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

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INTRODUCTION

The Eskay Creek deposit (56°38′N; 130°27′W), in northwestern British Columbia, is approximately 80 kilometres north of Stewart. The deposit, known as the 21 zone, is hosted in bimodal volcanics of the Lower Jurassic Hazelton Group, within the Stikine Terrane, near the western margin of the Intermontane Belt. The 21 zone has been subdivided into the 21A and 21B zones on the basis of differing ore mineralogies and gold grades. Both zones are hosted by similar lithologies.

Published reserves for the 21 zone are 3.95 million tonnes (4.36 million tons) grading 26.4 grams per tonne (0.77 oz/ton) gold and 998 grams per tonne (29.12 oz/ton) silver (The Northern Miner, January 28, 1991). The bulk of these reserves are in the 21B zone. As this paper goes to press, reserves have been revised downwards (Globe and Mail, December 17, 1991). New tonnage and grade estimates are not available, but projected gold recovery is now approximately 62 000 kilograms (2 million oz.), a reduction of one-third from earlier estimates, largely as a result of using a cut-off grade of 13.7 grams per tonne gold. The 21A zone is estimated to contain approximately 1.41 million tonnes (1.56 million tons) of probable and possible reserves grading 7.2 grams per tonne (0.21 oz/ton) gold and 116.6 grams per tonne (3.4 oz/ton) silver at a cut-off grade of 1.4 grams per tonne (0.04 oz/ton) (Roscoe Postle Associates Incorporated quoted in Britton *et al.*, 1990).

This report presents preliminary observations of the 21A Zone. Data were collected during the summer of 1991 as part of an M.Sc. study by Roth. Drill core from three sections through the zone, spaced at 100 metre intervals, was re-logged to develop a detailed geological framework for the deposit (Figure 6-6-1). Several mineralized intervals between these sections were re-logged to evaluate changes along strike. Samples were collected for petrographic and geochemical analysis.

REGIONAL GEOLOGY

Four tectonostratigraphic assemblages have been defined in the area of the deposit (Anderson, 1989): the Paleozoic Stikine assemblage, the Triassic to Jurassic volcanic-plutonic complexes, the Middle and Upper Jurassic Bowser overlap assemblage, and the Tertiary Coast Plutonic Complex. The Triassic to Jurassic strata include the Upper Triassic Stuhini Group and the Lower Jurassic Hazelton Group (Anderson, 1989; Anderson and Thorkelson, 1990). Regional geology is also summarized by Britton *et al.* (1990).

GEOLOGY OF THE 21A ZONE

The Eskay Creek property is underlain by Lower to Middle Jurassic Hazelton Group volcanics and sediments. A summary of the property geology is provided by Britton *et al.* (1990). The general geological features of the 21 zone deposit have been described by Blackwell (1990). Features of the 21A zone are detailed below.

Stratigraphy observed in drill core from the 21A zone drill core is illustrated in Figure 6-6-2. The strata strike northeast and dip moderately northwest. The sequence from footwall dacitic volcanics, upwards to felsic volcanics and into hangingwall basaltic volcanics, is consistent throughout the zone. The major volcanic units are generally separated by argillite, which occurs at the top of both the dacite and the rhyolite units. The contact between the footwall rhyolite and the hangingwall basaltic volcanics has been called the contact unit (Blackwell, 1990; Britton *et al.*, 1990). Argillite within the contact unit is referred to as the "contact argillite".

This stratigraphic sequence may represent two cycles of volcanism. The lower dacites and rhyolites would represent the progressively increasing felsic top of a volcanic cycle. The contact argillite reflects a hiatus between cycles, and is followed by basaltic volcanics that represent the mafic beginning of the next cycle.

Footwall dacite, the lowermost unit in the 21A zone (Figure 6-6-2), is a sequence of medium to dark green volcaniclastics, lapilli and ash tuffs. It has a minimum thickness of 60 metres. The volcaniclastics contain fragments of mixed provenance and are interbedded with shales, siltstones and coarser clastics. Volcanic textures and grading are locally preserved. A pinkish beige commonly amygdaloidal dacitic flow or breccia occurs locally near the top of the sequence. The dacitic sequence is generally separated from the rhyolitic package by a thin, black shale (0 to 10 m thick).

Footwall rhyolite overlies the dacitic unit and ranges from 70 to 210 metres in thickness (Figure 6-6-2). The unit consists dominantly of grey mottled, altered and devitrified material. Though many of the textures have been obliterated, well-preserved flow banding, breccias and volcaniclastics are present. Massive, siliceous light grey aphanitic rhyolite also occurs, most commonly in the lower portion of the sequence. Most of the rhyolite appears to consist of fragmental material. Clasts may be well preserved in a mottled and indistinguishable grey matrix that is

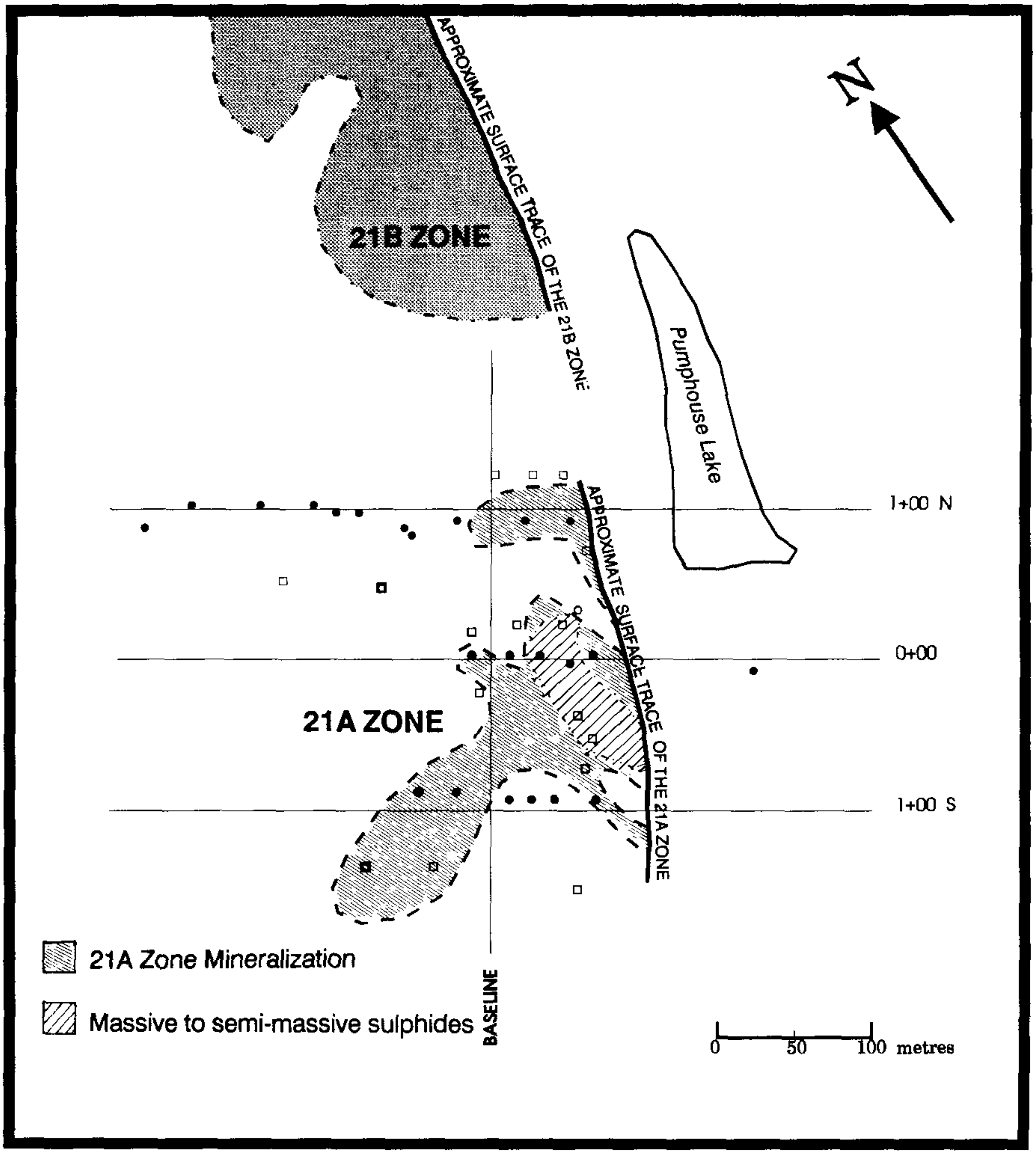

Figure 6-6-1. Schematic diagram of the distribution of gold mineralization in the Eskay Creek 21A zone, with locations of re-logged drillholes. Squares and dots mark intersections with the contact argillite. Dots = holes on detailed sections; Open squares = mineralized intersections logged off-section).

devitrified and altered. Excellent breccia textures, often with rotated flow-banded clasts, are predominantly monolithic; but variably altered clasts, and mixed massive siliceous and flow-banded clasts occur locally.

Fine-grained, possibly tuffaceous intervals occur most commonly near the top of the rhyolitic sequence, but also in the middle to lower part. Strong to intense sericitic alteration has obliterated many primary textures, but relict clasts are commonly observed. Textures in the Eskay Creek footwall are discussed further by Ettlinger (1992, this volume).

The upper contact of the rhyolite is difficult to define, partly due to sericitic alteration. The sequence locally grades upwards into the overlying argillite. In several drill holes, thin beds of siliceous black argillite are interbedded with intervals of grey to very dark grey, sericitic material. Clasts of argillite are locally included in a very soft, fine-grained, greenish matrix or in a black carbonaceous matrix. Elsewhere, variably altered rhyolite clasts occur in a black argillaceous matrix. This change from dominantly rhyolitic material to dominantly black argillaceous material was formerly termed the "transition zone" (Blackwell, 1990) and was considered to be part of the lower part of the contact unit. In this study, grey to dark grey sericitic intervals have been included as a subunit of the rhyolite sequence. The clastic material was logged as separate subunits of the rhyolite or argillite, based on dominant lithology.

Contact argillite, from 0 to 15 metres thick, occurs between the rhyolite package and the overlying basaltic volcanics (Figure 6-6-2). The upper contact is sharp. The argillite is black and mostly thinly bedded to laminated with silty or tuffaceous pyritic layers. It is variably calcareous, hard and cherty, or soft and graphitic (possibly bituminous). Beds of black limestone and fossil belemnites occur locally, but not necessarily together.

Basaltic volcanics form the uppermost sequence of the 21A zone stratigraphy (Figure 6-6-2). In drill core, the volcanics range from dark green to tan; their minimum thickness is 125 metres. Flows and some sills are intercalated with laminated to thin-bedded argillites with silty or tuffaceous layers and black chert; some of these units may represent distal turbidites. The silty to tuffaceous layers usually contain pyrite or pyrrhotite. Volcanic textures observed include pillowed flows and pillow breccias, massive, crystalline to porphyritic flows, amygdaloidal flows, hyaloclastites and debris flows. Brecciated intervals have a fine-grained calcareous and siliceous matrix.

ALTERATION

Alteration is prevalent in the footwall rhyolite. The rocks are altered extensively to quartz, sericite and pyrite, as well as chlorite and clay. Moderate to intense, pervasive sericitic and chloritic alteration are significant and abundant. The altered material is very soft, medium to dark grey or green, and contains ubiquitous very fine grained, disseminated pyrite. In some places, this alteration is also accompanied by secondary clay alteration – especially in zones of faulting or shearing. Silicification in the footwall rhyolite is pervasive to patchy. Narrow quartz veins with white, siliceous envelopes locally replace and obliterate flow-banded textures.

The hangingwall basaltic volcanics exhibit propylitic alteration. Barren calcite veins are common throughout the hangingwall sequence. This alteration may reflect either regional lower greenschist facies metamorphism or weak, late hydrothermal effects from the mineralizing event for the 21A zone.

MINERALIZATION

The bulk of gold mineralization in the 21A zone is in the lower part of the contact argillite and the upper portion of the footwall rhyolite (Figure 6-6-2). Gold and silver-rich mineralization also occurs locally in veins and veinlets throughout the footwall rhyolite. Sporadic precious metal values are present at the top of the underlying dacitic sequence.

The most striking mineralization and highest gold values within the 21A zone are found in a stratabound lens of massive to semimassive stibnite, arsenopyrite, realgar, orpiment and cinnabar at the base of the contact argillite (Figure 6-6-2). This lens represents a volumetrically small portion of gold-bearing mineralization in the 21A zone (Figure 6-6-1). Veins containing realgar and cinnabar, generally with calcite and/or quartz selvages, cut the lower contact argillite or the upper part of the footwall rhyolite close to the high-grade lens.

Much of the gold and silver mineralization in the 21A zone is associated with strongly to intensely altered, fine-grained, sericitized material in the upper part of the rhyolite (Figure 6-6-1). Sulphides in this zone are usually very fine grained and include pyrite, sphalerite, galena and tetrahedrite. This type of mineralization is also found locally in the middle portion of the footwall rhyolite.

The footwall rhyolite also hosts stockwork veins and veinlets of sphalerite, galena, tetrahedrite, pyrite and minor chalcopyrite. For the most part, these sulphides are not usually associated with significant precious metal assay values.

Minor gold mineralization occurs locally at the top of the dacitic sequence. The dacitic flow units locally host vein pyrite and semimassive pyrite, both associated with minor amounts of sphalerite and galena (Figure 6-6-1). The origin of the semimassive pyrite is not clear.

SUMMARY

The 21A zone at Eskay Creek occurs near the top of a felsic cycle of volcanism. The gold and silver mineralization is dominantly within both the top of the felsic rhyolitic package and the base of the overlying argillite. It occurs locally lower in the rhyolite sequence. Mineralization associated with massive lenses of arsenic, antimony and mercury minerals appears to be restricted to a volumetrically small part of the zone.

Data collected this summer will better define the distribution of, and relationships among, mineralization, alteration and lithology. A petrographic study will identify the fine-grained host minerals and sulphides and establish their relationships. This work will be enhanced by x-ray diffraction, microprobe and geochemical studies.

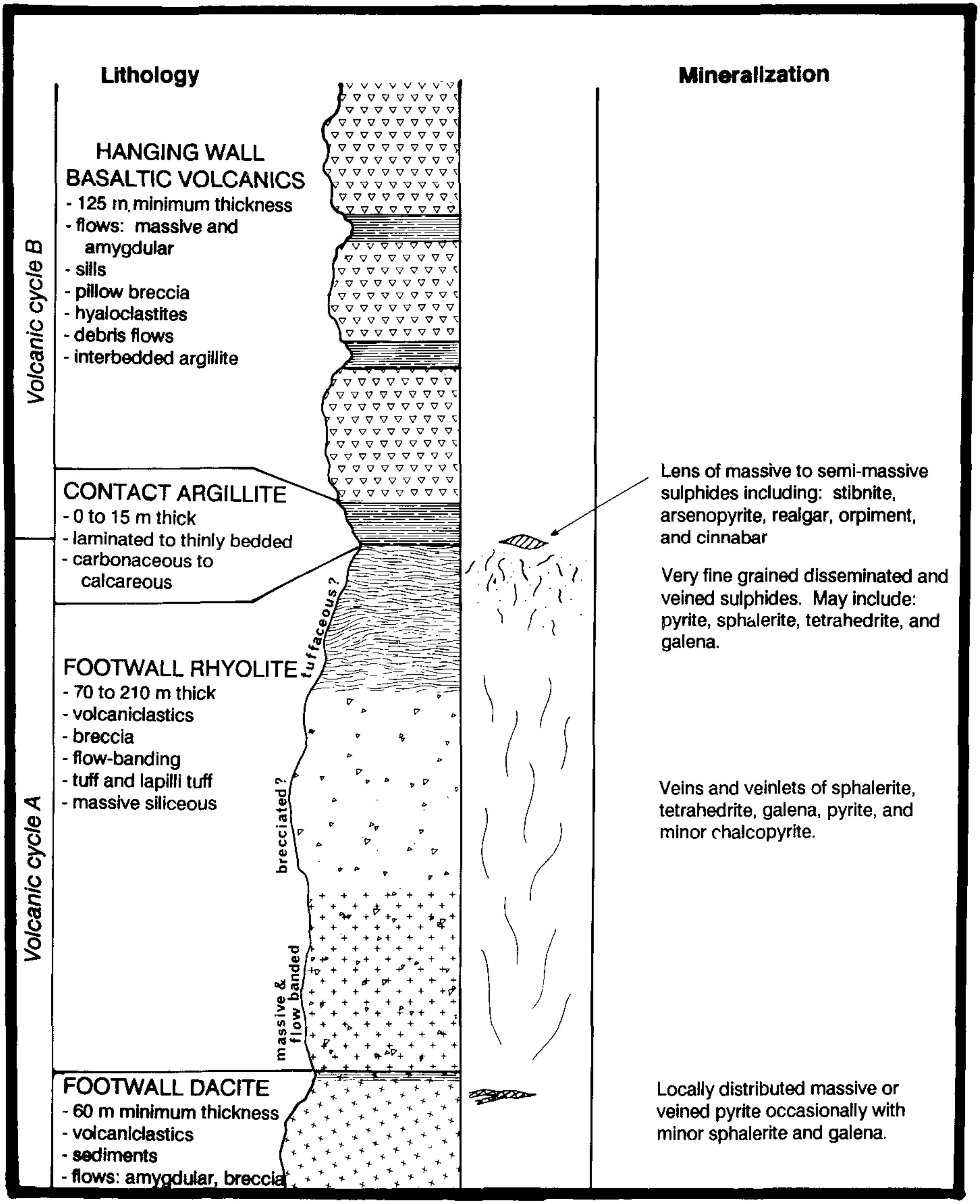

Figure 6-6-2. Schematic stratigraphic section of the Eskay Creek 21A zone showing general lithology, textures and mineralization.

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