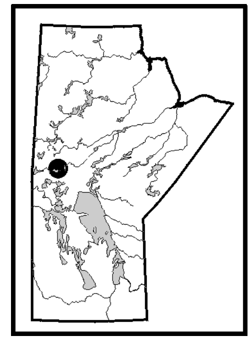
GS-8 VECTORING VOLCANOGENIC MASSIVE SULPHIDE MINERALIZATION AT THE RAINDROP ZONE, SNOW LAKE (NTS 63K16), MANITOBA

by G.H. Gale



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SUMMARY

Geochemical investigation of drill core from the Raindrop massive sulphide deposit indicates that the hydrothermal fluids may have vented at a stratigraphic level different from that targeted by early drill programs. Samples of volcanosedimentary rocks, including exhalite, exhibit a change in Eu content, from weakly negative to moderately positive, from south to north along the strata. These data suggest the presence of a hydrothermal vent site within a unit of volcanosedimentary rocks north of the previous drill target. Some of the problems encountered in using this approach in exploration are illustrated with samples from a drill-core section of mafic tuffaceous rock.

INTRODUCTION

The Raindrop zone is a small body of sulphide mineralization located approximately 1 km south of Daly Lake in the Snow Lake area (Fig. GS-8-1). The mineralization, discovered during drilling of an electromagnetic anomaly, underlies a swamp. It appears that the mineralized zone is hosted by felsic volcanic rocks of the Daly Lake rhyolite (Hodges and Manojlvic, 1993; Bailes and Galley, 1996; Paradis et al., 1998), because plots of drillholes indicate that the drill target was within rhyolitic rocks. A recent drill program to test the main sulphide lens intersected vein-type mineralization. Core samples were collected from the earlier drill programs to test the feasibility of using rare earth element (REE) data as a vector to sulphide mineralization.

This report summarizes results of geochemical studies on drill core from the property, and illustrates some of the problems that may be encountered in using this methodology.

GEOLOGICAL SETTING

In the vicinity of the mineralization, the Daly Lake rhyolite consists predominantly of aphyric flows, with minor quartz-rich rhyolitic rocks of probable tuffaceous origin at the top of the felsic volcanic sequence. The rhyolitic rocks are overlain by a thin unit of layered mafic, intermediate and felsic volcanosedimentary rocks (the sulphide facies iron formation (SFIF) unit, Fig. GS-8-2) that locally contains layered sulphides, sulphide-bearing siltstone and quartz-sericite schist that, in part, resemble exhalite. This distinctive unit thins from over 30 m in drillhole C104 to approximately 1 m in drillhole C37. It has not been possible to confirm its continuity at depth, because it was not intersected in the only available drill core (C126).

A late mafic intrusion (diorite) cuts through the volcanic sequence. Company drill logs and surface maps indicate that the sedimentary rocks are present along strike as rafts within the intrusion. This indicates that the intrusion stoped into the volcanic pile and probably did not displace local strata any great distance; consequently, any sulphide deposits formed from a hydrothermal system in this area should not have been removed by the intrusion.

MINERALIZATION

The massive sulphide lens intersected in early drillholes consists of near-solid and solid pyrite and pyrrhotite, with minor sphalerite and chalcopyrite. In the cores examined to date, the individual sulphide minerals occur as stringers and blebs within each other, and there is no evidence of layered sulphides. The textures and distribution of the sulphides indicates that the mineralization has probably been mobilized into a zone of deformation. This interpretation is consistent with the presence of garnet-chlorite-sericite alteration on both sides of a solid sulphide lens (i.e., the alteration continues into the hanging wall, as illustrated on Fig. GS-8-2). Consequently, the logical position for exhalation of the hydrothermal vent associated with this alteration zone is at the top of the rhyolitic rocks during deposition of the volcanosedimentary SFIF unit (Fig. GS-8-2).

Pyrite-bearing intermediate to mafic rocks in drillhole C126 were interpreted to be the stratigraphic equivalent of the sedimentary rocks intersected in the upper portion of drillhole C114. However, the former are indistinctly layered, mafic tuffaceous rocks and are vastly different from the well-layered sedimentary rocks. In addition, a fault at the contact between altered rhyolite and the tuffaceous mafic rocks in C126 probably accounts for the abundant veins and veinlets of mobilized sulphides in the mafic tuffaceous rocks. This illustrates one the problems commonly encountered

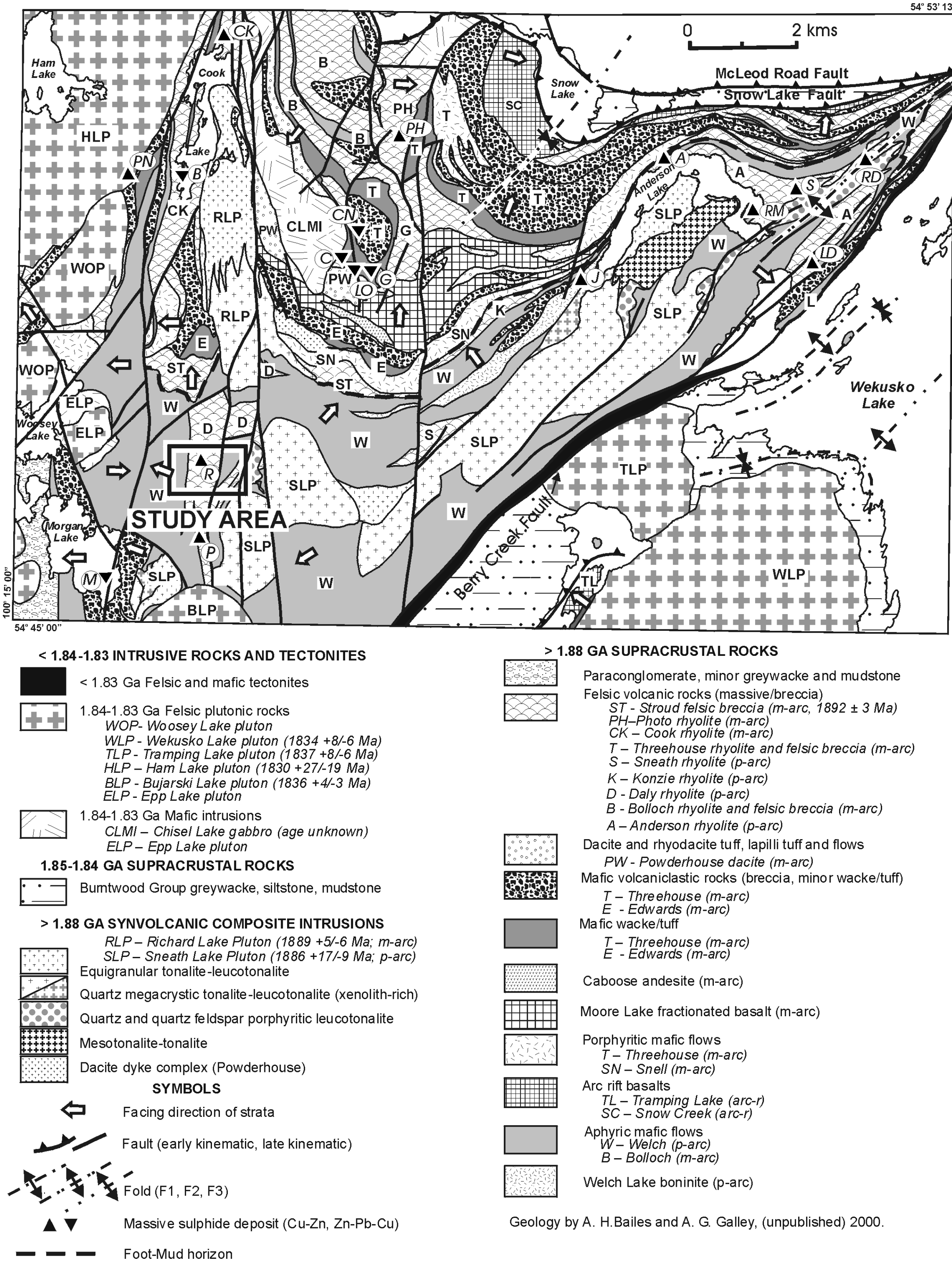

Figure GS-8-1: General geology and location of the Daly Lake rhyolite and the Raindrop zone.

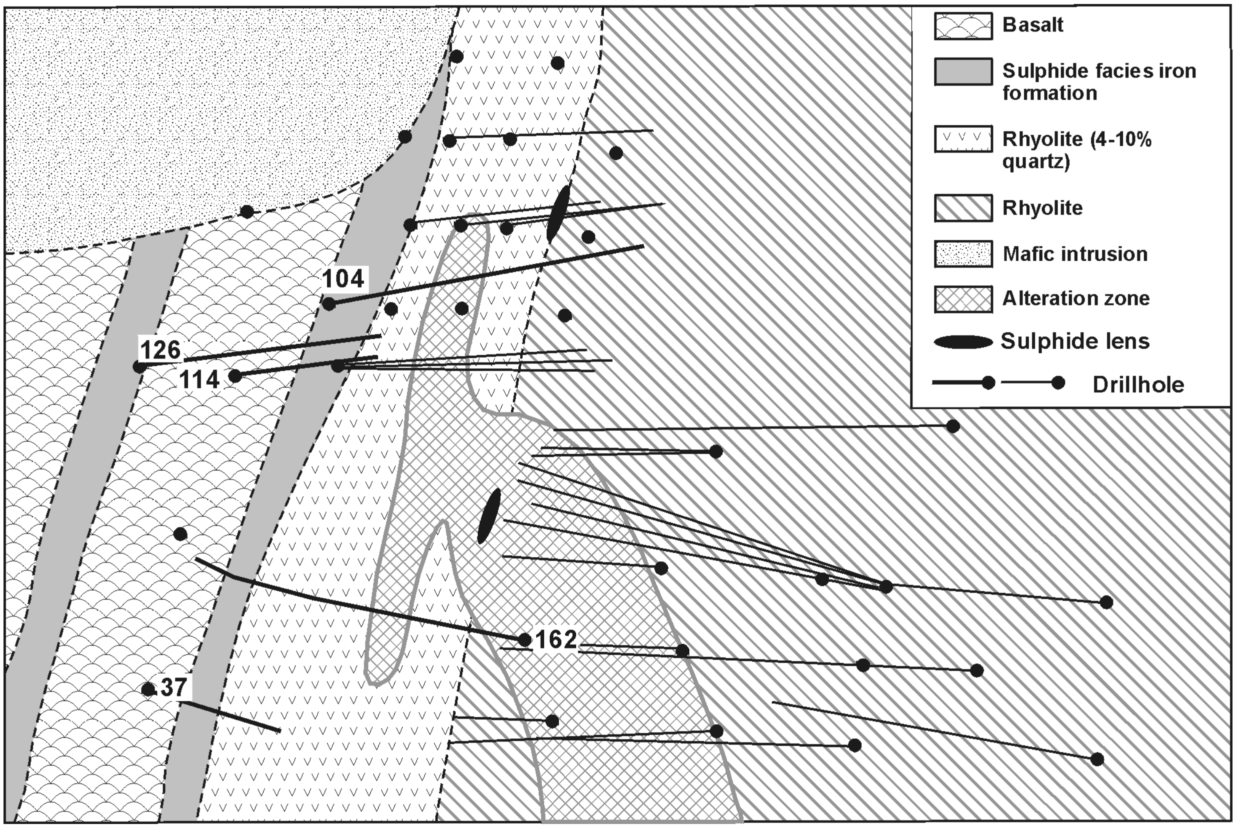

Figure GS-8-2: Geological setting of the Raindrop zone, with location of drillholes.

in correlation of mineralized units without the benefit of precise geochemical data.

GEOCHEMISTRY

Gale et al (1997) established REE patterns for exhalite, including layered sulphide ores, solid sulphides and footwall alteration zones in and around various volcanogenic massive sulphide (VMS) deposits, and proposed that REE data could be used to vector VMS mineralization. Rare earth element patterns typically associated with VMS mineralization are illustrated by samples from a small VMS deposit (Fig GS-8-3) within the same volcanic sequence, but several kilometres distal to the Raindrop zone.

In the absence of obvious exhalite in drill core near or adjacent to solid sulphide core sections at the Raindrop zone, selected samples of exhalite-like material from drillholes along the SFIF unit were analyzed. Positive Eu anomalies are present in several different beds within the unit. In addition, there is an apparent increase in the size of positive Eu anomalies along strike from south to north (Fig. GS-8-4). However, it cannot be established with certainty that the same beds were sampled in the different drillholes.

The Eu data indicate hydrothermal vent activity at a higher stratigraphic level than that targeted in the exploration programs to date. Furthermore, projection of the alteration zone, as defined on Figure GS-8-2, indicates that this zone of alteration should have vented at approximately the same position as that currently occupied by a mafic intrusion; this part of the strata has not been drilled.

Geochemical analyses of samples from drill core C126 illustrate some of the problems encountered in using Eu as a vector to VMS mineralization. Available drill logs for C126 indicate that the Eu-positive exhalite-bearing rocks analyzed in drill core C104 continued at depth and correlated with layered mafic (?)sedimentary rocks with abundant pyrite veinlets, near the bottom of the drillhole. Grab samples, over 1.5 m intervals, of these pyrite-bearing rocks indicate positive Eu anomalies in all samples (Fig. GS-8-5). However, major-element data and alteration indices show that these rocks are not altered and occupy the fields for unaltered basalt (Fig. GS-8-6). A re-evaluation of the drill core and the geochemical data indicates that the samples, which have only minor chemical variation from each other (Fig. GS-8-5), are probably unaltered mafic tuffaceous rocks; the positive Eu anomaly is consistent with those found in some unaltered basalt flows and mafic and felsic intrusions. This example illustrates one of the problems that may be

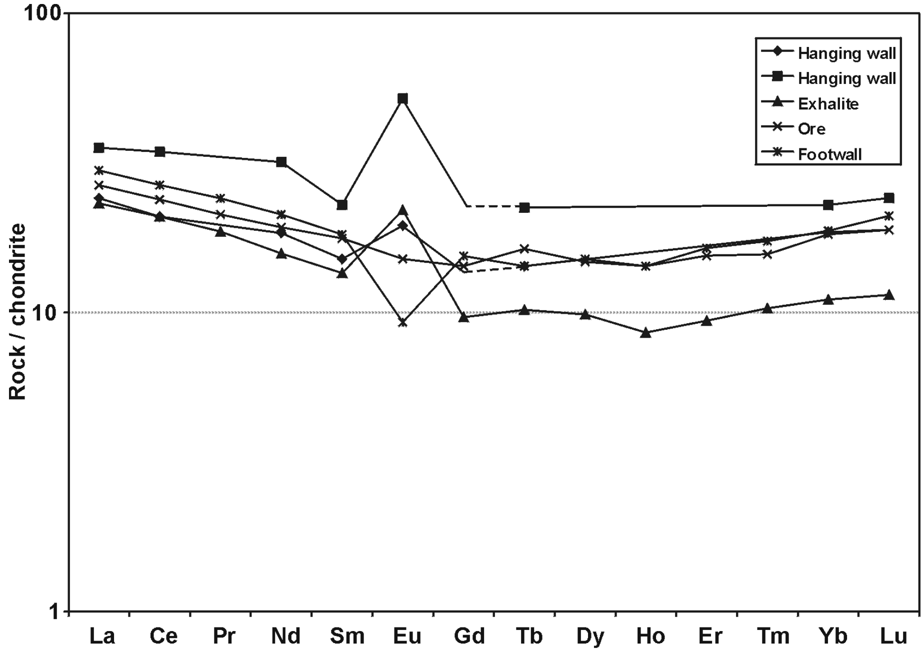

Figure GS-8-3: Rare earth element profiles for samples from the Spruce Point volcanogenic massive sulphide deposit, illustrating typical profiles for altered footwall rocks, solid sulphide, exhalite and associated hanging wall volcanosedimentary rocks.

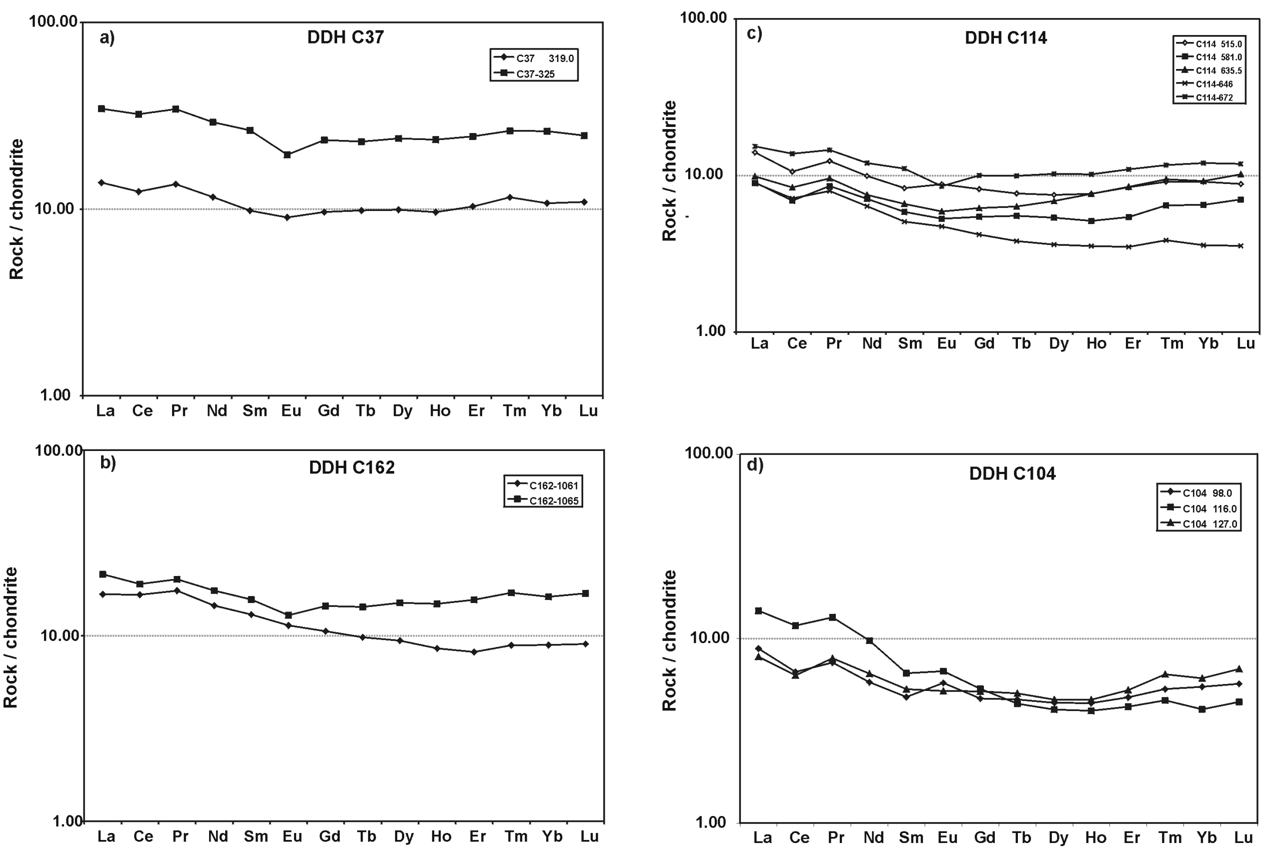

Figure GS-8-4: Rare earth element profiles for samples of sulphide facies iron formation in drill core along strike from the Raindrop zone. Location of drillholes shown on Figure GS-8-2.

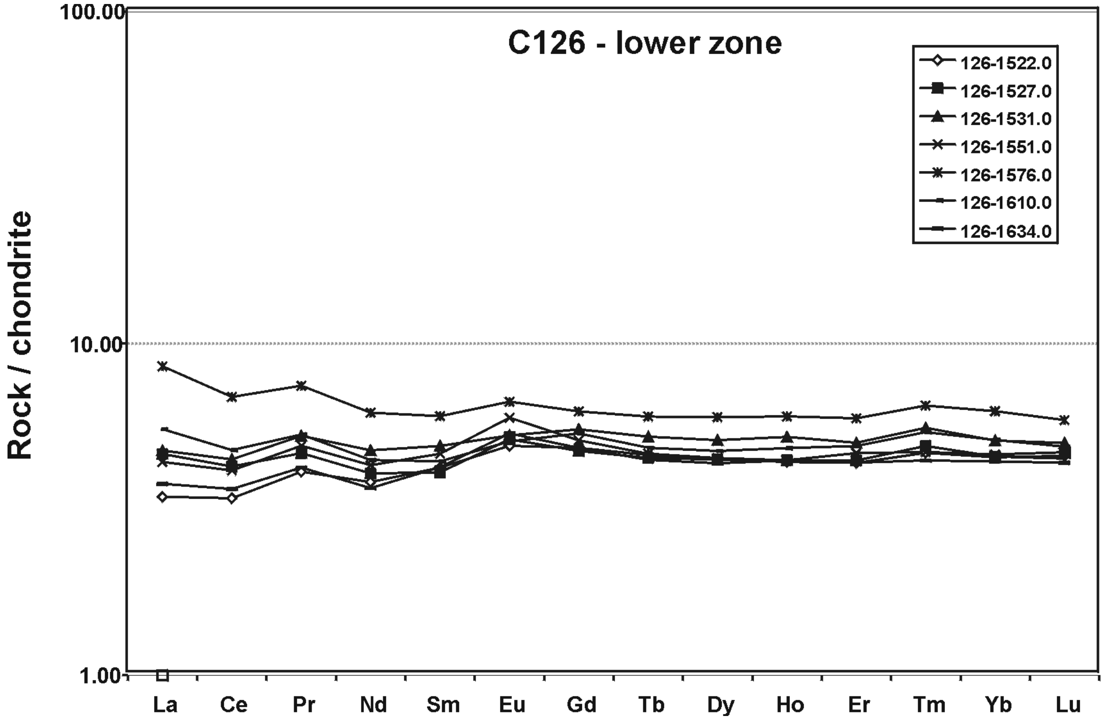

Figure GS-8-5: Rare earth element profiles for samples of pyrite-veined mafic tuffaceous rocks from drillhole C126, Raindrop zone.

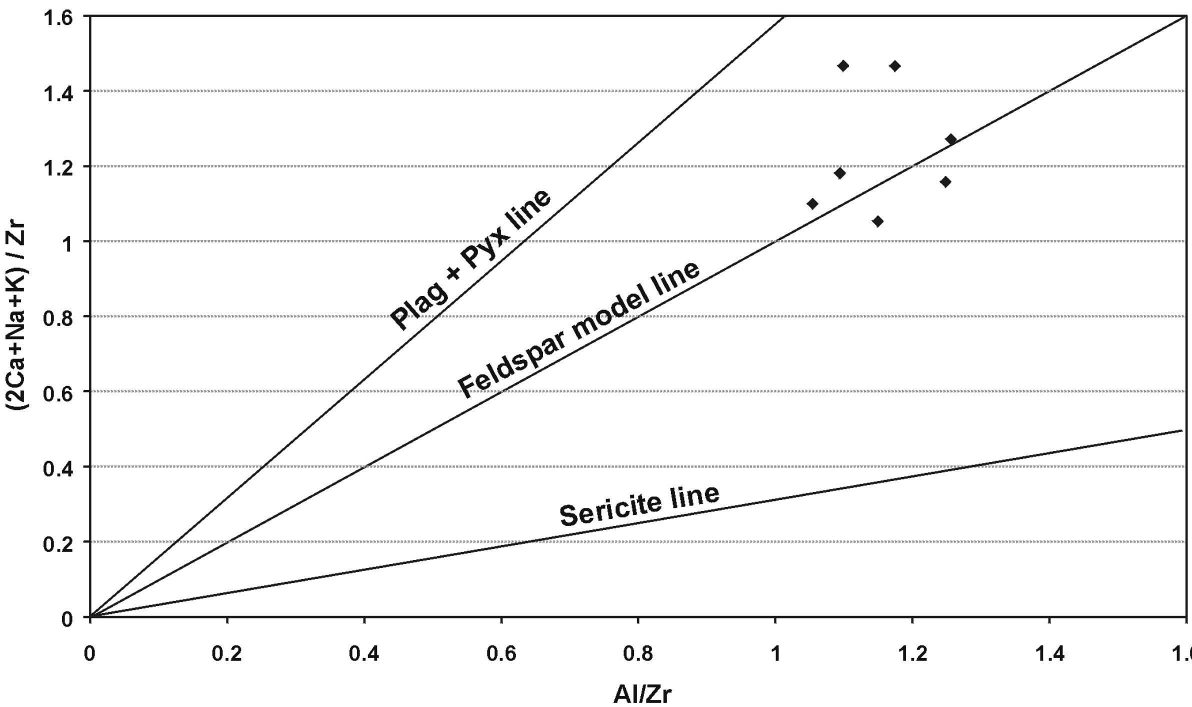

Figure GS-8-6: Feldspar model diagram (Madeisky and Stanley, 1993) for samples from drill core C126. Unaltered mafic rocks commonly plot between the plag+cpx and feldspar model lines.

encountered when using this methodology without due consideration of the stratigraphic position and primary geochemical attributes of the rocks under investigation.

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