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A PROPOSED MODEL FOR ORE CONTROLS AND EXPLORATION GUIDES AT THE BLACKDOME GOLD MINE

for

BLACKDOME MINING CORPORATION

Attention:
J.A. Anderson, Chairman
J.S. Drever, President
P. Busse, Mine Manager
D. Rennie, Chief Geologist

by Albert F. Reeve
February 8, 1989

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INTRODUCTION

This report is based on a review of mining and exploration data carried out at the Blackdome Mine during the period of February 1st to 3rd, 1989, with the objective of initiating a geological framework for on-going exploration in the near vicinity of the mine and in the district generally.

The company began exploration activities at Blackdome in 1978 and commenced production in May 1986. Since that time 207,357 tons of ore averaging 0.67 opt Au and 2.48 opt Ag have been produced to December 31, 1988.

Approximately 90% of this ore was mined from the South Mine on the No. 1 vein and nearby hanging wall structures. The following discussion is focused on the South Mine area because it has demonstrated itself to be a source of profitable, high-grade ore and suggests the possibility of extensions and repetitions in geologically favourable areas on the south part of the company's property and elsewhere in the district. The geological discussion is brief, focused on ore, and assumes that the reader is generally familiar with the property.

GEOLOGY OF ORE OCCURRENCE

High grade ore-bodies at Blackdome consist of tabular lenses averaging 7 feet in thickness, contained in epithermal, quartz-vein lodes which are in turn controlled by a steeply inclined, north east trending fault system. Ore is composed of stockworks and veins of vuggy quartz and adularia containing disseminated gold, silver, electrum, tetrahedrite and other sulphosalts, as well as minor pyrite chalcopyrite and galena. Metallic mineral content seldom exceeds 2%. The lateral terminations of ore are ragged assay boundaries, the average horizontal length of ore shoots being about 140 feet and the average vertical height 170 feet.

The fault zones are normal dip slip with dips of 50 degrees west to 90 degrees and measured vertical displacements of up to 165 feet. Major lateral displacement has not been observed. The fault plane is marked by a gouge band about 1 foot in average thickness which can occur on either wall or within the mineralized vein. They cut a sequence of gently deformed volcanic strata of Eocene age caped by miocene plateau basalts. The volcanic sequence forms a broad NNE plunging antiform. A simplified geological plan (fig. 1) and conceptual cross section diagram (fig. 2) is enclosed showing the relationship of the volcanic pile, fault struetures and ore bodies. The north-east trending fault system is extensive. Quartz veins with an aggregate strike length of more than 7 miles have been identified

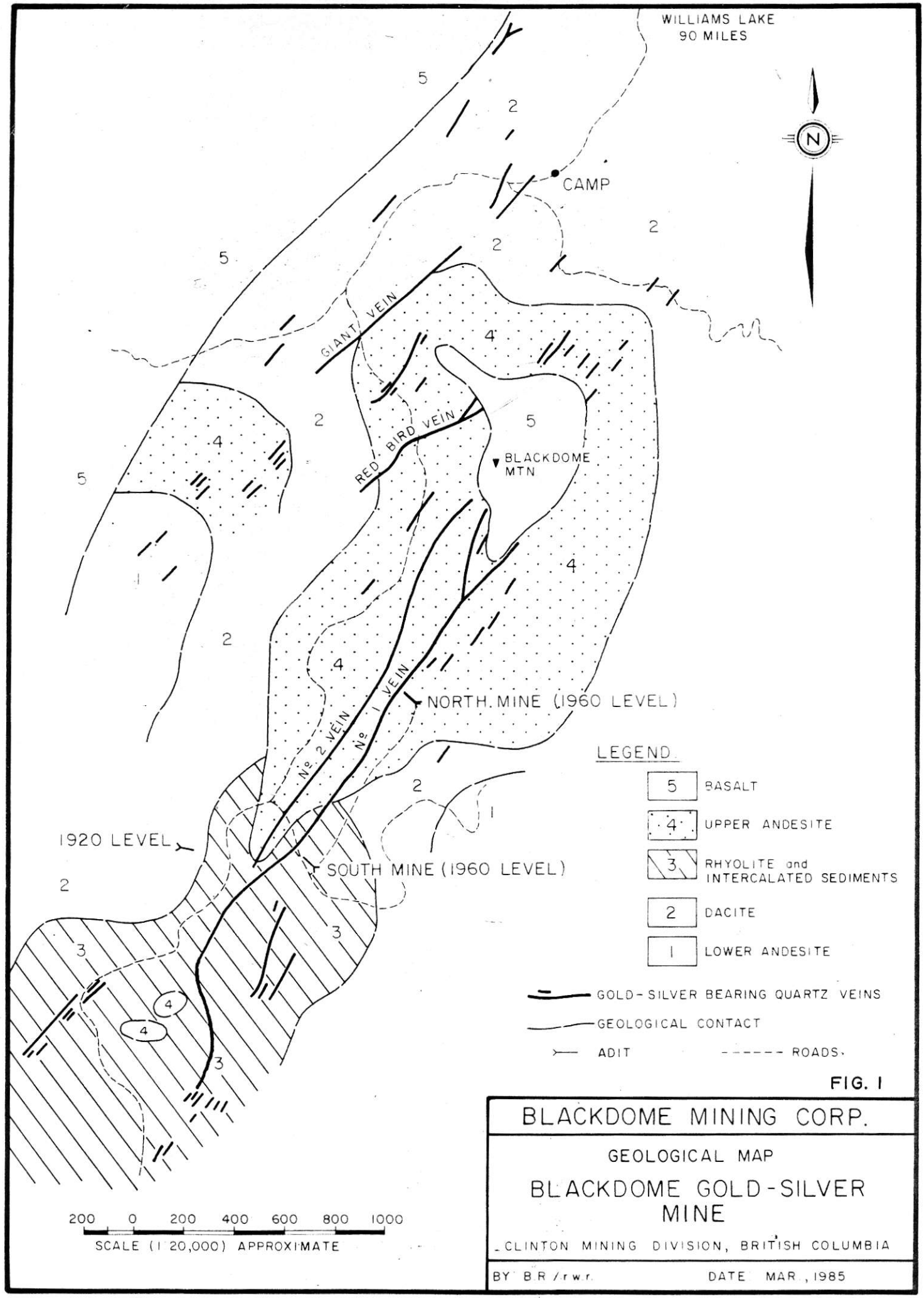


FIG. 1

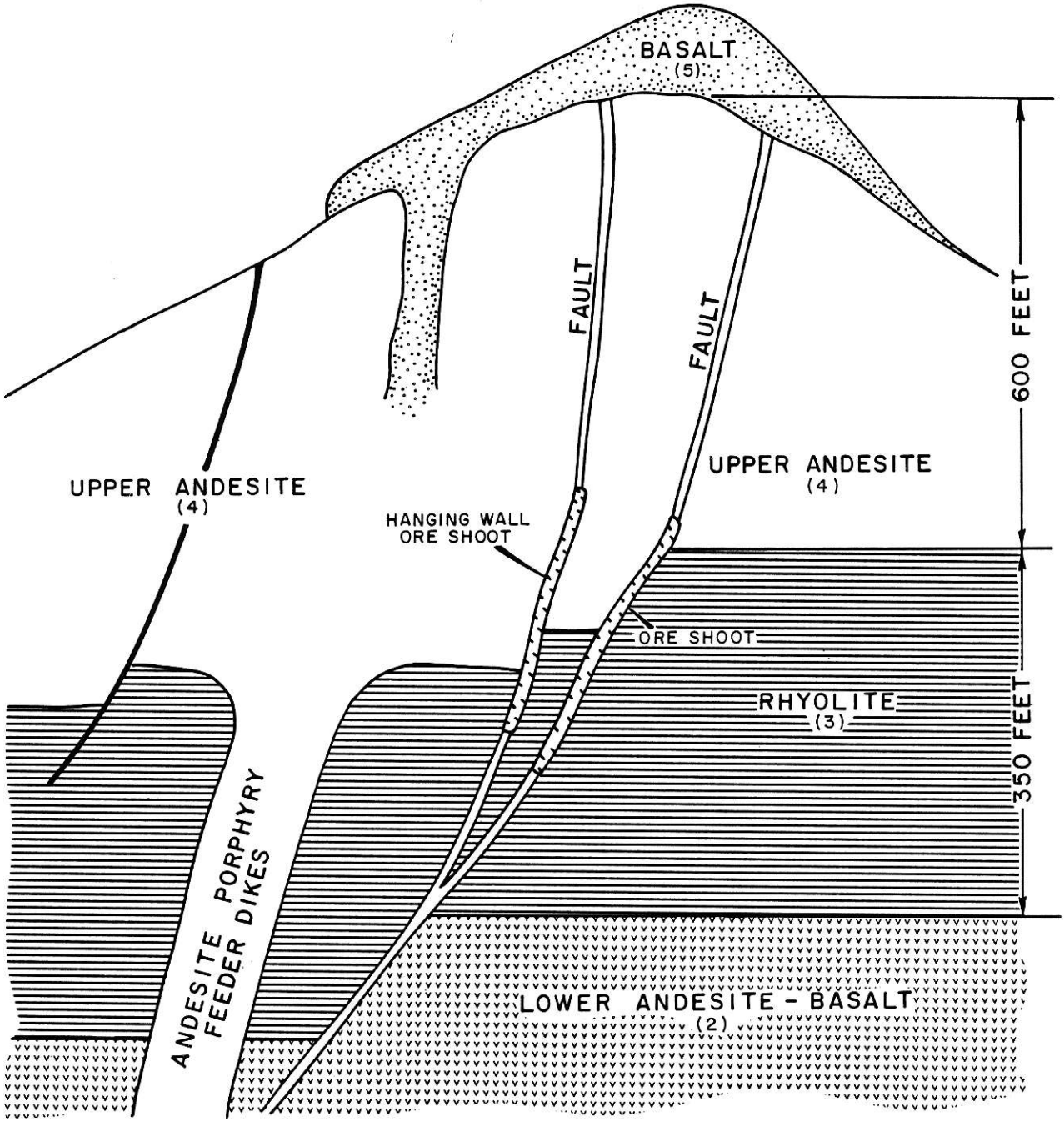
BLACKDOME MINING CORP.

GEOLOGICAL MAP

BLACKDOME GOLD-SILVER MINE

CLINTON MINING DIVISION, BRITISH COLUMBIA

BY B.R./r.w.r. DATE MAR., 1985



(NOT TO SCALE)

BLACKDOME MINING CORP.

DIAGRAMATIC CROSS– SECTION
LOOKING NORTH
BLACKDOME MTN. GOLD MINE

BY: A.F.R. / rwr

DATE: FEB.,1989

FIGURE: 2

on the Blackdome property. All of the veins are more or less gold and silver bearing; however, mineable high grade ore-bodies are restricted principally to the South Mine segment of the No. 1 vein which is 4000 feet long from Section 12+750 N to Section 11+550 and is extensively developed by underground workings.

Sixteen ore-bodies averaging about 12,500 tons each have been identified in this area, four of these exceed 30,000 tons with the smallest being 1,400 tons. Five of the 16 ore bodies occur up to 100 feet into the hanging wall of the main structure. The ore trend has a maximum verticle range of 330 feet and slopes downward to the south at 350 feet per mile. The vertical distance from the highest outcrops to the bottom of the lowest known ore occurrence is about 575 feet.

The South Mine ore zone is marked by a distinctive, <u>compound strike flexture of the No. 1 vein fault structure</u> (fig. 3) A large cymoid loop 2,000 feet in length occupies the north part of the mine with notable concentrations of ore near the ends of the loop and in the curved footwall branch. A second loop is partly outlined in the south end of the mine. Individual ore shoots, particularly those over 100 feet in length have compound strike flextures and are curved in verticle section as well. Ore shoots frequently dip more steeply than the general dip trend indicated initially by widely spaced diamond drill holes. The dip of the controlling fault structure which averages 60 degrees west has

been observed to steepen slightly as it passes upward from the lower andesite flow unit to the rhyolite volcaniclastic horizon. Detailed structural geology of ore distribution in the south mine has not been completely developed and documented at this point but it generally appears to conform with the large scale pattern of strike deflections and cymoid loops.

The Rhyolite volcaniclastic unit is less than 30 feet thick on the north part of the property but begins to thicken markedly at the north end of the South Mine workings until it exceeds 350 feet at the south end of the mine. Rhyolite occurs on one wall of most ore shoots in the South Mine.

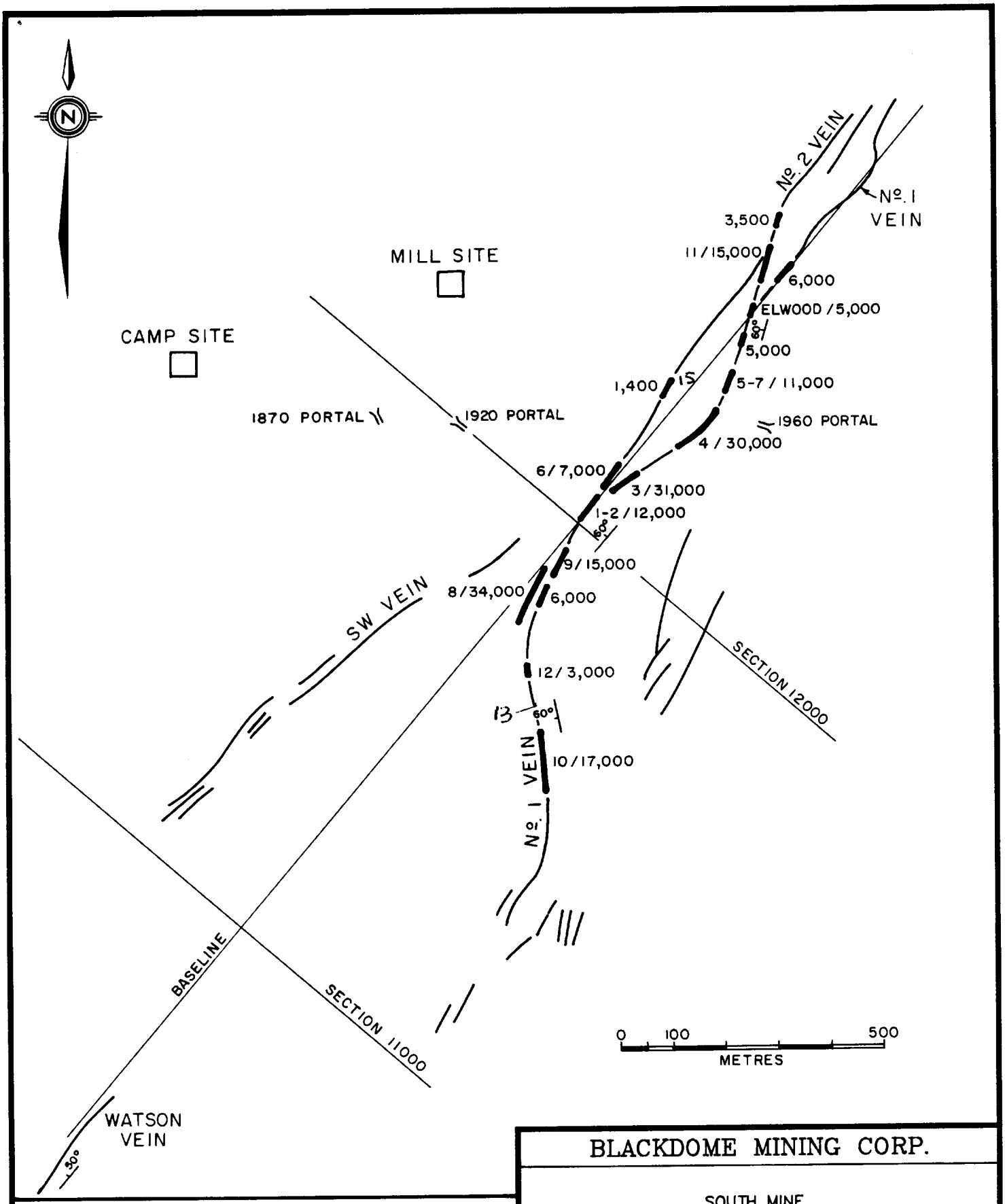
Andesite porphry intrusions which are feeders to the upper andesite flow unit cut the Rhyolite sequence in the footwall of the South Mine and to the southwest. The intrusions are mapped as dikes up to 100 feet in thickness and often assume an irregular stock like form.

ORE CONTROLS

The following are proposed as basic elements of ore control and exploration guides.

1. Vertical zonation

   Ore grade epithermal gold mineralization occurs in a



LEGEND:

- ORE SHOOT
- VEIN - FAULT TRACE
- 10/17,000 SHOOT No./ APPROX. TONNAGE (St) (Full Size)

BLACKDOME MINING CORP.

SOUTH MINE

PLAN DIAGRAM OF VEIN AND ORE SHOOT DISTRIBUTION

BY: A.F.R. / rwr

DATE: FEB.,1989

FIGURE: 3

restricted vertical range of 300 - 400 feet; it terminates upward into weakly mineralized quartz and clay alteration (i.e. 60-1 stope, Watson Vein) and downward into subgrade quartz. The South Mine ore-trend plunges southward but this could vary elsewhere depending on the shape of the pre-ore paleosurface as evidenced by the apparent north plunge of the Giant Vein gold zone. There are examples of epithermal vein systems elsewhere with more than one mineralized horizon (i.e. Guanajuato, Mexico) and it is possible that a second horizon may occur below a barren gap that occurs in the bottom of the present mine workings.

2. Rhyolite

The presence of rhyolite in the South Mine area appears to have an important effect on the ore bearing fault structures which steepen slightly (dip deflections) where the lower andesite-rhyolite contact is crossed causing dilation openings where ore shoots can form.

3. Andesite Porphry Feeder Dikes

The ore bearing fault structure is further modified by the presence of massive, relatively competent andesite intrusions which have the effect of "knots in a splitting plank" causing substantial strike deflections of the fault zone as it is propigated through the softer rhyolite formation. The strike deflections lead to further dilation

of the fault plane to channel and concentrate ore forming fluids. An example of an andesite body which has influenced the curvilinear development of the No. 1 vein fault is located in the South Mine workings, in the footwall, on section 12+100, at the 1920 Cross cut entry (fig. 3). This is also the junction of a major cymoid loop and the locus of three ore shoots which total 50,000 tons (No.'s 3, 6 and 1-2) (fig. 3).

4. Fracture Pattern (see fig. 3)

A large (2,000 feet long) well defined Cymoid loop controls the distribution of ore in the north and central parts of the South Mine. Hanging wall ore shoots occur at the loop junctions and the curved footwall branch is well mineralized (about 50% ore on the 1960 level).

A partially developed loop may exist in the southern part of the mine having a 34,000 ton hanging wall ore shoot at its north junction. The cymoid pattern appears to be an important ore control on a mine and district scale and may further relate to the size and shape of ore shoots as well as the pattern of metal distribution within the shoots.

5. Exposure

High grade ore is recessive in Rhyolitic wallrocks. Nine of the 16 ore shoots now identified in the South Mine are

partly eroded; none of these formed a natural outcrop even though they occur on the upper flank and crest of a high ridge.

Ore is blind to surface in the south end of the South Mine and there are indications, further to the southwest, at the Watson Vein and on the Lexington property that the most favourable horizon for mineralization is not exposed at surface.

6. Alteration

Weak to moderate propylitic and argillic alteration accompanied by minor quartz veining and silicification is restricted to a thickness of a few feet in vein walls. "Clay Cap" alteration immediately above the ore horizon has been observed. Montmorillonite, illite, chlorite and sericite have been identified in the Watson Vein outcrop.

CONCLUSIONS AND RECOMMENDATIONS

Geologically favourable areas for further exploration occur east of the South Mine and to the southwest. Exploration should emphasize structural mapping to identify favourable branching, curvilinear fracture patterns and cymoid loops in the mine and in the district generally.

If the structural data is presented on level plans where there is enough drill hole and underground data to do so, the prominent branching and strike deflections of the vein system that are related to ore, will be most readily identified.

It is likely that the ore horizon does not come to surface southwest of the mine so that structural patterns may be the only drilling targets. Some knowledge of the chemistry and mineralogy of the vein system above the ore horizon would help to define such targets.

The proposed favourable areas are recessive and it will not be easy to collect structural information. Careful prospecting, mapping, and the continued development of a "Troad" system (trenches and roads) is recommended (the South Mine was discovered by prospecting quartz float). The selective use of geochemistry, geophysics (VLF), and "geological" drill holes in critical areas are secondary means of defining structure. Broadly based geological traverses are also recommended to develop a structural framework for the district.

Diamond drill hole intersections are vital to exploration success. Experience has shown that many drill holes do not report ore when they pass through shoots that have been confirmed by subsequent mining. It is recommended that the pulps from all drill core samples be screened and checked for coarse metallic gold, silver and electrum.

Planning exploration work; the mine needs a flexible minimum annual budget to carry out essential exploration work, within, and in the near vicinity of the mine workings and to research exploration opportunities in the district. Additional exploration funding could then be proposed as required on the basis of well defined geological rationale. Unless the size, distribution and character of ore shoots changes drastically, it seems unlikely that very large reserves can be defined in a short period of time, notwithstanding the size of the exploration budget. A budget with the objective of maintaining reserves while allowing a total cost operating profit would appear to be the most realistic approach.

Some prospective exploration targets are as follows:

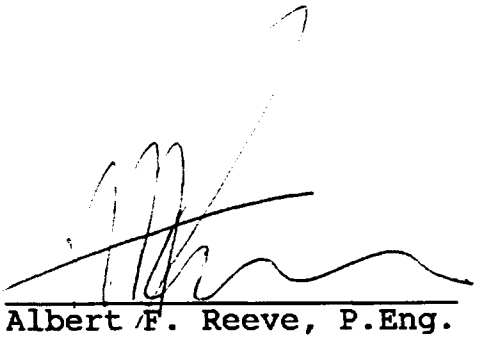
1. The segment of the No. 1 vein between No. 3 and No. 4 ore bodies, where the vein is not completely defined by drifting and raising.

2. At the south end of the mine workings where the junction of a large cymoid loop may occur.

3. The northeast extension of the Watson Vein particularly beyond the point where it enters the rhyolite formation.

4. The southwest projection of the Watson Vein where it intersects a southeast trending projection of a Vein that occurs on the Lexington property.

5. The north part of the Balatar property where an anomalous strike deflection of the northeast trending vein system occurs.



Albert F. Reeve, P.Eng.
Mining Geologist