

PRELIMINARY REPORT ON WALLROCK ALTERATION
ERICKSON GOLD MINE, CASSIAR DISTRICT
(104P)

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INTRODUCTION

The Erickson Gold mine is 12 kilometres southeast of Cassiar, British Columbia (104P/4). Production commenced in April 1979 and presently averages 170 tonnes per day grading approximately 17.0 grams gold per tonne and 15.0 grams silver per tonne.

Mineralization is in quartz and carbonate veins contained in intermediate to mafic volcanic rocks, chert, argillite, ultramafic, and exhalative sedimentary rocks of the Sylvester Group. Where the veins are in contact with volcanic rocks, graphite and/or carbonate alteration envelopes generally are well developed. This paper describes the megascopic characteristics of zoning and differences within the alteration envelopes.

An idealized model of the vein-alteration halo is illustrated on Figure 109. Veins commonly range up to 5 metres in thickness and associated alteration haloes extend from near 0 to 40 metres, although 1 to 15 metres is common where volcanic material forms the host.

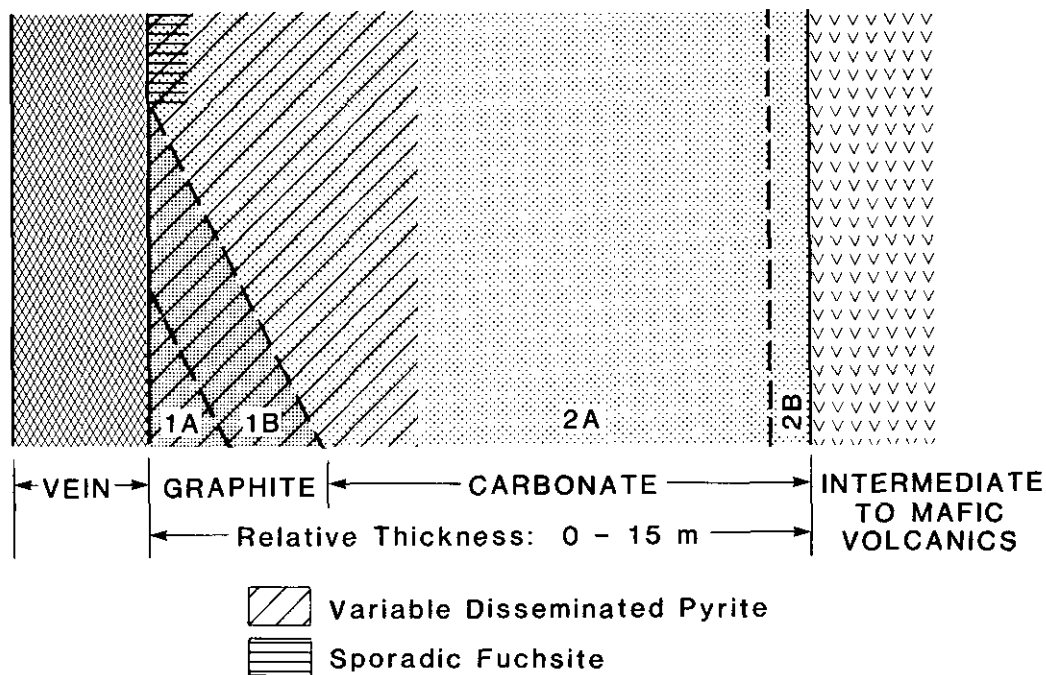


Figure 109. Cross-section of idealized alteration halo characteristic of quartz and carbonate veins, Erickson Gold mine, Cassiar.

The entire alteration halo generally is divisible into several zones. The most clear-cut change is from an outer carbonate zone (2) gradationally into an inner graphite-bearing zone (1) adjacent to the vein. Each of these zones can be further subdivided. In the following section general descriptions are presented of the character of unaltered wallrock and the individual alteration zones. These start with the 'unaltered' wallrock and continue with zones inward toward the vein. A summary of descriptive material is provided in the accompanying table.

**DESCRIPTION OF IDEAL ALTERATION ZONING
RELATED TO QUARTZ AND CARBONATE VEINS AT THE ERICKSON GOLD MINE**

Zone	Thick-ness metres	Occur-rence	Colour	Textures	Mineralogy
country rock intermediate to mafic volcanics		host	medium to dark green	massive and pillowed flows, breccias, massive to layered tuffs ± crackled texture	plagioclase, actinolite, chlorite, epidote, calcite, quartz, Ti oxides ± pyrite
slight carbonate 2b	<1	very common	pale green to tan	massive, aphanitic to fine-grained ± crackled texture	plagioclase, Ca-Fe-Mg carbonates, sericite, chlorite, epidote, quartz, Ti-oxides ± pyrite
moderate to intense carbonate 2a	<15	very common	tan with minor purplish grey mottling	massive, aphanitic to fine grained ± crackled texture	Fe-Mg-Ca carbonates, sericite, fuchsite, quartz, Ti-oxides, plagioclase ± pyrite
slight to moderate graphite 1b	<4	un- common	tan to light and dark grey	massive, aphanitic to fine-grained ± crackled texture	Fe-Mg-Ca carbonates, graphite, sericite, quartz, Ti-oxides ± pyrite
intense graphite 1a	<2	un- common	black	massive, soft, friable, fine-grained, frequently crosscut by slickensides, occasional fine porosity	graphite, Fe-Mg-Ca carbonates, quartz ± pyrite
vein	<5	very common	white to tan ± black bands	massive to layered with stylolites	quartz ± Fe-Mg-Ca carbonates, graphite, sulphides, gold, altered wallrock fragments

VOLCANIC COUNTRY ROCK: Country rocks are volcanic rocks of andesitic to basaltic composition that typically are medium to dark green and weather to a dark green to black. Most exposures consist of aphanitic to fine-grained massive rocks that commonly contain well-developed pillows. Less commonly breccias and well-laminated tuffs are observed. A cross-cutting network of dark green to black hairline fractures may be present imparting a 'crackle' texture to the rocks. Constituent minerals of the 'unaltered' wallrock include plagioclase, actinolite, chlorite, epidote, calcite, quartz, and titanium-oxides. Disseminated, fine to coarse-grained pyrite may be present also.

ALTERATION ZONE 2B: Zone 2B marks the transition from country rock to carbonate altered rock; it is typically pale green to buff and may have a speckled or mottled texture. Most of the altered volcanic rocks are massive and aphanitic to fine grained, although in places primary textures may be visible. A 'crackled' texture, evident because of dark green to black hairline fractures, may be superimposed on the rock. Mineralogically the zone is characterized by partial alteration of plagioclase to iron-magnesium-calcium carbonates and sericite. Chlorite, epidote, quartz, titanium-oxides, and pyrite may also be present in lesser amounts. The width of the transition zone is generally less than one metre, but may be much wider, especially if abundant stringer veins are present. The zone is almost invariably present adjacent to both quartz and carbonate veins.

ALTERATION ZONE 2A: In Zone 2A there is moderate to intense carbonate alteration of the volcanic rocks near the veins; it is most commonly buff coloured, massive, and aphanitic to fine grained. Locally, varying shades of purplish-grey impart a mottled texture to the rock. A crackled texture of black hairline fractures may be present locally. Constituent minerals include varying amounts of iron-magnesium-calcium carbonates, sericite, fuchsite (chromian muscovite), quartz, titanium-oxides, and plagioclase. The fuchsite

occurs as sporadic blebs less than 1 centimetre in diameter. These blebs are found in that part of the zone closest to veins, but only where the zone is in contact with the vein. Coarse euhedral pyrite crystals may also occur in the portion of the zone closest to veins, even if the zone is not in direct contact with the vein. Zone 2A is normally less than 15 metres wide and is commonly present; it occurs adjacent to both quartz and carbonate veins.

ALTERATION ZONE 1B: Zone 1B marks the transition from carbonate to graphite-altered rock. The transition is gradational; colour changes from buff to pale or dark grey; the texture is massive and aphanitic to fine grained. Ordinarily, black hairline fractures crosscut the rock. Mineralogically the zones are characterized by variable amounts of graphite with iron-magnesium-calcium carbonates, sericite, quartz, and titanium-oxides. Coarse euhedral pyrite crystals may be scattered throughout the zone or concentrated closer to the veins. Zone 1B is not present in all alteration haloes but where formed it is typically less than 4 metres wide. This zone may occur without an adjacent zone of intense carbonate alteration, but such occurrences are rare.

ALTERATION ZONE 1A: Zone 1A is marked by intense graphite alteration. The rock is typically fine grained, black, massive, soft and friable. It is prominently slickensided and may have a fine porous texture. Mineralogically graphite dominates; there are lesser iron-magnesium-calcium carbonates and quartz. Pyrite may also occur but in smaller amounts than in previously described zones. Zone 1A is uncommon; where present it is generally less than 2 metres wide.

PYRITE: Pyrite occurs in variable amounts in all alteration zones. Concentrations up to 5 per cent are noted adjacent to veins; pyrite decreases in size and amount away from the vein. Fine-grained pyrite predominates; the coarse-grained euhedral pyrite generally occurs within 1 metre of a vein. The euhedral pyrite crystals may attain a diameter of 5.0 millimetres.

GENERAL COMMENTS

Most veins are composed almost entirely of quartz with minor amounts of scattered iron-magnesium-calcium carbonates. A few veins have graphite ribbons and stylonitic textures. Sulphide minerals in the veins are pyrite, tetrahedrite, chalcopyrite, and sphalerite; there are minor amounts of free gold. Graphite and carbonate altered wallrock fragments may be incorporated into veins. They also occur in localized contact breccia zones. Less commonly, layered carbonate veins, with only minor amounts of quartz, are observed. In the carbonate veins only pyrite occurs; it is concentrated along layers and occurs as disseminations. Only carbonate alteration is observed in country rock adjacent to such veins.

There are no systematic changes within alteration haloes throughout the mine; however, specific zones may be absent and zones vary widely in width from one vein to another. Carbonate alteration is typically present whereas graphite alteration, particularly the more intense type, is uncommon. Generally, alteration zones have quartz and/or carbonate veins in their cores; however, some do not. In general, alteration envelopes are relatively symmetrical but the thickness on the hangingwall side is up to twice that on the footwall side. Both hangingwall and footwall alteration thicknesses average from two to six times the vein thickness. Alteration envelopes rarely extend more than 40 metres from a vein; in most cases they extend less than 15 metres from the vein margin.

This report is a summary of preliminary fieldwork on megascopic characteristics of graphite-carbonate alteration zones developed in volcanic rocks at the Erickson Gold mine. The work is directed toward investigating wallrock alteration patterns. Future work will focus on mineralogical and elemental zoning patterns within the alteration zones.

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