A RHYOLITE FLOW DOME IN THE UPPER HAZELTON GROUP, ESKAY CREEK AREA (104B/9, 10)

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INTRODUCTION

Mapping at 1:5000-scale of an area surrounding the Eskay Creek precious and base metal deposit, initiated in 1991 and completed in 1992, emphasizes facies variations within the Lower to Middle Jurassic rocks of the Hazelton Group. This work is an integral part of the Mineral Deposit Research Unit's Iskut River Metallogeny project and is the basis of M.Sc. thesis research by the author at The University of British Columbia.

The study area is centred within the northern half of the Unuk River map area (Alldrick *et al.*, 1989) and extends south of the Eskay Creek deposit (Figure 2-13-1). Previous work in the Unuk and adjacent Snippaker and Sulphurets map areas was compiled by Britton (1990); work by the Mineral Deposit Research Unit (Bartsch, 1991, 1992; Lewis, 1991; Lewis *et al.*, 1992), provided stratigraphic updates.

Mapping indicates that the stratigraphic footwall to the Eskay Creek deposits comprises a rhyolite flow-dome complex which forms a linear belt several kilometres long. A major mineralized and intensely altered subvolcanic felsite dike can be mapped along the same strike length of stratigraphy. The felsic volcanic rocks and dike are interpreted to represent a fissure eruptive centre. This paper reports on stratigraphic relationships from a cross-section constructed from mapping and diamond-drill-hole data. The cross-section A-A′ (Figures 2-13-2 and 2-13-3) is located 500 metres south of the McKay adit on property held by American Fibre Corporation and Silver Butte Resources Ltd.

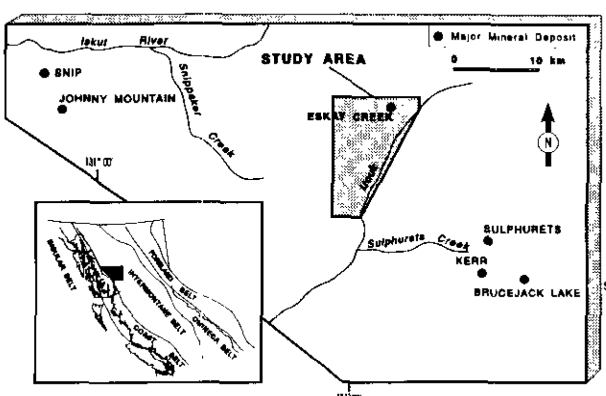

Figure 2-13-1. Location map showing the MDRU Iskut River Project area and area covered by the author's 1:5000-scale mapping.

STRATIGRAPHY

The Hazelton Group has been subdivided into lower and upper sections (Lewis *et al.*, 1992). The lower Hazelton rocks are dominated by volcanic flows, breccias and volcaniclastic rocks of intermediate composition, the upper Hazelton Group is characterized by a dominance of felsic volcanic rocks overlain by sedimentary and mafic volcanic rocks. Detailed stratigraphic subdivisions of the Hazelton Group have been proposed (Britton *et al.*, 1989; Bartsch, 1991,1992; Lewis, 1992; Lewis *et al.*, 1992). Abrupt facies changes render regional stratigraphic correlations speculative.

Cross-section A-A′ is located on the western limb of a regional anticline, 2 kilometres south and along strike from the Eskay Creek deposits. The regional and minor fold axes trend 035° and plunge gently to the northeast. The western limb of the anticline has a predictable, continuous stratigraphy (Bartsch, 1991, 1992; Lewis, 1991; Lewis *et al.*, 1992) and bedding dips vary from 50° to 70° northwest.

CROSS-SECTION A-A′

The Hazelton Group rocks are best mapped in terms of facies. Stratigraphic relationships described in cross-section A-A′ represent a minimally disrupted section through proximal facies and a thick section of felsic volcanic rocks belonging to the upper Hazelton Group. Facies relationships of the rhyolites in plan view (Figure 2-13-2) through which section A-A′ is drawn are interpreted to represent a flow dome tilted on its side. Broad characteristics from which the interpretation of a dome is based are:

- A multiphase felsite feeder dike and associated minor felsic and mafic dikes within footwall sedimentary rocks.
- Basal and peripheral fragmental felsic rocks, including heterolithic and monolithic breccias commonly containing pumaceous clasts.
- A central zone of rhyolite lava which forms a resistant topographic high and is dome-like in the cross-sectional exposure at surface.

The subvolcanic felsite dike cuts across bedding in the sedimentary rocks underlying the dome. The sedimentary rocks include interbedded shales, feldspathic wackes, conglomerates and minor bioclastic limestones of the upper Hazelton Group. Local abundance of shallow-marine fauna within the limestones and shales in conjunction with conglomerate beds with well-rounded, water worn pebbles, suggest that the sediments were deposited in a shallow-marine setting.

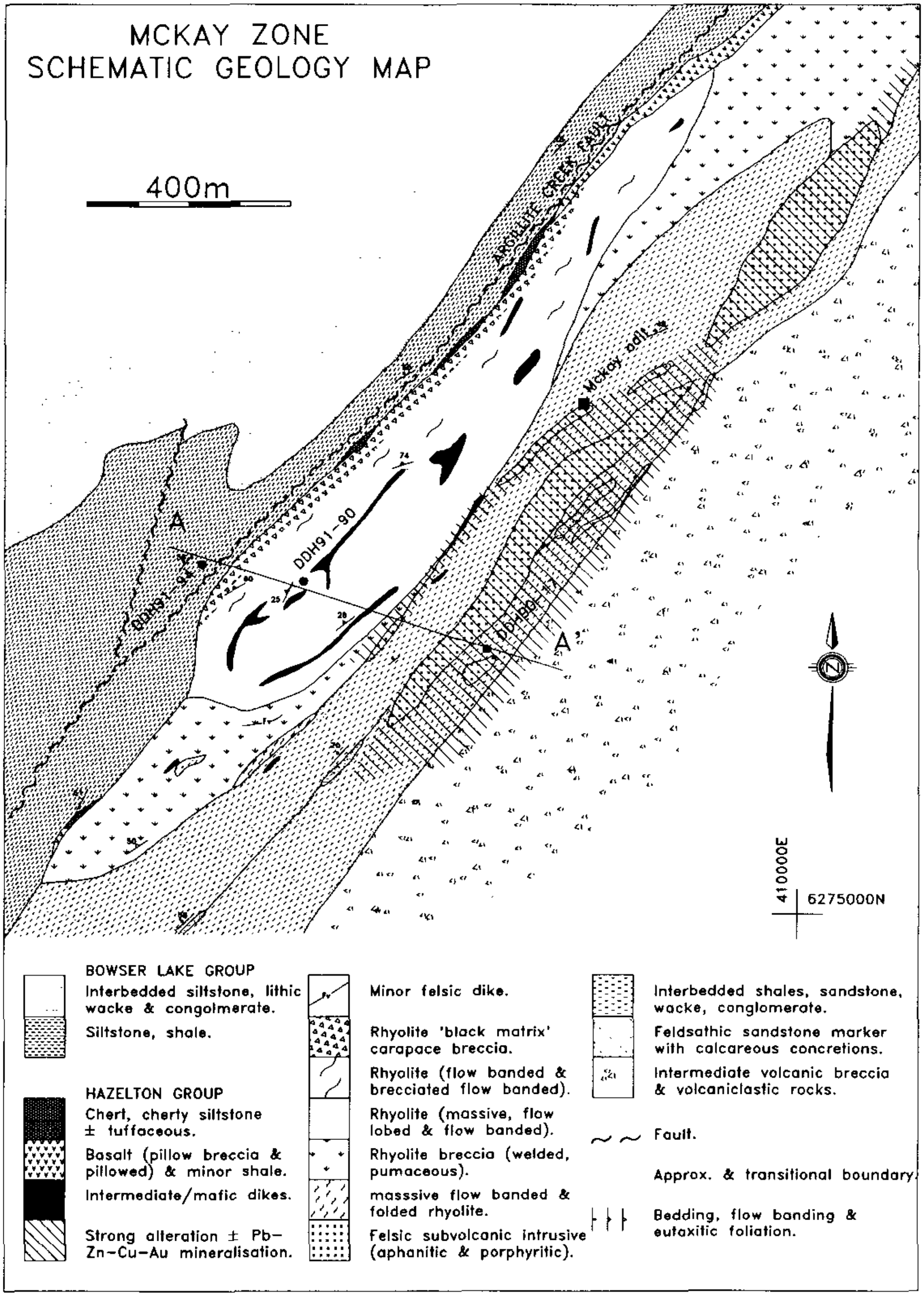

Figure 2-13-2. Geological interpretation map; broad facies distributions are interpreted to represent a rhyolite dome. The location of cross-section A-A′ is indicated.

The intrusion is lensoid in shape and forms a prominent, radiant orange, gossanous knoll with 50 metres vertical relief. Similar discontinuous lensoidal intrusions extend in a linear belt south to the Coulter Creek thrust fault and north to the immediate footwall of the Eskay Creek deposit (*see* Bartsch, 1991). The location of the 'dike lenses' spatially correlates with the thickest intervals of the felsic extrusions. The intrusion is pervasively altered and is composed predominantly of microcrystalline quartz, sericite and potassium feldspar. Ghosts of feldspar phenocrysts are commonly visible. The dike is multiphase, a minor late phase is potassium feldspar phyric, displays minimal alteration and has intrusive contacts with altered aphanitic felsite.

The base of the felsic succession comprises unsorted volcanic breccias. The breccias are thin (2-4 m) in the section (Figure 2-13-2), but thicken peripherally to the south and north. They are characterized by an abundance of pumice. Locally, at the base of the breccias, cherty devitrified clasts are strongly flattened. Intense alteration, in particular strong sericitization and structurally imposed fabrics, hinder confident interpretation of primary textures; however, the local development of breccias with flattened clasts at the base of the sequence suggests a probable zone of welding and development of eutaxitic textures. The contacts of the welded breccias are sharp, planar and locally discordant to bedding in the underlying sediments.

The greatest thickness of felsic rocks comprises a complex assemblage of flow-banded and brecciated, flow-banded rhyolites. The eastern exposures of the rhyolite, closer to the felsite intrusion and lower in the section, are massive with less well developed flow banding and breccias. Massive rhyolite comprises lobes less than 1 metre in diameter, which are fine grained and may display peripheral autobreccia rinds, typically set in zones 10 centimetres thick containing fabrics which anastomose tangentially around the lobes.

Flow banding in the rhyolite is irregular with development of small and large-scale flow folds. The flow banding is generally flat throughout the section, but steepens markedly to the west where it is subparallel to the steep, westerly dipping rhyolite contact. The western contact of the rhyolite is marked by a rhyolite 'black matrix' carapace breccia. The breccia consists of matrix-supported angular rhyolite clasts in a matrix of black chert. The black matrix breccia is less than 5 metres thick and caps the section of rhyolite characterized by massive flow-banded lavas and breccias with flow-banded clasts.

Alteration and devitrification are pervasive throughout the felsic volcanic rocks; however, islands of minimally altered rhyolite occur within the core of large massive flow lobes. Alteration assemblages are dominated by quartz, sericite, potassium feldspar and pyrite, with or without chlorite. Alteration and mineralization are most intense within and along the margins of the felsite dike. Mineralization styles within the footwall are dominated by pyrite±galena, chalcopyrite and sphalerite in quartz-vein stockworks within the dike, or at the contact of the dike,

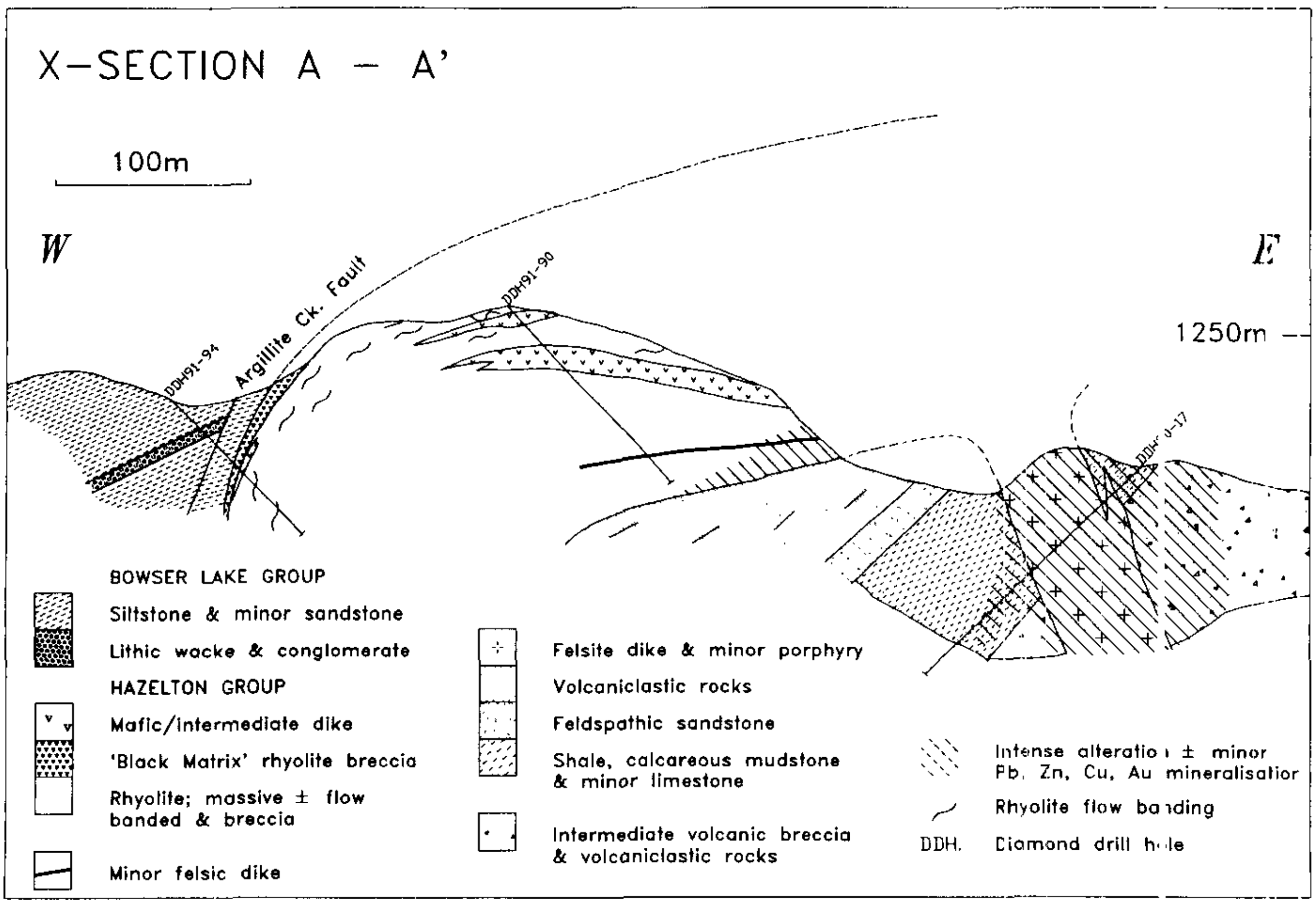

Figure 2-13-3. Cross-section A-A′, schematically showing stratigraphic relationships between rhyolites and subvolcanic felsite dikes.

associated with intense silicification of calcareous mudstone.

The rhyolite dome is intruded by numerous small aphanitic rhyolitic and dacitic dikes and late chlorite-carbonate-altered, fine to medium-grained mafic dikes. The smallest dikes are discontinuous and intrude subparallel to the general orientation of the flow banding or within disrupted flow folded zones. The minor dikes fan out from the subvolcanic intrusions in the immediate footwall of the dome (Figures 2-13-2, 2-13-3).

Lenses of thinly laminated white and black cherty siltstone 1 to 2 metres thick occur locally along the rhyolite contact. The siltstones are correlative with the Salmon River Formation shales hosting the stratiform mineralization at Eskay Creek. Salmon River Formation basaltic flows which overlie the Eskay Creek 21 zone deposit pinch out 500 metres to the north of cross-section A-A′. Twenty metres west of the rhyolite contact is the Argillite Creek fault. Argillites to the east of the fault may be Salmon River correlative but are indistinguishable from argillites of the Bowser Lake Group west of the fault.

CONCLUSION

Rhyolitic rocks to the immediate south of the Eskay Creek deposits display facies relationships characteristic of rhyolite flow-dome complexes. Early explosive eruptions are represented by the basal and peripheral breccias and were followed by extrusion of rhyolite lava. Hydrothermal fluids derived from the magmas or resulting from convection initiated by the magmatic activity were concentrated along the fissure-eruptive feeder zone to the rhyolites.

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