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STRUCTURE, METAMORPHISM AND
MINERAL DEPOSITS IN THE DIAHOT REGION,
NORTHERN NEW CALEDONIA

Thesis submitted for the degree of
Doctor of Philosophy
in Geology.

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ABSTRACT

The area studied covers about 150 square kilometres in the northern end of New Caledonia in the lower parts of the Diahot River near Ouégoa. The rocks consist dominantly of a metamorphosed Cretaceous sedimentary-igneous sequence of carbonaceous pelites with intercalated basaltic rocks and rhyolitic tuffs. The Cretaceous sequence is flanked to the southwest by Eocene rocks consisting mainly of siliceous argillites, phtanites (massive cherts) and limestones.

High-pressure metamorphism, radiometrically dated at 38-21 m.y. (Oligocene-lowermost Miocene) by Coleman (1967), increases progressively in grade towards the northeast in a continuous sequence from lawsonite-albite facies through glaucophanitic greenschists to eclogitic glaucophanitic albite-epidote amphibolites. Lowest grade rocks occur in the southwest near the Cretaceous-Tertiary boundary and the highest grade rocks are exposed along the east coast and as tectonically-emplaced blocks in fault zones around Ouégoa. Regional metamorphic assemblages are defined with respect to four zones in pelitic parents which in order of increasing metamorphic grade are:- (1) lowest grade rocks, (2) lawsonite zone, (3) transitional zone, (4) epidote zone. Metamorphic isograds are mapped for paraschist lawsonite, Na-amphibole, garnet and epidote; and for pumpellyite, Na-amphibole, lawsonite and omphacite in metabasalts.

In the Cretaceous rocks the regional strike of the foliation is northwest-southeast with dips to the southwest, although small-scale steeply-plunging folds are abundant. On a regional scale the major structure is an open to isoclinal, asymmetric, reclined fold with a sinistral vergence, trending southwest, and it plunges steeply down the dip of the regional foliation. This folding occurred largely synchronously with high-pressure metamorphism.

During retrogressive metamorphism, large-scale transcurrent sinistral faulting occurred, striking northwest-southeast and dipping southwest. In the region north and east of Ouégoa these faults characteristically occur as zones up to 2 km wide occupied by high-grade ortho- and paragneisses (glaucophanites) and serpentinites, and form a complex anastomosing network. This faulting, accompanied by broad flexuring, has removed some parts of the metamorphic sequence resulting in constrictions and broad flexuring of the isograd patterns in certain areas of the field.

Small-scale kink and chevron folding has occurred late in the tectonic history and post-date both the steeply-plunging folds and the metamorphism.

Stratiform Cu-Pb-Zn mineralization with minor amounts of Au and Ag occur at five relatively major sites (Pilou, Mérétrice, Fern-Hill, Balade and Murat mines) and at numerous smaller localities throughout the field. The mineralization is restricted to definite stratigraphic horizons in the

Cretaceous sequence where black carbonaceous phyllites are associated and interbedded with rhyolitic metatuffs. The sulphide ores are well laminated, show relict sedimentary textures, and occur as layers and lenses which are conformable with the host rocks. The deposits are thought to be sedimentary-volcanic in origin and derived from acid volcanic metalliferous exhalations which have undergone chemical precipitation and sedimentation in localized black shale, euxinic environments on the sea floor. All of the deposits have been subjected to and variously modified by the metamorphism.

An attempt is made to explain the large-scale structural features observed in the Diahot region in terms of plate tectonic theory.

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