1"., that is, very few phenocrysts, if any, are between 1/8" and 1/4" in diameter. Rock containing only the smaller phenocrysts is called "single stage porphyry" - rock containing both the larger and smaller phenocrysts is called "two stage porphyry". Rock containing only the larger phenocrysts has been observed, but has a cloudy matrix in which the outlines of the smaller phenocrysts may be obscured.

The two-stage porphyry contains on the average only one or two large phenocrysts in two or three square feet of exposed surface. Thus, the odds are that only one large phenocrysts would be observed in 10 or 15 feet of core. Thus where the core is dirty and/or contains quartz stringers,

two-stage porphyry may be incorrectly recorded as single-stage porphyry.

Much of the porphyry (perhaps 50%), including both stages, is cloudy - the phenocrysts merge into the matrix with megascopically gradational boundaries. This "cloudy" porphyry grades into greenstone, that is, the phenocrysts become increasingly cloudy until none can be distinguished from the matrix, and the rock is consequently recorded as greenstone.

The single-stage porphyry is in places brecciated and in one locality a fragment of porphyry was found, apparently isolated in greenstone breccia a few inches from the contact of solid porphyry. A zone of highly brecciated single-stage porphyry was observed on surface near co-ordinates 7000N-4500E. A similar zone occurs in D.D.H. -B.C.S. "D" in the same area. Another zone of this type was observed one or two miles north of the map area. These zones suggest that at least the single-stage porphyry, if not also the two-stage porphyry, is in places flow rock.

Purple Porphyry

Purple porphyry is invariably associated with the "purple tuff" in the area mapped. White feldspar phenocrysts occur in the purple (hematitic?) andesite matrix.

Diorite Dikes

Diorite dikes are abundant. They contain orthoclase and minor hornblende. They are difficult to distinguish from Premier porphyry in some places, although in most places they appear fresher, are more grey in colour, have chilled margins, and near their cores contain more abundant coarse feldspar.

Lamprophyre Dikes

Lamprophyre dikes are also abundant. Most of these are aphanitic and buff-coloured.

STRUCTURE

Minor Structures

The above descriptions indicate that the rock types described are gradational. Very few contacts, either bedding or intrusive, are sufficiently sharp to enable attitude determination by a Brunton Compass. Also, outcrops are in most places too sparse to determine attitude by relationship of contacts to topography.

Major Structures

The surface mapping confirms some of Langille's statements regarding the distribution and attitude of the "purple tuffs". These tuffs in the area mapped form lenses of about 100 ft. maximum thickness, striking a few degrees west of North and dipping about 20 degrees westerly. These lenses form the only easily recognizable horizon marker. They appear uniform in attitude, indicating little, if any, folding in the area. They show no evidence of intrusion by greenstone or porphyry.

The greenstone, as described under Lithology in a prior section, is at least in part fragmental. On surface these fragments are observed only on very clean weathered outcrops, therefore it is suspected that much more fragmental greenstone exists than is recorded. The fragmental zones in conjunction with the chert bands and variation in colour and texture may permit bedding determination in some parts of the mine workings.

Two zones of Premier porphyry are shown on the surface geological map: one zone trends easterly along N 5500, and the other lies in the central north part of the mapping area. These zones merge in the mine area. The two-stage porphyry may form cores to parts of these two zones.

The easterly-trending porphyry body is in several places in sharp contact with bounding greenstone. The contacts are irregular but no definite apophyses of porphyry into greenstone could be found. However, the nature of the contacts suggests that the porphyry is intrusive. At one locality two-stage porphyry is in sharp contact with single-stage porphyry and is conformable to a zone of flow structure in the latter. This indicates that the single-stage and the two-stage porphyry differ in age. The contact may be between (1) flows; (2) combined sills or sheets; (3) flow and sill. The lack of rubble in the flow structure suggests that (2) is the most likely. However, porphyry breccia has been noted in this easterly-trending porphyry zone in an underground drill hole, which suggests that the porphyry is flow. The observations on minor structures in this easterly-trending porphyry zone thus afford contradictory evidence on whether the zone is extrusive or intrusive.

The maps and sections show that the easterly-trending porphyry zone is formed by a number of steep (45 degree plus or minus) westerly-dipping bodies which merge near the surface both with one another and with the north zone. These bodies forming the south zone are lenticular both in plan and section. They are similar in strike to the "purple tuffs" but dip more steeply. Although the contacts appear intrusive in some places, they are gradational in others.

Gradation occurs in two ways: (1) by increasing cloudiness of phenocrysts as described in "Lithology"; (2) by a gradual decrease in size of phenocrysts until the single-stage porphyry grades into fine-grained greenstone. Thus some of the aphanitic and some of the fine-grained greenstone may be intrusive. This point may account at least in part for the decrease in the amount of porphyry in the lower levels; the intrusive (?) may be present but not porphyritic.

The central north zone of Premier porphyry contains several outcrops of primary breccia near N6500 E4500 on surface. One drill hole through the zone also shows primary breccia in contact with the "purple tuff." The compilation of plans and sections indicates that the north central zone of the porphyry could well be conformable to the "purple tuff." Irregularities in topography do indicate that the strike is similar to that of the "purple tuffs" but these irregularities are not sufficiently marked to permit attitude determination. Unfortunately no mine workings underlie this zone and thus its thickness and dip are not known except as shown by the one drill hole (DDH-BCS "D"). The strike of this body is apparently northerly and the dip perhaps shallow westerly.

In summary

The North Zone	The South Zone
(1) appears conformable to "purple tuffs."	(1) well explored by underground workings
(2) only one sharp contact noted;	(2) formed by at least 5 different bodies
(3) highly brecciated over large area near "purple tuffs";	(3) bodies dip 30 degrees more steeply than "purple tuffs"
(4) therefore more likely a flow.	(4) several sharp, perhaps intrusive contacts noted
	(5) brecciated contact observed in one drill hole only
	(6) therefore more likely a series of dikes or sheets, possibly feeders to the North zone.

The bulge formed where the South Zone bodies merged is the thickest body of porphyry known in the area. There is no reasonable basis for predicting other porphyry bulges at depth.

Dikes

Dikes are numerous in many parts of the workings. Most of them trend south-easterly and dip steeply south-west. Prior workers have studied them in more detail than allowed by the present investigation and have reported on their relationships to the orebodies. Their work indicates that the dikes are in part pre-ore and in part post-ore, and that local pre-ore dikes may, by trapping or damming effects, have promoted ore deposition. However, in the area as a whole, the dikes do not appear to be a major factor in ore deposition.

Relationship of Ore to Host Rock.

The data obtained in this investigation confirm some of the ideas of previous workers regarding ore deposition. The high grade precious metal ore was deposited in siliceous pyritic zones in porphyry host rock. High grade ore contained, on the average, only one or two percent of black sulphides. The sulphides occur as fine stringers and sparse disseminations.

Lower grade ore containing a higher percentage of sulphides and markedly lower amounts of precious metals was deposited in the greenstone. This base metal ore is formed by massive sulphide stringers and replacements accompanied, or more likely preceded, by quartz stringers rather than by silicification.

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January 14, 1955

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