824335

PROJECT: SAMATOSUM PROPERTY

STRUCTURAL SECTION FROM THE SAMATOSUM DEPOSIT TO THE REA LENSES

CONFIDENTIAL PROGRESS REPORT

FOR MINNOVA INC.

by

J. Keith Glover, Ph.D., M.Sc.

Geological Consultant

May 14, 1990

INTRODUCTION

Ten days were spent on relogging of diamond drill core from holes that were drilled along the Rea Horizon. In all twenty holes have been relogged from sections 110 + 50 W to 100 +00 W, inclusive, and from Section 97 + 50 W. A graphic method of logging was used in which all the core from holes on the same section and from immediately adjacent sections was layed out and a fence diagram constructed at 1:500 scale. This method facilitates comparison of lithologies (and structures) whereby tie-lines can be drawn on a more objective basis.

THE GENESIS OF THE REA LENSES

The Rea lenses are clearly overturned volcanogenic massive sulphide deposits that occur within a conformable sequence along a profound (albeit local) stratigraphic break between the Rea mafics and the Rea sediments. Although this seems like old news, I think that it is important to put this issue to rest. The main points of evidence (as I see them) are:-

a) Despite the fact that many lithologic breaks are the locus of shearing and/or brittle fault zones (probably with little displacement), sufficient conformable contacts have been seen throughout the sequence to indicate that the Rea package holds together as a continuous stratigraphic succession with no major structural breaks:

   (i) From the mafics to the ore sequence:- This contact is the locus of a brittle fault in most holes, but in RG 236 (@ 145.2 m) the contact of altered Rea Mafics with underlying argillaceous (sedimentary) chert breccia does appear to be stratigraphic albeit sharp.

   (ii) Within the ore sequence:- The most complete successions I have seen so far are in RG 2, 5 and 26, on Section 100 +00W. Here, an intimate association exists between all members of the ore sequence, from bedded chert, at the structural top, to bedded massive and semi-massive sulphide (poorly represented in these holes), to pyritic silver-grey sericite ("muddy tuff") and yellow sericitic and pyritic tuff/siltone, to the intermediate volcaniclanistic unit at the structural base of the ore sequence.

   (iii) From the ore sequence to the turbidites:- The existence of the Quartz Vein Fault, in the structural footwall of the ore sequence, cannot be

demonstrated in every hole (e.g., RG 5 and RG 26) but where it is present it does not always occur at the structural base of the volcaniclastic sequence. For example, in RG 13 it occurs at 72.8 m, within the volcaniclastic sequence; in this hole and in RG 5 and RG 26 the contact with the underlying turbidite sequence is gradational.

b) Unequivical stratigraphic tops are common within the turbidite sequence. These comprise distinctly graded AE turbidite cycles, often with load casts or flame structures at the stratigraphic base and laminated sections of alternating siltstone and shale at the stratigraphic top. The resulting facing directions are almost always downhole. This implies that the complete succession at Rea is overturned. However, reversals in facing directions and small-scale folds (in RG 13, RG 14 and RG 34) demonstrate that some parasitic folds do occur on this generally overturned panel. This lends support to Jim Oliver's contention that the L98 lens lies within the hinge zone of tight to isoclinal overturned syncline; certainly, I believe his underground mapping should be taken seriously.

d) The ore sequence occurs structurally below the contact with intensely pyritized, sericitized and carbonatized Rea Mafics. This alteration is spatially associated with boudined and folded quartz veins and stringers, and, as described by previous workers has a geochemical signature that is typical of a footwall feeder zone to a Kuroko-type massive sulphide deposit.

e) "Chert" is intimately associated with the ore sequence. In most of the holes I have looked at it occurs structurally below the Rea Mafics. It is generally light to dark grey in colour, but is locally ollve green to mauve. It is commonly thinly bedded to finely laminated with variable amounts of pyrite that at least in some cases occurs as septa parallel to compositional layering within the chert. These features, together with its stratabound nature, all point toward an exhalative origin. However, the conclusive evidence for this interpretation occurs within the intermediate volcaniclastic sequence which occurs in the (structurally) lower part of the ore sequence. Here, lenses of poorly sorted heterolithic chert breccia contain fragments of chert that are lithologically identical to all the varieties described above. These fragments generally occur within an argillaceous matrix, but locally the matrix comprises silver grey sericite with fine grained disseminated pyrite ("muddy tuff"). This unit looks lithologically identical to

the heterolithic chert breccia (complete with sulphide clasts!) found in the hanging wall of the H-W deposit at Buttle Lake, where it has been similarly interpreted as the product of debris flows.

e) The texture of the mineralization is quite distinct from anything at Sam - both in the Rea trenches and in core, massive sulphide is generally fine grained and well bedded. In the trenches, the stratigraphically overlying barite horizon is locally well laminated, although it is generally massive and brecciated by discordant silica-sulphide stringers (Oliver, 1988).

f) Some of the textural variants of the"muddy tuff" are clearly clastic in nature:- (1) angular yellow sericitic fragments in a silver grey pyritic and sericitic matrix locally occur within this unit in the Rea Trenches; (2) heterolithic chert breccia locally contains a "muddy tuff" matrix (RG 5, RG 26 and RG 31).

g) The Intermediate Volcaniclastic unit is characterized by its heterogeneity and the laterally discontinuous nature of the sub-units within it. It is generally massive to poorly bedded and contains coarse, poorly sorted sedimentary and volcanic detritus, commonly within an argillaceous matrix. It was probably deposited by mass flow processes. The most likely expression of this depositional mode within this unit is the heterolithic chert breccia, which also locally contains sulphide fragments (e.g. RG 237, from 138.7 m to 147.5 m). Although many of the clearly volcaniclastic sections within the unit are probably intermediate in composition, some sections are indistinguishable from the Rea Mafics (e.g. in RG 258, from 367.3 m to 412.6 m). This, together with the lack of any definitive structural evidence for a fold hinge or thrust fault in either RG 254 or RG 258 suggests that the section problem between these two holes is most easily explained by a facies change between the intermediate volcaniclastics in RG 254 and the mafics in RG 258 (see schematic cross-section).

NORTHWESTERLY STRIKE EXTENT OF THE REA HORIZON

Relogging of diamond drill holes from sections 105 + 00 W to 110 + 50 W has allowed the differentiation of units within the Rea Mafics. This enables the division of the mafics into a stratigraphically lower porphyritic sequence with FeMg and plagioclase phenocrysts, comprising subvolcanic sills and/or massive flows, amygdaloidal flows and monolithic mafic lapilli tuff (probably pillow breccias) and an overlying pyroclastic sequence, comprising medium to

coarse grained feldspar crystal tuff with heterolithic lapilli, intercalated with fine grained aphyric flows that are variably amygdaloidal. The upper part of this unit is generally grey in colour, contains fine-grained ferroan dolomite (primary or secondary?) and has an argillaceous component, most commonly within the matrix but rarely as shale rip-up clasts.

Plots of the distribution of these units on section and level plan shows that the sequence dips at 55 degrees Grid North. The only possible cross-fault occurs between RG 284 and RG 279, with an apparent left-lateral strike separation of about 50 metres. Alternatively, this may represent a lateral facies change from the porphyritic unit to aphyric amygdaloidal flows intercalated with crystal tuff. This is supported by the fact that the footwall fault, which strikes 17 degrees south of grid west and dips 50 degrees toward the north, is not offset by any cross faults. This helps to constrain the postulated cross-faults that apparently offset the 266 Zone immediately to the north of this area.

RG 286 intersected the Rea Horizon (167.7 m to 168.0 m - sheared semi-massive sulphide (pyrite) fragments in an argillaceous matrix) immediately below the mafic sequence. The horizon was also intersected further to the west in RG 290 where eight metres (true thickness) of semi-massive sulphide (pyrite with trace chalcopyrite) occurs stratigraphically above (?) about 3 metres of "muddy tuff". The main footwall fault occurs structurally below these intersections. The level plan demonstrates that the favourable stratigraphy is opening to the west, and therefore offers considerable potential in this direction.

SCHEMATIC CROSS SECTION FROM REA TO SAM

The accompanying cross-section is meant to present the most likely structural-stratigraphic interpretation, based on our current understanding of the two deposits, the succession that hosts them and the structure. It implies that the Sam and Rea Mafics are one and the same, and also that the deposits occur at different stratigraphic levels - Sam below the mafics and Rea above the mafics. The Rea horizon is therefore either stratigraphically equivalent to the upper part of the mafic sequence or lies above the Sam Mafics on the upright limb of the postulated large-scale anticline.

It is probably inappropriate to take this well-worn model any further at this point - hopefully, it can be more thoroughly tested by relogging of holes between the two deposits, which I plan to do at the end of this month.

Respectfully submitted:

J.Keith Glover

Geological Consultant

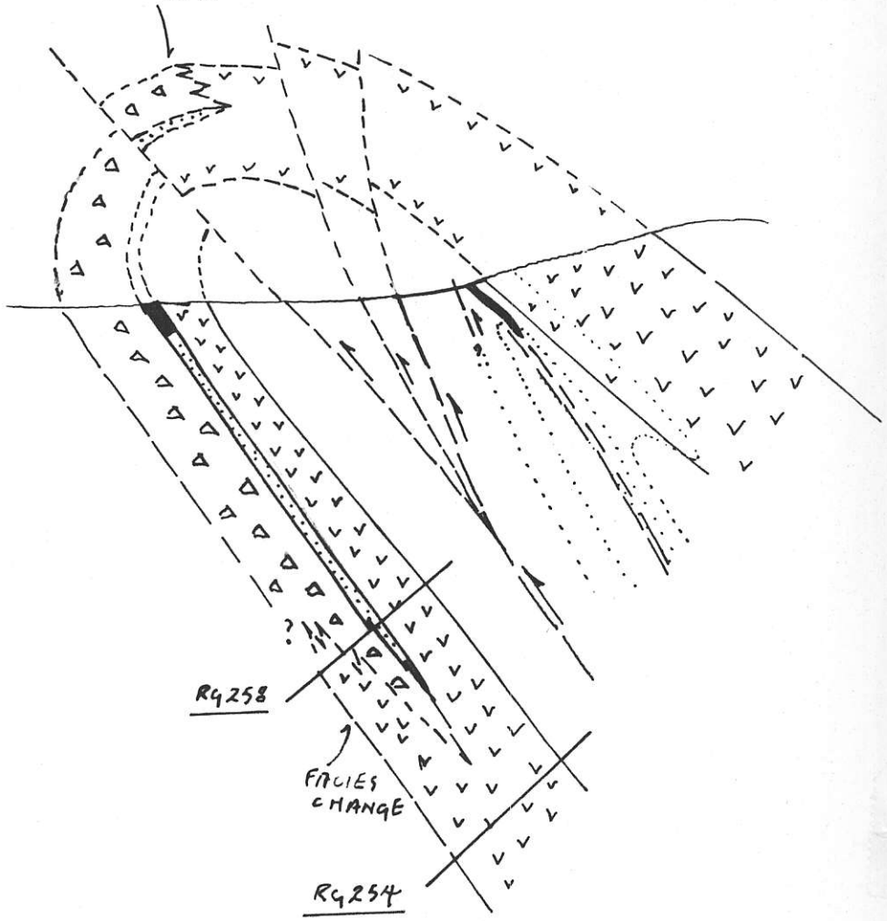
SW

NE

FACIES CHANGE

PRESENT

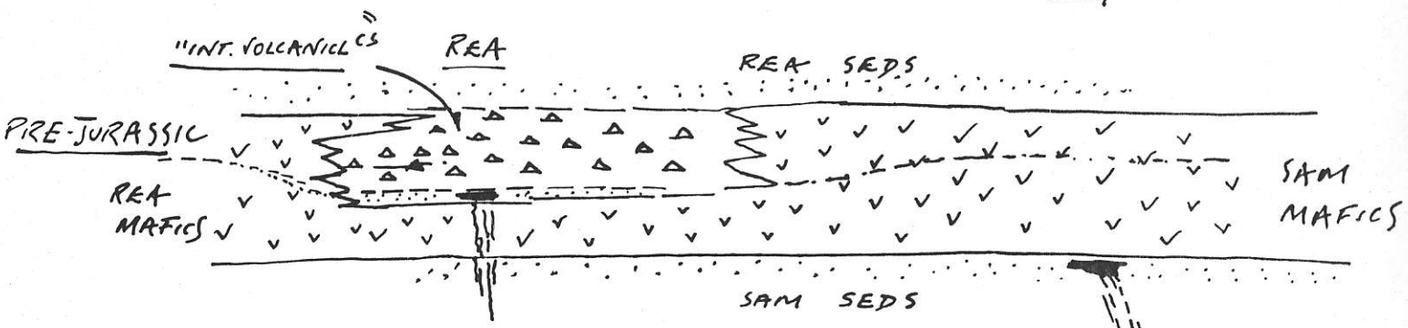
DISTANCE BETWEEN THE TWO DEPOSITS — 500m.

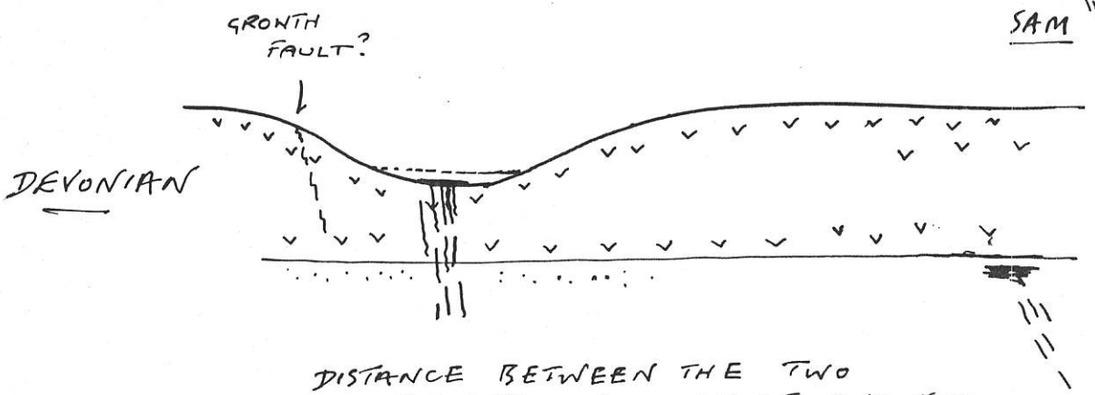


METALLOGENIC ZONING

GOLD/ARSENIC BELT

SILVER BELT





DISTANCE BETWEEN THE TWO DEPOSITS MINIMUM OF ONE KM.