



**SURFACE GEOLOGY OF THE 21A ZONE, ESKAY CREEK,
BRITISH COLUMBIA
(104B/9W)**

By Tina Roth, Mineral Deposit Research Unit, U.B.C.

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INTRODUCTION

The Eskay Creek deposit (56°38'N, 130°27'W) is in the Iskut River area of northwestern British Columbia, approximately 80 kilometres north of Stewart (Figure 2-12-1). The deposit, known as the 21 zone, occurs in a bimodal volcanic sequence of the Lower to Middle Jurassic Hazelton Group. The 21 zone is comprised of several zones distinguished by differing ore mineralogies and gold grades.

Geological reserves for the 21 zone are 4.30 million tonnes grading 28.8 grams per tonne gold and 1027 grams per tonne silver (Edmunds *et al.*, 1992). The bulk of these reserves occur in the 21B zone as tabular, syndimentary sheets of graded and fragmental sulphides and underlying vein and disseminated zones. Mineralization in the 21A zone occurs as a massive to semimassive stratabound lens of stibnite-realgar-cinnabar-arsenopyrite underlain by footwall disseminations and veins of dominantly sphalerite-galenatetrahedrite-pyrite with minor amounts of chalcopyrite. The 21A zone is estimated to contain approximately 0.97 million tonnes grading 9.6 grams per tonne gold and 127 grams per tonne silver (A. Ransom, International Corona Corporation, personal communication, Dec. 1991). The property operator to August 1992 was International Corona Corporation. The current operator is Homestake Canada Ltd.

Preliminary geology of the 21A zone has been described by Roth and Godwin (1992). During the summer of 1992, an area including the 21A zone was mapped at a scale of 1:1000; results are presented here.

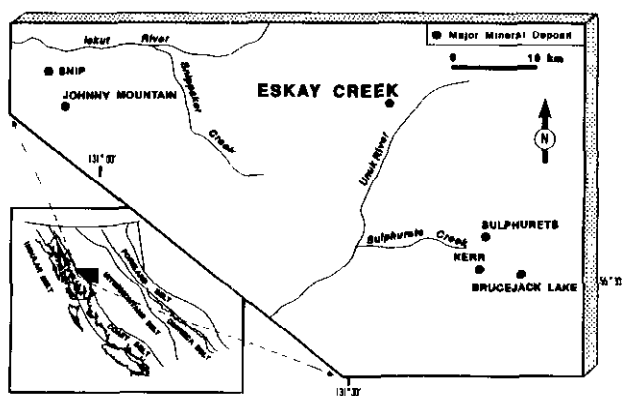


Figure 2-12-1. Location map of Eskay Creek, Iskut River area.

REGIONAL GEOLOGY

The area is underlain by Triassic Stuhin Group and Jurassic Hazelton Group sedimentary and volcanic rocks, which have been described by several workers including Alldrick *et al.* (1989), Anderson (1989), Anderson and Thorkelson (1990), Britton (1991), Lewis (1992) and Lewis *et al.* (1992). The detailed stratigraphy containing the Eskay Creek deposit has been described by Bartsch (1992a, 1992b, 1993, this volume).

SURFACE GEOLOGY OF THE 21A ZONE

Host stratigraphy of the 21A zone is a sequence of volcanic and sedimentary rocks that strike northeasterly and dip moderately to the northwest. The map of the 21A zone area is reproduced in Figure 2-12-2 at a reduced scale. A cross-section through the deposit is presented in Figure 2-12-3. Units 1 to 8 below are described from oldest to youngest. A zone of intense alteration obscures most lithologies in the northeastern part of the study area. However, the presence of distinctive amygdaloidal dacite allows extension of contacts through this part of the map.

Footwall sediments and volcanoclastic rocks (Unit 1) are the lowermost unit in the map area. Shale and sandy sediments were observed in the southeast part of the area, southeast of Eskay Creek. On the northwest side of the creek, volcanoclastic rocks are generally unsorted and consist of dominantly intermediate volcanic clasts and minor argillite clasts in a dark green chloritic matrix. Locally these clastic rocks are graded and bedded. Pyroclastic material, exposed near the south end of the map area shows well-developed, slightly flattened pumice fragments and intermediate volcanic clasts in a dark green matrix.

Dacite (Unit 2) overlies Unit 1 based on stratigraphy interpreted from drill core logged in 1991. Quartz, locally chlorite, amygdules are common and assist tracing this unit through zones of intense quartz-sericite-pyrite alteration. The dacite has a characteristically pinkish beige alteration, cut by a stockwork of pyrite and quartz-rich veins (up to 10 cm wide) with grey sericitic envelopes. The dacitic composition has been confirmed by geochemical analysis (Edmunds *et al.*, 1992). This unit may represent a flow or sill.

Argillite (Unit 3) occurs in most drill sections where it separates the dacite, sediments and volcanoclastic rocks from the overlying rhyolite. On surface, only two small shale outcrops were found in this stratigraphic position. The relationships between Units 1 to 3 depend upon an intrusive or extrusive interpretation for Unit 3. Coarser sedimentary

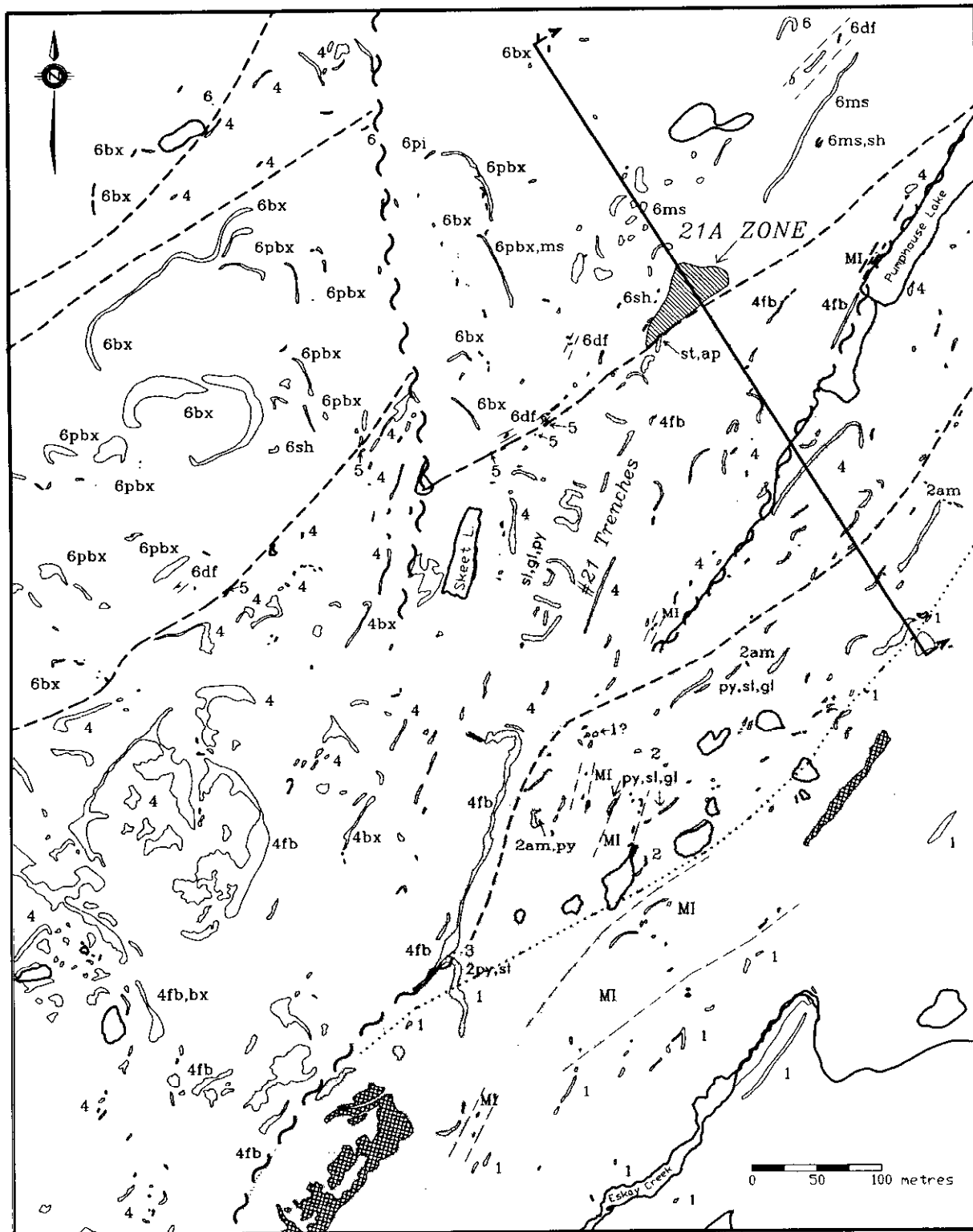


Figure 2-12-2. Map of the 21A zone area. Cross-section A-A' is shown in Figure 2-12-3.

LEGEND

- | | |
|----|--|
| 6 | Basalt and intercalated shale and argillite. |
| 5 | Contact shale and argillite. |
| 4 | Rhyolite. |
| 3 | Argillite. |
| 2 | Dacite. |
| 1 | Sediments and volcaniclastic rocks. |
| MI | Mafic intrusion. |
| | Altered felsic intrusion. |
| | Surface projection of massive to semi-massive st-re-ci mineralization. |
| | Quartz-sericite-pyrite alteration: moderate to intense. |

ABBREVIATIONS

am	amygdules
bx	breccia
df	debris flow
fb	flow banding
ms	massive
pbx	pillow breccia
pi	pillows
sh	shale
ap	arsenopyrite
ci	cinnabar
gl	galena
py	pyrite
re	realgar
sl	sphalerite
st	stibnite

- | | |
|--|--|
| | Outcrop |
| | Fault |
| | Geologic contacts:
interpreted, inferred,
approximate. |
| | Lake, pond, stream. |

rocks are observed locally in drill core at this stratigraphic horizon (Figure 2-12-3). In drill hole CA89-024, wacke overlies stockwork-altered dacite and grades up-hole to graphitic argillite.

Rhyolite (Unit 4) overlies the dacite and argillite. Contact relationships were not observed in surface mapping. In outcrop, most of the rhyolite appears to be massive and



Plate 2-12-1. Rotated, flow-banded clasts of rhyolite in an altered rhyolite matrix (Unit 4).

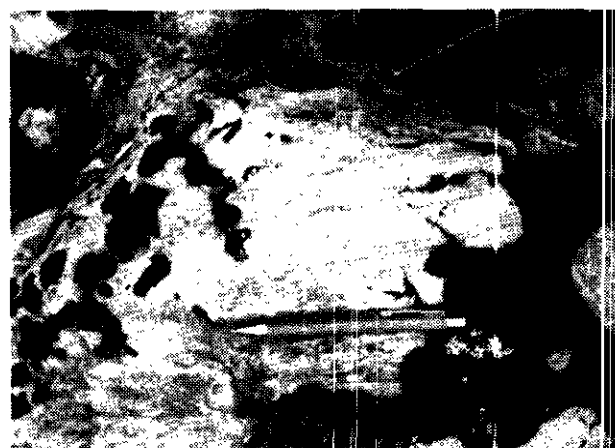


Plate 2-12-2. Flow-banded rhyolite (Unit 4). The texture becomes prominent on the weathered surface.

textureless. However, on surfaces that have been broken and exposed for a few years, flow banding and well-preserved breccias with rotated flow-banded clasts are common (Plates 2-12-1 and 2-12-2). Contorted flow bands occur at hand-specimen to outcrop scale. Attitudes of flow bands are inconsistent and locally chaotic.

The upper contact of the rhyolite with overlying siliceous, black argillite or chert (Unit 5) is exposed locally. At this contact, white siliceous rhyolite fragments are incorporated in a black siliceous matrix (Plate 2-12-3).

Rhyolite also occurs as a discrete lens within the basalt sequence in the northwest part of the map area. It is not obvious from surface mapping whether contacts between this rhyolite and the surrounding basalt are tectonic or stratigraphic, as they are not exposed. Evidence from diamond-drill core suggests that this rhyolite is intercalated with basalt at depth (Edmunds *et al.*, 1992). The relationship between the rhyolite and basalt is critical to understanding the Eskay Creek deposit.

Contact argillite and chert (Unit 5) occurs between the rhyolite and the overlying basalt and hosts massive to semi-massive stibnite-realgar mineralization of the 21A zone. In

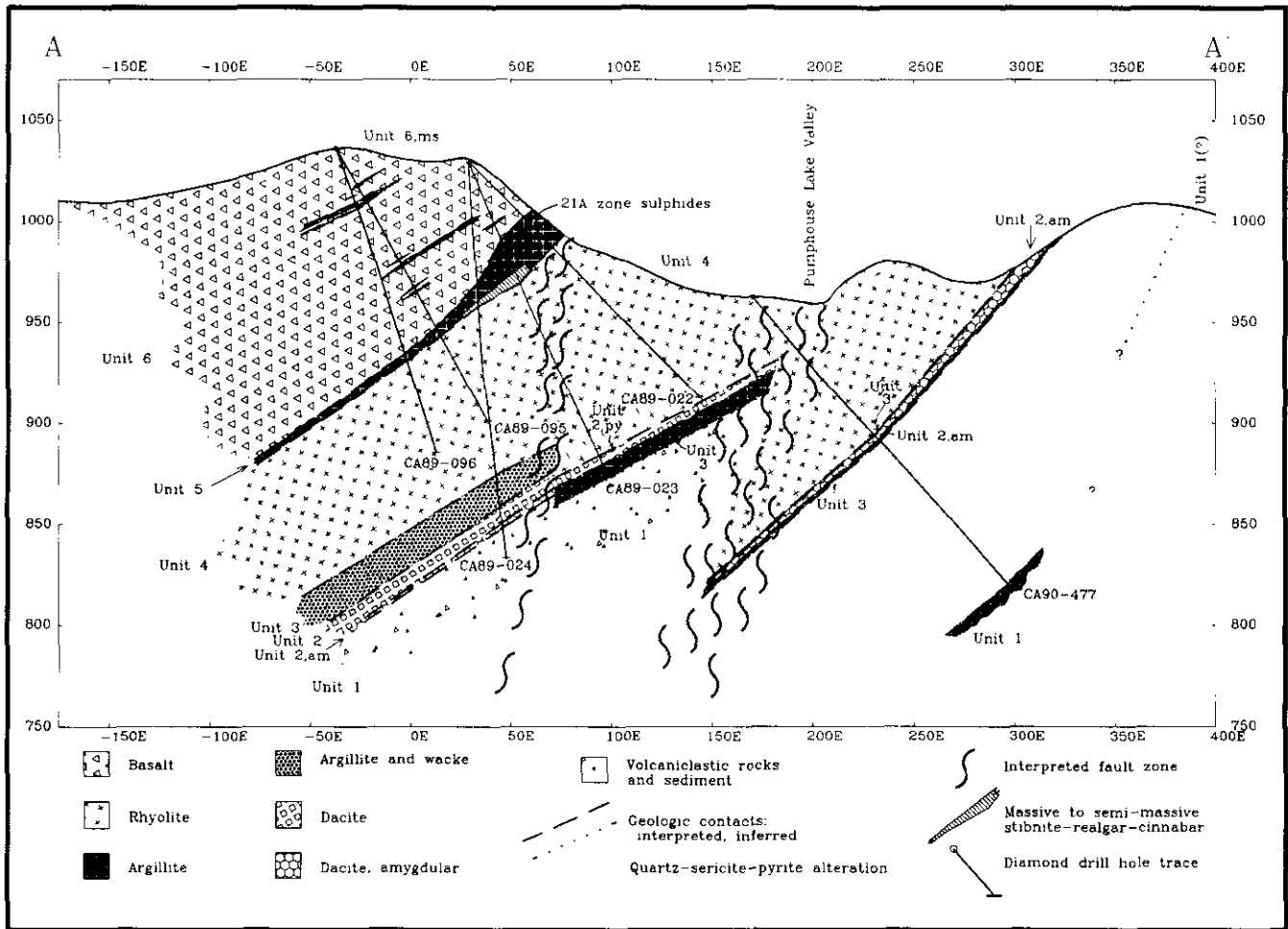


Figure 2-12-3. Schematic cross-section A-A' showing stratigraphy through the 21A zone.

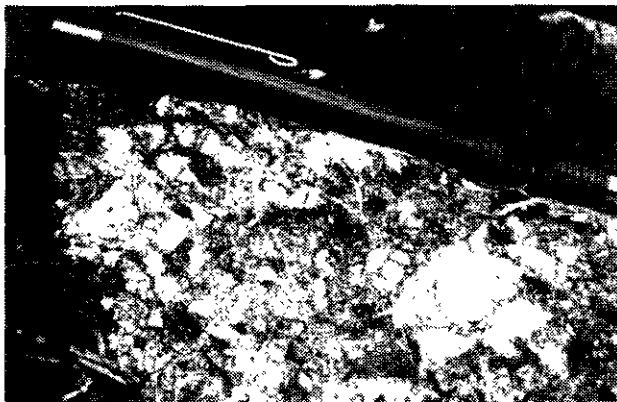


Plate 2-12-3. Siliceous, white rhyolite fragments in a siliceous, black matrix. This texture is characteristic of the top of the rhyolite (Unit 4) in contact with the overlying black, siliceous argillite (Unit 5).

drill core the argillite is usually laminated, variably calcareous, cherty or graphitic, and locally contains thin intervals of intercalated tuffaceous to brecciated rhyolite. At surface, only a few very hard and cherty black outcrops are exposed. Thin, white quartz veinlets generally cut perpendicular to bedding. In some exposures, thin cherty beds

weather white, giving the outcrop a banded appearance. The bedding in the unit is locally folded gently or disrupted.

Basalt (Unit 6) is massive to pillowed and brecciated. In the area immediately overlying the 21A zone the basalts are generally massive. Topographically and stratigraphically overlying the massive basalt are well-preserved pillow flows and pillow breccias showing chilled and amygdaloidal pillow margins (Plate 2-12-4). Well-formed pillows are commonly 80 centimetres to 1 metre in diameter; locally pillows are smaller and have irregular or elongate shapes. Massive to blocky and brecciated basalts also occur within the pillowed sequence, possibly as sills, flows or dikes.

Argillite intervals, rarely exposed at surface, are intercalated with the basalt sequence. A basalt debris flow, with clasts of basalt and argillite, crops out in the northeast corner of the map area near the base of the basalt sequence. In the central portion of the map, a debris flow immediately overlies the contact argillite (Unit 5). In the northeast, the debris flow is underlain by massive basalt.

INTRUSIVE ROCKS

Felsic intrusions cut across stratigraphy in the footwall rocks and are possible feeders for the rhyolite and/or the orebodies (Edmunds *et al.*, 1992; Bartsch, 1992b; 1993. this

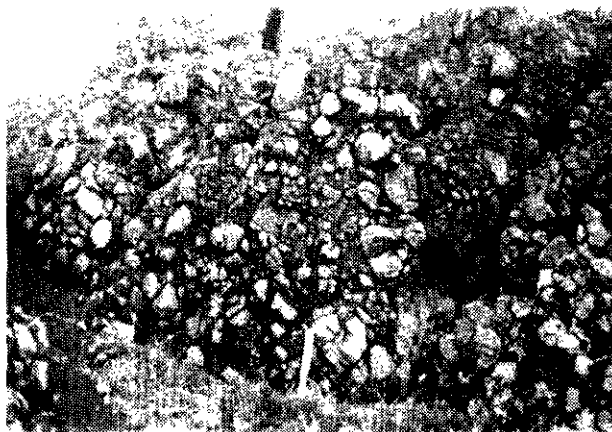


Plate 2-12-4. Brecciated pillow basalt fragments (Unit 6) in a calcareous matrix. The clasts show chilled and amygdaloidal margins.

volume). Within the map area, these intrusions are expressed on surface as two distinctive gossanous bluffs (marked by cross-hatching on Figure 2-12-2). They are pervasively altered to quartz-sericite-pyrite assemblages and primary textures are not evident. Hostrocks marginal to these intrusions are also intensely altered.

Mafic dikes and sills are exposed throughout the map area, in both the hangingwall and footwall of the 21A zone. The mafic intrusions appear to be generally weakly altered or fresh. Typically these rocks are dark green to grey and locally contain up to 5 per cent chlorite-filled amygdules. The mafic intrusions are comagmatic with the basaltic flows (Unit 6) (Edmunds *et al.*, 1992).

ALTERATION

Variably intense alteration (stippled pattern, Figure 2-12-2) extends along a generally northeast-trending zone in the Pumphouse Lake valley that includes the area between the gossanous bluffs. Intense silicification and variable secondary quartz-sericite-pyrite alteration has generally obliterated all primary textures and features in the rocks, making interpretation of a protolith difficult. Locally, relict features such as altered clasts and amygdules allow the interpretation of contacts within this zone.

In the 21 zone trenches sericite-pyrite alteration is dominant and is characterized by small white patches, generally 3 centimetres across, in a grey matrix. On the north end of the 21 zone trenches an area of intense sericite-chlorite-pyrite alteration, which immediately underlies the massive mineralization of the 21A zone in drill core, is exposed at surface.

STRUCTURES

Several faults transect the area. A north-trending dextral fault, with an apparent offset of about 120 metres, occurs in the centre of the map at the rhyolite-chert-basalt contact. Another fault is interpreted at the contact between the rhyolite and the felsic intrusion. A small, apparent dextral offset along this structure is indicated by shales of Unit 3,

which appear to be juxtaposed against altered dacite. This fault may be related to the major north-north west-trending fault zone which occurs along the Pumphouse Lake valley (Blackwell, 1990; Figure 2-12-3). Minor faults and shear zones, not shown in Figure 2-12-2, are also present in the map area.

The prevailing structural fabric in the map area is a moderate to intense foliation and cleavage most prominent in the Pumphouse Lake valley. This fabric trends about 030° and dips steeply. Footwall rocks to the 21A zone are more intensely foliated than the hangingwall basalts. Variable foliation intensity reflects the proportion of phyllosilicate development in the hydrothermal alteration zone related to base and precious metal mineralization.

MINERALIZATION

The Eskay Creek deposits have been described in detail by Britton *et al.* (1990) and Blackwell (1990); the 21A zone has been described by Roth and Godwin (1992) and Roth (1992). This discussion will be limited to a brief description of the general styles of mineral showings within the map area.

Veinlets and stringers of sphalerite, galena, tetrahedrite, and pyrite occur locally in the footwall rhyolite sequence. These veinlets are most evident in the #21 zone trenches, and also occur locally in outcrops in the Pumphouse Lake valley. Sulphides are sparse in the rhyolites in the southwest part of the map area.

The most prominent surface showings are pyrite veins on the dacitic volcanic rocks (Unit 2). Sphalerite and galena are commonly associated with these veins.

Disseminated stibnite and arsenopyrite, with associated gold and silver, is exposed at the north end of the #21 zone trenches in intensely sericite-chlorite-pyrite-altered rhyolite (Figure 2-12-2). They also occur in drill core from immediately beneath massive sulphides in the 21A zone contact argillite. Massive stibnite-realgar-cinnabar mineralization is not exposed at surface, although small weathered fragments can be found at the north end of the #21 zone trenches.

CONCLUSIONS

The map and cross-section presented here elaborate on earlier work by Roth and Godwin (1992) and Roth (1992). The stratigraphic sequence is comprised of sediments and volcanoclastic rocks, overlain by dacitic, rhyolitic and basaltic volcanic rocks. Intervals of argillite and shale occur between the volcanic units, and are intercalated with basalt. Rhyolite may also be intercalated with basalt. Felsic and mafic intrusions, which may be related to the rhyolite and basalt respectively, were outlined by surface mapping.

Within the map area, quartz-sericite-pyrite alteration is most intense in the 21A zone footwall and marginal to the felsic intrusions. Sericite-chlorite-pyrite alteration is prevalent in the area immediately underlying massive sulphide mineralization. Disseminated stibnite and arsenopyrite are locally associated with this footwall alteration. Veins and stringers of sphalerite, galena, tetrahedrite and pyrite cut the footwall rhyolite; veins in the underlying dacite are domi-

nated by pyrite, with sphalerite and galena. Studies are ongoing to characterize the alteration and mineralization associated with the 21A zone at Eskay Creek.

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